Fetal Cerebral Oxygenation Measurements by T2*-mapping in Normal Pregnancies and in Pregnancies Complicated by Fetal Heart Defects

MH Lauridsen1, N Uldbjerg2, TB Henriksen1, OB. Petersen1, B Staussbal-Grøn4, NB Matthiesen1, DA Peters1, S Ringgaard1, S, VE Hjortdal1,

Background
Structural heart defects are associated with smaller cerebral size and markers of cerebral immaturity as early as in fetal life. Newborns with major heart defects often have visible lesions on cerebral MRI even before surgery and children with major congenital heart defects have increased risk of neurodevelopmental disorders. There are several reasons for this. We aim to explore if fetal cerebral oxygenation is compromised in fetal heart defects.

Materials and Methods
In BOLD MRI, the presence of deoxyhemoglobin decreases the signal. By using serial echo times in a breath-hold, T2* (ms) can be calculated and is presumed to be a proxy for tissue oxygenation. By performing serial T2* measurements at gestational age 30-32 and 36-38 weeks in healthy pregnant women expecting a child with heart defects as well as in healthy controls expecting healthy singletons, we aim to estimate:

Preliminary Results
We investigated 11 fetuses with heart defects (transposition of the great arteries (5), coarctation of the aorta (2), fallots tetralogy, hypoplastic left heart syndrome, common arterial trunk and double outlet right ventricle) and 20 normal fetuses. Cerebral T2* seemed to decrease with increasing gestational age. No difference in cerebral T2* between normal fetuses and fetuses with heart disease was detected. Fetal cerebral T2* measurements are challenged by fetal movement and other artifacts.

Conclusion
In our preliminary study we found no difference in cerebral T2* between normal fetuses and fetuses with heart disease. Study and analysis are ongoing.

1 Department of Pediatrics, Aarhus University Hospital, Aarhus, Denmark
2 Institute for Clinical Medicine, Aarhus University, Aarhus, Denmark
3 Department of Obstetrics and Gynecology, Aarhus University Hospital, Aarhus, Denmark
4 Department of Radiology, Aarhus University Hospital, Aarhus, Denmark
5 Department of Clinical Engineering, Central Denmark Region, Aarhus, Denmark
6 MR Research Centre, Aarhus University, Aarhus, Denmark
7 Department of Cardio-Thoracic Surgery, Aarhus University Hospital, Aarhus, Denmark

Mette Høj Lauridsen, MD. Ph.D.-student. Departments of paediatrics and thoracic surgery research, Aarhus University Hospital. Denmark. Mail: mettelur@rm.dk