Overview of EPA’s Endocrine Disruptors Research Program

Elaine Francis
National Program Director
Pesticides and Toxics Research Program

Purpose of EDCs Research Program

- To provide EPA’s Office of Prevention, Pesticides, and Toxic Substances, the Office of Water and the Regions with the scientific information they need to reduce or prevent unreasonable risks to humans and wildlife from exposures to individual pesticides and toxic chemicals and environmental mixtures of chemicals that interfere with the function of the endocrine system.
Annotated History

- Identified EDCs as emerging public health and environmental issue (’94)
- Published interim guidance document (’97)
- Published peer-reviewed research plan (’98)
- Developed Multi-Year Plan (’01, ’03, ’07 draft)
- OMB Program Assessment Rating Tool (’04)
- External review by Subcommittee of Board of Scientific Counselors (’04, ’07)
- Issued seven RFAs through extramural grants program (funded 62 grants)
- >519 peer reviewed publications

Long-Term Goals

- Supporting Agency’s Screening Program
- Providing a better understanding of the science underlying the effects, exposure, assessment, and management of endocrine disruptors
- Determining the extent of the impact of endocrine disruptors on humans, wildlife, and the environment
Supporting Agency’s Screening Program

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<td>Uterotrophic</td>
<td>Avian 2-gen</td>
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<td>AR</td>
<td>Pubertal (female)</td>
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<td>Mysid Lifecycle</td>
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<td>Frog metamorphosis</td>
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Understanding Underlying Science (1)

- Determining classes of chemicals that act as EDCs and their potencies
  - (Anti)androgens, (anti)estrogens, antithyroids
- Investigating mode of action of certain EDCs
- Studying approaches to cumulative risk to EDCs
- Determining the dose-response curves for EDCs at environmentally relevant concentrations
- Studying the impact of developmental exposures in the short term and later in life
- Examining the ability to extrapolate across species
- Developing next generation of screening assays
Understanding Underlying Science (2)

- Identifying major sources of EDCs entering the environment, focusing on:
  - wastewater treatment plants
  - confined animal feeding operations
  - drinking water treatment plants
- Developing tools for risk management of EDCs, such as biodegradation processes or pollution prevention strategies
- Developing and validating analytical and DNA based molecular indicator methods for characterizing environmental exposures

Determining Impacts (1)

- Paper Mill Effluents
- Waste Water Treatment Effluents
  - Collaborations with: Office of Water, 10 EPA Regions; Global Water Research Coalition, state of Ohio, Chicago
- Biosolids/Sludge
- Drinking Water
- CAFOs
  - Collaborations with: Regions, STAR awardees, other Agencies
- Dosed-Lake Study in Canada
- Developing novel methods to characterize exposures to mixtures
Determining Impacts (2)

- Determining the magnitude of adverse impacts on wildlife
  - Evidence that EDCs are affecting wildlife at individual level
  - Evidence that EDC effects in individuals are causing population-level effects
  - What tools are needed to provide linkage between population level effects and diagnostic evidence of EDC impacts

- Determining the magnitude of adverse impacts of EDCs on human health
  - Supported 12 epidemiology studies across federal agencies
  - Exposure to high levels of PBBs prenatally and via breast milk may impact puberty in girls
  - Conducted large scale exposure studies to assess exposures of children to environmental chemicals, including some suspected EDCs

What’s in the Future?

- Finalizing updated Multi-Year Plan
  - Taking into consideration recommendations by full BOSC Program Review in December 2004 and Mid-cycle review in September 2007
  - Continuing to develop new methods/tools and applying them to environmentally relevant issues – e.g., WWTP, CAFOs, pharmaceuticals

- Interest in expanding our partnerships and collaborations

- Communicating results
  - Informal interactions with client offices within EPA
  - Workshops
  - Developing a website
  - Synthesis document that summarizes intramural and extramural research
Summary

- There is global concern regarding exposures to some environmental agents that interfere with endocrine systems
- EPA has developed a research program that has three Long Term Goals and is addressing specific key science questions
- EPA’s EDCs’ program is unique among research organizations
  - Human health and wildlife
  - Effects, exposure, risk management
  - Intramural and extramural research
  - Core and problem-driven
  - Leveraged with collaborators in other federal agencies, academia, and industry