upside
Understanding Pregnancy Signals and Infant Development

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

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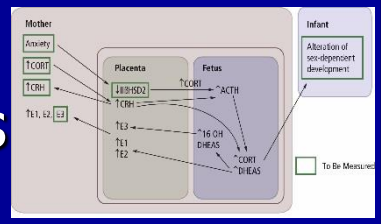
National Institutes of Health
Turning Discovery Into Health

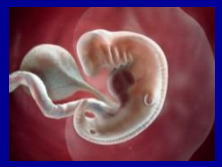
What is ECHO?

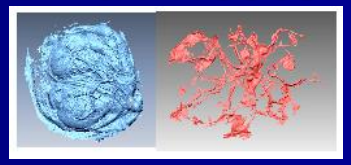
- An NIH-wide program to study Environmental influences on Child Health Outcomes
- ECHO supports "multiple, synergistic, longitudinal studies using existing study populations… to investigate [early] environmental exposures — including physical, chemical, biological, social, behavioral, natural and built 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

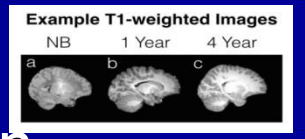
What is oUR role in ECHO?

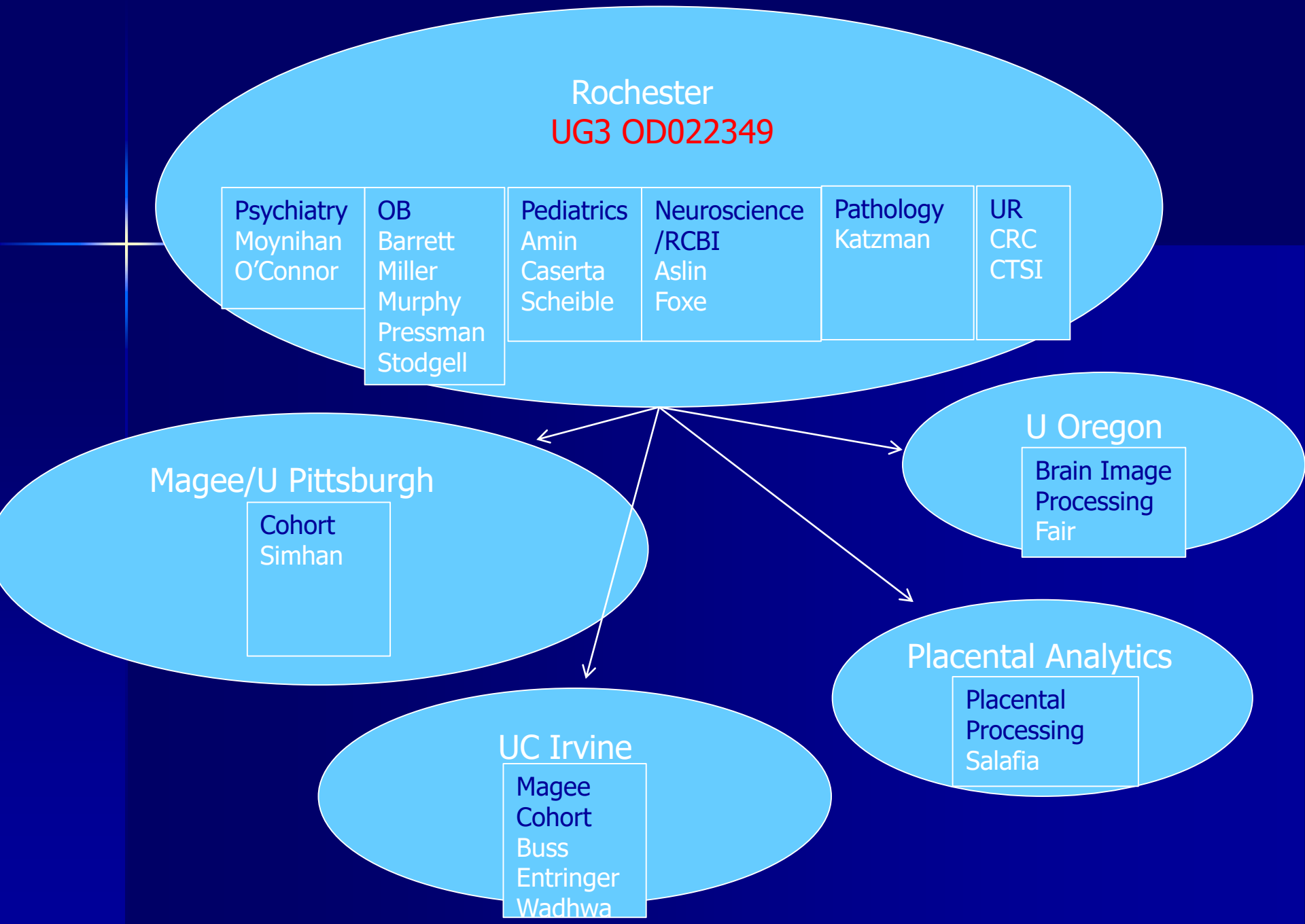
- Contribute '2' cohorts (~n=500) from Rochester and Magee/U Pittsburgh
- Contribute novel but synergistic data & concepts
- Uniquenesses/Quasi-uniquenesses:
  - Intensive assessments from 1st trimester
  - Intensive placental analysis
  - Neonatal and repeated MRI
  - Stress physiology + sex steroids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










Rochester
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Psychiatry
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Foxe
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Cohort
Simhan
Placental Analytics
Placental
Processing
Salafia
UC Irvine
Magee
Cohort
Buss
Entringer
Wadhwa

What are the BIG ideas?

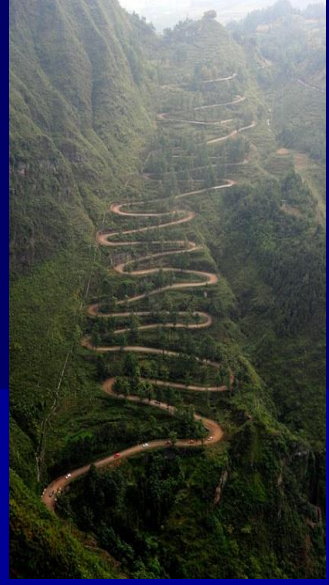
- Developmental Origins of Health and Disease (DOHaD)
  - *in utero* and early postnatal exposures instigate an adaptive response in the organism that is carried forward in development with persisting effects on behavior and biology
  - Prenatal maternal stress/anxiety may be one programming mechanism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

PRE- PRENATAL PERI- POSTNATAL →

		1st	2nd	3rd	Birth	1m	6m	1y	2y	3y	4y
Pre-pregnancy exposures (retrospective)	✓										
Prenatal exposures .demog .psychosoc .blood .urine .saliva .diet .records		✓	✓	✓							
Placenta/cord					✓						
Postnatal exposures .breast milk .caregiving .demog .psychosoc						✓	✓	✓	✓	✓	✓
Child metabolic .DXA .anthropomet .blood .urine .saliva					✓	✓	✓	✓	✓	✓	✓
Child neurodev outcomes						MRI	Cog	MRI EEG Cog	EEG Cog	EEG Cog	MRI EEG Cog

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