OUR LEGENDS IN LAB COATS

HAYLEY GODDARD

Curing cancer, preventing heart disease, repairing brains of people with epilepsy and reducing rates of stillbirth are just some of the incredible medical breakthroughs on our horizon.

Aussie families who are desperate for answers to some of our biggest health challenges are in good hands, with some of country's most talented female scientists on the cusp of these life-changing discoveries – which could be realised in the next 10 years.

Science and Technology Australia chief executive Misha Schubert said some of the world's greatest advancements in medical research were from women, such as mRNA technology.

"It was a game-changer in Covid vaccines. Dr Katalin Karikó spent 30 years of her life developing mRNA technology and the first decade of that work, many in the scientific community didn't think it would work," Ms Schubert said.

She said female representation in science had improved in the past decade but there were still challenges in the sector.

"The most recent data on women's enrolment in undergraduate science degrees shows signs of strong growth – that's really encouraging," she said.

"But we know there is a challenge for women who are moving into early and mid stages of a career in science. We need to create strong job security and support for women who choose a career in science research."

A recent survey of women in STEM (science, technology, engineering and mathematics) found 34 per cent of respondents aged between 25 and 35 intended to leave their profession within five years. The main reasons were related to job insecurity, with 28 per cent seeking better pay and conditions and a further 28 per cent leaving because of lack of career advancement.

Professor Kathryn North, who is president of the Australian Associate of Medical Research Institutes, said "change is happening".

She said was excited about the future of the sector and the projects being led by women, such as research into human genes, stem cells and possible avenues for vaccines to help people with food allergies.

Meet some of Australia's trailblazing women in medical research.

DR SOPHIE PAYNE

Neuroscientist at Bionics Institute

Dr Sophie Payne has created – and is testing – a small medical device that could help stimulate the body's natural healing system to combat diseases such as Crohn's or rheumatoid arthritis, which affects half a million Australians.

The device is a tiny electrode – about the size of a thumbnail – that can, during surgery, be attached to the vagus nerve, which controls several organs, including the body's anti-inflammatory response.

"Around 80 per cent of people with Crohn's disease require surgery to remove damaged sections of their bowel, and, unfortunately, there are few effective treatments to prevent the disease recurring at the operation site," she said.

DR LAURA EADIE

Biomedical researcher at South Australian Health and Medical Research Institute

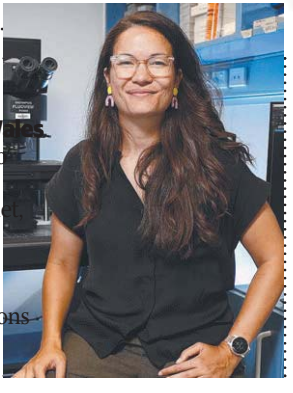
Dr Laura Eadie is researching more effective treatments for people with T-cell acute lymphoblastic leukaemia (T-ALL) by analysing their genes for any mutations that could be treated with drugs.

She said while high-dose chemotherapy treatments were effective for most T-ALL patients, many experienced long-term side effects.

"My research will identify new and repurposed FDA-approved drugs targeted to a patient's specific leukaemia, providing hope for patients who have relapsed," Dr Eadie said.

DR CAITLIN COWEN

Research fellow at University of New South W



Dr Caitlin Cowen is studying babies' poo in a bid to unlock answers to the causes of mental health.

She said there was a correlation between our di the gut microbiome and how we feel – but more research was needed.

She hopes the microbiome can be used as a diagnostic tool to help treat mental health conditions and set children up for success from a young age.

DR CHARIS TEH

Researcher at Walter and Eliza Hall Institute of Medical Research

Dr Charis Teh is looking to find the "kill switch" that triggers cell suicide in blood cancers.

Using cutting-edge technology, she wants to uncover the most potent druggable killers in blood cancers.

"Despite some advances, current treatment options for solid cancers remain limited and many patients have a dismal prognosis," she said.

KATE MASTON

Mental health researcher and psychologist at Black Dog Institute

Kate Maston is working to understand why the rates of mental health issues have increased in the past decade by surveying more than 6000 Australian teenagers in a long-term project called the Future Proofing Study.

"Suicide is the leading cause of death in young people in Australia. Understanding why young people are experiencing such high rates of mental ill health is the first step in knowing where to target preventive and early intervention programs," she said.

PROFESSOR ADRIENNE GORDON

Clinical professor at The University of Sydney

Professor Adrienne Gordon is part of a national research project, the Safe Baby Bundle, which aims save about 200 lives a year by reducing the number of stillbirths after 28 weeks of pregnancy.

The study is looking at five factors – smoking cessation, decreased foetal movements, side sleeping, monitoring a baby's growth and improving shared decision-making around the timing of the birth – to see if they have an effect.

"This work can both save lives and improve the clinical care of families who experience the loss of their baby," Professor Gordon said.

CHRISTINA MAHER

Biomedical engineer at The University of Sydney

Christina Maher is working with artificial intelligence to find new treatments for people with epilepsy, which affects more than 140,000 Australians.

She is exploring how to use MRIs to map brain electrical networks and "information highways" combined with artificial intelligence to better understand, diagnose and treat the condition – and to achieve better outcomes with surgery.

"Thirty per cent of people with epilepsy don't respond to medication and we want to understand why that is," Ms Maher said.

AMANDA KHOURY

Epigenetics researcher at Garvan Institute of Medical Research

By studying the structure of DNA within our cells, Amanda Khoury hopes to unlock new ways to treat cancer.

"The DNA within our cells has a precise three-dimensional structure, which is important for healthy cell function. In cancer cells, this structure is disrupted," she said.

"My work is focused on mapping the altered 3D structure of DNA in cancer and identifying the key players that drive this change, with the ultimate goal of finding new therapeutic options."

PROFESSOR IONA NOVAK

Cerebral Palsy Alliance chair of allied health at The University of Sydney

Professor Iona Novak was inspired to pursue her research career by her childhood "best friend" who had cerebral palsy. Her research looks at how DNA and stem cells could hold the key to preventing cerebral palsy and repair the brains of kids with the condition.

"We have just come to understand that children with cerebral palsy have inflammation, which makes a role for stem cells to dampen that inflammation and repair the brain ... and improves movement more than rehabilitation alone," she said.

ASSOCIATE PROFESSOR JACLYN PEARSON

Antimicrobial resistance researcher at Hudson Institute of Medical Research

Antimicrobial resistance (AMR) is one of the greatest public health threats.

Close to five million deaths were attributable to AMR in 2019 alone and this figure is projected to increase to at least 10 million a year by 2050 with no interventions.

In the first major test of its kind, Associate Professor Jaclyn Pearson is trying to find new ways to treat "superbugs" – bacteria and viruses that are highly resistant to antibiotics and can cause more severe disease.

"I want to understand how they survive so well in our bodies, because we know it's not just the drug resistance that makes them indestructible. These bacteria have also evolved to hide from our immune system," she said.

PROFESSOR KAYLENE YOUNG
Theme leader for brain health and disease research at Menzies Institute for Medical Research at University of Tasmania

Professor Kaylene Young and her team are working on a potential world-first brain repair treatment for people with multiple sclerosis (MS) – a disease where the immune system invades and attacks the nervous system, killing insulating cells called oligodendrocytes.

"My team found that a non-invasive form of brain stimulation, called transcranial magnetic stimulation, can massage the electrical activity of the brain and increase the number of new oligodendrocytes added to the brain over time," Professor Young said.

"We aim to find out whether magnetic brain stimulation can overcome the effects of MS to stop disability from worsening over time and even restore function that was previously lost."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