METABOLIC OUTCOMES OF ENDOCRINE DISRUPTING CHEMICALS

AN ASSESSMENT FOR THE CHAMACOS WOMENS’ HEALTH STUDY

Faculty Mentor: Dr. Brenda Eskenazi
RESEARCH OVERVIEW

- **SEVESO**
  - Contact Info Data Management

- **VHEMBE**
  - Survey Info Data Management

- **CHAMACOS**
  - Develop 16Y Assessment
  - Women’s Health Study Lit Review
• 1976 chemical plant explosion in Seveso, Italy
• Highest residential human exposure to dioxin ever recorded
• Venda tribe of Vhembe district in Limpopo, South Africa

• Assess exposure to and effects of antimalarial insecticide use
CHAM 1
601 pregnant women enrolled 1999-2000,
527 singleton live births

CHAM 2
300 9-year-old children enrolled 2010-2011
DATA COLLECTION

- Biological & Environmental Specimens
  - Blood, hair, breast milk, saliva, etc
- Maternal Questionnaire
- Home Inspection
- Neurodevelopment Assessment
- School Performance
- Physical Exam
- Tanner Staging
- Respiratory Function Tests
SEXUAL RISK-TAKING
SUBSTANCE USE
EXTERNALIZING BEHAVIOR
CRIMINALITY/DELINQUENCY
DRIVING
SCHOOL PERFORMANCE
GANG ACTIVITY
DISCRIMINATION
SOCIAL MEDIA

16 YEAR ASSESSMENT
PLANNING
16 YEAR ASSESSMENT

- Planning meetings to coordinate assessment construction
- Alignment with Salinas Teen Health Study
- Meeting with IRB to discuss ethical and privacy issues
- Researching and designing new scales

- Self-Report Delinquency Scale
- Buss-Perry Externalizing Behavior Scale
- Barkley Driving Behavior Scale
- Everyday Discrimination Scale
OBJECTIVES

- Endocrine Disrupting Chemicals (EDCs)
  - Phthalates
  - DDT/DDE
  - HCB
  - HCH
  - PCBs
  - PBDEs
  - PFOA/PFOS

- Health Outcomes
  - Obesity
  - Cardiovascular disease
  - Type 2 Diabetes
  - Metabolic syndrome
  - Non-alcoholic fatty liver disease
METHODS

Metabolic Syndrome

- Waist circumference
- Fasting blood sugar
- Triglycerides
- Blood pressure
- HDL cholesterol

PubMed

- Hexachlorocyclohexane (HCH)
- Organochlorine pesticides (OCPs)
- Organochlorines (OCs)
- Pesticides
- Endocrine disruptors (EDCs)
- Persistent organic pollutants (POPs)

Returned 332 articles
78 selected for relevance
42 from after 2000
7 exclusively on HCH, 23 on multiple EDCs
<table>
<thead>
<tr>
<th>Reference</th>
<th>Study Type</th>
<th>Exposure(s)</th>
<th>Outcome(s)</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wu H, Bertrand KA, Choi AL, et al. 2013</td>
<td>Case-control study and literature review</td>
<td>plasma HCB other POPs HCB Total PCBs diabetes</td>
<td>Incident T2D Total PCBs</td>
<td>†&lt;br&gt;Pooled OR=2.00 (6 studies)&lt;br&gt;Pooled OR=1.70 (6 studies)&lt;br&gt;OR=1.06/ng/g of serum weight increase in total PCBs (assuming linear relationship)</td>
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↑ Positive association, ↓ Negative association  ✗ No significant association
# RESULTS

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<th>Obesity</th>
<th>Type 2 Diabetes</th>
<th>Metabolic Syndrome</th>
<th>Cardiovascular Disease</th>
<th>Non-alcoholic Fatty Liver Disease</th>
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<td>Phthalates</td>
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FUTURE DIRECTIONS

- Obesity as intermediate risk factor for T2D and CVD
  - Body fat/adiposity as a confounding factor
- Models predicting non-monotonic relationships
- Transgenerational effects of EDC exposure
- Effect modifications by developmental stage and sex
- Additive/synergistic effects of mixtures of multiple EDCs
- Negative impacts of metabolites vs. parent compounds


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