

SESSION 9E: OBSTETRICS**Fetal renal parenchyma: Evaluation of a novel ultrasound measurement to assess kidney development**

Sonja Brennan,¹ David Watson,² Donna Rudd,³ Michal Schneider,⁴ Yogavijayan Kandasamy^{5,6}

¹ *Ultrasound Dept, Townsville Hospital, Townsville, QLD, Australia,*
² *Obstetrics & Gynaecology, Townsville Hospital, Townsville, QLD, Australia,*
³ *College of Public Health, Medical & Veterinary Sciences, James Cook University (JCU), Townsville, QLD, Australia,*
⁴ *Medical Imaging & Radiation Sciences, Monash University, Melbourne, VIC, Australia,*
⁵ *Dept of Neonatology, Townsville Hospital, Townsville, QLD, Australia,*
⁶ *Mothers and Babies Research Centre, Hunter Medical Research Institute, John Hunter Hospital, The University of Newcastle, Newcastle, NSW, Australia*

Introduction: Abnormal fetal growth can adversely impact renal development and is associated with increased risks of developing hypertension and chronic kidney disease later in life. A non-invasive, sensitive method of assessing normal and abnormal fetal kidney development is required. We hypothesise that the fetal renal parenchymal thickness could be used to evaluate the development of the fetal kidneys and provide an indirect estimate of fetal nephron number. This study uses antenatal ultrasound to assess fetal renal parenchymal growth and blood flow to determine if these are affected by abnormal fetal growth.

Methods: A longitudinal, observational study was conducted at the Townsville Hospital, Townsville, Australia between May 2017 to December 2018. Mixed risk women with an accurately dated, singleton pregnancy underwent a pregnancy ultrasound scan at least every four weeks between 16 and 40 weeks gestation. Renal parenchymal thickness and echogenicity, renal volume, fetal growth biometrics, amniotic fluid measurements, renal artery Doppler and other fetal Dopplers were assessed in appropriately grown, fetal growth restriction or large for gestational age fetuses.

Results: 155 participants were recruited, with 7 participants excluded due to fetal abnormalities. Mixed effects modelling was used so that variations between gestational ages within fetuses and between fetuses was considered. A reference graph was developed for normal fetal renal parenchymal growth. In growth restricted fetuses the renal parenchymal thickness was found to be significantly less when compared to the parenchymal thickness of appropriately grown fetuses.

Conclusions: Measurement of the renal parenchymal thickness is an innovative method to evaluate the development of the fetal kidneys. This new chart of fetal renal parenchymal thickness may be useful for the diagnosis of nephropathologies and the identification of infants at risk of kidney disease. Fetal growth restriction was found to adversely affect the renal parenchymal growth. This suggests growth restricted fetuses are born with fewer nephrons and are therefore likely to be more susceptible to hypertension and early onset kidney disease later in life.