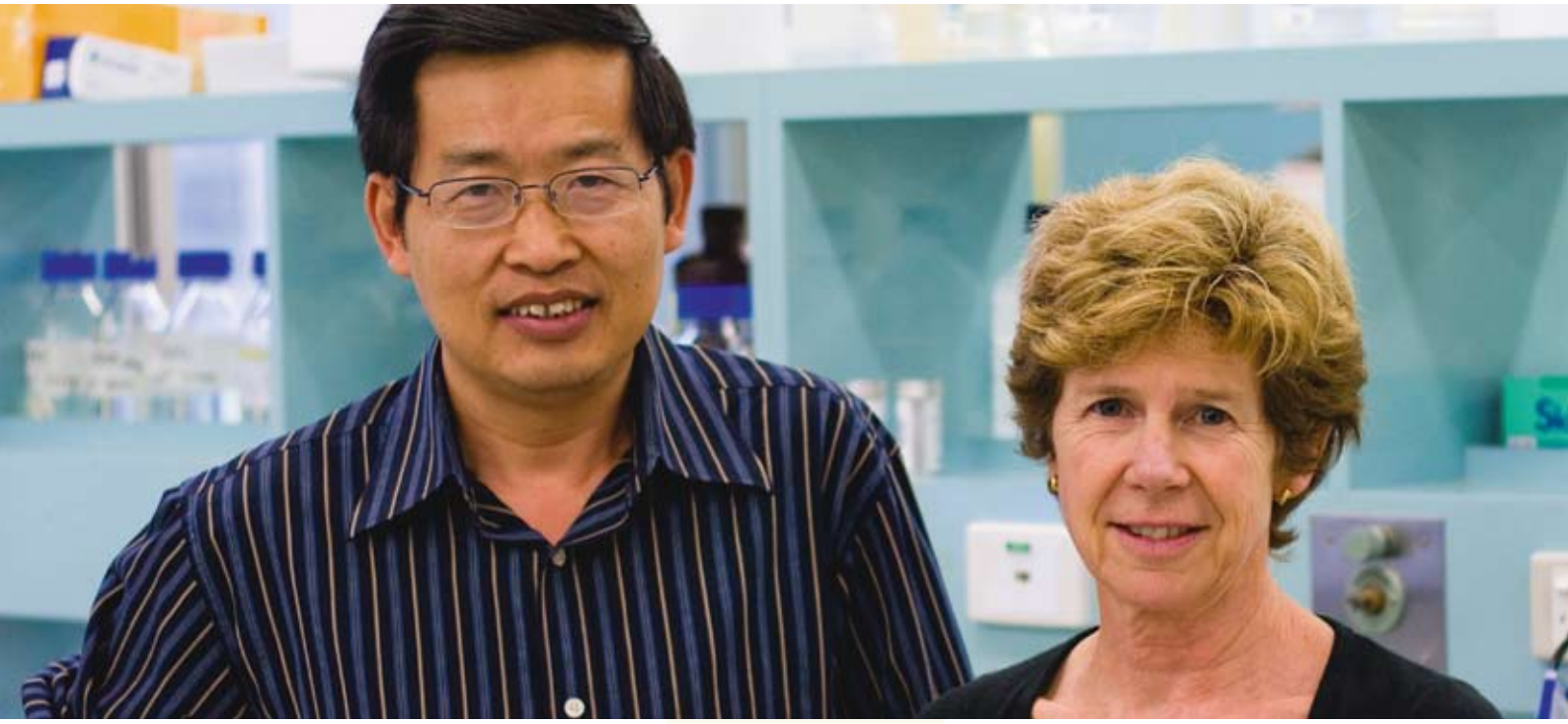
FEBRUARY 2008

LUMINESCENT

Newsletter of the Centenary Institute of Cancer Medicine and Cell Biology



Professors Pu Xia and Jenny Gamble lead research programs in two of the Centenary Institute's newest laboratories, Signal Transduction and Vascular Biology respectively.

Welcome

Welcome to the February 2008 edition of LuminesCent. In this edition enjoy reading about our brilliant scientists whose work continues to make news headlines. In addition, you may read about why a special microscope attracted media interest on page five.

Centenary Institute scientist, Dr Bernadette Saunders talks about her fascinating research into the global killer disease TB in our Researcher Profile article on page four.

There wasn't a seat left in the house for our most recent Centenary Institute Colloquium about RNA based research which you may read more about on page three.

This edition reflects an active start to 2008 and we look forward to continuing to share the results of our scientists' important research with you throughout the year.

Jane Moloney, Editor

In the News

Centenary researchers making the headlines

Men's Health in the spotlight

Associate Professor Chris Semsarian's life-saving research into sudden cardiac death – a genetic form of heart disease – was the subject of a substantial article in Australia's foremost business, financial and political newspaper, the Australian Financial Review (1st November 2007).

The death of mobile phone entrepreneur John Ilhan last October 2007 of a suspected heart attack highlighted the terrible reality that sometimes apparently healthy people can die suddenly. In the article, Assoc. Prof. Semsarian encouraged Australia's business executives to visit a cardiologist if they have a relative under 50 years of age who has suffered a sudden death. He explains, "I think young business men and women in Australia are very aware of the need to maintain a healthy work life balance to protect themselves against heart disease, but the tragedy of sudden cardiac death is that it is genetic factors as opposed to your physical fitness which determines if you are susceptible to the disease."

Continued on page two...

In this Issue

CENTENARY INSTITUTE

In the News continued

Sudden cardiac death occurs when a defective gene disrupts the electrical system of the heart and causes a cardiac arrest without warning in young people. Thanks to Assoc. Prof. Semsarian's research, it is possible for families with loved ones who have died from sudden cardiac death to have the rest of the family checked to identify if they also have the same defective genes.

If defective genes are identified, a defibrillator can be implanted. The Centenary Institute is home to the only centre in Australia which offers this type of genetic evaluation of families with sudden death.

The multiphoton microscope is unveiled

The arrival of a special microscope at the Centenary Institute caught the attention of television reporters and journalists in November. The microscope will primarily be used by the Centenary Institute's new Immune Imaging laboratory to view immune responses to cancer and infectious diseases in real-time in living tissue. Professor Wolfgang Weninger, head of the new laboratory and Professor Mathew Vadas, the Centenary Institute's Executive Director explained the significance of the microscope to TV news crews from Channels Ten and Nine (20 November 2007) comparing it in importance to 'the hubble telescope'. Read more about this cutting edge piece of equipment and Prof. Weninger's research on page five. It also possible to watch the news bulletins on the Centenary Institute's website, **http://www.centenary.org.au/p/news/articles/multiphoton/**

The Sydney Morning Herald's medical reporter, Belinda Kontominas also visited the Institute and interviewed Prof. Weninger about the microscope (26 November 2007). Prof. Weninger explained that by using an innovative imaging approach and the new microscope, his team now has access to "a completely new world" of the body's internal workings.

A number of online media outlets including Science Daily, What's New in LAB Technology and Australian Life Scientist also wrote about the microscope.

Channel Nine's health reporter, Jessica Rich prepares her report about the multiphoton microscope.

Centenary Welcomes

In November 2007, we were pleased to welcome two new members to the Centenary Institute's Board of Governors, Mr Geoff Dixon and Dr Teresa Anderson.

Mr Dixon is the Chief Executive Officer and Managing Director of Qantas. He brings tremendous corporate experience and marketing skills to the Board.

Dr Teresa Anderson is the Director of Clinical Operations, Sydney South West Area Health Services (SSWAHS). Previous to her current appointment she was the General Manager of Liverpool Hospital. Dr Anderson has a PhD from Macquarie University and brings a wealth of experience in management and healthcare delivery to the Board. We look forward to working with Mr Dixon and Dr Anderson over the coming years.

Research Update

Small molecules making big waves

The smallest RNA molecules called microRNAs were the subject of a major one day Colloquium organised by the Centenary Institute on Wednesday, 30 January. The Nobel Prize for Physiology or Medicine was awarded to Andrew Fire and Craig Mello in 2006 for their discovery that double-stranded RNA molecules play an active part in regulating gene activity, and can effectively silence or regulate a gene. Since this discovery the scientific community has become very excited about the potential of non coding RNA in particular microRNAs to treat diseases.

In line with our commitment to conduct world class medical research the Centenary Institute invited experts from around the world to share their thoughts on the potential of microRNA's with Centenary scientists.

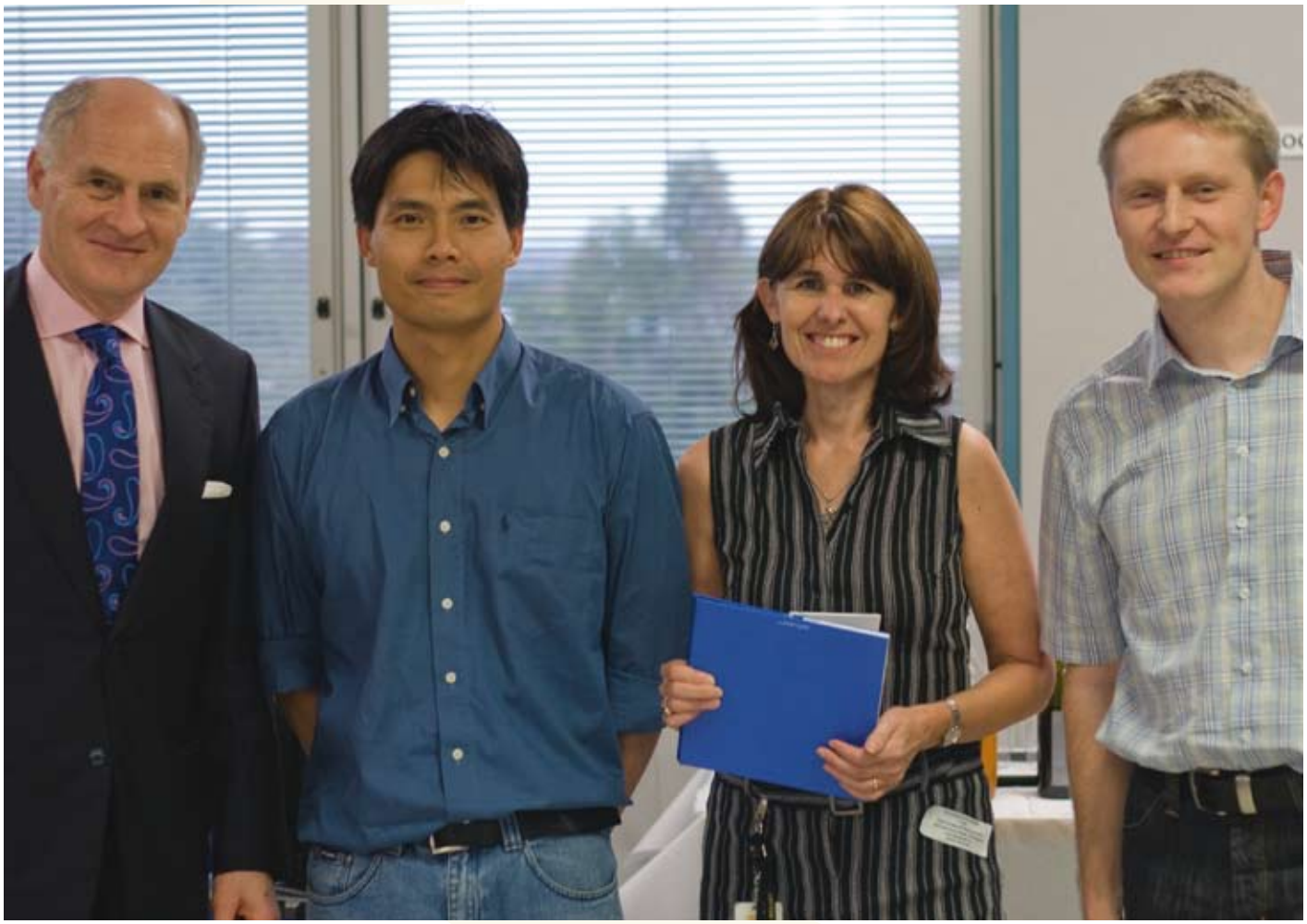
The Centenary Institute is steadily increasing its microRNA based research profile and is conducting research across a number of areas including breast cancer, angiogenesis in relation to solid cancer tumours and leukaemia.

Professor Mathew Vadas explained, "MicroRNAs are tiny molecules that play an important role in the production of protein in our bodies.

Since Fire and Mello's discovery, the scientific community has learned that microRNAs act like a handbrake in a car when it comes to gene activity meaning we can turn them on and turn them off.

When it comes to diseases like cancer for example, the hope is that we can figure out which microRNAs we need to 'switch on' or 'switch off' to stop cancer metastasizing. I believe the potential of microRNA based research is significant, it's an exciting time to work in this area and tackle devastating diseases, in particular cancer, by adopting a new way of thinking."

We were honoured to have renowned scientists such as Dr Gunter Meister from the prestigious Max Planck Institute of Biochemistry in Germany, Dr Bharat Chowrira, Vice President of Sirna Therapeutics and Executive Director, Merck and Co. Inc., USA and a host of Australian experts join us for this learning opportunity.



Centenary Institute Colloquium organisers Prof. Mathew Vadas, Executive Director, Dr Nham Tran and Dr Eileen McGowan pictured with speaker Dr Gunter Meister, Max Planck Institute of Biochemistry, Germany

Researcher Profile

For Dr Bernadette Saunders the pursuit of a career in science was a natural step stemming from a passion for solving puzzles as a child. With a career in science now spanning over ten years, Dr Saunders enjoys solving far more complex puzzles than those of her childhood by dedicating her time to medical research into one of the world's oldest diseases, Tuberculosis (TB).

Dr Saunders received her Ph.D. from the University of Melbourne in 1995 before joining a large TB research group working at Colorado State University in Fort Collins at the foothills of the beautiful Rocky Mountains. In 1999, Dr Saunders returned to Australia to work in the Centenary Institute's Mycobacterial Research Group with Professor Warwick Britton.

Dr Saunders now leads the "Host Response to Infection" group which focuses on immunity to TB both at a cellular and genetic level.

Describe your research….

Our group is conducting research aimed at understanding the elements of the immune system required to develop and maintain resistance to TB infection.

We know that genetic factors play a role in an individual's susceptibility to TB infection. A second focus of the group aims to identify genes which increase a person's risk of developing clinical TB. It is estimated that two billion people in the world are infected with latent TB of whom 5-10% will develop clinical disease. By examining small mutations in genes, we hope to establish why some people are more susceptible than others to latent TB becoming active at a particular point in their lives.

The Mycobacterial Research Group is also trying to develop a better TB vaccine. The current vaccine does not provide sufficient life long protection against TB, particularly in the developing world where most cases of TB occur.

What impact will your research have on public health?

In terms of human suffering, the global impact of TB particularly in the developing world is staggering. Nine million new cases of TB develop every year causing over 1.6 million deaths.

Our team hopes that our research will help to unravel the TB puzzle and increase our understanding of basic immune and inflammatory responses, which impact on not only TB, but other inflammatory diseases such as rheumatoid arthritis and asthma. Specifically, we would like to develop new diagnostic and therapeutic options and ultimately a new vaccine.

What has been the highlight of your career?

With collaborators at Nepean Hospital (Penrith, NSW) we were the first research group to demonstrate that a small mutation, called a single nucleotide polymorphism, in the gene encoding the P2X7 receptor is associated with increased susceptibility to extrapulmonary tuberculosis. The P2X7 receptor is expressed on a number of white blood cells and activation of this receptor can aid in the killing of TB.

We were also the first group to show that the membrane-bound form of Tumour Necrosis Factor (TNF) alone could control acute tuberculosis infection. TNF is a chemical messenger produced by immune cells which helps to contain TB infection and prevent its spread. Our work in this area is ongoing and is helping to define the conditions that control TB inflammation.

What do you love most about the research you do in the Centenary Institute?

I love being part of a community that is seeking to advance knowledge. In that sense, it's a very rewarding career driven by the prospect of making new discoveries which will have a beneficial effect on society. I enjoy research into TB; it has an intriguing scientific etiology as well as a fascinating social history. With evidence of the disease found in Egyptian mummies and references to it in great novels and countless operas, TB has played an important role in the history of our civilisation and continues to do so to this day.

World Class Technology and Talent Battle Cancer at the Centenary Institute

Access to the best equipment and facilities is vital to achieving excellence in medical research. Without proper equipment, our scientists cannot push the boundaries of science and make important discoveries to benefit the health of us all. The arrival of the multiphoton microscope last November is one such piece of equipment that is causing a stir at the Centenary Institute.

Representing the cutting edge in medical technology and microscopy, the unique imaging features of the *multiphoton microscope* will enable scientists at the Institute unprecedented access to the secret workings of living tissues at the cellular and molecular level.

Austrian Professor Wolfgang Weninger, Head of the Institute's new Immune Imaging laboratory is one of only a handful of people in the world who specialises in using the multiphoton microscope in the immunology field to view immune responses in real-time in living tissue.

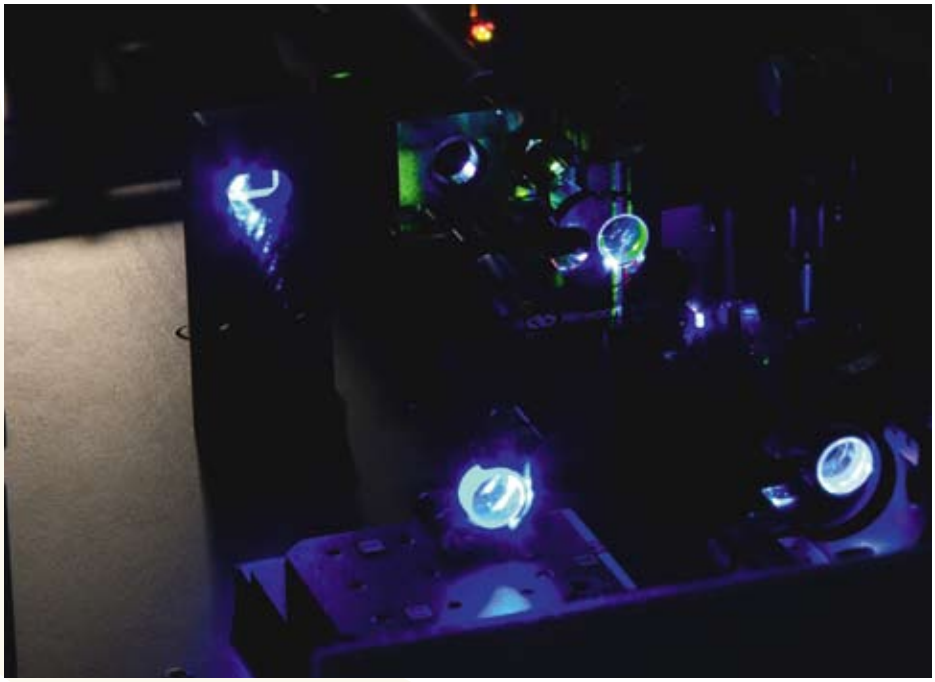
Prof. Weninger will lead a team of researchers to study the dynamics of the immune system's response to cancer and infectious diseases.

"Cancer is still a leading cause of death in Australia. There is a need to develop improved anti-cancer therapies based on the use of the body's own resources - namely our immune system. This type of microscope is an outstanding tool to study how our bodies fight cancer both in early and advanced stages. If we can learn more about how our immune system attacks cancer cells directly in the context of intact tissues, we hope to develop improved immuno-therapies," Prof. Weninger said.

The multiphoton microscope will also support the research of other Centenary scientists particularly in auto-immune and liver diseases.

The microscope has two unique features, its imaging mode and laser. The unique imaging mode uses multiple laser beams and means fast moving objects and dynamic processes in living tissue can be viewed, for example, cells in the blood stream. The laser has been enhanced with a unit called an OPO that produces longer wavelengths of light than those used in other microscopes enabling researchers to potentially look deeper into living tissue than ever before.

Professor Wolfgang Weninger looks down the powerful multiphoton microscope which has a unique laser (pictured) that produces longer wavelengths of light than those used in other microscopes.



Sponsor a seat of knowledge, support a cure!

We are offering you the opportunity to make a lasting impression in the field of medical research through the purchase of your own personalised seat of knowledge in the Centenary Institute's lecture theatre. The lecture theatre is where our researchers teach, learn and share their breakthroughs in medical research.

The Centenary Institute is entering a major phase of growth over the next five years to build on our current outstanding work in the areas of cancer treatment and prevention, liver and heart diseases, TB and immune diseases. To achieve this, our efforts to raise capital are ongoing and the first phase of a global recruitment program to attract the finest scientific minds to the Centenary Institute is underway. We want you to know that your involvement and support is critical on this long and challenging road.

A Gift for Posterity

With your donation of $1,000 (or more), Centenary Institute will:

- Inscribe a plaque with either your name or the name of someone you would like to honour;
- Affix your plaque to a seat of knowledge in our lecture theatre;
- Send you an official certificate of recognition.

The number of available seats is limited, so if you are interested in this special opportunity, please phone 1800 677 977 or email Sally Castle at **s.castle@centenary.org.au.**

Centenary Institute's Founding Director in Portrait

The Centenary Institute was honoured to receive a portrait of its founding Director, Professor Tony Basten recently. The portrait, commissioned by the Australasian Society of Clinical Immunology and Allergy and donated by the artist Dr Gillian Dunlop to Prof. Basten is on display in the Institute's boardroom. Dr Gillian Dunlop who is also a Sydney Ear, Nose and Throat (ENT) surgeon combines her love of ENT surgery with art to successfully specialise in portrait painting. Prof. Basten led the Centenary Institute and its research capacity for over 15 years before retiring from the position in 2005.

Stop Press!

Work of Centenary Scientist named in Top 10 Breakthroughs of the Year

Science is generally accepted as the world's highest impact peer-reviewed scientific journal. Every December, the journal announces ten scientific 'Breakthroughs of the Year' and we are delighted to announce that research which Prof. Weninger collaborated on with colleagues while at the Wistar Institute was cited in this year's top ten.

Highlighting the significance of this accolade, Professor Mathew Vadas said, "The decision by *Science* to cite Professor Weninger's research as one of the 'Breakthroughs of the Year' is a truly prestigious honour that most scientists only ever dream about."

Prof. Weninger's research provided dynamic new evidence of how the body's immune system reacts and interacts in the face of invasion by pathogens. The paper, *"Asymmetric T lymphocyte division in the initiation of adaptive immune responses"* was published in *Science* in March 2007. The same paper is listed among the ten all-time highest-ranked papers in biomedicine by the Faculty of 1,000 Biology. This is a Faculty of over 2,300 leading researchers who highlight and review the most interesting papers published in the world in the biological sciences.

Awards and Achievements

Congratulations to Barbara Fazekas de St Groth who was awarded a Professorship from the University of Sydney in September 2007. Professor Fazekas heads up the T Cell Biology laboratory at the Institute, and conducts research into the role of T cells in our immune system, as well as the environmental and immunological factors responsible for our susceptibility to autoimmune diseases including type 1 diabetes, MS and rheumatoid arthritis, inflammatory diseases such as ulcerative colitis and Crohn's disease, and allergic diseases such as asthma, eczema and hay fever.

Dr Mikaela Rapp, one of the Centenary Institute's newest scientists, was named in the distinguished journal *Science* for her win in a global essay writing competition. Dr Rapp from Sweden recently joined the new Structural Biology laboratory headed by Dr Mika Jormakka. Dr Rapp took the European prize in GE Healthcare's Essay Competition for her essay, "The Ins and Outs of Membrane Proteins".

The GE & Science Prize for Young Life Scientists recognizes outstanding Ph.D. graduate students from around the world and rewards their research in the field of molecular biology. Dr Rapp's essay may be read in the online edition (7 December 2007) of the journal, **http://www.sciencemag.org/feature/data/prizes/ge/2007/2007.dtl**

The Centenary Institute welcomed the conferring of the highly prestigious Prince Mahidol Award in Medicine to the Chairman of its Scientific Advisory Board, Professor Axel Ullrich on January 30, 2007. The award was granted by Thailand's King Bhumibol Adulyadej for Prof. Ullrich's outstanding and exemplary contribution to the advancement of medicine throughout the world. Prof. Ullrich, Director of Molecular Biology at the Max Planck Institute for Biochemistry in Germany chairs the Centenary Institute's Scientific Advisory Board which is comprised of world leading scientists who offer their expertise to the Centenary Institute.

Commenting on the Award, Professor Mathew Vadas said, "Prof. Ullrich's exceptional achievements in research, particularly into the molecular biology of breast cancer are worthy of this prestigious Award and we are honoured to have the opportunity to work in partnership with him through our Scientific Advisory Board.

Prof. Ullrich played a leading role in the study of molecular mechanisms of cancer and pioneered the concept of "targeted cancer therapy". His research led to the development of the drug, "Herceptin" the first target-directed, gene-discovery based breast cancer therapy.

Message from the Director

Building value continues

Dear supporters of the Centenary Institute, I am pleased to report that we had a very active and successful year in 2007.

There is now a renewed confidence in the Centenary Institute as a leader and uniter of medical research efforts on the campus.

We increased our staff from 103 to 134 in 2007. Our research income was $5.6 million in 2007 and will increase to $8 million in 2008. We are also continuing our successful recruitment drive for internationally outstanding scientists. In particular, we look forward to appointing two Professors to lead research programs in Cancer Biology and Endothelium laboratories located in the Centenary Institute. Both positions will be appointed in partnership with the University of Sydney and in the case of Cancer Biology, also with the Sydney Cancer Centre (SCC).

2007 was not without its challenges including the postponement of our major annual fundraising event, 'Race for a Cure' Day due to the Equine Influenza outbreak. However, we were overwhelmed and gratefully thank our generous Race Day sponsors and supporters who insisted we keep their contributions to the Day in spite of its postponement.

Significantly our partnership with the Sydney Cancer Centre to build a facility devoted to cancer research is gaining even more momentum. A joint application to the Australian Cancer Research Foundation for capital funds resulted in a major grant of $5 million being awarded towards the building of the facility.

I would like to welcome our new supporters to the Centenary Institute and am hoping to meet with you over the next year. The potential of scientific research to cure some of the world's most debilitating diseases is limitless and we look forward to sharing our successes with you in the coming years.

More than ever we need your support as we continue to engage in a major phase of growth. Whilst continuing on the above programs, in 2008 we will persist in bringing the medical benefits of our scientists' discoveries closer to fruition. In 2008 I'll continue to communicate the results of our work with you, our supporters, and the importance of scientific research to the wider public in Australia.

Thank you for your continued support, and I wish you a happy and healthy year.

Professor Mathew Vadas

Thank You for Backing Race Day 2007!

The Centenary Institute's 2007 'Race for a Cure Day' was a casualty of the equine influenza outbreak which brought horse racing in NSW to a standstill for the second half of 2007. We were overwhelmed by the generosity of many of our corporate sponsors and guests and their insistence that we keep their Race Day contributions for the Institute's medical research. We would like to warmly thank Inghams, Lifestyle Financial Services, Regional Radioworks, Aussie, MMB and the Wine Society for their generosity and unwavering support.

We would also like to thank our longstanding partner the Wine Society for enabling us to host a silent auction at their Young Winemaker of the Year Awards dinner in the Westin Hotel on Saturday 3 November. They gave us the opportunity to raise much needed funds by auctioning goods and services donated for the Race Day Auction. Our thanks go to the wonderful companies that donated the prizes.

Lastly, a reminder that all bets are on for a great day of racing and fundraising with you in 2008!

Centenary Institute of Cancer Medicine and Cell Biology

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