SEARCHER MAGAZINE

Summer 2022

Brainiac

2021 HMRI Award for Research Excellence Winner: Professor Michael Breakspear

Hello! Hello!
Meet the first NEW1000 babies

Big ideas a step closer
Innovation and creativity rewarded

The art of science
What do scientists and artists share?

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HMRI Hunter Medical Research Institute

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Don't miss any of our live or virtual events

In 2022 HMRI looks forward to once again hosting more in-person and continuing to deliver virtual seminars on a range of medical research topics.

Visit **hmri.org.au/events** for all our up-to-date event info and to register for our upcoming live or virtual events.

Coming up:

HMRI Foundation Charity Golf Day
Thursday 17 March
Crowne Plaza Hunter Valley

Regular Community Seminars
See our website or follow us on social media to see what's coming up

Stay connected!

You can catch-up on all of our previous seminars or tune in to new ones on our YouTube channel and via our website.

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Professor Mike Calford
Institute Director

Happy 2022! Last year was certainly interesting, and we've been through a lot as a community. While it's been a disruptive time, our researchers at HMRI have adapted and continued to deliver world-class research. HMRI has come through these trials remarkably well and is in many ways a more robust and healthier organisation now than we were pre-pandemic.

Our researchers have continued to excel in securing grants. HMRI Affiliated Researchers received over $60 million worth of grant funding from government and industry bodies in the past year.

In 2021 HMRI also embarked upon several ambitious projects, such as the New1000, which will follow the lives of 1,000 babies each year for the first 1,000 days of life. We saw the first babies from this study born, and the data collected over the next decade may help unlock the key to lifelong health.

HMRI's staff and researchers spent 2021 reviewing our purpose, priorities, and research programs. This project incorporated a series of activities to ensure we can build upon our current and historical success and has now been completed.

We agreed to an updated purpose: "To improve the health and wellbeing of our communities". Our purpose sits atop everything we do and is a reminder of our mission and foundation.

The next phase focused on updating our research priorities which will guide our programs in the future. In consultation with our research community, we've decided on Priority Populations, Healthy Life Course and Healthy Future.

Priority Populations encompasses research that improves the health and wellbeing of our vulnerable communities, Indigenous peoples, and regional and rural populations.

Healthy Life Course encompasses research that improves health and wellbeing across every stage of life.

Healthy Future encompasses research that responds to current and emerging challenges affecting the health and wellbeing of our communities through innovative approaches, technologies and translation.

With these new priorities as a guide, we updated our research programs. HMRI now has 19 separate research programs studying a wide range of fields and conditions – both familiar and new. I won't mention them all here, but I encourage you to head to the website to learn about their fantastic work and vision.

Thank you to everyone who has provided support to HMRI over the last year. We would not have achieved these things without you, that's why our new purpose clarifies that you are our number one priority.

Best wishes,

Professor Mike Calford

2021 HMRI Award for Excellence winner Professor Michael Breakspear

Mixing maths and medicine to see the future

Michael describes himself as a Sydney boy born and bred and spent most of his first 40 years in and around the area before moving to Brisbane then Newcastle. A curious student, he studied medicine, mathematics, and philosophy at university. After a stint in a country hospital as a junior doctor, he returned to Sydney and trained as a psychiatrist.

Michael is still a practising psychiatrist, and he has focused his clinical work on helping those with complex challenges. He currently works in the Awabakal Aboriginal Medical Service. While in Queensland, he worked in the Brisbane Women's Prison which he said gave him valuable perspective.

"The prison population is a complex and diverse mix of people, very different from common perceptions," he said. "Women in prison have extremely high trauma histories, often leading to addiction, then to prison."

"I think visiting a prison and talking with prisoners would be a valuable and eye-opening experience for many people, especially for those making or backing the laws which lead to higher rates of imprisonment."

Michael never lost his interest in mathematics and physics and continued his studies. His multidisciplinary training led him to where he is now combining maths and physics with psychiatry to unlock the secrets of the brain.

Michael's career in research is driven by his desire to understand and predict severe disorders of the brain such as bipolar disorder, schizophrenia, Alzheimer's, and dementia.

The brain is complex, and Michael's goal is to build a computer model of it that works like the computer models used to predict the weather.

"Modern weather predictions are made by feeding data, things like temperature, pressure and wind into a supercomputer which then combines these with a mathematical model to make predictions."

"We want to create a similar model to predict an individual's chances of developing or experiencing certain brain disorders, allowing earlier and more effective intervention."

Michael says it is unlikely we will ever get to the point a computer could 100 per cent say an individual will develop a specific disease. But again, like a weather report predicting a 60% chance of rain, we might say an individual has a 60% chance of developing bipolar disorder.

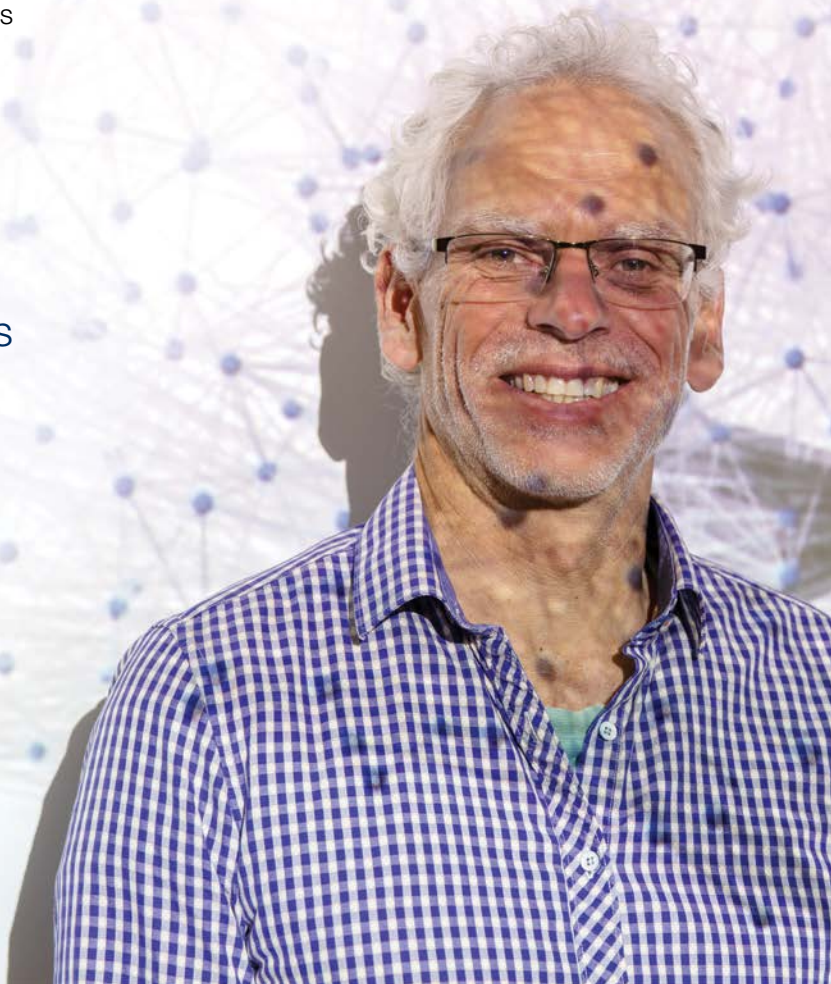
Currently, Michael is the lead investigator on several projects researching Alzheimer's disease and other dementias. Michael says that while treatment has come a long way in recent years, one big problem still exists.

"By the time that people begin to show symptoms of dementia and go to the doctor, it is often too late," Michael said.

He explains this is due to the brain being very good at adapting to damage.

"If the brain encounters a problem, it is excellent at adapting and using a different area to perform the same function. Unfortunately, this means you can have advanced disease and not notice symptoms. By the time your memory starts to fail, a lot of damage has been done, we might be able to slow further progression, but we can't undo the damage."

By using advanced scanning devices at HMRI and creating better disease models, Michael and his team's ultimate goal is early identification of people most at risk of developing dementia. That way, treatment can start before they develop symptoms and potentially improve, or even prevent future dementia.



Big ideas a step closer

HMRI and University of Newcastle researchers share $4.5m in National Health and Medical Research Council (NHMRC) Ideas grants

The NHMRC Ideas Grant scheme supports innovative and creative research, and the latest round was announced in November 2021. Many of these projects started with HMRI seed funding from generous donors, allowing them to progress to this stage.

Conjoint Associate Professor Chris Grainge received $909,800 to study how bronchiectasis develops and progresses in the lung. His team have identified a defect in the production of cells critical to moving mucus in the airways in samples taken from patients with bronchiectasis and will investigate the cause.

Professor Lee Smith received $733,000 to study adrenal-targeted nanobiotechnology therapy for adrenal disease. The adrenal gland produces hormones essential for life-long health. Currently, adrenal conditions require life-long drug replacement therapy, with no possibility of a cure. Professor Smith and his team aim to develop novel drug treatments and single-injection cures for adrenal disease.

Dr Jonathan Paul received $732,300 to study the targeted delivery of nucleic acid therapeutics for preventing preterm birth. Thousands of babies could be saved each year with a timely intervention for preterm birth. Dr Paul and his team first developed uterine-targeted nanocarriers for targeting interventions to the pregnant uterus. They now aim to block the premature uterine contractions that cause preterm birth.

Associate Professor Nikki Verrills received $597,800 to study a dual approach to activate a tumour suppressor for breast cancer therapy. Cancer is caused by the inactivation of proteins that inhibit cell growth and survival, called tumour suppressors. Associate Professor Verrills and her team have developed drugs that reactivate this process. The team will test how these drugs function in breast cancer to develop new therapies that could have wide-reaching applicability for many cancer patients.

Dr Kirsten Coupland received $497,200 to study new pathways to improve stroke outcome and the importance of managing intracranial pressure. Stroke is caused by a loss of blood supply that results in brain tissue death leading to disability. Delayed expansion of stroke injury can occur in the 24–48 hours after stroke. Dr Coupland and her team found an increase in cerebrospinal fluid pressure is likely to blame. Dr Coupland has evidence that a change in the composition of cerebrospinal fluid drives this increase in pressure, and she aims to design therapies to prevent it.

Winners announced for 2021 HMRI Research Awards

The HMRI Awards are a celebration of the outstanding efforts and achievements of individuals and teams who drive and support the opportunities that health and medical research bring to the wellbeing of our community.

The recipients of the 2021 HMRI Awards for Research Excellence are:

The HMRI Newcastle and Sydney Foundation Research Team Award –
The Daughters and Dads Active and Empowered team

Early Career Research Award –
Dr Nicole Nathan

The Mid-Career Research Award –
Professor Vanessa McDonald

The Research Excellence Award –
Professor Michael Breakspear

HMRI Director Professor Mike Calford said that while 2021 had been a challenging year, HMRI researchers had continued to excel.

"Our award winners' tonight are a fantastic example of how the research conducted at HMRI is focused on the needs of our community," Professor Calford said.

"The work of the DADAE team is empowering young women and improving their health, Dr Nathan is delivering evidence-based interventions to lower childhood obesity, Professor McDonald is developing a new paradigm in airway disorder treatment and Professor Breakspear's advanced neuroimaging research is unlocking the secrets of the brain to tackle terrible diseases like dementia."

"All of these researchers are addressing priority health areas for our community and are global research leaders."

This year's awards were streamed live from the HMRI building on Thursday 4 November to celebrate and honour medical research excellence. Congratulations to this year's winners and finalists.

Didn't get to watch the awards on the night? Scan this QR code:

Dr Nicole Nathan, Professor Vanessa McDonald and Professor Michael Breakspear Above: DADAE Team leader Professor Phil Morgan

HCRF Awards all for the kids

Despite a year of postponed or cancelled events, the 2021 Hunter Children's Research Foundation Awards still managed to announce $75,000 in children's medical research grants, thanks to their tireless efforts and their wonderful donors. Their support allows HMRI researchers to truly make a difference in the lives of seriously ill children. Congratulations to the winning researchers!

Associate Professor Koert de Waal is a Neonatal Clinician whose work with preterm babies has saved many children. The grant will support the *'POKES study': Practice Observations and Knock-on effect of Skin breaks in preterm infants*, addressing the survival of preterm babies from infection.

Dr Beth Mah is a clinical psychiatrist focused on perinatal psychiatry (infant mental health), primarily in Aboriginal mothers and babies. The grant supports her project *'Neurofeedback treatment to improve complex post-traumatic stress disorder symptoms in Aboriginal and Torres Strait Islander Children in Out of Home Care',* addressing transgenerational trauma by delivering and evaluating an evidence-based therapy to interrupt this damaging cycle.

Dr Carla Da Silva Sena focuses on lung function in children with a history of brochiolitis in infancy, and children born from asthmatic mothers. The grant funds *'Lung function and respiratory health at 6 weeks of age in a cohort of children born to non-asthmatic mothers'*, a project predicting children at risk of developing asthma in early life, and identifying ambient air pollutants associated with lung function development in children.

To watch the HCRF Awards and hear from past and present recipients providing updates on their work, scan the QR code:

Hello! Hello! Meet Michael and Ollie – the first babies born into the NEW1000

On 15 July 2021, weighing in at just 900gms and one kilogram, twin boys Michael and Ollie North became the first babies to be born into the **NEW1000** family study.

The study aims to recruit 1,000 babies and their families over 10 years to understand how the first 1,000 days of a child's life impacts their health and wellbeing into adulthood.

While waiting for her 12-week ultrasound at the hospital, Alannah was invited to participate in the study. She welcomed the opportunity with open arms.

"Ever since I was young, I've been extremely interested in health," she explains. "I come from an active, sporty family, so looking after yourself and your health has always been part of my way of life. It's this kind of research that goes towards really positive outcomes and can help people in the future."

At her 27-week scan, fetal growth restriction (FGR) was detected in the unborn twins. And just a week later, Michael and Ollie were born at 28 weeks gestation and placed in the John Hunter Hospital's Neonatal Intensive Care Unit.

Across the next three months, Alannah and Nathan visited the boys daily until finally, they were big enough and strong enough to be carefully swaddled and driven home.

Like many very premature babies, both Michael and Ollie were born with a hole in the heart and while Michael's closed using medication, Ollie's required surgery in Sydney.

"I thought being a paramedic who does a lot of shift work would have helped me with the lack of sleep," Alannah laughs. "But nothing could have prepared me for this. Being a mum is the hardest job I've ever had!"

NEW1000 researchers are studying the early origins of many health issues. One study relates to the microorganisms (collectively known as the microbiome) that live on and inside us and play a central role in health and disease.

Researchers will investigate the role of the microbiome in the developmental origins of health and disease. Samples are being collected from parents to see how their microbiome profiles influence their child's.

"Being part of the NEW1000 study has been effortless. I didn't need to make any changes in my day-to-day life to be a part of the research process," Alannah states. "It's not invasive, and there's been no issue for the boys."

"Years ago, my children may not have had stood a chance being born at just 28 weeks. The technology that has helped my kids be here today has come out of the trial and error of past research. If being a part of a study can benefit the community and make a difference to other lives down the track, why wouldn't you do something?"

To participate or learn more about the NEW1000 family study visit new1000.org.au


Nathan and Michael, Alannah and Ollie

The art of science

At first glance, art and science don't seem much alike. We think of art as being all expression and feeling while science is logic and control. But artists and scientists do have a lot in common: both tend to be passionate, driven and adept at harnessing the power of creative thinking to make an idea or hypothesis a reality.

Each year, HMRI bestows the Award for Research Excellence to a researcher who's made a world-class impact with their research and mentorship. A respected local artist is then commissioned to create an artwork representing the work of the award winner.

In 2020, the award went to Distinguished Laureate Professor Nick Talley AC, who was introduced to artist Brittany Ferns. Brittany spent ten years as a graphic and textile designer in Sydney and L.A. before returning to Newcastle where she now creates portraits and landscapes in her unique style.

"Meeting Professor Talley and learning more about his work was exciting, and I loved the subject matter challenge. It got me thinking in a different way," Brittany said.

"I went with a 'good vs bad' gut theme for the painting. I wanted to show how the gut affects the whole body."

The piece is called *Conversations* and depicts two figures facing each other in conversation, referencing Nick's evidence-based research on the continuous exchange of information between the gut wall, bacteria and the nerves. The colour palette directly references the digestive system with darker browns and yellows symbolic of an unhealthy gut, and the pinks tones a healthier gut. The lighter figure on the left is 'good', the darker represents the 'bad' gut. Closer inspection reveals a third figure behind – Professor Nick Talley himself!

Professor Talley said the painting was fabulous and thought the representation of the 'good' and 'bad' gut being intertwined and connected through images of people was excellent.

"The gut changes, you can move from one state to another. You can move from healthy to unhealthy and then come back again," Professor Talley said.

Distinguished Laureate Professor Nick Talley AC unveiled *Conversations* with artist Brittany Ferns

"I like the people theme. This is what it's all about. It's about people's health, it's about helping people and making their lives better."

The original artwork is usually auctioned at the annual HMRI Ball, but this year *Conversations* was auctioned online as part of the HMRI Foundation Art Exhibition at Earp Distillery Co. It was purchased by Donna and Kent Ireland, who kindly donated it to Professor Talley. Nick in turn has donated the artwork back to HMRI to be displayed and enjoyed by not just him, but his entire team, and all those who visit HMRI. We sincerely thank Donna and Kent for their generosity.

The HMRI Art Series was launched in 2005 and has continued year-on-year with the generous support of Chris and Shirley Piggott, Classic Framing and Memorabilia and local Hunter artists. Previous artworks hang on the walls of many of HMRI's gracious supporters as a reminder of the research discoveries they've helped achieve.

A brief selection of the HMRI Art Series, inspired by our award winning researchers

I can make things again **by Susan Ryman. Inspired by Professor Chris Levi, 2009 Researcher of the Year**

The Triumph of Age **by Donna Buck. Inspired by Professor Julie Byles, 2015 Researcher of the Year.**

A special place in her heart

When we first meet Pam Miller, her daughter Nicole is 34 weeks pregnant. But while many grandmothers can enjoy the countdown to the birth of a new grandchild, Pam is anxious.

"It's only after 34 weeks into a pregnancy that I can start to relax," Pam explains. "Until then, it's impossible because it's at the same stage as when we lost our baby boy."

Pam was 26 years of age when her one-day-old child passed away at the Royal Women's Hospital.

Pam and husband Richard

"The nurses thought he was healthy. He went into the overnight nursery, and I went to bed." The following day things took a tragic turn for the worst, and Pam's baby was taken to Emergency with collapsed lungs.

At 72 years of age, Pam's trauma is still raw. In 1974, families were not afforded the same emotional support that many now receive as a matter of course.

"There were no photos. He wasn't brought back up to me. He was cremated with no other record of him."

Life after loss

Pam suffered several miscarriages between 6 weeks and 25 weeks into her pregnancy before meeting with a specialist in Sydney. He carried out investigations and agreed with Pam's self-diagnosis of an 'incompetent cervix'. This condition occurs when weak cervical tissue causes or contributes to premature birth or pregnancy loss.

To help address the condition, the specialist put a stitch around the neck of Pam's cervix. And while the couple sadly lost their one-day-old boy at 34 weeks, they were then blessed with three beautiful children, Nicole, Michelle, and Ian.

Finding purpose through giving

As an experienced medical receptionist, research has always held a special place in Pam's heart. She began to donate to both HMRI and BorneHMRI after hearing Sarah and Dean Mumms' story, and has chosen to leave a bequest to HMRI.

Pam and family today

"When HMRI came out to speak with us, Richard was able to sit and speak about the death of our boy, which he hadn't been able to do before".

"Donating to HMRI's research has made me feel like the pain I've been through hasn't been in vain."

*** New grandchild update ** Congratulations to Pam's daughter, Nicole, who gave birth to a healthy baby boy, Zachary, on the 12th of November. Welcome to the world!*

To learn more about premature birth, scan the QR code to watch our World Prematurity Day Community Seminar featuring Sarah Mumm, Distinguished Laureate Professor Roger Smith AM, Professor Craig Pennell and Dr Jonathan Paul.

If you, like Pam, would like to donate or leave a bequest to HMRI, please contact HMRI Bequest Manager, Julia Berry, on (02) 4042 0581 or julia.berry@hmri.org.au

The Seeds Once Sown by Leda Turner. Inspired by Professor Clare Collins, 2017 Researcher of the Year.

Beat by Brett McMahon. Inspired by Professor Frances Kay-Lambkin, 2019 Researcher of the Year.

Conversations by Brittany Ferns. Inspired by Distinguished Laureate Professor Nick Talley AC, 2020 Researcher of the Year.

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Yes!

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Thank you for donating to HMRI in the past and for considering this donation request. We really value our supporters and would like to keep you informed about our work. From time to time we may allow like-minded charities to contact you with fundraising materials. In return, they help us to reach more generous supporters like you. HMRI will treat your personal information in accordance with the HMRI Privacy Policy. Our Privacy Policy is available at hmri.org.au/policies. If you would like to email HMRI directly, please do so via donate@hmri.org.au

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help us to help others

Last chance ASX Raffle

The ASX Refinitiv Charity Foundation is being drawn in March. HMRI is one of the supported charities and time is running out to buy your ticket.

There are three amazing prizes:

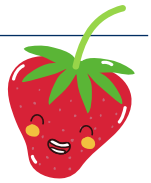
1st Prize: Mazda 3 N 6 Auto Hatch 620 Pure, valued at $28,300

2nd Prize: Robert Oatley premium wine (6 cases of 12 bottles) valued at $1,200

3rd Prize: Lenovo Tab P11 2K 11" 4GB/128GB Tablet valued at $497

The raffle is drawn Thursday 10 March 2022 so scan the QR code above to buy your tickets for the chance to win and to support HMRI research.

Home experiment for National Science Week



COVID-19 restrictions put a dampener on some of last year's National Science Week activities, but it allowed HMRI to try a new way of getting budding young scientists interested in a medical research career.

The National Science Week theme was *Food: Different by Design*. HMRI researcher, Dr Michelle Brown, performed a simple experiment to extract DNA from a strawberry using common household items including methylated spirits, dishwashing detergent and salt. A video of the experiment and accompanying explainer worksheet went up on the HMRI website and social media channels, inviting kids to have a go themselves at home and show us their results.

The video was a bit different to Michelle's usual ovarian cancer research, but she explained the basic principles of the DNA extraction are the same she and her team use in the lab. DNA, short for deoxyribonucleic acid, is the molecule that contains the genetic code of all organisms. It's in every cell of every living thing – plants, animals and even bacteria. It carries all the information about how a living thing will look and function.

We received some awesome pics, reports and videos from home-schooling scientists showing their results, with Kodi, Alex, Isla and Beatrix winning HMRI lab coats for their sterling efforts! Although the comp is over, you can still access the video and worksheet by scanning the QR code below and try the experiment for yourself!

In partnership with our community

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