Environmental Drivers of Chronic Disease (& the Climate Crisis)

Based on Environmental Threats to Healthy Aging
by Jill Stein MD, Ted Schettler MD, MPH, Maria Valenti and Ben Rohrer

Greater Boston Physicians for Social Responsibility (GBPSR)
www.psr.org/Boston
and
The Science and Environmental Health Network

Slides created by the Mass. Coalition for Healthy Communities, GBPSR, and National PSR.
Metabolic Syndrome
At the Crossroads of the Western Disease Cluster

Environmental Factors
- Food System/Diet
- Built-environment/transportation
- Fossil fuel energy
- Toxic Chemicals
- Socioeconomic stress

Altered Pathways
- Inflammation
- Oxidative Stress
- Disrupted Insulin Signaling

Metabolic Syndrome
- Diabetes
- CV disease
- Obesity
- Abnormal lipids
Public Health Significance

- Obesity/overweight – 2/3 US adults
- Pre/Diabetes - 40% US adults
  [Link](http://apps.nccd.cdc.gov/DDTSTRS/default.aspx)
- Cardiovascular disease – still leading cause of death. HT increasing.
- Metabolic syndrome - >1/3 adults, 60% > 65 yrs old.
- Alzheimer’s disease – ½ >84 yrs old, 5.3M
The New Face of Inflammation

Indications of a heart attack include sweating, anxiety and chest pains


http://pathmicro.med.sc.edu/ghaffar/innate.htm
Insulin Action = Normal Metabolism

↓ TG synthesis

healthy arteries

↓ blood sugar

Insulin signaling
Inflammatory Mediators Disrupt Insulin Signaling -> Inflammatory Metabolism

- Inflammatory mediators
- Inflammation
- Oxidative stress

↑TG

- Vascular disease
- ↑blood sugar

Insulin signaling
Novel Nutrients Drive Inflammatory Metabolism

- Saturated fat
  - ↑TG
  - Inflammatory Mediators
    - ↓Omega-3 (↑Omega-6)
  - PG, LT
    - inflammation
    - ↓anti-oxidant micronutrients

- High Glycemic CHO, Fructose
  - ↑blood sugar
  - Vascular disease
    - Oxidative stress
      - Insulin signaling
Toxicants, Inactivity, Obesity, & Stress Also Drive Inflammation, Inflammatory Metabolism

- Saturated fat
- Inflammatory Mediators: ↑TG, VLDL
- PGs, LTs
- Blood sugar: ↑
- Oxidative stress: ↓anti-oxidant micronutrients
- Inflammation
- Vascular disease
- Insulin signaling
- High Glycemic Index
- Endocrine Disruptors

- Omega-3 (↑Omega-6)
- Obesity
- VLDL
- Fasting insulin signaling
- Inactivity
- Fructose
- Air Pollution
- Micronutrients

Endocrine Disruptors
<table>
<thead>
<tr>
<th>NUTRIENT</th>
<th>ORIGIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>High glycemic carbohydrate</td>
<td>Food processing</td>
</tr>
<tr>
<td>Saturated fat, ↓ ω3s, ↑ ω6s</td>
<td>Animal confinement, over-feeding, grain feeding</td>
</tr>
<tr>
<td>↓ ω3s</td>
<td>Long shelf-life, pasture → grain feeding</td>
</tr>
<tr>
<td>↑ ω6s</td>
<td>Emergence of seed oils</td>
</tr>
<tr>
<td>Trans fat</td>
<td>Food processing (hydrogenation)</td>
</tr>
<tr>
<td>↓ Anti-oxidants, polyphenols</td>
<td>Lack of fresh fruits/vegetables</td>
</tr>
</tbody>
</table>
Influence of Nutritional Factors on chronic diseases

- **Increase risks**
  - saturated and trans fats
  - high glycemic carbohydrate
  - lack of fruits/vegetables/omega 3s

- **Reduce risks**
  - fruits, vegetables
  - omega 3s, PUFAs
  - low glycemic carbohydrate
  - Mediterranean diet
Metabolic Syndrome
At the Crossroads of the Western Disease Cluster

Environmental Factors
- Food System/Diet
- Built-environment/transportation
- Fossil fuel energy
- Toxic Chemicals
- Socioeconomic stress

Altered Pathways
- Inflammation
- Oxidative Stress
- Disrupted Insulin Signaling

Metabolic Syndrome
- Diabetes
- CV disease
- Obesity
- Abnormal lipids
- Alzheimer’s/Dementia

Mediterranean diet

Transportation

Fossil fuel energy

Toxic Chemicals

Socioeconomic stress