



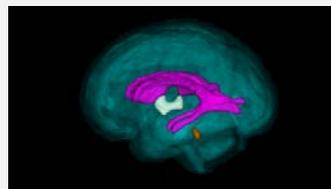
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Innovative Research Studies

Novel quantitative MRI tools for the detection of placental failure in high risk pregnancies

What is the study about?

This study explores structural and functional development of the *in vivo* placenta for women with hypertensive disorders of pregnancy (HDP). Hypertensive disorders in pregnancy (HDP) are the most common co-morbidity of pregnancy, affecting up to half a million women per year in the United States alone, and is a leading cause of maternal and perinatal mortality. These vascular disorders can disrupt placental function by interrupting normal placental implantation and uteroplacental perfusion. Placental insufficiency in turn deprives the developing fetus of essential metabolites necessary for normal growth and brain development resulting in fetal growth restriction (FGR). FGR remains a leading cause of stillbirth and a major risk factor for premature birth, cerebral palsy and lifelong neuropsychiatric morbidity including attention deficit hyperactivity disorder, autism, and schizophrenia. Despite advances in fetal diagnostic techniques, there are no current clinical tools that directly and noninvasively assess placental function in utero. We have previously shown disruptions in placental structure and perfusion in fetuses with established FGR. Given that clinicians can identify placental insufficiency only after the mother or fetus has been affected, we are studying this group of high-risk pregnancies in order to detect early deviations of normal placental function prior to the onset of irreversible fetal harm.



3D fetal brain reconstruction



3D placental reconstruction

What are the clinical applications of advanced neuroimaging of the growth restricted fetus?

There has been a tremendous amount of work that has shown the intra-uterine environment has life-long consequences to the fetus, which can even be passed on to subsequent generations. Understanding the immediate consequences of an adverse intra-uterine environment to the developing brain is key to optimizing care of the fetus and improving outcomes.

How is placental insufficiency relevant to the work that we do in the Developing Brain Research Program?

Unfortunately, the placenta is still a poorly understood organ that plays a critical role in fetal development. Therefore, a better understanding of the placenta is necessary to better understand the maternal-fetal interface and neurodevelopmental impact.

Next steps in the field

As we develop a more robust understanding of placental development and the impact on fetal growth, the important next steps are to apply the tools developed in the MRI lab to assess the safety and efficacy of novel therapies in realtime.



Nickie Andescavage, MD
Neonatologist

Welcome New Brain Team Members



Yuan-Chiao Lu
Research Associate



Catherine Lopez
Program
Coordinator



Jenifer McAndrew
Clinical Program
Coordinator



Nicole Anderson
Research Technician

Research Publications

Yuo W*, Xu F, Limperopoulos C. Linear convolution model of fetal circulation for hemodynamic responses to maternal hyperoxia using in utero functional MRI. *Biomedical Imaging (ISBI 2018), 2018 IEEE 15th International Symposium on Biomedical Imaging*. 24 May 2018.

Bouyssi-Kobar M*, Brossard-Racine M, Jacobs M, Murnick J, Chang T, Limperopoulos C. Regional microstructural organization of the cerebral cortex is affected by preterm birth. *Neuro Image: Clinical*. 2018;18:871-880.

Mahdi E*, Murnick J, Limerperopoulos C. Cerebral Perfusion is Perturbed by Preterm Birth and Brain Injury. *American Journal of Neuroradiology (Accepted)*

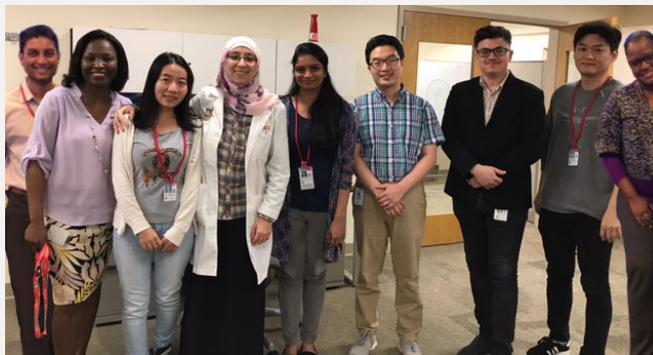
Fun at Bring Your Child to Work Day 2018!



Meet our New Study Coordination Team



Farewell to Eman Mahdi



Congratulations!

Yao and Dhinesh
On winning the
Certificate of Excellence for
Research Week 2018.

Another congratulations
to Yao for receiving the
Thrasher Research Fund's
Early Career Award!



Featured Press

- ❖ GABA concentration in pre-term brain increases with gestational age
- ❖ Which targeted nutritional approaches can bolster micro-preemies' brain development?
- ❖ MRI evaluates effectiveness of nutrition for preemies' brain growth

March of Dimes Event Recap



Upcoming Events

- ❖ ISMRM – Paris, France June 16-21, 2018
- ❖ 17th World Congress in Fetal Medicine – Athens, Greece June 24-28, 2018
- ❖ Children's National Race for Every Child – Washington, DC October 20th, 2018