THE SECRETS IN OUR BONES

SVI scientists delve inside the bone cavity

Electron scanning micrograph of a blood vessel (centre) in the bone marrow cavity resting on solid bone (foreground)
MICHAEL'S MEDAL

Professor Michael Parker has been recognised by the Australian community of biochemists and molecular biologists with the award of the 2011 Lemberg Medal.

The Medal is the most senior award from the Australian Society for Biochemistry and Molecular Biology (ASBMB) for an Australian molecular biologist.

The award acknowledges Michael for his extensive contributions to both Australian and international research.

Michael joins a list of distinguished awardees, including the Institute’s Jack Martin (1990) and Bruce Kemp (1996).

“Michael Parker is undoubtedly one of Australia’s most distinguished achievers in structural biology,” says Tom Kay. “He is a natural choice for this medal through his outstanding contribution to medical research and as a leader in his discipline whose original research has had a major impact in structural biology applied to human health.”

The work in Michael’s laboratory has resulted in the determination of more than 100 crystal structures, which have had implications for a broad range of diseases, including Alzheimer’s, cancer and infectious disease.

The medal, which was officially announced in March, will be presented to Michael at the annual ASBMB meeting conference in Cairns in September, where he will present the Lemberg Lecture.

FAT & BONE LINK

Fat and bone have more in common than it would seem at first glance. In fact, they are born from the same cell. This stem cell churns out either fat or bone, depending on the signal it receives.

However, there is a fine balance: when more bone cells are made, there is a reduction in the number of fat cells, and vice versa. In osteoporosis, in which bone weakness is caused by a reduced number of bone-producing cells, there is an increased number of fat cells in the bone marrow.

Researchers in the Bone Cell Biology and Disease Unit are trying to identify the genes and signaling pathways that drive the stem cell towards the production of bone or fat. This would open the door to the development of new therapies for diseases such as osteoporosis.

Julie Quach recently completed her PhD in the Unit and has published a paper in the Journal of Biological Chemistry based on her PhD findings. In the paper, Julie and her colleagues identify a protein called Zinc Finger Protein 467 as one of the factors controlling the decision of the stem cell to produce either fat or bone. The group showed that by forcing expression of the protein in the leg bones of mice, they can double the number of fat cells present in the bone marrow.

The head of the Unit, Natalie Sims says, “Julie’s very careful work has identified a new way that bone and fat cell formation can be manipulated for better bone health. Until now, no-one knew that this protein played any role in the skeleton.”

2 Minutes with Emma

My first job was... to keep a record of the type of cars that passed through a particular intersection in Adelaide over an 8 hour period for the local council.

My worst job was... the above, it was so boring! It was a very quiet intersection and I had neglected to bring a book or music with me to fill in the time.

I got into research because... I enjoyed the creative side of being able to investigate new things, and knowing the benefit it may bring to others.

The hardest thing I have ever done was... finishing my PhD. My lab closed down at the end of my first year, my project didn’t really work for two years, and I did many all-nighters and worked nearly every weekend to get to the end result.

My scientific role model is... any scientist who has worked hard to become recognised as the best in their field, who can communicate and share their findings with enthusiasm to any audience, and who can appreciate that other things are also important in life.

Emma Baker, postdoctoral researcher in the Stem Cell Regulation Unit, joined SVI in 2009 after completing her first postdoc at Baker IDI.

My childhood ambition was... to work with animals, either as a vet, or in a zoo, or an animal rescue centre.
Australians and it’s clear that they value the work we do. Improved prevention and treatment needs additional, not reduced, investment that will ultimately benefit you and me and our families. Let’s not wait until we are sick to recognize the benefits of innovative medical care. While the push for a flat NHMRC budget may be understandable in the current economic climate – a decline in real or absolute terms is not in our national interest.

At SVI and the other leading Australian medical research institutes like The Walter and Eliza Hall Institute in Melbourne and The Garvan Institute in Sydney, the salaries of virtually all researchers from Professor to new graduate are paid by the NHMRC. Some of our finest minds are working up to 65 hours a week trying to find the next medical breakthrough and are being paid a relative pittance for doing it. Worse, there is little or no job security. Researchers bid for their salaries through highly competitive grants and fellowships that must be renewed at least every 5 years and often every 3 years. There are no institutional funds for salaries and no tenure. It is not just grants for chemicals or equipment or very junior staff that are paid by the NHMRC – it is the livelihoods of Australia’s best and brightest medical researchers.

A reduction in NHMRC funding is virtually unprecedented. Even without such a reduction, all researchers experience career setbacks and funding difficulties due to the low success rate for grants, which is falling even without budget cuts. It is hard to explain to a highly qualified researcher with an international reputation and a young family that the chance of their grant application being successful is about one in five. (It was actually 23% in 2010). Further declines in success rates will make the outlook seem hopeless and we’d risk losing researchers trying to forge a career of importance to the community. Years of career development will be wasted and it will take many more years to make up for it.

As if all that wasn’t challenging enough, hospitals and universities have retreated from funding research salaries. Who knows how many medical breakthroughs have been lost along the way. We should be empowering our researchers, not limiting them.

HAVE YOUR SAY

While more recent reports suggest that the government values medical research and recognizes the importance of funding through NHMRC, it is important that the government is kept aware of how important this issue is to the community at large. Please consider the following actions:

- Write to newspapers and/or call talkback radio.
- Contact the politicians who influence federal budget decisions.
- Contact your local federal member.

Visit www.discoveriesneeddollars.org for more information.
The group treated mice with clinically relevant doses of Epo and showed the expected increase in red blood cells. To the surprise of the researchers, the mice also experienced a loss of bone mass and effects on some types of immune cells. When they blocked the bone loss with drugs used to treat osteoporosis, they found that this also blunted the blood cell response.

When asked about the repercussions of their studies, Carl says, “Earlier studies by us and others have shown the importance of the bone marrow microenvironment in the development of blood cells, and this work further cements those findings. Importantly, these results may have relevance for patients with anemia treated with Epo, since many anemic patients are known to have higher rates of osteoporosis and fractures.”

Heart disease is Australia’s number one killer. In fact, it kills four times as many women as breast cancer does, but many women are not aware of their risk. Problems with blood supply to the heart muscle are signaled by chest pain. When women are investigated for chest pain, they are less likely than men to have narrowing of the large blood vessels of the heart. Yet, despite being less likely to have diagnosed coronary artery disease, women with chest pain are more likely to die from the condition.

Associate Professor Jock Campbell, Head of SVI’s Molecular Cardiology Unit, has recently published a paper explaining why this is the case. In collaboration with the cardiac surgeons at St. Vincent’s Hospital, and with the consent of patients, Jock has obtained small pieces of heart muscle from patients having heart operations.

When Jock compared the small blood vessels in heart muscle from men and women under the microscope he found, surprisingly, that the walls of the small blood vessels were thicker in women than in men.

Jock says, “We know from other studies that blood vessels with thicker walls are more likely to constrict and limit blood flow. The small blood vessels with thicker walls in the heart muscle of women may reduce the supply of oxygen and nutrients to the heart muscle. This may result in chest pain and heart attacks, even though the woman’s coronary arteries appear to be free of disease.”

Jock hopes that this greater understanding of how the small blood vessels in heart muscle affect disease vulnerability will allow us to reduce the rate of death from heart disease in both men and women.

These advances also show the importance of partnership between researchers and the community. In this case, this takes the form of the contribution made by the many patients who agreed to the surgeon taking a small piece of their heart muscle for Jock to study.

So when it came to choosing a location for her postdoctoral work, Sofie gravitated towards SVI’s Stem Cell Regulation Unit, headed by Drs Carl Walkley and Louise Purton. The research in the Unit focuses on the relationship between blood cell development and the “scene of the crime”, the bone marrow, where the blood cells develop.

Together, Sofie and Carl recently published a paper in the prestigious journal Blood, explaining the side effects of elevated levels of a hormone called Epo, shorthand for erythropoietin. Epo is widely used clinically to increase red blood cell counts in people with anaemia.

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9 Princes St, Fitzroy, VIC 3065 Tel: 03 9288 2480 Fax: 03 9416 2676
Email: enquiries@svi.edu.au Web: www.svi.edu.au
Getting involved

There are many ways you can support medical research at SVI.

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Please return to:
St Vincent’s Institute of Medical Research, 9 Princes St, Fitzroy, VIC 3065

2011 DIARY

MONDAY MAY 23
SVI Annual Forum – ‘Cancer Prevention’
With speakers including Mr Todd Harper, CEO Cancer Council Victoria, Mr Simon McKeon, Australian of the Year and Associate Professor Jörg Heierhorst, cancer researcher, SVI.
5pm in the Michael Chamberlin Lecture Theatre, St Vincent’s Hospital
To register contact:
Kathryn O’Connell koconnell@svi.edu.au
03 9288 2746

SATURDAY JUNE 4
Collingwood vs St Kilda Night Game Dinner

In support of Childhood Diabetes Research at SVI.
Join SVI supporters for dinner and to watch the game in reserved seating.
5pm at the MCG
Ticket price: $365 pp (incl GST)
For enquiries contact: Clare Lacey clacey@svi.edu.au
03 9288 2480

THURSDAY JULY 21
Lunch with The Hon Tony Abbott MP, Leader of the Opposition
Myer Mural Hall, 6th Floor Bourke St Store.
Ticket price: $330 pp (incl GST)
For booking contact: Beth Castles bcastles@svi.edu.au
03 9288 2480

Madeleine Whiting joined SVI in January this year, taking over from Robin Berry as the Director of Development.

Madeleine has 12 years’ experience in the healthcare sector with exposure to fundraising both as a volunteer and through senior managerial appointments.

Most recently, Madeleine worked as the Philanthropic Relations Director at Monash University and was previously the Australasian Manager of a global organization raising funds for sustainable eye care projects in developing countries.