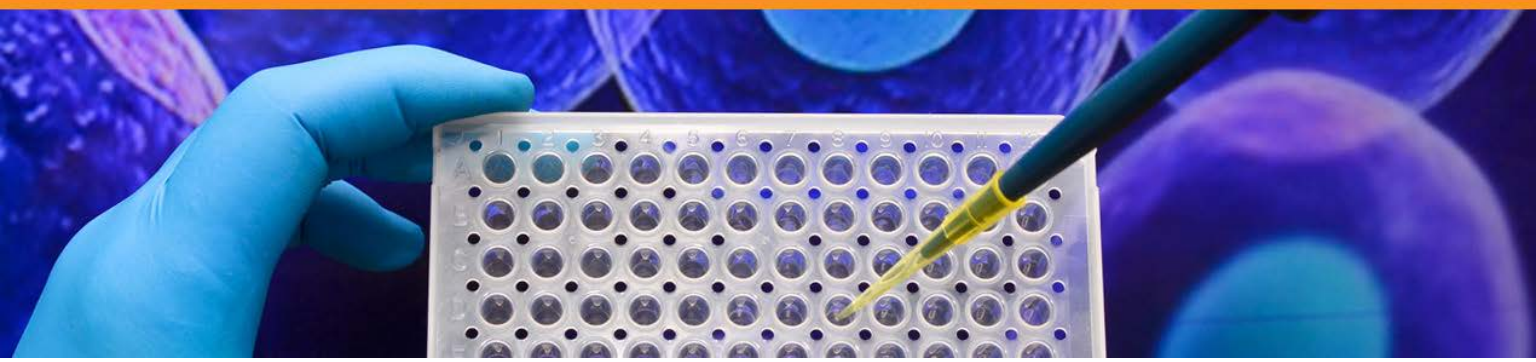
2017 Research Discoveries



The Developing Brain Research Program scientists **Josepheen DeAsis-Cruz** and **Marine Bouyssi-Kobar** are among the top 10 who are recognized for the 2017 Children's National Research Discoveries.

March 2018 Volume 3 Issue 1

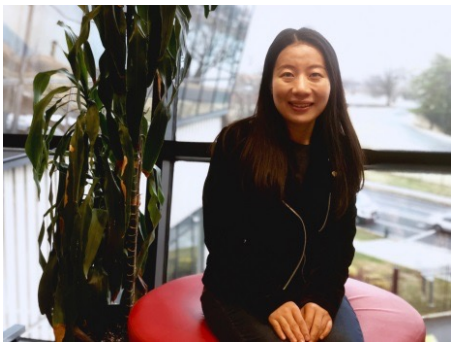
Innovative Research Studies

Prenatal Maternal Stress Impairs In-vivo Global and Regional Fetal Brain Growth

What is the study about?

Prenatal maternal stress has been increasingly linked with altered fetal programming in animal models and long-term cognitive, emotional and behavioral dysfunction in children and adults. However, the effect of prenatal maternal stress on in vivo human fetal brain growth is unknown.

The objective of this study is to examine the relationship between prenatal maternal psychological distress and serial in utero brain volumetric growth and development in fetuses with congenital heart disease compared to healthy controls using magnetic resonance imaging (MRI) and questionnaires assessing maternal stress, depression, and anxiety. The successful application of advanced non-invasive fetal MRI techniques provides an unprecedented opportunity for the in vivo study of fetal brain development under maternal stress.



Yao Wu, PhD
Research Postdoctoral Fellow

What is the influence of prenatal maternal stress, anxiety and depression on global and regional brain growth in healthy fetuses?

We studied 88 healthy fetuses with 144 MRI studies. Maternal psychological distress affected the volumes of fetal hippocampus, total brain volume in female fetuses, and brainstem in male fetuses in the second late and third trimesters of gestation.

What is the influence of prenatal maternal stress, anxiety and depression on global and regional brain growth in fetuses with congenital heart disease (CHD)?

We studied 55 CHD fetuses with 91 MRI studies. Prenatal maternal stress was associated with smaller total brain volume, cerebellum, and hippocampi in CHD fetuses. Impaired hippocampal regions by maternal stress were shown in figure 1. Regional impairments in cerebellar development in CHD fetuses by maternal stress were noted in figure 2.

What is the impact of prenatal maternal stress, anxiety and depression on birth outcomes?

Maternal depression was associated with labor induction and lower Apgar score. Maternal anxiety was associated smaller birth weight and head circumference at birth.

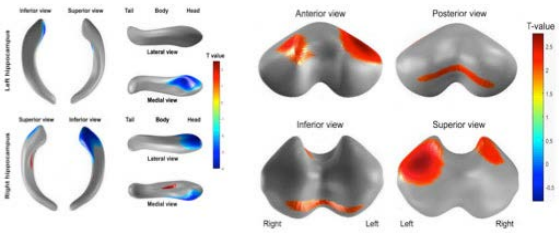


Fig 1. Altered hippocampal regions by prenatal maternal stress in CHD fetuses

Fig 2. Altered cerebellar regions by prenatal maternal stress in CHD fetuses.

Summer Internship Program

2018 Orientation | June 11, 2018

How to apply? | Click here for more info

Josepheen DeAsis-Cruz et al. Aberrant brain functional connectivity in newborns with congenital heart disease before cardiac surgery. Neuroimage: Clinical. Sept. 28, 2017.

Marine Bouyssi-Kobar et al. Altered cerebral perfusion in infants born preterm compared with infants born full term. The Journal of Pediatrics. Dec. 4, 2017.

Congratulations Sudeepta Basu on receiving the Meritorious Poster Award at the 2018 ESPR "Temporal trends of GABA and Glutamate in the Developing Preterm Brain.

Congratulations & Welcome to:
Feng Xu's newest addition, Baby Sophia & Katie Ottolini's newest addition, Baby Colin!

Sophia

Colin

Featured Press [links]

- childrensnational.org
- healthimaging.com
- sciencedaily.com
- cardiovascular-business.com
- eurekalert.org
- 2017 CNHS Research Discoveries

Welcome New Brain Team Members

Nicole Simard
Clinical Research Coordinator

Li Zhao
Research Faculty

Research Impact

CNHS 8th Annual Research and Education Week

Zun Z. Non-invasive magnetic susceptibility imaging of the human placenta using MRI: Preliminary results in healthy pregnancies.

Wu Yao. Maternal stress during pregnancy alters regional brain growth in fetuses with Congenital Heart Disease.

Krishnamurthy D. Integrated Research Information System (IRIS)-Web based MRI processing and visualization for a fetal and neonatal brain analysis pipeline.

Wu Y. Maternal stress during pregnancy alters regional brain growth in fetuses with Congenital Heart Disease.

You W. Prenatal maternal anxiety increases blood oxygenation to the fetal brain during maternal hyperoxia: a functional MRI study.

Schlatterer S. The Placenta-Heart-Brain Connection: placental pathology and brain MRI findings of neonates with CHD.

Pediatric Academic Societies (PAS)

Pradhan S. Early extra-uterine exposure alters preterm brain biochemical development. *Platform*
You W. Altered placental hemodynamic response to maternal hyperoxia in fetuses with CHD using functional MRI. *Platform*
Basu S. GABA and glutamate measures in the cerebellum and frontal cortex of preterm infants. *Poster*
Wu Y. Prenatal maternal stress alters in utero cerebellar development in fetuses with congenital heart disease. *Poster*
Wu Y. Impaired in utero regional brain growth in fetuses with CHD. *Platform*
Andescavage N. In vivo quantification of placental microcirculation in healthy and high risk human pregnancies using advanced MRI. *Platform*
Andescavage N. Impaired in utero cortical maturation in the growth restricted fetus. *Platform*
Mirza H. Cerebro-Cerebellar Diaschisis in Preterm Infants following Unilateral Cerebral Parenchymal Injury. *Platform*
Gupta A. Caffeine increases GABA/Cr ratio in frontal cortex of preterm infants on spectroscopy. *Platform*
Ottolini K. Impact of Early Nutrition on Microstructural Brain Development in VLBW Infants. *Platform*

Eastern Society for Pediatric Research (ESPR)

Mirza H. Cerebro-Cerebellar Diaschisis in Preterm Infants following Unilateral Cerebral Parenchymal Injury. *Platform*
Gupta A. Caffeine increases GABA/Cr ratio in frontal cortex of preterm infants on spectroscopy. *Platform*
Ottolini K. Impact of Early Nutrition on Microstructural Brain Development in VLBW Infants. *Platform*
Basu S. Temporal trends of GABA and Glutamate in the Developing Preterm Brain. *Poster*

American Society of Echocardiography

Tague L. Preoperative Brain MRI Findings in Hypoplastic Left Heart Syndrome.

Research Publications

Zun Z. Placental Perfusion Imaging Using Velocity Selective Arterial Spin Labeling. *Magnetic Resonance in Medicine*. 2018;1-12.

Bouyssi-Kobar M. Regional microstructural organization of the cerebral cortex is affected by preterm birth. *NeuroImage:Clinical.* (In Press)

Upcoming Events [links]

ESPR - March 16-18, 2018 Philadelphia, PA

Research and Education Week - April:16-18, 2018 CNHS

March of Dimes- April 22, 2018 Washington, DC

MARCH OF DIMES
MARCH FOR BABIES

PAS - May 5-8 Toronto, Canada

American Society of Neuroradiology (ASNR)- June 2-7, 2018 Vancouver, Canada

Cardiac Neurodevelopment Outcome Collaborative (CNOC)- Jun 5-6 2018 Kansas City, MO