

AL & VAL ROSENSTRAUSS FELLOWSHIP RECIPIENT

DR GRAEME POLGLASE

Dr Graeme Polglase is a Senior Scientist and a Senior Research Fellow at The Ritchie Centre, Monash Institute of Medical Research, Monash University. His research aims to improve the immediate and long-term respiratory, cardiovascular and neurological outcomes of preterm infants. In particular, Dr Polglase's research focuses on the events around the time of birth, and how they can influence the safe transition of a preterm fetus to a newborn baby.

Dr Polglase was awarded the Rebecca L. Cooper Medical Research Foundation Al and Val Rosenstrauss Fellowship beginning in 2012 to investigate how events prior to birth can predispose the preterm infant to a greater incidence and severity of lung and brain injury.

Research

Preterm birth is defined as birth <37 weeks of gestation, and occurs in approximately 8% of all births within Australia. The incidence of preterm birth has increased 36% in the past 25 years, and is the leading cause of newborn death and disability. Two of the largest problems facing preterm infants are lung and brain injury. Due to the immaturity of the preterm infants lungs at birth, they often require respiratory support, often in the form of mechanical ventilation. It is now known that this requirement of respiratory support can increase lung inflammation and injury leading to long-term respiratory disease. Our recent studies have further demonstrated that this respiratory support can also lead to brain inflammation and injury. However, the role of the environment within the womb and how this can either amplify or reduce brain injury is not known. In particular, almost two thirds of preterm infants are exposed to inflammation while they are in the womb; this is known to cause preterm birth and increase the incidence and severity of preterm lung and brain injury including a 4-fold increased risk of cerebral palsy. The influence of respiratory support on brain injury after inflammation in the womb is not known, and may lead to increased incidence and severity unless we can find better ways to deliver this respiratory support. Further, almost all women at risk of preterm delivery are given steroids to mature the preterm infants lung. This treatment is known to reduce respiratory disease and brain injury, and may protect the brain from injury resultant from respiratory support. The interaction between inflammation in the womb and steroids will also be investigated.

A major component of these studies is the use of new technologies which will significantly enhance our capabilities and understanding of how the preterm transitions at birth. We will combine real-time measurement of lung inflation and blood flow using state of the art phase-contrast imaging at the Australian Synchrotron. Brain injury will be assessed using multiple modalities of Magnetic Resonance Imaging, specifically targeting early markers of brain inflammation and injury. Demonstration that brain injury occurs due to the initial respiratory support, and that better techniques can prevent the progression of brain injury, will directly influence change in clinical practice resulting in improved outcomes for preterm babies.