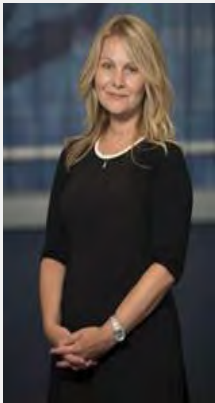




December 2018 Volume 3 Issue 4

## Director's Message For the New Year:



As 2018 comes to an end, I would like to share a heartfelt thanks to everyone on our team. We've come through a year that was filled with both challenges and successes. We have continued to grow as individuals and as a family while building a strong community of caring for our patients and for each other. Working with you this past year has been a pleasure and a privilege. Our collective impact reaffirms that our sum will always be greater than our parts. I am excited about the potential and promise that the translation of our work holds for transforming the lives of babies before and after birth. Always remember that great things never come from comfort zones!

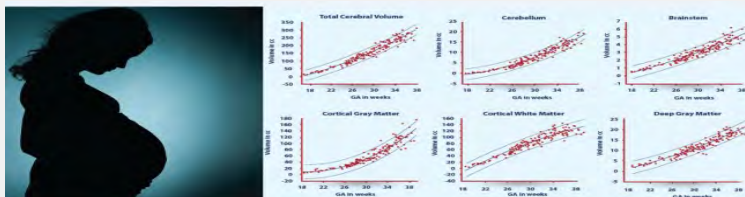
*Catherine Limperopoulos, PhD*

## Innovative Research Studies

### Integrated Research Information System (IRIS)

#### What is the study about?

Integrated Research Information System (IRIS) is a state-of-art cross-platform research application that can be used to bring advanced neuroimaging research applications to real-time diagnoses. The software will aggregate cutting edge MRI data processing pipelines that include Structural MRI, Functional MRI and Molecular level MRI data. It will allow users to load and compare various research studies, specifically to identify and study critical regions of interest within the fetal brain and provide data denoting growth of the developing brain longitudinally over the gestational age. Within the software, users can select predefined pipeline resources such as patient data, executable modules, workflows and services and the ability to write custom executable code within its graphical user interface (GUI). To obviate the task of manually managing intermediate data within a script, IRIS will automatically manage and simultaneously pass data between programs. Once a user has created a pipeline within IRIS, it can be saved to a personal library and be reused in other workflows created with intuitive drag and drop functionality.



#### What are the clinical implications of Integrated Research Information System (IRIS)?

We hope to provide advanced diagnostic tools for early diagnosis and better surveillance that will ultimately lead to decreased mortality, preterm birth, and improved child health and outcomes in pregnancies by developing a dedicated platform that will offer real-time, fetal-neonatal brain MRI diagnostic capabilities to support timely, more precise and better-informed decision making for clinicians.

#### How is IRIS relevant to the work we do in the Developing Brain Research Lab?

IRIS is capable of presenting raw anatomical/structural MRI images in a simplistic interpretable, user-friendly manner. IRIS is currently being validated with manually processed results from a large database of normative fetal & neonatal brain MRI studies and our preliminary results show highly consistent and reproducible findings.

#### Next Steps:

At present, IRIS focuses mainly on anatomical/structural fetal MRI images. Our future plan is to provide support for functional MRI, Diffusion Tensor Images and MR Spectroscopy data in the fetus and newborn.



From Left to Right: Sun Kim, Dhinesh Krishnamurthy, Bernard Scalise.

## Featured Press

- Featured on CNHS website: **Limperopoulos C, De-Asis Cruz, J.** MR detects neurological impairments in newborns with CHD before surgery
- Featured on CNHS website: **Limperopoulos C, De-Asis Cruz, J.** Newborns with CHD show signs of brain impairment even before cardiac surgery
- Featured press on CNHS website: **Limperopoulos C, Basu, S.** Amarie, an infant born prematurely, is enrolled in the ONESIE research study that seeks to understand how preterm birth affects the cerebellum.
- Featured press on Springer Nature: **Limperopoulos C, Basu, S.** Third Trimester Cerebellar Metabolite Concentrations are Decreased in Very Premature Infants with Structural Brain Injury

## Welcome New Team Members !



**Kathryn Bannantine**  
Clinical Research Nurse  
Coordinator



Congratulations to **Manouchka**  
on the arrival of her twin boys

## Welcome New Interns !



**Elizabeth Matsiyevskiy**



**Allen Jo**

## Upcoming Events

- Washington Hospital Center - Grand Rounds, December 2018, Washington DC
- Pediatric Grand Rounds - March 2019 Augusta, Georgia
- HIE Symposium - Jan 2019 Norfolk, VA
- The Annual Conference of the Israel Society of Obstetrics and Gynecology - Jan 19, Ramat-Gan Israel

**Destination Imagination "DI" Team from St. Peters Catholic School in Waldorf Visited us to learn more about developing brain !**



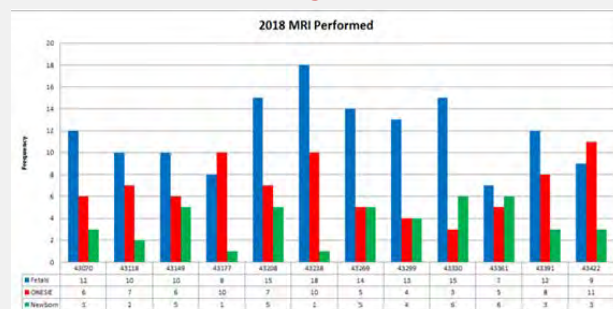
## Research Presentations

- 5th Annual Human Placenta Meeting, Human Placenta Project: **Placental Structure and Function in Real Time, Current Progress and Future Directions.** Bethesda, MD. Nov 2018. **Poster Presentations :**
  - Andescavage N.** Characterizing gender-specific anatomic and diffusional development of the placenta in the healthy human pregnancy.
  - Lu YC.** In vivo quantitative MRI measurement of human placental morphometry in healthy and high-risk fetuses.
  - Zun Z.** Changes in MR susceptibility of the human placenta in response to maternal hyperoxia.
  - You W.** Altered placental hemodynamic response following maternal hyperoxia in pregnancies complicated by fetal congenital heart disease.
- Limperopoulos C, Functional Imaging of the Fetal brain and Placenta, ISFB Symposium**
- ISFB Symposium. Washington DC. Nov 2018 Poster Presentations:**
  - Andescavage N.** Placental diffusion in "brain-sparing" and "non-brain sparing" fetal growth restriction.
  - Cruz, J.** Thalamicortical functional organization in the developing fetal brain.
  - Krishnamurthy, D.** Integrated Research Information System (IRIS) - Real-time Multi-Platform Fetal and Neonatal Brain MRI processing and visualization toolkit.
  - Pradhan, S.** Non-invasive Measurement of Biochemical Profiles in the Developing Fetal Brain.
  - Pradhan, S** - Feasibility of detecting in utero placental metabolic profile using Magnetic Resonance spectroscopy
  - Schlatterer, S.** The Placenta-Heart=Brain Connection: Placental Pathology and Brain MRI Findings of Neonates with Congenital Heart Disease.
  - Wu. Y.** Impaired Global and Regional Brain Growth in Fetuses with Complex Congenital Heart Disease.
  - Zhao, L.** Improved Image Resolution and Speed in Fetal MRI.
  - Zun, Z.** MR susceptibility imaging of the human placenta in vivo: Preliminary results in healthy pregnancies.

## Research Publication

- Hernandez-Castillo C, Limperopoulos C, Diedrichsen J.** A representative template of the neonatal cerebellum.
- Limperopoulos C.** Early extra-uterine exposure alters regional cerebellar growth in infants born preterm.
- Limperopoulos C.** Clinical course of a fetus with hypoplastic left heart syndrome and premature ductal constriction" for publication in Cardiology in the Young

## 2018 Study Updates



**HAPPY HOLIDAYS !**