

2021 TE PŪIAKI PUTAIAO MATUA A TE PIRIMIA SCIENCE PRIZE

Preventing brain damage in newborns

Newborn babies need just the right level of blood sugar for their brain, otherwise it can lead to brain damage. Approximately 30% of all New Zealand newborns, or 12,000 babies a year, are born at risk of low blood sugar and brain injury. The multidisciplinary Neonatal Glucose Studies Team led by Distinguished Professor Dame Jane Harding FRSNZ have won the Te Pūiaki Putaiao Matua a Te Pirimia Science Prize. The team has spent more than 20 years understanding the issue with long term studies and has developed new ways to diagnose, treat and prevent blood sugar imbalance in babies.

One of these methods – dextrose (sugar) gel rubbed inside a baby's cheek – reduces admission to intensive care, improves breastfeeding, and saves money; this is now recommended internationally as first-line treatment for low blood sugar (hypoglycaemia).

They have also developed new methods to monitor blood sugar levels in babies, including Gluco-Light, a new non-invasive glucose monitoring device currently being tested, which reduces the need for painful and distressing repeated heel-prick tests.

Their research into neonatal hypoglycaemia has changed practice around the world, saving millions of healthcare dollars and leading to the development of, and investment in, new, patented commercial products. Most importantly, their research has improved the lives of mothers and babies around the world.

Dame Jane said they were inspired to do this research because of its importance and because the problem of understanding and treating blood sugar in babies has been around for decades.

“Nearly a third of all babies are born at risk of having too low blood sugars and about a half of those will get a low blood sugar, so that's a lot of babies. It's a big problem, a common problem and one therefore that really matters because if we don't get it right, we are talking about brain injury.”

“We've known for a very long time that sugar levels that are too high or too low are bad for babies' brains but we've not really known how high or how low, we've not really known how best to test for it or how best to treat it.”

Dame Jane says the team have spent the last twenty years working their way through the following problems: “‘how do people treat these babies?’ ‘are there better ways to treat them?’, ‘do we know what the outcomes really are?’, ‘do we know which babies need treating?’ ‘can we find good ways of measuring what difference it makes to babies' brain development?’. ‘what does it do to their vision and their understanding of what they see?’ ‘How does it change how they do at school?’

“It has occupied us because as we have tackled one part of it, we have come up with new questions, and realised we need to think about something differently, and the results from one study always spark off ‘oh I wonder if that's important, we better study that now’.”

Tackling such a broad range of questions has required a broad range of skills in the team.

“One of the joys of this work and the challenges has been that it's been very multidisciplinary. We have had to bring together a team who can think about the problem in many different ways. We

have a bioengineer, vision scientist, psychologist, educationalist, many different disciplines, and that's always challenging because you think about things in different ways, you don't even speak the same language, so having to learn each other's ways of thinking and make the most of that, has been an interesting challenge."

Another challenge has been the long term and long reaching nature of the research, both in terms of keeping in contact with the participating families who are spread around the country and some around the world, and the necessity for years-long studies.

"You can't figure out if you have made a difference to babies' brains until they've grown up and gone to school and you can tell whether they are doing better at school."

In addition to the team's success in developing new treatments and better screening methods for babies' blood sugar, their work in assessing vision is also being applied more generally. They began to study vision because it is likely to be affected by low blood sugar.

"We know that low glucose injures the part of the brain that is normally involved in vision but it is very difficult to test visual function in very young children who can't tell you if they can see something. With adults you say 'can you see this? say yes or no', but young children can't tell you that."

The method they developed for testing vision in very young children was subsequently patented, and a spin out company was formed to develop the method for office-based testing of vision in young children and it has been used for assessing vision for the Paralympics.

Dame Jane says the prize is a confirmation that the work is important and has made a contribution and she is thrilled that the prize recognised the multidisciplinary team effort.

The award comes with a \$500k prize that will allow the team to keep progressing.

"One of the next steps that we're planning to use the prize for is to assemble the evidence that we have so far into developing a national guideline to support the management of these babies at risk, so that we have a consistent, evidence-based and cost-effective approach to managing the huge numbers of children who have this problem each year."

Team members:

Distinguished Professor Dame Jane Harding FRSNZ, Neonatologist, University of Auckland

Dr Jane Alsweiler, Neonatologist, University of Auckland

Distinguished Professor Geoff Chase FRSNZ, Bioengineer, University of Canterbury

Dr Richard Edlin, Health Economist, University of Auckland

Gregory Gamble, Statistician, University of Auckland

Dr Deborah Harris, Neonatal Nurse Practitioner, Te Herenga Waka – Victoria University of Wellington

Associate Professor Christopher McKinlay, Neonatologist, University of Auckland

Jenny Rogers, Follow-up Team Leader and Kaiarahi, University of Auckland

Professor Benjamin Thompson, Vision Scientist, University of Waterloo, Canada

Dr Philip Weston, Neonatologist, Waikato District Health Board

Professor Trecia Wouldes, Developmental Psychologist, University of Auckland

Mō Te Puiaki About the Prize

TE PŪIAKI PUTAIAO MATUA A TE PIRIMIA SCIENCE PRIZE

Awarded to an individual or team for a transformative scientific discovery or achievement, which has had a significant economic, health, social and/or environmental impact on New Zealand and/or internationally.

This is one of five prizes awarded each year.

The Government of New Zealand introduced The Prime Minister's Science Prizes in 2009 as a way of raising the profile and prestige of science among New Zealanders, in Aotearoa and internationally.

www.pmscienceprizes.org.nz/