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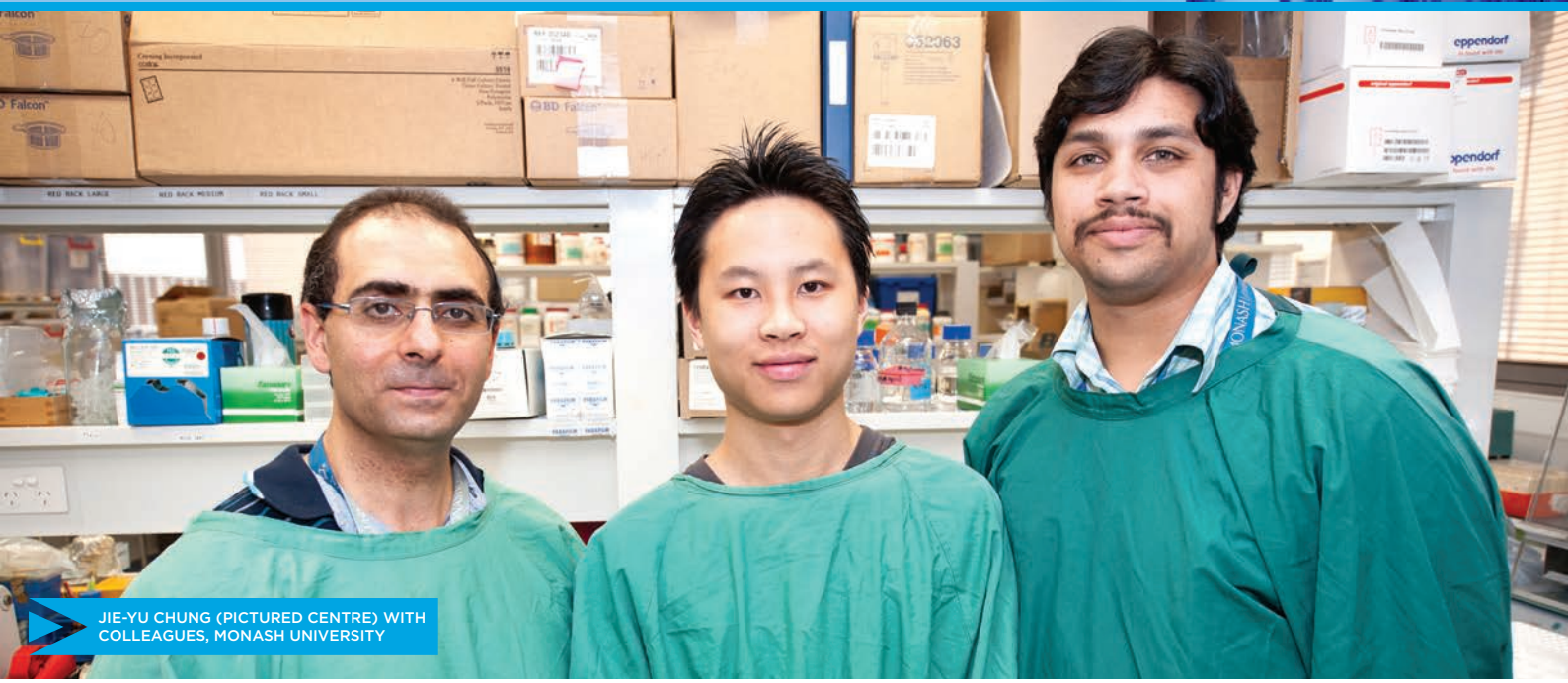


JIE-YU CHUNG (PICTURED CENTRE) WITH COLLEAGUES, MONASH UNIVERSITY

Hijacking the immune system to treat MS

Just one year into his MSRA scholarship Jie-yu Chung from Monash University in Melbourne, has already made excellent progress in his research. Working with A/Prof Frank Alderuccio, Jie-yu is investigating the possibility of using gene therapy to reprogram the immune system in MS.

While it is unclear what triggers MS, it is clear that an immune response against myelin, the insulating layer around nerve fibres, is causing damage. This is thought to be due to a failure of training of immune cells at the start of their development, so the cells see myelin as foreign rather than a part of the self.

The first stage of Jie-yu's work saw him successfully develop and test a new procedure to introduce genes into stem cells which will develop into the cells of the immune system. By introducing genes that encode 'self' proteins that are found in myelin, it is hoped the cells will develop to recognise these 'self' proteins correctly, preventing the attack on myelin.

Jie-yu transplanted modified bone marrow stem cells into mice with MS-like disease. The introduced genes were activated in B and T cells of the immune system and this successfully prevented the usual immune attack on myelin.

The newly reprogrammed cells were able to protect the mice against developing MS-like disease, with Jie-yu's experiments showing there was a 50% reduction in the number of mice that developed disease. This excellent work has shown that the immune system can be exploited to prevent the development of cells that mediate damage to myelin in MS.

However, since a range of immune cells were reprogrammed in this first stage, it is unclear which specific immune cell subtype is responsible for the attack in MS. The next stage of this project will address this question. Jie-yu will now use his gene delivery technique to introduce the genes into the stem cells so that they become activated in specific sub-types of immune cells. This will enable him to determine which immune cell subtypes need to be reprogrammed to most effectively protect against MS. This new work will shed light on which cells are the key culprits in the attack on myelin and lead to new ways to prevent myelin damage.

'This project is providing us with proof that the immune system can be manipulated to prevent the development of cells that mediate damage to myelin which will prove useful in the fight against MS', commented Jie-yu. ■

DR KAYLENE YOUNG (PICTURED FIRST ROW, FAR RIGHT) AND HER GROUP, MENZIES RESEARCH INSTITUTE TASMANIA

Finding the key to myelin repair

New myelin producing cells are added to our brains daily. Could this be the key to myelin repair in MS?

Dr Kaylene Young, who received an MSRA project grant in 2012, supported by F5m+ and the Trish MS Research Foundation, leads a team of highly talented young researchers who are investigating the biology of oligodendrocytes, the myelin forming cells in the brain. Dr Young also received the highly prestigious R.D. Wright Biomedical Career Development Fellowship from the NHMRC in their 2013 funding round, a great example of the multiplier effect produced by foundation funding from MSRA.

Based at the Menzies Research Institute Tasmania and the University of Melbourne, Dr Young and her colleagues recently discovered that a specialised type of cell in the brain, known as oligodendrocyte progenitor cells, make new oligodendrocytes throughout life – not just during development.

If these cells could be targeted to make more oligodendrocytes, this could provide a novel therapeutic approach to enhance myelin repair in MS.

So far, the team has found that myelin that is laid down during adulthood is very similar to the myelin that is generated as part of lesion repair during MS. This myelin is different to the myelin created during development. This indicates that what was previously considered 'abnormal' insulation in repaired MS lesions is actually a feature of the insulation made by oligodendrocytes generated during normal adulthood.

Dr Young's findings suggest that myelin created for lesion repair is actually adult-generated myelin and independent of the disease environment. In the normal adult central nervous system, these myelin segments are being added all the time, but they are widely distributed. Ongoing work will investigate adult myelin production during MS using laboratory models. If adult myelin production can be increased and distribution controlled, it might provide a new avenue to repair the lesions in MS. ■

Researcher's work flags stem cell potential

Prof Bruce Brew's research looks at ways of improving the ability of stem cells to repair damage in the MS brain.

Following the inflammatory attacks that damage myelin in MS, there is a limited amount of myelin repair that can restore function.

Over time, and following repeated attacks, the capacity for myelin regeneration is reduced and scarring can further inhibit repair. This is what leads to an accumulation of permanent disabilities in people with MS.

PROF BRUCE BREW, ST. VINCENT'S CENTRE FOR APPLIED MEDICAL RESEARCH

There are currently no treatments that are able to induce myelin repair in MS. The failure of normal repair mechanisms also represents a barrier to the potential use of transplanted stem cells for treatment of MS. For his research, Prof Bruce Brew of the St. Vincent's Centre for Applied Medical Research in NSW, was awarded a three year MSRA project grant in 2012, supported by F5m+. He is looking at ways to enhance the natural repair mechanisms in the brain and optimise the potential of transplanted stem cells.

Prof Brew's focus is on the biological pathway, known as the kynurenine pathway that metabolises, or breaks down, an amino acid – tryptophan. Tryptophan is involved in many repair mechanisms in the body, including remyelination.

'We are making excellent progress in investigating this pathway in the stem cells of the brain to see whether it can be manipulated to enhance myelin repair. We have examined the components of the pathway in neural stem cells, which can give rise to both neurons and support cells of the brain – including the myelin producing oligodendrocytes,' Prof Brew said.

One finding was that all components of the pathway were present in neural stem cells and that blocking that pathway with specific inhibitor drugs can increase the growth and development of neural stem cells. This suggests these inhibitors have potential to improve neural stem cell proliferation in people with MS, and improve outcomes for therapies that involve stem cell transplantation.

Prof Brew is also interested in the effects of interferon-beta therapy on neural stem cells and oligodendrocyte precursor cells. In cells grown in the laboratory, he has shown that interferon-beta therapy can affect the growth and development of the precursor cells.

This promising work is a great step forward towards effective stem cell therapy for people with MS. ■

Brains at work in tissue research

Tissue samples collected as part of the MSRA Brain Bank has been put to valuable use to investigate repair processes in MS.

Dr Linda Ly of the University of Sydney has made great progress in her research using this important facility established just five years ago.

One area of her attention is that damaged myelin can be repaired in the early relapsing stages of MS. However, in progressive MS this remyelination process fails. This is also the stage where people begin accumulating disability and new therapeutic strategies are desperately needed.

Dr Ly's research which is supported by the Trish MS Research Foundation, focuses on proteins and their relationship to lesions in the brain and spinal cord of people with MS. By comparing different stages of lesions, for example lesions which have undergone repair versus those where repair processes have failed, she hopes to identify a molecular signature for remyelination in MS.

She has characterised 53 separate regions of tissue and identified 199 proteins which were found in different amounts across the lesion stages. Twenty-five of these proteins are likely to have functions within the remyelination process and these proteins are now the subject of a range of follow-up analyses to further define their role in MS tissue.

Understanding the remyelination process better will provide a framework for the discovery of novel drugs that promote regeneration in MS.

Information about the MSRA Brain Bank can be found at **www.msbrainbank.org.au** ■

MS RESEARCH AUSTRALIA BRAIN BANK

DR LINDA LY, UNIVERSITY OF SYDNEY

We see red ... everywhere!

Did the colour red seem a little more prominent these past few weeks? If your world took on a rose-tinted hue then hopefully Kiss Goodbye to MS was part of the reason!

Throughout May, the challenge to wear, dare and share all things red was taken up by many around the country. Our goal was simple – to increase the community's understanding of MS and to encourage people to fundraise towards a solution.

From bold and beautiful lipstick to crazy red hair, many extreme and fun dares were shared – showing there's more than one wild way to get a serious topic on everyone's lips. Hundreds of parties and people doing the most amazing things, all aimed at raising funds for MS research and services for those living with the disease.

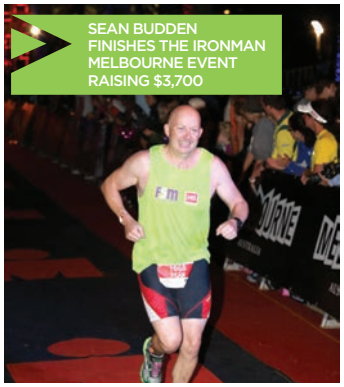
A big red Kiss logo was seen on a vintage red Alfa Romeo racing in Phillip Island and maybe you saw a woman riding a red kiss-covered lawnmower from Melbourne to Sydney (M to S)! The awareness, along with the love, was spread all around the country – from outback to beaches and morning teas to sausage sizzles – for this popular and important campaign.

There were even prominent sites in Brisbane, Melbourne, Adelaide, Hobart and Canberra which changed their lighting and shone a rosey red tone over their neighbourhoods.

The goal that everybody wear, dare and share struck a chord. This fun and empowering campaign enables people with MS, their friends and families to engage in weird and wonderful fundraising activities to make their own personal contribution to a world free from MS.

Thank you to everyone who supported Kiss Goodbye to MS. Next May will be redder than ever and we hope you will continue to join in the fun! ■

Race towards a Cure


SEAN BUDDEN FINISHES THE IRONMAN MELBOURNE EVENT RAISING $3,700

Heading into the cooler months is the best time for those fit enough to think about joining our race ... that is the race towards a cure. It is time to put on the running shoes and participate in one of the upcoming events that involve running (at least part of the way!).

There are multiple events being held in cities all over Australia so everyone has an opportunity to participate.

Most importantly, remember when you register in any event that you make sure you select to fundraise for F5m+ and MSRA. Last year F5m+ raised over $100K in the running season alone and this year we aim to beat that with plenty more people showing interest.

Running events coming up:

- Run Gold Coast: 6-7 July
- Run Melbourne: 21 July
- City to Surf: 11 August
- Bridge to Brisbane: 1 September
- Adelaide City to Bay: 15 September
- Sydney Running Festival: 22 September
- Melbourne Marathon Festival: 13 October

Party for a purpose

As a special member of the F5m+ family we would like to wish a Happy Birthday to Jackie Ballard, sister of Ian Ballard.

She decided there was no better way to celebrate a milestone event than holding a jazz night at which she will sing. Go Jackie! Even though your party is in the UK we'll hear the applause from here and wish you a fantastic night.

Cheers to BackVintage Wines

BackVintage Wines is donating a percentage to F5m+ from every case of wine sold if you mention F5m+ when ordering.

For nearly six years BackVintage Wines have been a strong supporter of F5m+, here's cheers BackVintage. To place your order visit **www.backvintage.com.au**

Event Partners

Warringah Council

Our Sponsors

Vodafone Foundation

Over $26,000 Raised

PADDLE TO BATTLE MS

Farewell Jeremy Wright – and thank you

MS Research Australia is preparing for a major change with the retirement of Jeremy Wright, its founding Chief Executive and tireless leader.

Current and former staff, scientists around the country, people with MS, suppliers and volunteers – many feel a hint of sadness while also expressing thanks for his dedication and enthusiasm.

To have lifted the profile of MS research is one thing; but to have overseen an additional $25m in public funds raised since MSRA's 2004 start-up to aggressively accelerate the research effort is worthy of great praise. The result has been a mini-revolution in Australian MS research, with a new level of national collaboration and major 'platform' projects, that are underway and gaining world attention.

'Under Jeremy's leadership, MSRA has enjoyed significant growth, in fact a tenfold increase in the annual research budget,' said MSRA Chairman, Paul Murnane.

'He has also built a team that fast established a reputation in the wider research community for their commitment to growing this nation's basic and applied MS research. They also demonstrated an ability to be inclusive with the science community, donors and corporations to attract their support.'

'Along with this work, Jeremy has built lasting friendships with people with MS, their families and friends, often engaging with them in community fundraising efforts as part of Foundation 5 Million Plus (F5m+). We owe him a debt of gratitude for putting MS research in a strong position – providing renewed hope that there is a solution for this often terrible disease,' Murnane said.

On his departure, Jeremy will take up several non-executive roles as part of a well-earned career change, while keeping a lasting connection with the MS community as part of the MS Saints and F5m+. We wish Jeremy well for his future. ■

MSRA Partners

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