1. **The use of in utero Magnetic Resonance Imaging: Is there a link between congenital heart disease and brain abnormalities in the fetus**.

Chloe R. Finney

Academic Unit of Radiology, University of Sheffield

Purpose
This is a pilot study to determine the possible role of in utero MR imaging (iuMR) for detecting brain abnormalities in fetuses with congenital heart diseases (CHD).

Methods/Materials
Pregnant women carrying a fetus with CHD but no brain abnormality on ultrasonography were recruited from one fetal maternal centre to undergo third trimester iuMR of the fetal brain at the Academic Unit of Radiology in Sheffield. A radiological review was made to report structural brain abnormalities and a range of intracranial volume estimates were made from 3D FIESTA acquisitions using 3D Slicer software following manual segmentation. Those values were compared with values from over 200 normal fetuses. z scores were calculated and regression analyses performed.

Results
Sixteen pregnant women were studied and five (31%) fetuses had structural brain abnormalities (3 with ventriculomegaly, 2 with vermian hypoplasia). Brain volumes of the CHD cohort were significantly lower than normal fetuses and there appears to be a relationship between the â€˜severityâ€™ of the CHD and reduction in brain volume although our numbers are too small for formal analysis.

Conclusions
Fetuses with CHD have a high risk of having structural brain abnormalities not recognised on ultrasonography and have smaller brain volumes. Fetuses with CHD that produce abnormal intra-cardiac mixing of oxy- and deoxyhaemoglobin appear to have more severe reductions in brain volume and we discuss the fetal physiology that underpins that finding