MS WIRE
SEPTEMBER 2023

PIONEERING AI PROMISES REVOLUTIONARY ADVANCEMENTS IN MULTIPLE SCLEROSIS TREATMENT

New research exploring cutting-edge Artificial Intelligence (AI) technology to better analyse MRI scans of people with multiple sclerosis (MS) could unlock crucial insights into disease progression and pave the way for improved treatment of people living with the condition.

The research, led by Dr Heidi Beadnall from the University of Sydney, was announced as one of four recipients of MS Australia's latest round of new innovative Incubator Grants, totalling $92,565, which support ground-breaking projects exploring new frontiers of MS research.

Dr Beadnall's team will explore, with the use of AI technology, whether brain lesion number, lesion volumes and brain volumes can be efficiently calculated from routine magnetic resonance imaging (MRI) scans using automated imaging analysis.

In MS, MRI plays a pivotal role in visualising the brain and spinal cord, aiding in diagnosis, prognosis, and monitoring disease activity and treatment response.

AI-driven analysis can eliminate the time-consuming manual process and enable the extraction of significantly more information from MRI scans.

"In the clinic, people with MS (as well as their families, friends and carers) often ask questions like 'How many MS lesions do I have?', and 'Do I have brain atrophy (shrinkage)?"

"Currently these questions cannot be answered accurately, due to clinicians not having rapid access to quantitative MRI data in the real-world clinical setting. This project addresses this unmet need by making this data available to clinicians," says Dr Beadnall.

With a strong emphasis on fresh ideas for advancing MS research, this year's Incubator Grants will fund the initial stages of new research and be led by four researchers from three leading Australian Universities.

CONTINUED ON PAGE 3

MS AUSTRALIA
RESEARCH
ADVOCACY
CURE

FROM THE CEO

ROHAN GREENLAND

Hard to believe, but we are just a few weeks away from the opening of MSA's Progress in MS Research Conference to be held in Perth from November 29 to December 1.

This year, the conference is going to be extra special for a number of reasons.

First, we have a really big, globally significant announcement to make in partnership with our very good colleagues at MS Western Australia. But you'll have to wait for the conference to hear more about that.

Second, this year we are seeing our conference expand, running for three days rather than two. This follows feedback from past conferences that the agenda is just too packed for two days, a reflection on the breadth and depth of MS research underway in Australia.

Third, we are embracing the consumer voice, encouraging more people with MS to participate while showcasing some of the excellent research work underway that embraces the lived experience in research, from concept to conclusion.

And fourth, we have a really stellar range of speakers from across the world attending, speakers you won't want to miss.

As Australia's pre-eminent MS research conference, we have a well-earned reputation on the international stage, providing an invaluable opportunity for clinicians, allied health professionals, researchers and the MS community to come together to access global innovation and insights, and to network.

And to ensure all who wish to attend are able to do so, delegates have the option of attending the full conference, the one-day community session or an online highlights package.

The keynote themes of the 2023 conference include:

- Health Behaviour and Modifiable Lifestyle Choices in MS
- Lab to Clinic for Myelin Repair
- Lived Experience & Community Involvement in Research
- Neuroimmunology

This year's conference boasts a number of high-profile and accomplished international keynote speakers, including;

- Prof Jeremy Chataway, University College London, UK (Lab to Clinic for Myelin Repair)
- Professor Wee Yong, University of Calgary, Canada (Neuroimmunology)
- Prof Robert Motl, University of Illinois, USA (Health Behaviour and Modifiable Lifestyle Choices in MS)

I encourage your involvement at the Progress in MS Research Conference at Pan Pacific Perth, Western Australia.

The draft conference program is now available to view. The program shows the timings across all days and includes information on sessions, topics and speakers.

You can learn more and register here.
www.msaustralia.org.au/register

Hope to see you there!

Rohan Greenland
CEO, MS Australia

PIONEERING AI PROMISES REVOLUTIONARY ADVANCEMENTS IN MULTIPLE SCLEROSIS TREATMENT

CONTINUED FROM PAGE 1

Of the other funded projects, two will target repairing myelin, the protective sheath around nerves damaged in MS, with the potential to halt and reverse MS-caused disability — the Holy Grail of MS research. The fourth project aims to improve the diagnosis and management of MS by monitoring MS flare-ups using brain tracers that target specific proteins.

MS Australia Head of Research, Dr Julia Morahan says this novel research, made possible through MS Australia's Incubator Grants, demonstrates MS Australia's commitment to innovative research in its mission to create a world free of MS.

"We are facing accelerating numbers of MS in Australia, so we are more determined than ever to explore every possible avenue to find solutions. These grants exemplify that commitment," Dr Morahan said.

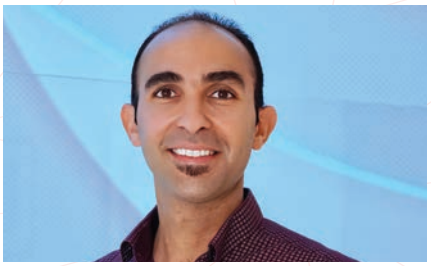
"These grants are not only an investment in research but also the researchers themselves. Each of these projects and the dedicated teams behind them showcase Australia's position at the forefront of MS research."

MS Australia President, Associate Professor Desmond Graham, congratulated the successful researchers, saying the standard of applications was exceptional and reflected the high calibre of science underway in Australia.

"Research serves as our beacon of hope. I eagerly await the research outcomes as they have the potential to bring us closer to our goal of revealing cures for MS," Associate Professor Graham said.

"These grants are only possible thanks to the generosity of our state and territory Member Organisations and a generous Australian community who are passionate and dedicated to making a difference for people living with MS."

Dr Heidi Beadnall and her team from The University of Sydney, are dedicated to improving diagnostic tools for MS, using the latest advances in imaging technology and AI – to assist neurologists in determining the effectiveness of treatments and enable early intervention if necessary. The team will also determine which factors can contribute to management and treatment decisions, with findings from this study providing valuable information for tailored care for people living with MS.



Dr Mohammad Haskali and his team from The University of Melbourne, will be developing new methods to monitor flare-ups in MS. Using brain tracers for specific proteins on brain cells, the researchers hope to accurately visualise and monitor inflammation occurring in real time, in order to improve the diagnosis, monitoring, and management of MS. Their overall aim is to facilitate better treatment strategies for people with MS.

One of the studies investigating the activity of myelin-producing cells in MS will be undertaken by **Ms Natalie King and her team from the Menzies Institute for Medical Research at the University of Tasmania**. The research will help to uncover the mechanisms that hinder myelin repair in MS and understand which factors can guide cells towards generating new myelin. With this knowledge, the researchers hope to find ways to promote brain repair in people with MS, leading to new therapeutic options for MS.

Associate Professor Simon Murray and his team at The University of Melbourne, will gain knowledge into how myelin is formed and maintained throughout life. This work from Associate Professor Murray and his team could contribute to the development of new targeted therapies that could promote myelin repair. In addition, these new therapies may have a positive effect on learning, memory, and overall brain health as people age.

EXPLORING THE DIET - MS CONNECTION:

New Study Sheds Light on How Food Choices Influence Multiple Sclerosis Progression

Exploring How Diet Can Influence MS Progression.

Recent research conducted by Dr Alice Saul and her team at the Menzies Institute for Medical Research, the University of Tasmania, supported in part by MS Australia and The Penn Foundation, suggests that the food we eat may play a role in how MS progresses.

Data from the AusLong study, conducted over a 10-year period, was collected to understand the relationship between a pro-inflammatory diet and the progression of MS.

The findings, published in the *Multiple Sclerosis Journal*, shed light on the impact of diet on relapse rates and inflammatory activity in individuals with MS.

What Did the Study Find?

Data was analysed from 223 individuals who had been diagnosed with MS-related demyelination of the central nervous system.

The researchers assessed their diets using a tool called the Dietary Inflammatory Index (DII®). They discovered some important associations between diet and MS progression.

Participants who had a more pro-inflammatory diet, as indicated by higher DII® scores, had a higher risk of experiencing relapses. Specifically, those who scored highest on the DII® had more than twice the risk of relapse compared to those with the lowest scores.

The team also found that individuals with higher DII® scores had larger periventricular fluid-attenuated inversion recovery (FLAIR) lesions on their brain scans.

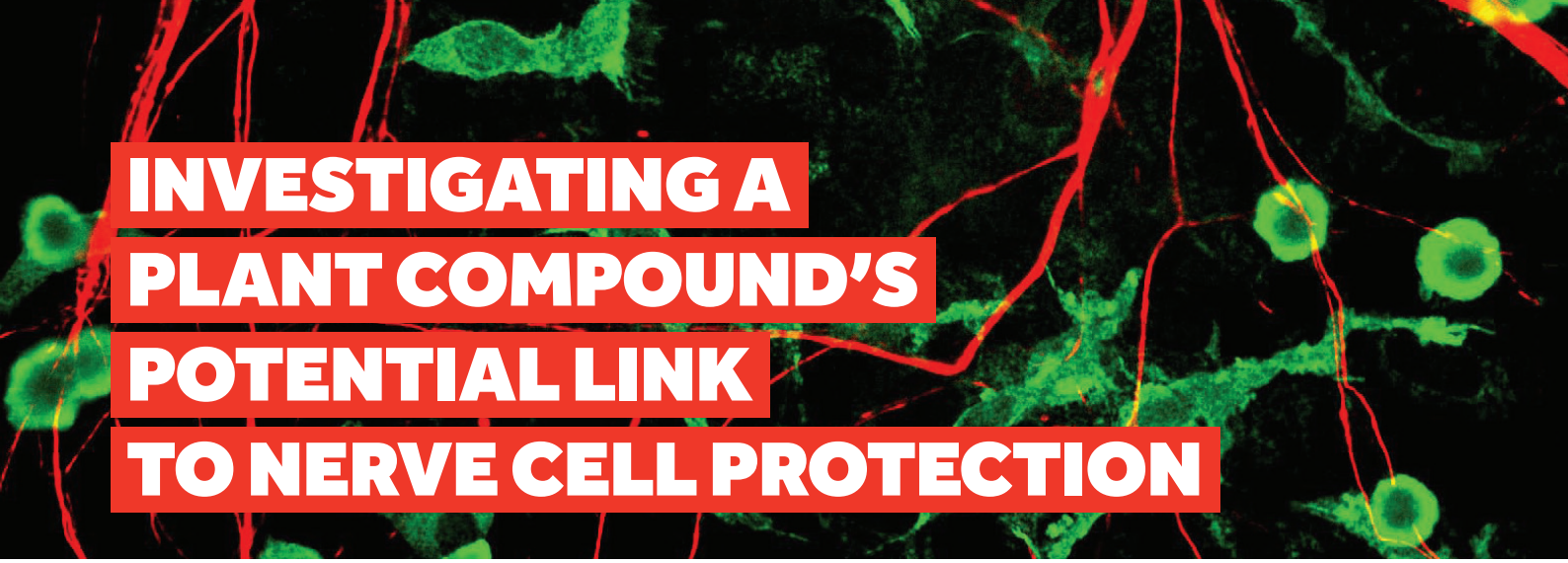
What Does This Mean for People with MS?

These findings highlight the significance of diet for individuals living with MS. It suggests that the foods we eat can influence the frequency of relapses and the progression of disability in MS.

While more research is needed to fully understand how diet affects MS, these findings provide valuable insights. They suggest that adopting an anti-inflammatory diet, rich in components found in fruits and vegetables, may help reduce the risk of relapses and slow the progression of disability.

Making healthier food choices can be a complementary approach to traditional medical treatments for MS. By focusing on an anti-inflammatory diet, individuals with MS can have a positive impact on their overall health and wellbeing.

It is important to remember that diet alone cannot cure MS, but it can play a role in managing the disease and improving long-term outcomes.



INVESTIGATING A PLANT COMPOUND'S POTENTIAL LINK TO NERVE CELL PROTECTION

In the world of nature's chemistry, there are amino acids that go beyond the ones used for building proteins.

These special amino acids, known as non-protein amino acids (npAAs), are derived from plants and serve various protective functions, like defending against insects and competing plants.

One such npAA, azetidine-2-carboxylic acid (Aze), is found in beets and used for sugar production and livestock feed.

Recent research conducted by an interdisciplinary team at the University of Technology Sydney (UTS) suggests that Aze, due to its similarity to the amino acid proline, can be mistakenly incorporated into proteins during their formation.

This substitution could lead to changes in important proteins involved in creating myelin, the protective coating around nerve cells.

These altered proteins might trigger an immune response that mistakenly attacks and damages myelin, which is a key hallmark of MS.

What Did the Researchers Do?

MS Australia-funded researcher Associate Professor Alessandro Castorina and his team conducted experiments using specific microglial cells, which are immune cells in the brain associated with inflammation in MS.

They examined the effects of Aze on these cells by studying the levels of genes related to cellular stress and inflammation. The cells were treated with Aze alone or with a combination of Aze and L-proline, a natural amino acid similar to Aze.

What Did the Researchers Find?

The study revealed that Aze reduced cell viability and activated genes associated with cellular stress in microglial cells. Additionally, Aze altered the levels of specific markers related to an inflammatory state in these cells.

Moreover, the researchers discovered a significant increase in Aze-bound proteins after Aze treatment, confirming that Aze becomes a part of cellular structures.

However, when L-proline was given alongside Aze, it mitigated the negative effects. L-proline supplementation protected the cells from Aze-induced cell death, normalised levels of genes related to cellular stress, and reduced the amount of Aze incorporated into proteins.

What Does This Mean for People with MS?

These findings provide insights into a potential mechanism by which Aze, a non-protein amino acid found in certain plant-based foods, might contribute to the development or progression of MS.

When Aze is mistakenly incorporated into myelin proteins, it can lead to structural changes that trigger an immune response against the myelin coating.

Understanding how Aze affects myelin damage opens up possibilities for targeted treatments for MS.

The protective effects of L-proline supplementation suggest that it could be used as an intervention to counteract the harmful effects of Aze on microglial cells, potentially reducing the inflammatory response associated with MS.

SUPPORTING A BRIGHTER FUTURE FOR PEOPLE WITH MS

The National Disability Insurance Scheme (NDIS) stands as a remarkable initiative that has delivered life-changing benefits to many Australians living with disabilities.

Nevertheless, the Scheme is not without fault and too often a source of stress and anxiety for participants, underscoring the pressing need for its improvement.

Following the announcement of the NDIS Review last year, we launched our advocacy campaign, 'A Better NDIS for People Living With MS,' calling for six essential reforms to ensure all people with MS are treated with dignity and fairness when engaging with the NDIS.

The campaign not only captured the attention of politicians and decision-makers within the NDIS but also secured prominent coverage from the national media. Above all, it received tremendous support from the MS community.

As the NDIS Review nears its conclusion, we rallied Australians to sign a Letter of Support, backing the NDIS Review Panel co-chairs to make the right decision to implement the reforms called for by the MS community.

The response to this call to action was incredibly heartening. More than 2,100 passionate people joined together to advocate for a better NDIS for people with MS by adding their names to the letter.

We are delighted to share that on 14 August, we successfully submitted the Letter of Support to the NDIS Review. However, our journey is far from over.

We eagerly await the NDIS Review co-chairs' recommendations and the subsequent response from the Government. These outcomes will shape our next steps towards ensuring positive change.

In the meantime, we want to express our sincere gratitude to our state and territory MS Member Organisations and the members of the Neurological Alliance Australia for endorsing and amplifying the impact of this campaign.

Furthermore, we extend our heartfelt thanks to everyone who participated in the campaign for their enthusiasm and commitment to creating a better future for people living with MS. Your support truly makes a difference.

ENGINEERING A WAY TO HELP PEOPLE WITH MS

Nigel Caswell wasn't sure about attending his first multiple sclerosis (MS) conference.

"I was afraid, wondering if I'd see what my future held," said Nigel, who was diagnosed with MS in 1993.

But the former civil engineer was glad he went because it changed his life.

More than two decades later, the 78-year-old Bentleigh resident received MS Australia's John Studdy Award for his service to others living with the neurological condition.

Nigel's volunteer work for the MS community began when he came across an ambassador's stall at the conference.

"They were recruiting people who were willing to go out into the community and talk about MS. I like public speaking, and I'm a blue sky kind of person. I felt I could help," he said.

Nigel has been an MS Plus ambassador and MS Australia advocate for 28 years, speaking to community groups, schools and other organisations. His advocacy work involves lobbying politicians.

He's also given time to other causes. In 2013, Nigel received a Medal of the Order of Australia (OAM) for his varied contributions.

"I'm not the sort to let the grass grow under my feet.

"Volunteering has helped me to live with MS and turn something that might seem like bad luck into an advantage.

"I'm sure I get more attention because some people don't expect someone in a wheelchair to have intelligent remarks to make."

When Nigel started having health issues, it took years to get an accurate diagnosis. He underwent several unpleasant tests and a complicated operation that didn't solve the mystery. Five years later, MRI technology provided the answer: progressive MS.

In some ways, the diagnosis was a relief. At least Nigel knew what he was dealing with and could access support and treatment.

After his diagnosis, Nigel was able to continue working as a senior executive at Parks Victoria for several years. He later became a marriage and funeral celebrant.

Now retired, Nigel enjoys caravan touring with Stevie, his wife. He also likes painting watercolours and spending time with his two sons and four granddaughters.

These days, he gets around in a walker at home and a wheelchair when he goes out. Despite this, he feels lucky.

Being an MS ambassador and donor are two ways Nigel has thanked MS Plus staff for their support.

Now he's adding something else: a gift in his Will.

"A bequest is a logical extension of my MS ambassador role. It will help keep my work going after I'm gone.

"It's important to help fund research that will lead to better treatments. The current drugs have unpleasant side effects. It would be great to have better ones available."

But a cure would be even better.

"It might not be there in time to help me, but if my gift can help others receive a cure, that's a good thing in my book," he said.

Could you be like Nigel and help others with MS?

It's easy to leave a gift in your Will. Even one per cent of what is left after taking care of family and friends. Ask Laura or Rebecca at MS Plus.

Call 1800 443 867,
email futureplanning@ms.org.au
or visit mymslegacy.org.au

MEET THE RESEARCHER

ASSOCIATE PROFESSOR LAURA PICCIO

THE UNIVERSITY OF SYDNEY, NSW

TELL US AN INTERESTING FACT ABOUT YOURSELF...

I have lived in three different continents. I am originally from Italy, where I completed my education and medical training. After my neurology residency I moved to the United States supported by a fellowship funded by the National MS Society. I was supposed to stay there for just a few years, but I ended up staying for almost 15 years. In 2019 I moved with my family to Australia where I now work at The University of Sydney. I feel fortunate to have had all these opportunities to see different places because of my passion for research. I now have three different homes around the world.

WHAT WAS THE MOST EXCITING DEVELOPMENT IN MS RESEARCH?

I have seen the field changing dramatically in the last 10-15 years. The number of medications now available for treating MS has increased significantly and the trajectory is still on the rise. In this landscape, from my point of view, a major breakthrough has been the introduction of infusions with monoclonal antibodies (e.g. Natalizumab and Ocrelizumab) which are very effective in controlling disease activity as well as the introduction of oral treatment.

TELL US ABOUT YOUR CURRENT RESEARCH PROJECT...

Our project will study the role of the receptor named TREM2 in remyelination. TREM2 is expressed by microglia, the cells that function as the "guardian" of the central nervous system. Microglia has a critical role in keeping everything under control and they get activated every time there is a disturbance in the tissue or damage. Their primary role is protective, but in certain circumstances their chronic activation could be detrimental and contribute to this damage. Our research has shown that TREM2 plays a key role in mediating microglia activation in response to an insult such as demyelination. Specifically, TREM2 seems to be implicated in the clearance of myelin debris, a critical step to allow remyelination. We have shown that by activating TREM2, it was possible to increase the clearance of myelin debris and enhance remyelination. The project funded by MS Australia is looking into how to better characterise the mechanism of action of TREM2 in these pathways.

WHY IS YOUR RESEARCH IMPORTANT AND HOW WILL IT INFLUENCE THE UNDERSTANDING AND TREATMENT OF MS?

Promoting remyelination is the main unmet need in MS. We hope that by activating TREM2 with specific drugs we can promote remyelination. Importantly, treatments targeting TREM2 are already in clinical trials for people with dementia. Therefore, positive results in preclinical models could then support a faster translation into the clinic since some drugs are already available.

HELP FAST TRACK A CURE FOR MS

To make an online donation scan the QR code

REGISTERED CHARITY acnc.gov.au/charityregister

DONATE *(donations over $2 are tax deductible)*

To support MS Australia's vital work I would like to:

- ☐ Make a one-off donation of $
- ☐ Make a monthly donation of $
- ☐ Learn more about leaving a gift in my Will
- ☐ I have already left a gift in my Will to MS Australia

CONTACT DETAILS

Title First name Surname

Address

Suburb State Postcode

Phone Mobile

Email

PAYMENT METHOD

- ☐ **Cheque** $ made payable to MS Plus Ltd
- ☐ **Direct Debit Request** $ *copy of service agreement can be provided on request*

Financial institution

BSB Acc. No.

Account holder's name

CREDIT CARD ☐ Mastercard ☐ Visa ☐ Amex

Credit card no.

Expiry date CVV

Name on card

Signature

Locked Bag 401, Lidcombe NSW 1825, Australia • 1300 733 690 • supporterengagementteam@ms.org.au • ABN 66 004 942 287