

# Mother Infant Research Institute



## FALL, 2018

### NEW FACULTY

*MIRI is thrilled to welcome three new PIs to our Institute. Each established Investigator brings a unique skillset and approach to addressing maternal and neonatal health.*

**DR. PATRICK CATALANO**



Patrick Catalano, MD, FACOG serves as both a Senior Research Investigator at MIRI and the new Vice Chair of Obstetrics & Gynecology Research. As a practicing physician-scientist for over 40 years, Dr. Catalano has helped to identify the lifelong health consequences of maternal obesity and gestational diabetes on both pregnant women and their children. Dr. Catalano joins us from Case Western Reserve University, MetroHealth Medical Center, Cleveland, OH where he was the Director of the Center for Reproductive Health and the Director of the Clinical Research Unit. His research has been funded by the National Institutes of Health (NIH) for over 30 years. Currently, Dr. Catalano serves as a Principal Investigator on the NICHD R01- sponsored clinical trial exploring the impact of lifestyle interventions in preparation for pregnancy (the LIPP trial).

**DR. PERRIE O'TIERNEY-GINN**



Perrie O'Tierney-Ginn, PhD is a Principal Investigator in the Mother Infant Research Institute. Her research interest focuses on the effects of maternal nutrition on fetal cardiovascular development and fat deposition, focusing on the role of placental lipid management in this relationship. Her lab is focused on two major NIH-funded projects: a cohort study to determine how maternal lipid metabolism in early pregnancy affects placental function and fetal growth; and identification of placental-derived microRNA affecting maternal glucose metabolism during pregnancy. The broader goal of her research is to understand how mother and placenta interact to regulate nutrient metabolism and delivery.

**DR. MARY WALLINGFORD**



The overarching research goal of Mary Wallingford, PhD is to advance biomedical knowledge of the placenta and promote the development of early diagnostics and novel therapeutics for disorders of placental dysfunction. She joined the Mother Infant Research Institute (MIRI) in March of 2018 and holds a joint appointment in the Molecular Cardiology Research Institute (MCRI). The research focus of the Wallingford Lab is vascular development and pathophysiology of the least understood human organ: the placenta. The placenta contains highly specialized vasculature that mediates interactions between maternal and fetal circulatory systems during pregnancy. Normal growth and function of the placenta are essential for maternal and fetal health, both during pregnancy and later in life.

## GRANTS

Dr. Jill Maron was named Multi-PI in a 5-year U01TR002271 for over \$8 million from the National Center for Advancing Translational Sciences (NCATS) of the National Institutes of Health. She and Dr. Jonathan Davis, Chief of Newborn Medicine at Tufts Medical Center, will lead the multi-center study “Precision Medicine in the Diagnosis of Genetic Disorders in Neonates.”

## SUMMER RESEARCH ACTIVITIES

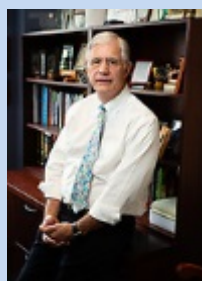
When they weren't in the lab this summer, MIRI Investigators were busy presenting exciting science at national and international conferences. Here are some of the highlights of their summer activities broadening scientific knowledge in obstetrics, placentation and newborn medicine.



**Dr. Jill Maron**, Executive Director of MIRI, was an invited lecturer at the Charleston Swallowing Conference at Northwestern University, Evanston IL. Dr. Maron gave three presentations during the conference including the opening lecture, which focused on swallowing and feeding disorders across the lifespan. It was attended by 800 participants from over 14 countries. She was also an invited guest speaker at the International Association of Dental Research in London in July. Her presentation was part of the Symposium “Will Saliva Translate to a Real Diagnostic Tool?” Dr. Maron, who is a founder of the North American Saliva Symposium (NASS), specifically addressed unique considerations of integrating salivary diagnostics into the neonatal population. Finally, she served as an *ad hoc* reviewer for the Pregnancy and Neonatology Study Section for *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) in June in Washington, D.C.



**Dr. Errol Norwitz** was an invited lecturer at “Frontiers in Reproduction: Molecular and Cellular Concepts and Applications,” held at the Marine Biological Laboratories in Woods Hole, MA. This intensive six-week basic science training program of researchers in reproduction, of which Dr. Norwitz is a member of the Board of Directors, is funded by the NICHD, the Burroughs Wellcome Fund and other organizations supporting the study of cell biology and reproduction. Dr. Norwitz's lecture, “Human implantation and placentation: normal and abnormal,” was part of the section on the developing adult male and female reproductive tracts under normal and pathological conditions.



**Dr. Patrick Catalano** attended the American Diabetes Association 78th Scientific Sessions Meeting in Orlando, FL. His oral presentation was entitled “Longitudinal changes in amino acid (AA) turnover in pregnancy in women with normal glucose tolerance (NGT) and GDM – relationship to fetal growth.” Dr. Catalano, who has helped to identify the lifelong health consequences of maternal obesity and gestational diabetes on both pregnant women and their children, also co-chaired the ADA Symposium “Who Do You Think You Are? Heterogeneity of Obesity and Gestational Diabetes Mellitus.” Three other abstracts of which Dr. Catalano was a co-author were presented at the meeting. Here in Boston, Dr. Catalano was a participant in the symposium “Bridging the Chasm between Pregnancy and Women's Health over the Life Course,” at Boston University School of Medicine.



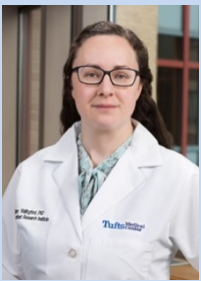
**Dr. Perrie O'Tierney-Ginn and Dr. Fernanda Alvarado**, a postdoctoral fellow in the O'Tierney-Ginn lab, also attended the ADA meeting in Orlando. Dr. O'Tierney-Ginn reviewed placental lipid metabolism in the setting of maternal obesity and diabetes, and discussed how these changes in placental lipid handling may contribute to altered fetal fat deposition. She also described recent data from her laboratory on how maternal diet modifies metabolic pathways in the placenta, and potentially the effects of maternal obesity on offspring. **Dr. Alvarado's poster** was entitled the "Relationship between Maternal DHA levels and Insulin Resistance in Hawaiian Women." Omega-3 fatty acids such as DHA have been shown to decrease insulin resistance in animals, though the effects of DHA in pregnant women are unclear. Dr. Alvarado presented data showing that high maternal DHA levels are associated with less insulin resistance in obese women. The O'Tierney-Ginn team speculates that high omega-3 intake before pregnancy has a positive metabolic impact in obese women.



**Dr. Michael House** participated in a study section reviewing applications for an R01 investigating "Opioid Use Disorder in Pregnancy," funded by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) and the National Institute on Drug Abuse (NIDA). Opioid use has reached epidemic proportions in the U.S. with 259 million prescriptions in 2012 alone, and this epidemic has not spared pregnant women. Approximately one third of insured reproductive-aged women fill a prescription for an opioid medication each year. The incidence of neonatal opioid withdrawal syndrome (also known as neonatal abstinence syndrome) increased from 1.19 to 5.77 per 1000 hospital live births per year between 2000 and 2009. By 2012, nearly 22,000 neonates were born with neonatal opioid withdrawal syndrome in the United States each year, translating to one neonate born every 30 minutes and resulting in \$1.5 billion in hospital charges nationwide constituting a public health emergency. Moreover, opioid use during pregnancy is associated with maternal comorbidities, preterm birth, fetal growth restriction, and other neonatal complications. This clinically-oriented R01 will fund research gaps in a critically important disorder.



**Dr. Tomo Tarui** presented his team's study, "Comparative quantitative MRI analyses of regional brain growth and cerebral sulcal development in living fetuses with isolated ventriculomegaly and Down syndrome," at Pediatric Academic Societies Meeting 2018 in Toronto, Canada. PAS is one of the largest academic meetings in Pediatrics, hosting over 65,000 pediatricians, research scientists, health care providers and policy makers, including 13,000 international attendees. Dr. Tarui's team revealed precise anatomical differences in fetal brains with Down syndrome and cerebral ventriculomegaly using advanced fetal magnetic resonance imaging (MRI) quantitative analysis methods. Dr. Tarui and his team continue to work on this project to further delineate their developmental differences in the fetal period and their potential impacts on future neurodevelopmental functions.



**Dr. Mary Wallingford** attended the 77th Society for Developmental Biology (SDB) Annual Meeting in Portland Oregon, July 20-24. She received a Junior Faculty Travel award to attend the meeting. At the meeting, she presented her abstract "Regulation of Inorganic Phosphate at the Maternal-Fetal Interface." Dr. Wallingford also attended the "SDB Boot Camp for New Faculty" at Reed College in Oregon. Its intellectual calisthenics included best practices on effective teaching, mentoring, and grant writing. While in Oregon, Dr. Wallingford had a full day of meetings with the University of Washington Placenta Research Network, an organization which she founded in 2016. Finally, Dr. Wallingford received a Judge Travel Award for the 2018 Annual Biomedical Research Conference for Minority Students (ABRCMS), which she will attend in November, 2018.


## RECENT PUBLICATIONS

MIRI's Principal Investigators published eight new manuscripts.



1. Lowe WL, Scholtens DM, Lowe LP, Kuang A, Nodzenski M, Talbot O, **Catalano PC**, Linder B, Brickman WJ, Clayton P, Deerochanawong C, Hamilton J, Josefson JL, Lashley M, Lawrence JM, Lebenthal Y, Ma R, Maresh M, McCance D, Tam WH, Sacks DA, Dyer AR, Metzger BE. Association of gestational diabetes with maternal disorders of glucose metabolism and childhood adiposity. *JAMA* 2018;320:1005-1016. [Pubmed Abstract](#)
2. **Wallingford MC**, Benson C, Chavkin NW, Chin MT, Frasch MG. Placental vascular calcification and cardiovascular health: It is time to determine how much of maternal and offspring health is written in stone. *Front. Physiol* Aug 2018;doi.org/10.3389/fphys.2018.01044 [Pubmed Abstract](#)
3. Gray KJ, Kovacheva VP, Mirzakhani H, Bjonnes AC, Almoguera B, DeWan AT, Triche EW, Saftlas AF, Hoh J, Bodian DL, Klein E, Huddleston KC, Ingles SA, Lockwood CJ, Hakonarson H, McElrath TF, Murray JC, Wilson ML, **Norwitz ER**, Karumanchi SA, Bateman BT, Keating BJ, Saxena R. Gene-Centric Analysis of Preeclampsia Identifies Maternal Association at PLEKHG1. *Hypertension* Aug 2018;72:408-416. [Pubmed Abstract](#)
4. Cross SN, Nelson RA, Potter JA, **Norwitz ER**, Abrahams VM. Magnesium sulfate differentially modulates fetal membrane inflammation in a time-dependent manner. *Am J Reprod Immunol* July 2018;80:e12861. [Pubmed Abstract](#)
5. Alvarado FL, Calabuig-Navarro V, Haghiac M, Puchowicz M, Tsai PS, **O'Tierney-Ginn P**. Maternal obesity is not associated with placental lipid accumulation in women with high omega-3 fatty acid levels. *Placenta* Sept. 2018;69:96-101. [Pubmed Abstract](#)
6. Wexler DJ, Powe CE, Barbour LA, Buchanan T, Coustan DR, Corcoy R, Damm P, Dunne F, Feig DS, Ferrara A, Harper LM, Landon MB, Meltzer SJ, Metzger BE, Roeder H, Rowan JA, Sacks DA, Simmons D, Umans JG, **Catalano PM**. Research Gaps in gestational diabetes mellitus: Executive summary of a national institute of diabetes and digestive and kidney diseases workshop. *Obstet Gynecol* Aug 2018;132:496-505. [Pubmed Abstract](#)
7. Barbour LA, Scifres C, Valent AM, Friedman JE, Buchanan TA, Coustan D, Aagaard K, Thornburg KL, **Catalano PM**, Galan HL, Hay WW Jr, Frias AE, Shankar K, Simmons RA, Moses RG, Sacks DA, Loeken MR. A cautionary response to SMFM statement: pharmacological treatment of gestational diabetes. *Am J Obstet Gynecol* June 2018;pii: S0002-9378(18)30529-5. [Pubmed Abstract](#)
8. Scatena M, Jackson MF, Speer MY, Leaf EM, **Wallingford MC**, Giachelli CM. Increased Calcific Aortic Valve Disease in response to a diabetogenic, procalcific diet in the LDLr<sup>-/-</sup>-ApoB100/100 mouse model. *Cardiovasc Pathol* May-June 2018;34:28-37. [Pubmed Abstract](#)

**SUMMER STUDENTS** MIRI was excited to host numerous students this summer throughout our laboratories. We were thrilled to teach these enthusiastic learners and excite them about the important impact that basic, translational and clinical research may have on maternal and child health.




**HOUSE LAB**

	<b>Skylar Karzhevsky</b> Undergraduate, Boston University	Investigating the effects of prostaglandin E1 and E2 on the biomechanical properties of cervical tissue remodeling.
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**MARON LAB**

	<b>Julia Fasse</b> Undergraduate, Tufts University	Students worked on numerous studies in the Maron Laboratory including Dr. Maron's R01 Clinical Trial <a href="#">SOMATOSENSORY MODULATION OF SALIVARY GENE EXPRESSION AND ORAL FEEDING IN PRETERM INFANTS</a>
	<b>Abigail McIntosh</b> Undergraduate, Tufts University	
	<b>Merjem Rizvancevic</b> Undergraduate, UNH	


**NORWITZ LAB**

	<b>Tom Lee</b> Undergraduate, UMass Amherst	Joint Project: Characterization of two genes involved in decidualization of the endometrial stroma.
	<b>Allen Ng</b> Undergraduate, Northeastern University	
	<b>Michelle Ng</b> Undergraduate, Univ. of Connecticut	Use of mouse granulosa cell-derived induced pluripotent stem cells (mGriPSC) to restore ovarian function.




**O'TIERNEY-GINN LAB**

	<b>Gabriel Simao</b> High School Student	Measuring the expression of microRNAs in the placenta that may affect maternal insulin sensitivity.
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**TARUI LAB**

	<b>Esther Muradov</b> Medical Student, Tufts Univ. Sch. Med.	Identified abnormal developmental features of fetal brains with cerebral ventriculomegaly. The data is an important keystone for further development of prenatal prognosis models of fetal brain anomalies.
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**WALLINGFORD LAB**

	<b>Simon Shulman</b> Undergraduate, UMass Amherst	Joint project: Maternal-fetal phosphate transport: the fetal side. High School Student
	<b>Destinee-Alix-Garth</b> High School Student	
	<b>Allyson Imbacuan</b> High School Student	



## FAREWELL TO SUMMER – MIRI'S LABOR DAY PARTY...



Before heading back to the lab for another year of work, MIRI employees, friends, and family enjoyed a get together hosted by Dr. Maron (far right).

## MIRI FALL SEMINAR SERIES

Please join us, at Stearns Auditorium in Farnsworth, for our Fall Seminar Series 2018:

September 21, 2018

“Maternal obesity and offspring health: Opportunities to improve outcomes”

Sarbattama Sen, MD Assistant Professor of Pediatrics, Brigham and Women's Hospital

October 19, 2018

“Neonatal Sepsis: A view from the SOFA”

James L. Wynn, MD, Associate Professor of Pediatrics, Pathology, Immunology and Experimental Medicine  
University of Florida College of Medicine, Division of Neonatology

November 16, 2018

“On moms, microbes & metabolism: How the ‘First 1000 Days’ Influence obesity and metabolic disease risk”

Kartik Shankar, PhD, DABT

Associate Professor, Department of Pediatrics

University of Arkansas for Medical Sciences

Director, Metabolic Programming Lab, Arkansas Children's Nutrition Center

December 7, 2018

“Clarifying autism diagnoses with saliva-based testing”

Steve Hicks, MD, PhD, Assistant Professor of Pediatrics

Penn State College of Medicine

