

Environmental Exposures on Child Health

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Children's respiratory health affected by postnatal exposure to air pollution...

What is the role of *in utero* exposure?

- ❑ Fetal origins of disease
 - ❑ Early origins of health
 - ❑ Developmental Origins of Health & Disease (DOHaD)
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Today's Talk

- ❑ How might we think about assessing *in utero* exposure?
 - ❑ What are the relevant endpoints when considering air pollution?
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Weight of Evidence*

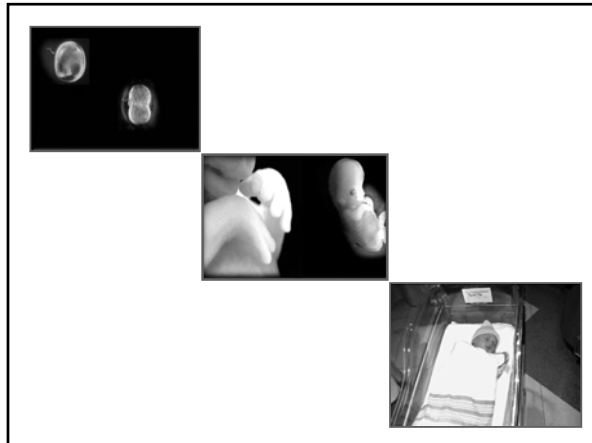
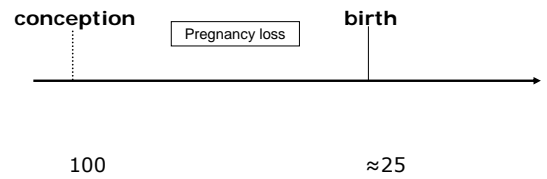
Endpoint	Weight of Evidence
Mortality	
intrauterine	
IMR	Sufficient
PNMR	
LBW	Suggestive
PTD	Insufficient
IUGR	Insufficient
Birth defects	Lack of study

*For inferring causality due to air pollution; Sram et al., 2005.

Limitations of Existing Research

- Exposure
 - Routine air monitoring
 - Limited biomarkers
- Child Health Outcome
 - Dependent upon clinical pregnancy & delivery
 - Limited consideration known determinants of fetal growth & birth size

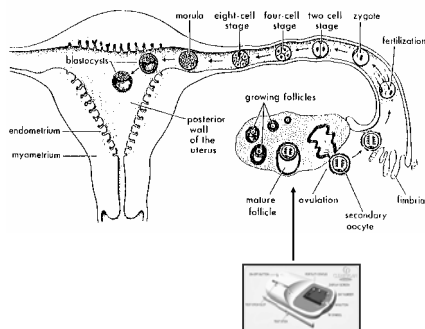
Continuum of Developmental Endpoints



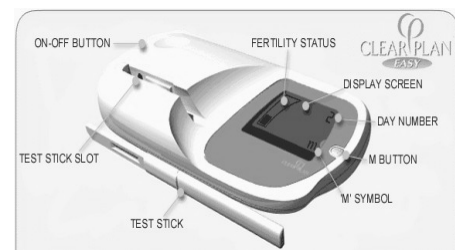
Relevancy of Pregnancy Loss

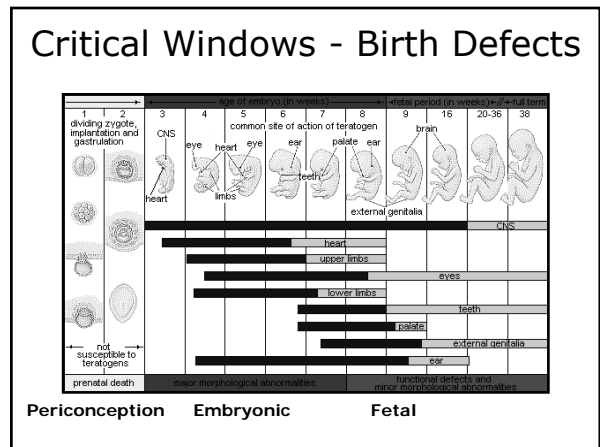
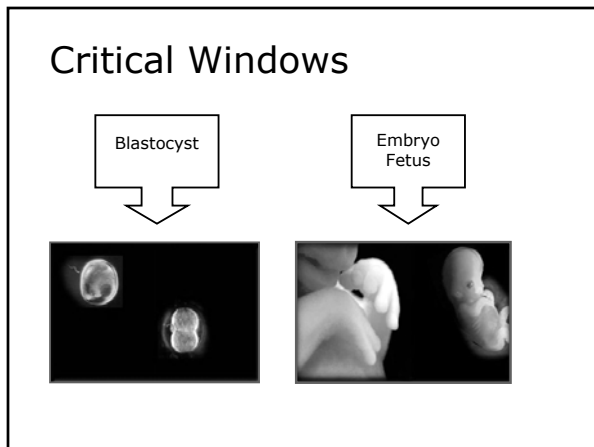
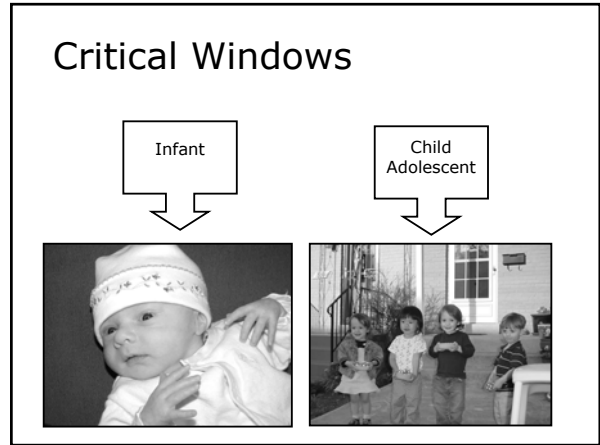
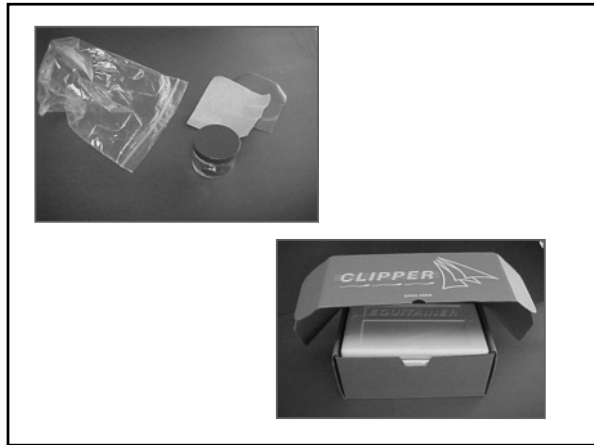
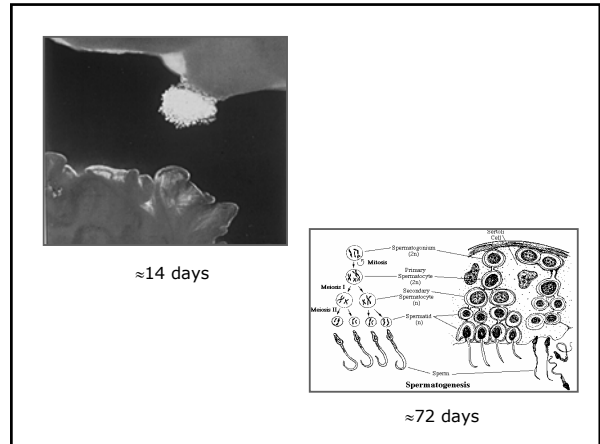
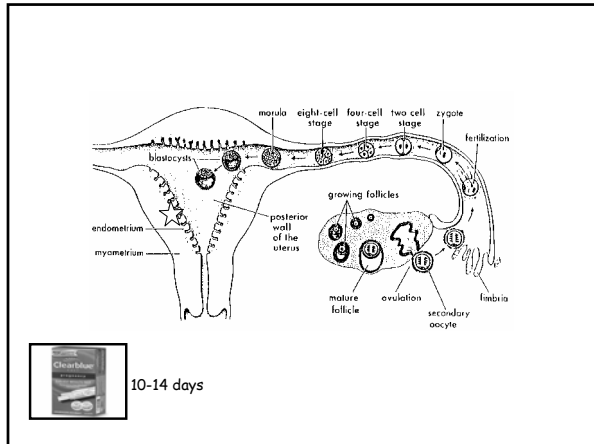
- Embryonic or fetal mortality
 - Male
 - Chromosomally abnormal conceptus

Early human development

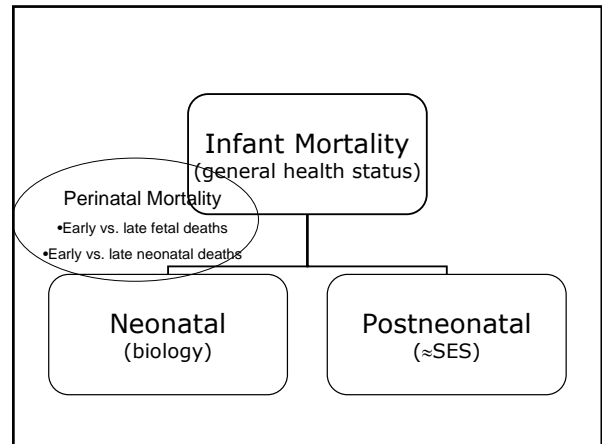


Fertility Monitor





Assessing Birth Endpoints – Study Design Considerations



State Requirements for Fetal Deaths, US

- All products of human conception
 - Weeks from LMP (e.g., ≥ 16 or 20)
 - Birth weight (≥ 350 grams)
 - Combination weeks & birth weight
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Pregnancy Outcomes Highly Correlated

- Prior Hx \approx twofold risk
- Restrict or model pregnancies per woman



Known Determinants of Fetal Growth

- Population
 - Altitude
 - Nutrition
 - Individual
 - Plurality of birth
 - Birth order
 - Gender
 - Birth defect
 - Genes & environment
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Assessing Gestation

- Varying approaches for quantifying
 - Dates vs. ultrasonography
 - LMP vs. conception
 - Calendar or lunar
 - Some biology for <37 week cutpoint
 - Preterm vs. premature
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Assessing Birth Size

- No biology for <2500 gram cutpoint
 - Measurement error
 - Timing cord clamped & infant weighed
 - Observer variation
 - Meconium or voiding
 - Potential bias
 - Distortions in gestational age
 - Complete assessment
 - Weight, length, chest & head
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Birth Prevalence-Birth Defects

- Incidence unknown
 - Birth prevalence varies by definition
 - Major vs. minor
 - Single vs. multiple or syndrome
 - Data source
 - Antenatal screening
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Conclusion

- Tools and methodologies for measuring exposures during pregnancy
 - Populations *at risk* for pregnancy can be recruited for study
 - Minimal data set inclusive of known covariates
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