
**Impacts of Trace Chemicals on the Environment**



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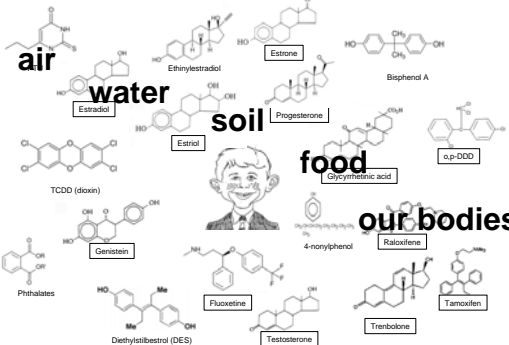
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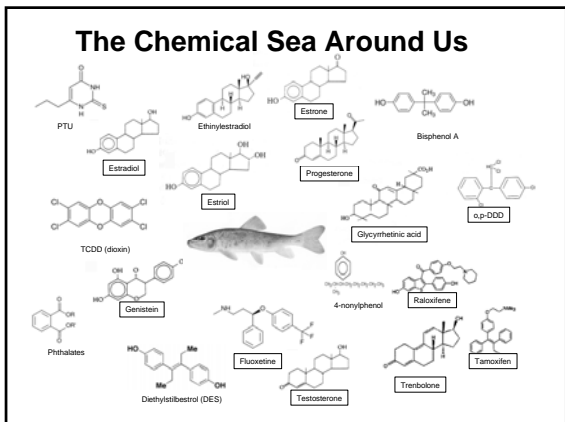
The Big Picture of Trace chemicals

And how we all fit into it.

The Chemical Sea Around Us

air
water
soil
food
our bodies





**Some chemicals
are antibiotics**

**Some chemicals
affect heart function**

**Some chemical
are neuroactive**

i.e., affect nervous system

Others affect hormone actions
i.e., disrupt endocrine functions

Others affect hormone actions
i.e., disrupt endocrine functions
= endocrine disrupting chemicals = EDCs

Endocrine-Disrupting Chemicals (EDCs)
Estrogenic Anti-estrogenic
Androgenic Anti-androgenic
Anti-thyroid Glucocorticoids
Anti-adrenal Obesogens
Anti-insulin

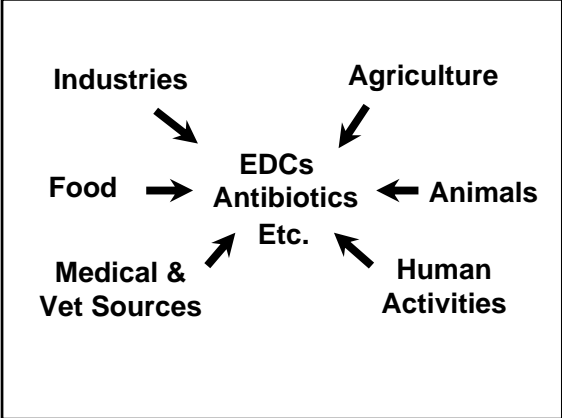
Some Estrogenic EDCs

Natural hormones
Estradiol Estrone Estriol

Pharmaceuticals
Ethinylestradiol Premarin/Equil

Pesticides
Atrazine DDT Methoxychlor

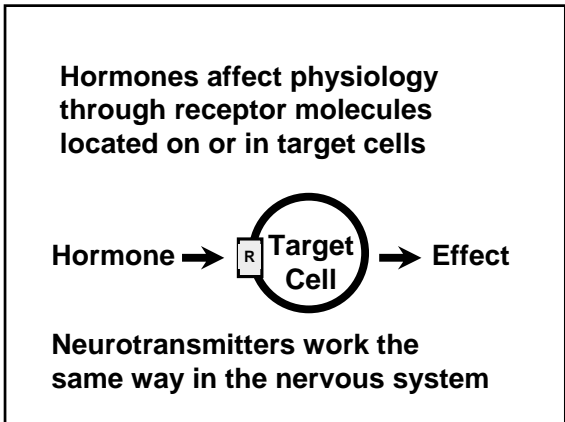
Everyday Chemicals
Phthalates Bisphenol A Nonylphenol

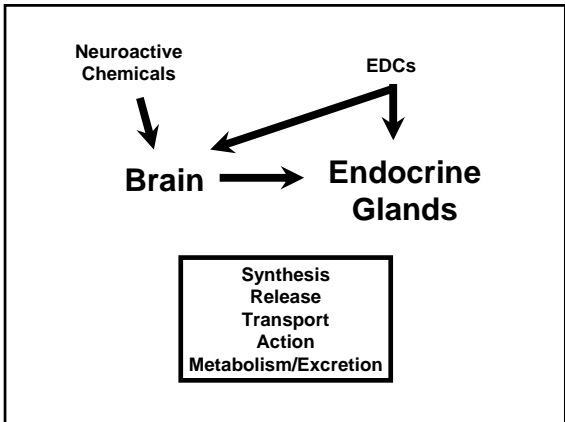


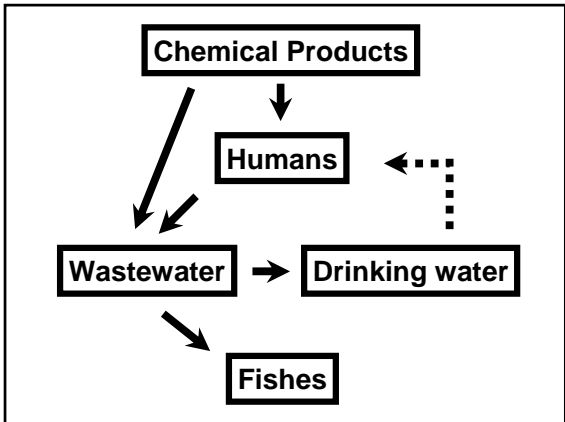
Endocrine Physiology

All body functions are controlled or modified by hormones

Hormones are natural body chemical regulators that work at very, very low concentrations







Estrogenic chemicals in wastewater

- Feminize male fish downstream**
- Alter downstream sex ratios to favor females**
- Cause development of intersex fish**
- Produce contraceptive effects in adult fish**


Observations in Humans

- Increases in endocrine cancers**
- Decreases in fertility**
- More female births**
- Earlier puberty**
- Increased male birth defects**
- Increased learning defects, autism**
- Increased obesity**

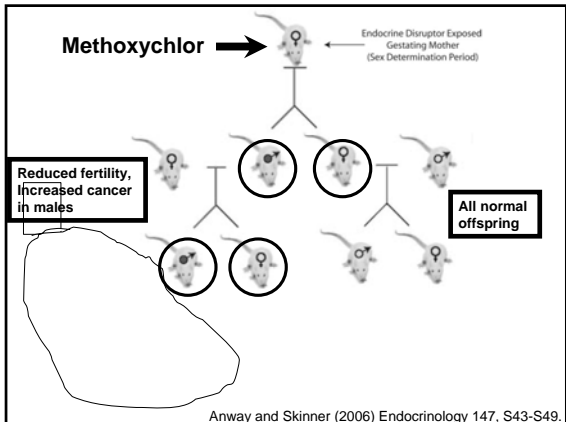
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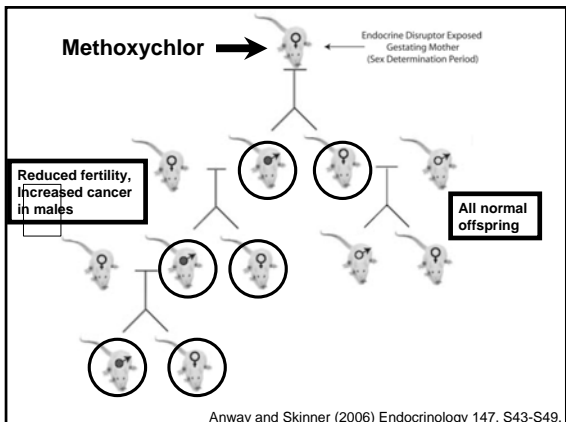
“The Fragile Fetus”

- Undeveloped DNA repair system
- Immature immune system
- Lack of detoxifying enzymes
- Primitive liver metabolism
- Lack of blood/brain barrier
- Increased metabolic rate




Hence *VERY* sensitive to chemicals

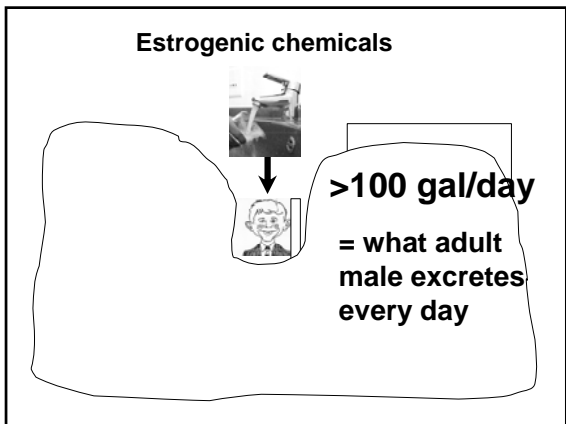


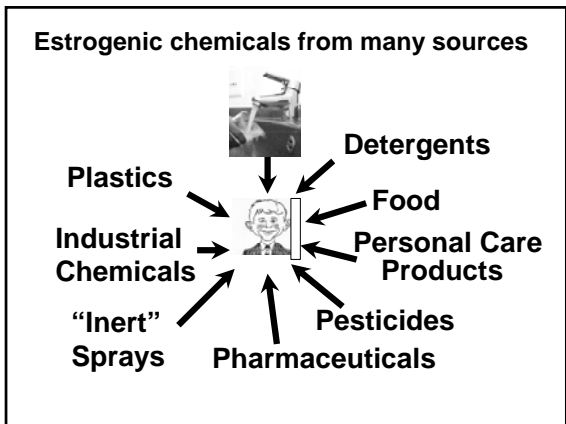


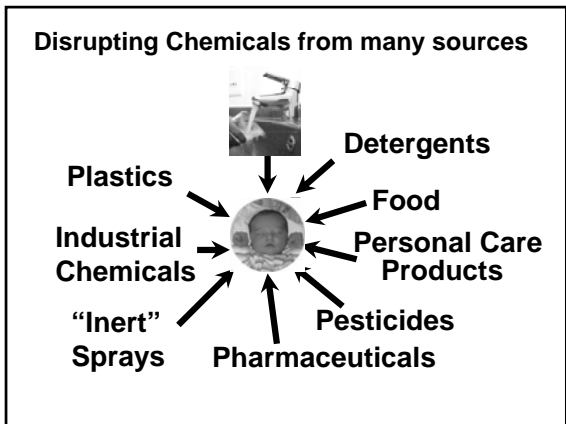
Is our drinking water safe?



YES & NO







Summary

Trace amounts of pharmaceuticals and other chemicals in surface and ground waters are a reality

Use of antibiotics, hormones, and pesticides in agriculture can contribute to water contamination

Effects in wildlife, microbes, and laboratory animals as well as concerns for human health
