Pre- and Postnatal Exposure Periods for Child Health:
The Rochester ECHO Project

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What is ECHO?

- An NIH-wide program to study Environmental influences on Child Health Outcomes
- ECHO supports “multiple, synergistic, longitudinal studies using existing study populations… to investigate [early] environmental exposures — including physical, chemical, biological, social, behavioral, natural and built environments — on child health and development”
- 4 outcomes are prioritized:
  - Upper and lower airway
  - Obesity
  - Pre-, peri-, and postnatal outcomes
  - Neurodevelopment
- Infrastructures for data and sample analysis, eg, CHEAR
What is our role in ECHO?

- Contribute ‘2’ cohorts (~n=500) from Rochester and Magee/U Pittsburgh
- Contribute novel but synergistic data & concepts
- Uniquenesses/Quasi-uniquenesses:
  - Intensive assessments from 1st trimester
  - Intensive placental analysis
  - Neonatal and repeated MRI
  - Stress physiology + sex steroids + inflammation
  - Early immune mechanisms for child neurodevelopment and metabolic health
- Interconnectedness of neurodevelopment and metabolic outcomes
Rochester
UG3 OD022349

Psychiatry
Moynihan
O’Connor

OB
Barrett
Miller
Murphy
Pressman
Stodgell

Pediatrics
Amin
Caserta
Scheible

Neuroscience
/RCBI
Aslin
Foxe

Pathology
Katzman

UR
CRC
CTSI

Magee/U Pittsburgh
Cohort
Simhan

U Oregon
Brain Image Processing
Fair

Placental Analytics
Placental Processing
Salafia

UC Irvine
Magee Cohort
Buss
Entringer
Wadhwa
What are the BIG ideas?

- Developmental Origins of Health and Disease (DOHaD)
  - *in utero* and early postnatal exposures instigate an adaptive response in the organism that is carried forward in development with persisting effects on behavior and biology
  - Prenatal maternal stress/anxiety may be one programming mechanism

- Maternal Immune Activation model
  - Alteration in maternal immune system may alter neurodevelopment in the child, at the extremes and within more normal variation

- Non-genetic intergenerational transmission of risk
  - Experiences pre-dating the pregnancy may alter maternal biology, which she brings to the pregnancy (and fetus)

- Inflammation as an organizing framework and developmental mechanism linking prenatal exposures and child health
  - Developmental timing and the search for ‘sensitive periods’
What are we doing (and when will we do it)?
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Where are we at?

- Recruitment of pregnant women is well underway
  - Recruitment for another ~15 months
- Infant assessments are just beginning
- Neurodevelopmental assessments for 1-year assessment are now being developed
- Biological samples (blood, urine, saliva, placental tissue, rectal swab, buccal cells, stool, CVF, nails) are being stored
What is needed to move forward and what are the opportunities?

- **Practical:** Opportunities abound for
  - shaping neurodevelopmental protocols, e.g., from 1 yr
  - assisting in collection of science
  - learning why psychologists [and neuroscientists] need to be bothered by placentae, T cells, and adipocytes

- **Conceptual:** Among the needed kinds of translations is that from peripheral “inflammation” – which we study directly and extensively – to “neuro-inflammation” – which we presume but only infer

- **Procedural:** Many different kinds of data are being collected that are *not* now spoken for by existing R01 or U grants
Questions