Changing Expectations of a Healthy Diet

Prevention of primary nutritional deficiencies

↓

Reductions in the onset/progression of select cancers

↓

Reduction in the onset/progression of age-related diseases

↓

Improvements in endurance capacity and mental health

↓

Reduction in the occurrence of select birth defects

↓

“Optimal Health”
Public’s Hope for Diet

“Optimal” diets will maximize an individual’s potential for: A long, healthy and productive life

But, what is “long, healthy and productive”? What are the real targets?

Public’s Expectations of the Food Industry and the Scientific Community

The identification of “healthy” diets and foods
The definition of how they work
The production of improved healthy foods
The communication of dietary information for the “individual” as well as for the general public.
Examples where diet may modulate the development and progression of chronic diseases:

- Age related vision loss
- Cancer
- Cardiovascular disease
- Diabetes
- Hypertension
- Obesity
- Osteoporosis
Dietary Reference Intakes: Nutrition for Optimal Health

*Traditional* approach: minimal need plus a safety factor to prevent deficiency diseases

*New* approach: incorporation of concepts of disease prevention

Dietary Reference Intakes (DRIs)

*Traditional* approach: minimal need plus a safety factor to prevent deficiency diseases

*New* approach: incorporation of concepts of disease prevention

- Estimated Average Requirement (EAR)
- Recommended Dietary Allowance (RDA)
- Adequate Intake (AI)
- Tolerable Upper Intake Level (UL)
Influences on Nutrient Needs

- Age
- Gender
- Genetics
- Reproductive status
- Environment
- Lifestyle habits
- Presence of disease

How healthy are we?
An estimated 17 million people (6.2% of the population) in the United States have diabetes mellitus.

By 2010, as many as 50 to 75 million Americans may exhibit the “metabolic syndrome” (aka Syndrome X).

Can we reduce the risk for diabetes through diet? Can we reduce the pathologies associated with diabetes?
Current evidence suggests that between 20 and 30 percent of cancers are due to poor food choices and physical inactivity. The role of nutrition and diet in cancer development is complex.

Key et al. Lancet 2002; 360:861-868
### Actual Causes of Death in the United States in 1990 and 2000

<table>
<thead>
<tr>
<th>Actual Cause</th>
<th>No. (%) in 1990</th>
<th>No. (%) in 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>400,000 (19)</td>
<td>435,000 (18.1)</td>
</tr>
<tr>
<td>Poor Diet and Physical Inactivity</td>
<td>300,000 (14)</td>
<td>400,000 (16.6)</td>
</tr>
<tr>
<td>Alcohol Consumption</td>
<td>100,000 (5)</td>
<td>85,000 (3.5)</td>
</tr>
<tr>
<td>Microbial Agents</td>
<td>90,000 (4)</td>
<td>75,000 (3.1)</td>
</tr>
<tr>
<td>Toxic Agents</td>
<td>60,000 (3)</td>
<td>55,000 (2.3)</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>25,000 (1)</td>
<td>43,000 (1.8)</td>
</tr>
<tr>
<td>Firearms</td>
<td>35,000 (2)</td>
<td>29,000 (1.2)</td>
</tr>
<tr>
<td>Sexual Behavior</td>
<td>30,000 (1)</td>
<td>20,000 (0.8)</td>
</tr>
<tr>
<td>Illicit Drug Use</td>
<td>20,000 (&lt;1)</td>
<td>17,000 (0.7)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,060,000 (50)</strong></td>
<td><strong>1,159,000 (48.2)</strong></td>
</tr>
</tbody>
</table>

Mokdad et al., 2004; JAMA 291: 1238-44
Global Assessment of Organic Contaminants in Farmed Salmon

“Risk analysis indicates that consumption of farmed Atlantic salmon may pose health risks that detract from the beneficial effects of fish consumption.”

Hites et al., Science. 2004; 303: 226-9

Dietary Soy and Increased Risk of Bladder Cancer: A Prospective Cohort Study of Men in Shanghai, China

“Comparer to men consuming soy less than once a week, the RR (95% CI) for those who consumed soy 1-<3 times per week, 3-<7 times a week and daily were 2.05 (0.80-5.29), 2.45 (0.89-6.76) and 4.61 (1.57-13.51), respectively (p for trend = 0.004), after adjustment for age, cigarette smoking and level of education. The soy-bladder cancer risk associations in smokers and non-smokers were comparable.”

Sun et al., Int J Cancer 112: 319-323, 2004
Common Issues: Disparate Approaches

- **How safe is safe?**
  Statutory interpretations and constraints

- **What are the risks?**
  Risk assessment procedures and risk management practices are consistent across regulations and agencies

- **How good is the quality control?**
  Hazard Analysis Critical Control Points (HACCP)

**USDA – FDA – CDC - EPA**
“In the long run, we expect that the use of “omics” technologies can be applied to a variety of bioassays, some in vitro, some in vivo, that will help us prioritize chemicals for testing in the more lengthy, expensive, and animal-intensive testing batteries, and perhaps even to guide selection of which tests should be done within those batteries.”

Robert Kavlock, EPA
Environmental Health Perspectives
112: A678-A685, 2004

“Some companies will not test a drug with a microarray experiment that has any chance of becoming part of a regulatory package. And then there are companies who view [submission of microarray data] as a positive, who say the FDA gets more information, we get more information, and we might find a positive aspect to our drug that we didn’t know about.”

Kurt Jarnagin, Iconix Pharmaceuticals
Environmental Health Perspectives
112: A678-A685, 2004
Metabolomics is a Integrative database

Genetics

Disease

Environment

Lifestyle

Metabolome

Tea

- Does Tea Affect Cardiovascular Disease? A Meta-Analysis
  - 10 cohort and 7 case-control studies
  - RR estimates for myocardial infarction relatively homogenous
    MI incidence reduced by 11% with 3 cup per day increase in tea consumption
  - RR estimates for coronary heart disease and stroke were heterogeneous