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Children's Environmental Health: Research Complimentary to the NCS

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U.S. Department of Health and Human Services
National Institute of Health
National Institute of Environmental Health Services

Research Complementary to the National Children's Study

- **Long term health effects of lead, mercury, and air pollution**
- **Community Based Participatory Research**
- **Environmental Justice**
- **Centers for Children's Environmental Health and Disease Prevention Program**

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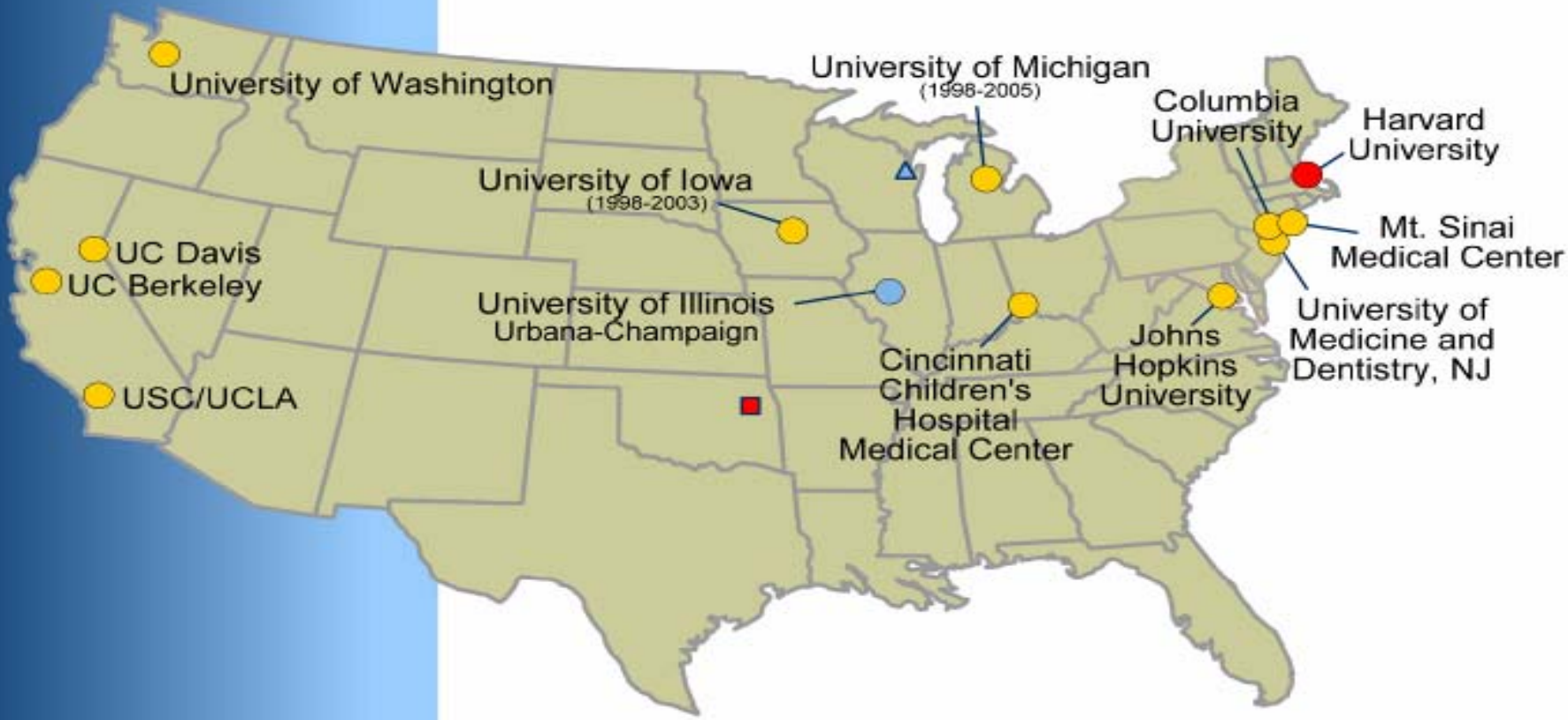
NIEHS/EPA Centers for Children's Environmental Health and Disease Prevention Research

Children's Environmental Health Center Locations



Purpose of the NIEHS/EPA Centers for Children's Environmental Health and Disease Prevention Program

- Laboratory + population health effects + exposure assessment research
- Development & test risk management strategies in order protect the health of children
- Promote multidisciplinary interactions among basic, clinical, & behavioral scientists & develop a future workforce
- Accelerate translation of basic research findings into clinical or intervention strategies to reduce exposures and health outcomes in young children
- Establishment of a national network of children's environmental health researchers

Questions being addressed in Children's Centers

- **Respiratory Disease**
- **Does air pollution cause new cases of asthma, exacerbate existing disease, and affect lung growth and function?**
- **How do genetic polymorphisms play a role in response to air pollution and susceptibility to asthma?**
- **Can we reduce allergens exposures in homes to prevent recurrent episodes of asthma?**

Questions being addressed in Children's Centers

- **Growth and Development**
- **How does exposure to pesticides, metals and other endocrine disrupting chemicals affect growth, development, learning and behavior, in utero, in young children, and through adolescence?**
- **Are there susceptible sub-populations? Are the affects the same in urban and rural populations?**
- **How does the social environment modify these risks?**
- **Can we use interventions such as integrated pest management, & breaking the take home pathway to reduce exposures to children?**

Questions being addresses in the Children's Centers

- **Autism**
- **What are the environmental and genetic risk factors for developing autism?**
- **How do they affect the various phenotypes of autism?**
- **How do chemicals/exposures in the environment affect the critical cells of the brain that are central to the development of autism?**
- **Using animal models that show characteristics of autism spectrum diseases, what can we learn about the impact of chemicals on behavior, language and learning?**

Lessons learned from the NIEHS/EPA Children's Environmental Health Centers (EHP, October 2005)

- **TIME – to assess the full range of developmental consequences to environmental chemicals and other exposures**
- **OUTCOME ASSESSMENT – in broad and narrow in scope**
- **EXPOSURE ASSESSMENT- environmental and personal measures working in concert with observational and ecologic approaches**
- **QA/QC**
- **COMMUNITY PARTICIPATION is paramount to success**
- **ETHICS**

Focus on exposure assessment in the Children's Centers

- Environmental assessment
  - Home, School, Car, Neighborhood
- Geographic Information System
- Questionnaire assessment
- Biomonitoring
  - Biospecimens collected from mother and child

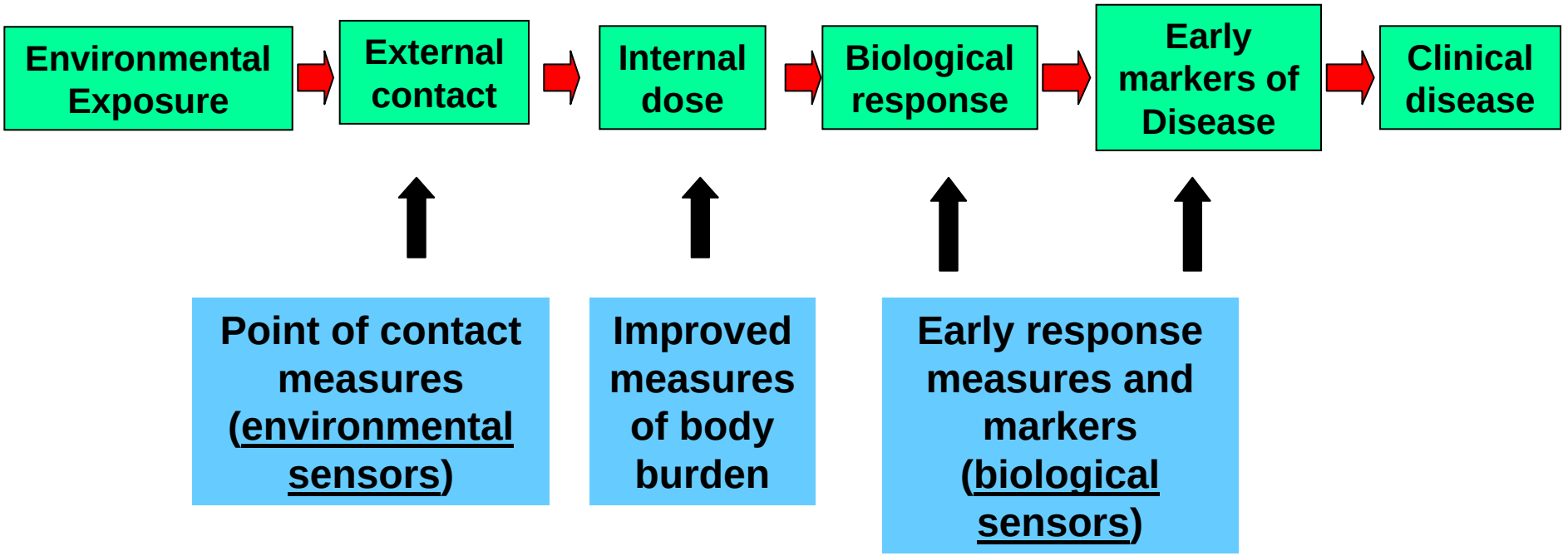
Biomarker research within the Children's Centers

- Maternal assessments- Personal air sampling, biomonitoring
- Assessment of children's body burden through measurements in biospecimens collected at critical windows of exposure and development
- New methods developed – meconium, phthalates, urinary metabolites of organophosphate pesticides
- Mother – child comparisons
  - Cord blood, other samples
- Integrated biomarkers
  - PAH- DNA adducts
- Comparison across a suite of biomarkers; across time; across geography

Possible strategies for improvements in exposure assessment

- Improve integration with biologic response
- Improved personal monitoring using real time monitoring
- Use of new technologies that define response on the cellular and molecular level
    - Genomic signatures
    - ID of proteomic responses
    - Metabolomic patterns of exposure by-products
- Better defined time course of exposure response
- Increased statistical precision

More Precise Markers of Exposure



Links personal exposures to body burden to biological response

NIEHS new initiative – Exposure Biology

- New technology to develop biomarkers of cellular response to environmental exposures
  - toxicogenomics, proteomics, metabolomics
- Are there exposure specific signatures?
  - Aging, acute vs. chronic exposure scenarios, dose, route of exposure
  - Are they tissue specific? Can they be measured in peripheral blood or other available biospecimens?
  - Are they affected by disease pathology?

Exposure Biology Initiative

- **Develop the biomarkers in animals and humans to compare and contrast response**
- **Focus on well characterized populations with stored biospecimens to develop and validate exposure -response markers**
  - **Compare with questionnaire assessment, body burden measures, and other currently used biomarkers**

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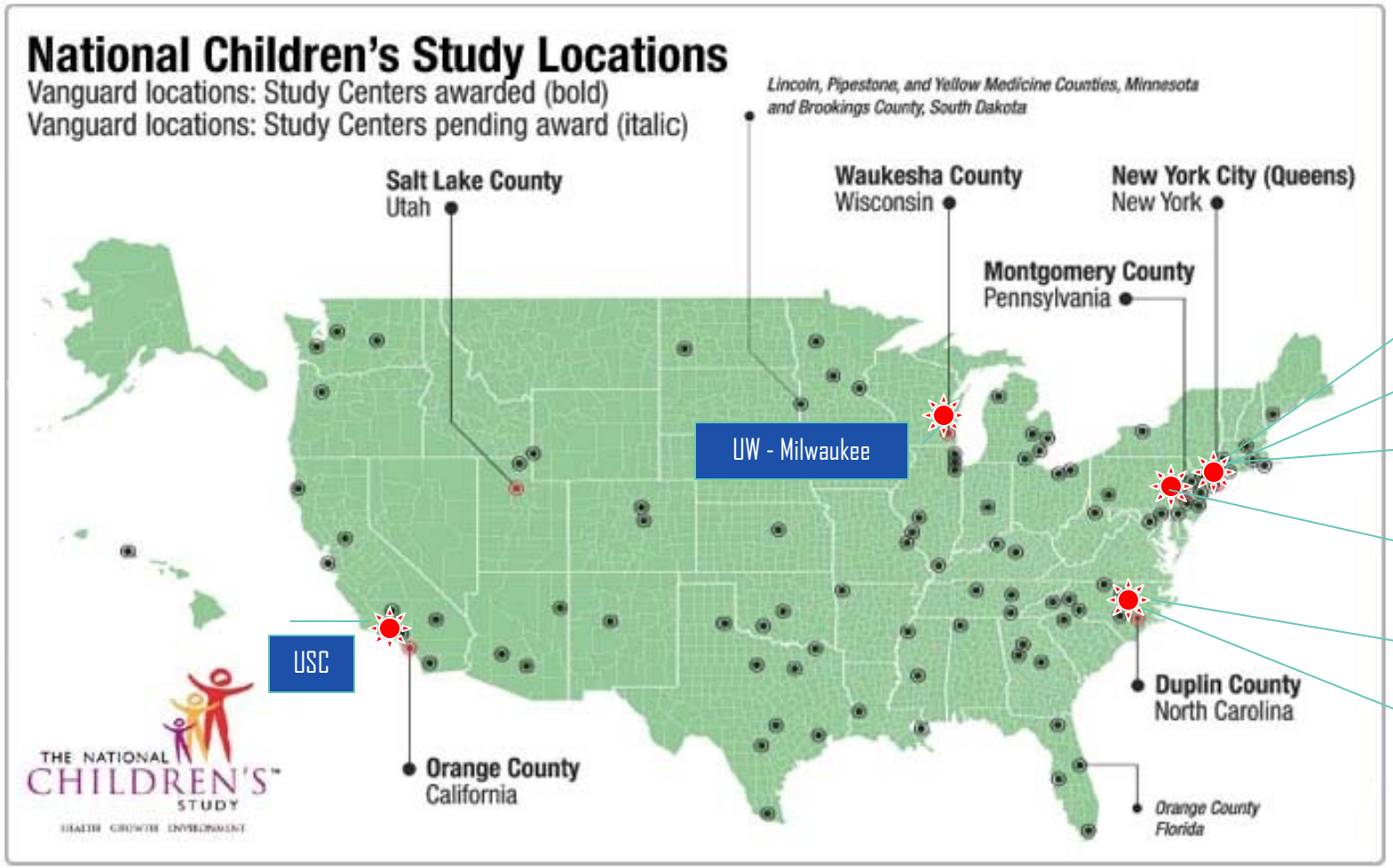

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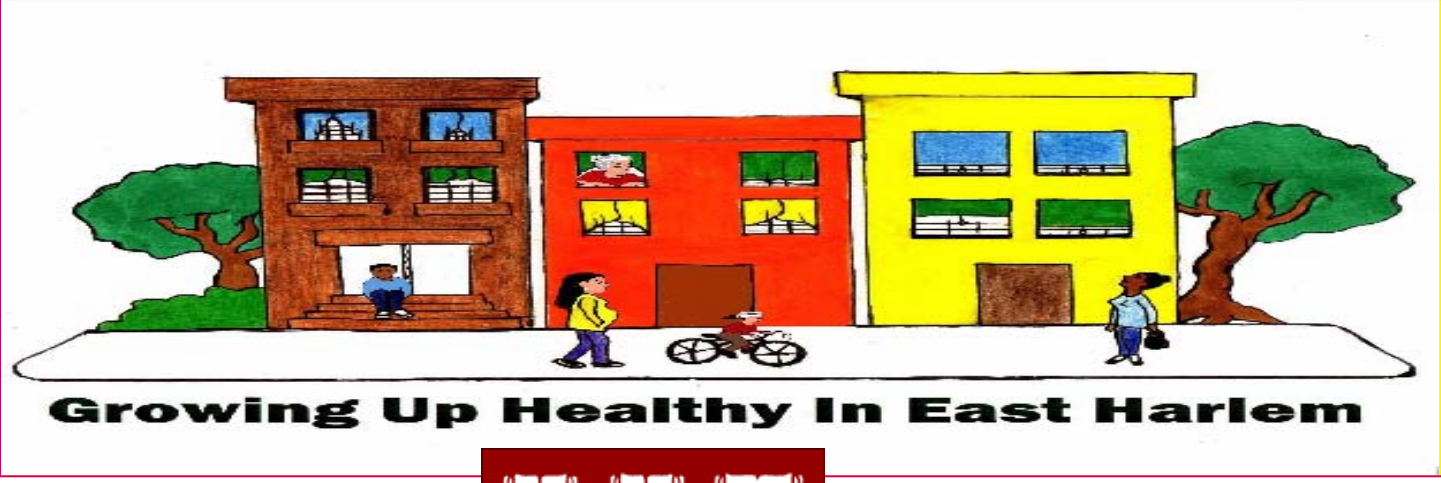

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THE CENTER FOR
Childhood
Neurotoxicology and Exposure Assessment

CHAMACOS

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HOME STUDY

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