

Asthma, smoking and the placenta

N.A. Hodyl, Robinson Research Institute, University of Adelaide, 55 King William Road, North Adelaide, SA 5006. Australia.

Asthma is one of the most common chronic health conditions worldwide with prevalence rates varying between countries from 1% to 18%. In Australia, approximately one in eight adults is affected by asthma. These rates are even higher among certain sub-populations, including women of reproductive age and the Australian Aboriginal people (with rates over 16% in both groups). Asthma during pregnancy is associated with adverse maternal and neonatal outcomes, including pre-eclampsia, gestational diabetes, perinatal mortality, preterm birth, growth inhibition and congenital malformations. Some debate exists regarding whether the adverse maternal and neonatal outcomes that are associated with asthma are due to the presence of this disease or to underlying common risk factors related to poor health. This includes cigarette smoking, which is well known to increase the risk of perinatal morbidity and mortality. Discriminating the effects of asthma from those of cigarette smoking in pregnancy is difficult to examine, given that smoking rates in women with asthma are much higher than in non-asthmatic populations. We have therefore utilised perinatal outcome data derived from a database of mandatory information collected by the South Australian Department of Health, to examine the independent and combined effects of asthma and cigarette smoking in pregnancy. We have assessed these outcomes in both Aboriginal and non-indigenous women.

The mechanisms that contribute to these poor outcomes in asthmatic pregnancies include altered placental function. Specifically, we have demonstrated maternal asthma decreases placental glucocorticoid metabolism and increases pro-inflammatory cytokine production. More recently, we have been investigating the roles of microRNAs (miRs) in regulating these pathways, and have found differential miR expression according to the presence of maternal asthma and active cigarette smoking during pregnancy. This contributes to compromised placental function, allowing the developing fetus to be exposed to an adverse intra-uterine environment. The implications of this extend well past the neonatal period.

Both the epidemiological and basic science data clearly highlight that maternal asthma and cigarette smoking result in an adverse fetal environment and lead to poor pregnancy outcomes. The adverse perinatal outcomes associated with both asthma and smoking can be alleviated through adequate asthma control and smoking cessation in pregnancy. These should be made a priority in antenatal care provision, to both Aboriginal and non-indigenous women, to improve perinatal outcomes and life-long health for these children.