The respiratory consequences of preterm birth

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Approximately 8% of Australia's 250,000 annual births occur preterm (prior to 36 weeks completed gestation) and recent observations indicate that the incidence of preterm birth is increasing. Preterm infants represent 75% of all neonatal deaths in Australia, with the vast majority of these deaths due to pulmonary disease. The respiratory consequences for survivors of preterm birth include the immediate challenges of breathing with underdeveloped lungs and, long term, with persisting pulmonary abnormalities.

Structural immaturity and surfactant deficiency are responsible for neonatal respiratory distress syndrome (RDS), the most common illness of infants born preterm. The use of antenatal corticosteroid and postnatal surfactant therapies to prevent RDS now permits survival of preterm infants born as early as 22 weeks' gestational age, but not without consequence.

Preterm infants are at risk of chronic lung disease/bronchopulmonary dysplasia (BPD), and the number of infants with BPD is rising as a result of increasing rates of survival for preterm infants. BPD is characterised by the long term (>28 days) requirement for ventilatory support and/or supplemental oxygen. The lungs of infants dying from BPD are inflamed and have fewer, larger alveoli than normal, and abnormal pulmonary vascular development. BPD was once regarded as a consequence of aggressive mechanical ventilation strategies but there now is a growing appreciation of the contribution of intrauterine inflammation to the aetiology of BPD.

Impaired airway function is commonly reported in follow-up studies of children born preterm. Decreased expiratory flow rates have been associated with preterm birth *per se* but airway function appears more affected in survivors of RDS and BPD. Airway hyper-responsiveness and reduced pulmonary gas exchange in childhood have been observed in survivors of BPD, suggesting persisting abnormalities in the structure of the lung parenchyma and airways.

Follow-up studies of preterm infants into adulthood are lacking, as are experimental examinations of the long term physiological and anatomical effects of preterm birth. Both are necessary to understand the causes of the long term respiratory consequences of preterm birth.