



Jane Pillow

What does the future look like for these fragile infants?

About one in 12 babies in Australia is born prematurely and WA has the best record in the country for keeping these babies alive and ensuring quality of life.

As it is only over the past 30 years that very preterm babies have survived in great numbers, there has been little research on the effects of very preterm birth on the health of mature adults.

Preterm babies may grow up with a high risk of ill health, including metabolic syndrome: increased risk of high blood pressure, stroke, diabetes, respiratory disease and central adiposity (excess abdominal fat associated with cardiovascular risk). They may contribute a burden on health care services depending on the extent of physical, financial, social and psychological hardship.

A group of UWA researchers has won an NHMRC grant to establish a Centre of Research Excellence to improve

the immediate and longer-term health outcomes of preterm infants and to try to improve the lives of this most vulnerable and fragile population.

It is one of only six Centres of Research Excellence (CRE) for clinical research funded by the NHMRC last year.

Led by Jane Pillow, Professor in the School of Anatomy, Physiology and Human Biology, and Karen Simmer, Winthrop Professor of Newborn Medicine in the School of Paediatrics and Child Health (SPACH), the new centre has investigators from five states.

Professors Pillow and Simmer are both clinical neonatologists and co-directors of the UWA Centre for Neonatal Research and Education.

The new CRE is built on the premise that the short and long-term health outcomes of preterm babies can be improved by the care they are given in the first weeks of their lives, and by not concentrating

on individual systems but by working together and considering the holistic needs of the infant.

The lead investigators give three reasons they think contributed to a successful application: the researchers involved are already working together to assess and treat preterm infants in a holistic way, combining the results of research on the heart, lungs, gastrointestinal tract, immunity, infection and brain development; the group already has a good track record for translating its research, implementing it in such projects as the human milk bank and probiotic therapy, which they started and which has now spread around the world; and their innovative strategies for developing early career researchers in multidisciplinary teams.

Their work spans the pre-clinical, clinical and translational phases of research. Professor Pillow explains: "Our work in the pre-clinical setting involves work with preterm lambs, pigs and newborn mice.

When we are developing brand new therapies, we need to make sure they are safe, so we trial the new treatments in preclinical models.

“Once we know they are safe, the therapies are evaluated in the human population via clinical trials. Then, if clinical trials are successful, move to translation and clinical implementation phases, to ensure that the research improves health outcomes. If we have unexpected results from clinical trials, we return to the pre-clinical setting to further refine the therapy. Our research is a continual review.”

In addition to the \$2.5 million CRE grant, Professor Pillow was successful in obtaining a \$1.7 million NHMRC project grant for her preclinical research studies. The project will break new ground in Australia by keeping preterm lambs ventilated for several weeks, and then weaning them off the mechanical ventilator and continuing to monitor them to examine long-term outcomes of new and controversial treatments. The study will focus on cardiorespiratory and neurodevelopmental outcomes, but collaborators will also assess the effect of the treatments on the development of other body organs and systems.

“The CRE will allow us to build value-adding studies onto this research,” Professor Pillow said. “We built support for the new preclinical facility into the CRE application because we felt that this preclinical work would form an important part of the translational research cycle.”



Professor Simmer gave examples of some of the centre’s projects.

“Preterm babies need ventilation to help them breathe and we will be looking at gentler ways of delivering these mechanical breaths, and how we can lessen the chances of lung disease in later life. Tim Moss is doing some work in this area introducing stem cells into damaged lungs,” she said.

“We are testing different types of nutrition for preterm babies, using both intravenous feeding and expressed breast milk, looking at giving them more and better quality protein. We are also working

on the type of lipid (fat) that we give them for better brain development, including giving the mother a therapy that will change the fat content of her breast milk.

“We will be furthering our study of probiotics to help develop the baby’s gastrointestinal system and looking at improving the infant’s immune system and inflammatory response so we can reduce the mortality and morbidity associated with infections.”

She said that, 30 years ago, it was all about survival for preterm babies.

“In the 1980s, we used to concentrate on just stopping them dying from lung disease. Now most preterm babies survive as their management in the neonatal ICU continues to improve.

“But we just don’t know yet how many get long-term complications and what those long-term complications will be.”

About 2,700 preterm babies are born or cared for at King Edward Memorial Hospital every year, so the centre has a ready-made study group.

They already follow babies born before 33 weeks gestation, until they are a year old, and those born earlier, until they are school age. There is also a group of adults in their early 20s which was established as a preterm cohort around the same time as the Raine Study, and the CRE will include them in their longer-term studies.



Karen Simmer