Food Matters

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Green Choices

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Environmental Influences on Reproductive Health

- Environmental Chemicals
- Nutrition
- Social and Built Environment
- Genetics
- In utero programming
- Interactions Among the Factors
What we eat profoundly impacts the health of individuals, communities and the environment we depend on for human sustenance.

Our current industrialized food system is energy intensive.

It produces vast quantities of food of low nutritional quality.

Features of our industrialized food are harmful to public and ecological health.

Obesity, diabetes, malnutrition, childhood cancer, and other chronic disease impacts are costly human consequences of our industrialized food system.
Food Matters to Pregnant Women, Children and Future Generations

**Nutrition Matters**
Good nutrition is an essential requirement of healthy human development

**Vulnerability Matters**
Developing fetus and human are highly vulnerable to environmental exposures

**Timing Matters**
Health consequences of *in-utero* and early life exposures can manifest across an individual’s lifespan
Timing Matters
Critical and Sensitive Windows of Development

- Blastocyst
- Embryo
- Fetus
- Infant
- Child
- Adolescent

Periconception → Prenatal → Postnatal → Childhood

Environmental Exposures

Immediate & Long Term Consequences
Developmental Origins of Adult Disease

“It is suggested that poor nutrition in early life increases susceptibility to the effects of an affluent diet”

Timing Matters

- Human evidence from study of Dutch famine during WW II
- Maternal under-nutrition during gestation has important effects on health in later life
- The timing of the nutritional insult determines which organ system is affected

Timing Matters

2414 people, aged 50 years, born as term singletons around the time of the 1944-1945 Dutch famine, of which 912 people participated in an interview and 741 subjects were also available for hospital examination.

- Exposure in early gestation: three-fold increase in coronary heart disease, more obesity
- Exposure in mid-gestation: increase in obstructive airways disease
- Exposure in late gestation: impaired glucose tolerance

Developmental Origins of Adult Disease

**DES** (Diethylstilboestrol): Intergenerational harm can result from *in utero* chemical exposures

Harm revealed decades after exposure

Pesticide Chlorpyrifos
Animal Evidence of “Timing Matters”

• Subtle widespread effects on developing brain below the threshold for any signs of exposure related to irreversible inhibition of acetylcholinesterase

• Stage specific effects disrupts the rat brain through a variety of cellular and molecular mechanisms - mechanism and outcome change with progression of cell differentiation

Key Health Concerns of Our Industrialized Food System

1. Widespread exposure to toxic chemicals
2. Antibiotic resistance
3. Food-borne illnesses
4. Environmental destruction
5. High level of consumption of foods of low nutritional value
1. Widespread exposure to chemicals with reproductive/developmental toxicity

Based on analysis of representative sample of U.S. population by NHANES 2003-2004. Note, not all women were tested for all chemicals

Percentage of U.S. Pregnant Women with Detectable Level of Analyte

Approximately 40% of children in the US may have levels in excess of benchmark exposures for neurological impacts from cumulative exposures to OP pesticides.

2. Antibiotic resistance

Factory Farms
As much as 70% of all antimicrobials in the U.S. are given to otherwise healthy beef cattle, swine, and poultry in their feed as a routine part of their production.

Many of these antimicrobials are thought to be from seven drug classes important to human medicine.

This practice is prohibited in many industrialized countries.
3. Food-borne illnesses

76 million illnesses, 325,000 hospitalizations, and 5000 deaths in the US each year

- High-speed, automated methods of slaughtering and food processing that may make contamination more likely and more difficult to detect

- Highly centralized large distribution channels can make detection of contaminated foods easier, but also greatly expands the reach and magnitude of health consequences due to a breach in food safety

- 2009 peanut butter salmonella contamination – 529 individuals in 43 states

4. Environmental Destruction

- **Energy inefficient**
  - 3 kcal in to create 1 kcal food energy
- **Polluting** – pesticides, nitrogen fertilizer runoff
- **Fossil fuel dependent**
  - Needed to run the machinery
  - Natural gas-derived fertilizers – In 2007, 58% of nearly 23 million tons of chemical fertilizers nitrogen-based
  - Petroleum-derived pesticides –
  - Transportation throughout the supply chain (small relative to livestock production)

Graphic http://www.sedona.biz/sustainable-living0107.htm
4. Environmental Destruction

• Climate change contributor
  – Global livestock production contributes 18% of global anthropogenic greenhouse gas emissions (transportation (14%); energy production (21%))
  – The climate impacts of livestock are largely due to the use of fossil-fuel intensive grain, rather than pasture or grass, to feed the animals
5. High level of consumption of foods of low nutritional value

- 1 in 3 children ages 2-19 years is overweight or obese
- Average consumption of HFCS has increased by over 25% in the last 30 years
- Prepared and processed food is readily accessible, inexpensive and heavily promoted
- Over $1.6 billion was spent in marketing to children and adolescents in 2006 by food, beverage, and quick-serve restaurant companies to promote their products to young people
Next: What Can Health Care Professionals Do to Promote a Healthy Food System?