Endocrine Disruption at the Top of the World
State of the Science with a Message from Alaska

Carol Kwiatkowski, PhD
Executive Director

TEDX: The Endocrine Disruption Exchange

- Critiques and reviews scientific research
- Provides scientific expertise
- Protects public health and the environment

Theo Colborn 1927-2014

TEDX
The Endocrine Disruption Exchange

Children's Environmental Health Summit 2016

Protecting Children at the Top of the World

Presented by:

ACAT

Alaska Community Action on Toxics


ConocoPhillips Soccer Stadium

Endocrine Disruption can Include

- POPs: Persistent organic pollutants
- PBTs: Persistent, bioaccumulative, and toxic chemicals
- Legacy chemicals: lead, DDT, solvents
- Emerging chemicals: plastics, antimicrobials

Overview

- Biology of endocrine disruption
- Exposure to endocrine disrupting chemicals
- The work of TEDX

Diseases and Disorders Associated with Exposure to Endocrine Disruptors

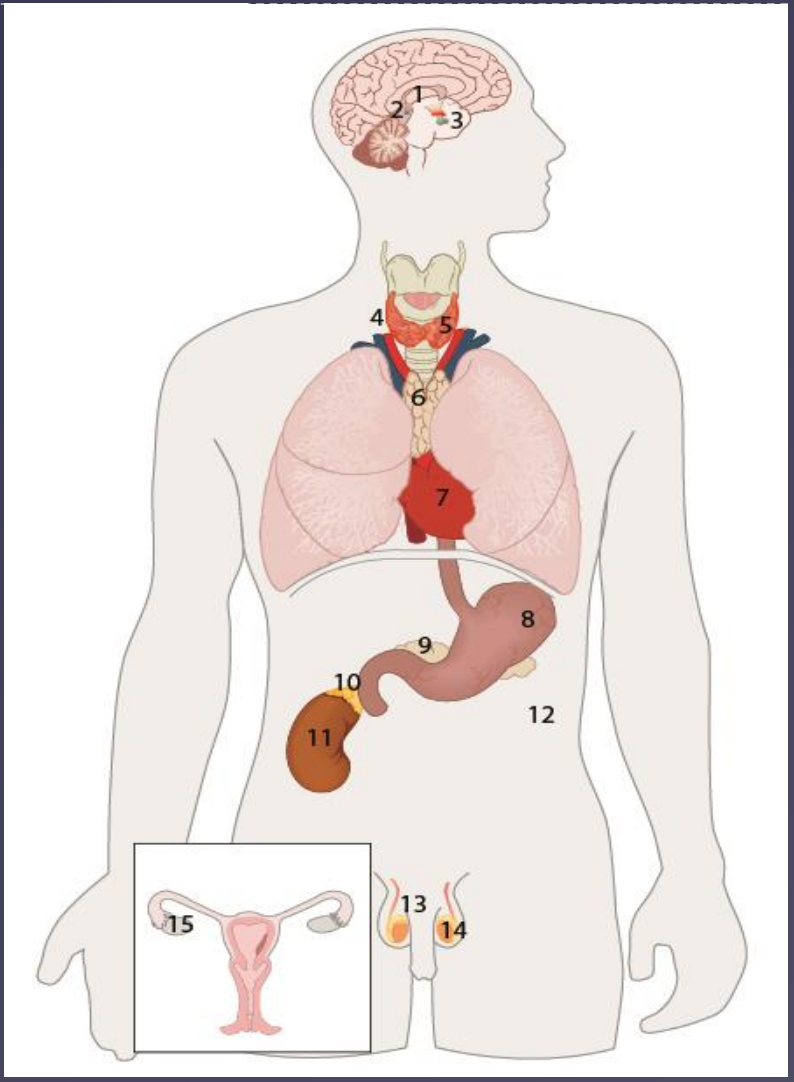
- Infertility and other reproductive problems
- Thyroid conditions
- Diabetes
- Obesity
- Cancer
- Attention Deficit Hyperactivity Disorder
- Autism
- Male birth defects (hypospadias, undescended testes)
- Parkinson's Disease
- Alzheimer's Disease
- Immune system disorders

What is an Endocrine Disruptor?

- An exogenous chemical, or mixture of chemicals, that can interfere with any aspect of hormone action.
  - The Endocrine Society

The Endocrine System

- Glands, organs and tissues of the endocrine system:
  - Reproductive glands, thyroid gland, the brain and other vital organs, fat tissue, skin, muscle



Adapted from HCWH Europe/Mariana Rei. (2013)

Communication through Hormone Messages

Functions of the Endocrine System

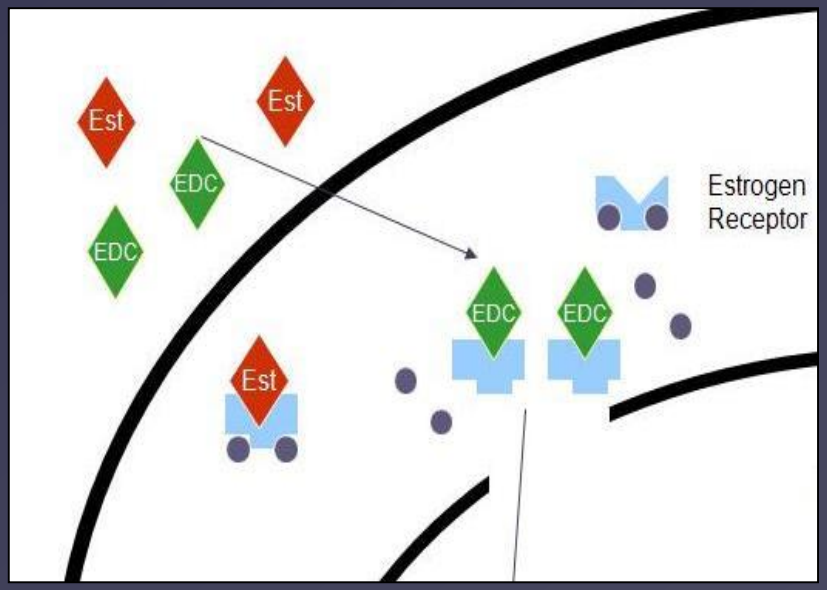
- Organ formation and growth
- Sexual maturation
- Intelligence
- Mood and bonding behaviors
- Sleep patterns
- Appetite and thirst

- Metabolic level
- Fat storage
- Stress response
- Ability to fight illness

- Blood pressure
- Blood sugar
- Cholesterol levels
- Bone density
- And more…

Endocrine disruptors

- Bind to hormone receptors
- Disrupt normal hormone activity
- Interfere with hormone production, transport, and metabolism



Hormone receptor action

Dose Matters

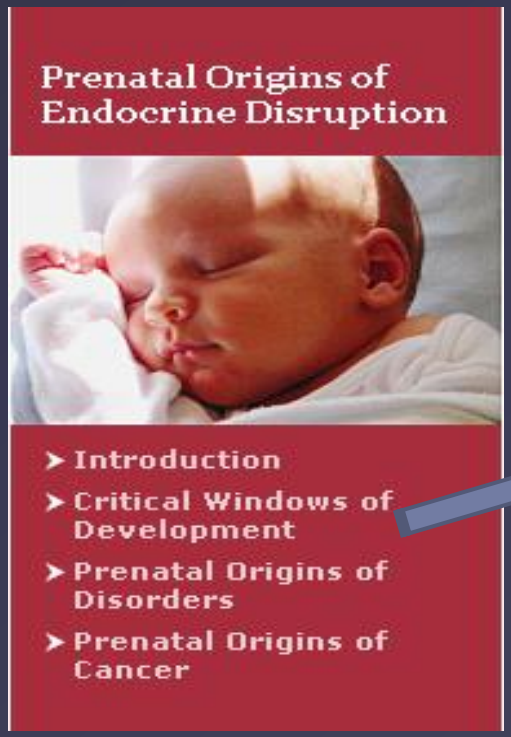
- Effects occur at low exposure concentrations
  - Comparable to levels found in indoor and outdoor environments

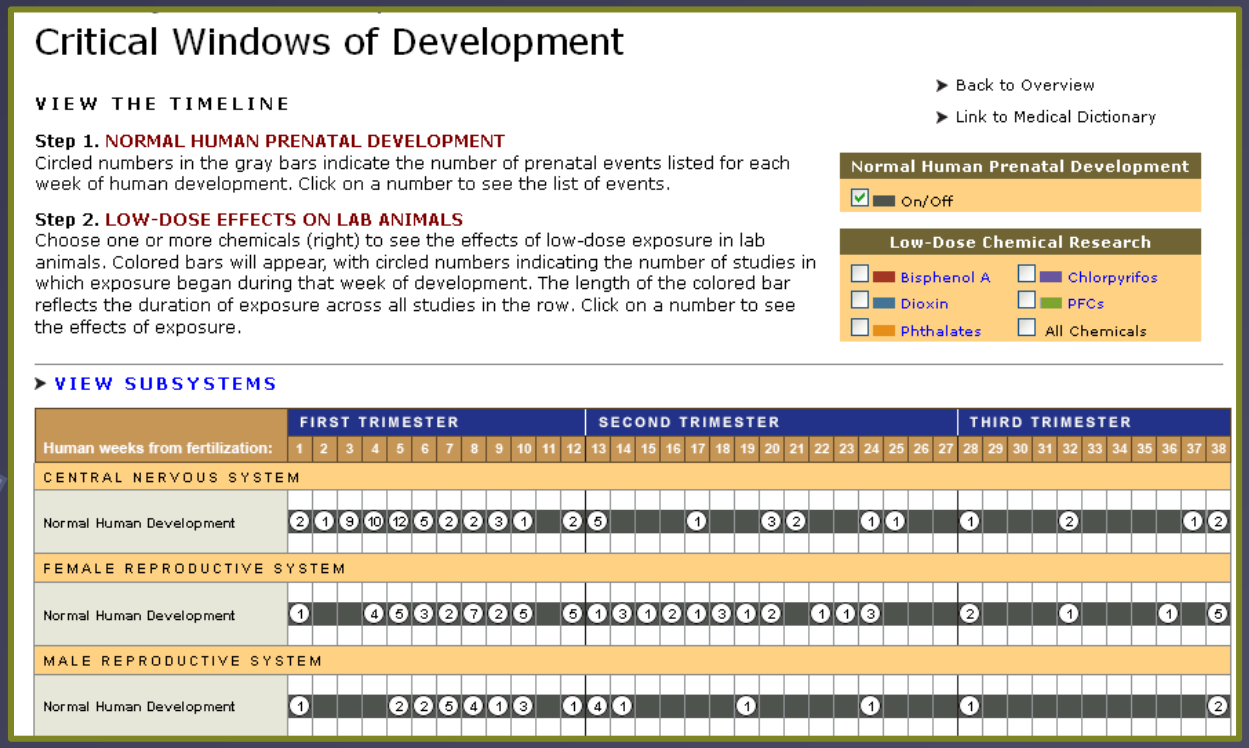
Age of Exposure Matters

- EDCs cross the placenta
- Prenatal and early life exposure can cause adverse effects
- Such effects can be permanent

TEDX Critical Windows of Development

www.tedx.org





Chemicals in the Critical Windows of Development

- Animal research on low-dose chemical effects
  - Bisphenol A (plastic)
  - Phthalates (plasticizer)
  - Chlorpyrifos (pesticide)
  - Dioxins (air pollutant)
  - PFOA and PFOS (non-stick stain/water repellant)

The Fossil Fuel Connection

Flame Retardants
Food Additives
Antimicrobials
Surfactants
Pesticides
Solvents
Plastics
Dyes

Personal Care Products
Household Products
Cleaning Products
Fragrances
Electronics
Furniture
Clothing
Toys

Start here

How EDCs get into the environment and our bodies

- Leaching
- Migration
- Absorption (skin, mouth)
- Digestion
- Breathing

Where are EDCs?

- In air, water, soil, food, dust
- In many wildlife species
- In every person tested

Children's exposure

- Higher levels found in children
- Children are born 'pre-polluted'

Multigenerational exposure

- One exposure = three generations
- Can also affect further generations
- Different effects across generations

State of the Science

- NIEHS Meeting: 25 years of endocrine disruption science
  - Mechanisms of action
  - Screening tools
  - Causal pathways
  - Mixtures

Precautionary principle

- "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

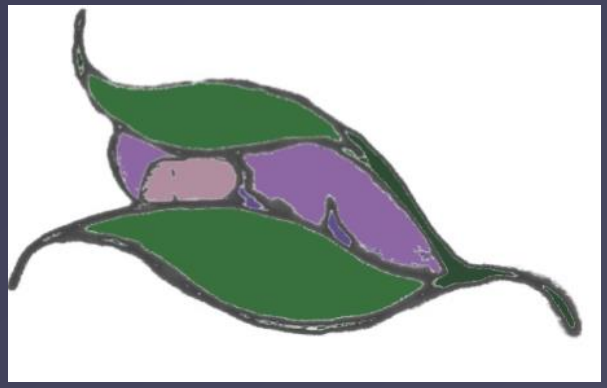
--United Nations Conference on Environment and Development, Rio de Janeiro, 1992

TEDX's Scientific Reviews

- Chemicals
  - Bisphenol A
  - ChemSec SIN List
  - Bisphenol S and Bisphenol F
  - BTEX: benzene, toluene, ethylbenzene, xylenes
  - Polycyclic aromatic hydrocarbons
  - Melamine
  - Triclocarban

TEDX's PODS Project

- Prenatal Origins of Diseases/Disorders and Syndromes
  - ADHD/Hyperactivity
  - Parkinson's disease
  - Autism
  - Diabetes
  - Obesity



Systematic Review

- NIEHS National Toxicology Program Office of Health Assessment and Translation
  - Explicit structured protocol, transparent decision making
  - Hazard identification conclusion
  - Better for regulatory decision making
  - New standard for literature reviews

Project TENDR

- Targeting Environmental Neuro-Developmental Risks
  - Scientists, Health Professionals/Providers, Children's Health and Disabilities Advocates
  - Consensus Statement: the chemical regulatory system is broken
  - A call to action: toxic chemical exposure can be prevented!
  - Endorsed by major medical societies

The Role of Scientists

- In matters of public health, scientists have a moral obligation to speak out about their research

Thank you

TEDX Funders:
Arkansas Community Foundation
Winslow Foundation
Cornell Douglas Foundation
Wallace Genetic Foundation
Forsythia Foundation
And many other foundations
and private donors

The TEDX Team:
Carol Kwiatkowski
Chris Ribbens
Jo Rochester
Ashley Bolden
Kim Schultz
Katie Pelch

TEDX.org