Obesity and Cancer: The biological connection

Los Angeles, California
May 10, 2006

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America’s Weight Problem
ACS lifestyle guidelines [2002]

- 1. Avoid all tobacco use and inhalation of all tobacco smoke
- 2. Eat a variety of healthful foods
  - 5 or more servings of a variety of FRUITS & VEGGIES
  - Choose WHOLE GRAINS in preference to refined
  - Limit consumption of RED MEAT, especially processed & high fat
- 3. Maintain a physically active lifestyle
  - At least 30 minutes (60 for children), 5 times per week
- 4. Maintain a healthy weight; lose weight if overweight
- 5. Limit intake of alcohol, if you drink at all.
Prudent Diet

• **Leaves** (e.g., lettuce, spinach, romaine, bok choy)
• **Fresh fruit** (e.g., mango, banana, berries, orange)
• **Broccoli-like veggies** (e.g., cauliflower, squash)
• **Root veggies** (e.g., carrots, potatoes, yams, jicama)
• **Cereals** - unrefined (e.g., rice, quinoa, rye, corn, cracked wheat, oats, barley)
• **Legumes** (e.g., pinto, garbanzo, lentil, soy bean)
• **Seeds** (e.g., sesame, sunflower, pine nuts)
• **Fish** (e.g., salmon, halibut, tuna, mackerel)
• **Low-fat animal** (e.g., nonfat milk, nonfat yogurt, skinless chicken, egg whites)
Mediterranean cuisine
Growth Rate of U.S. Food Consumption
(Disappearance data) % per person, 1990-2000

140 lbs of extra food each year!

- Fats: 18%
- Sugars/Sweeteners: 11%
- Vegetables: 10%
- Grain: 10%
- Dairy: 4%
- Fruit: 3%
- Red Meat: 1%

U.S. Dep’t of Agriculture
Science-based food pyramid

- Oils/Sweets
- Nonfat Dairy: 2 servings
- High Protein: 1 serving
- Grains, dry beans, other starchy foods: 5+ servings/day
- Fruit: 3+ servings/day
- Vegetables: 4+ servings/day
- No more than 2 hours TV/day
- 30+ minutes brisk walking or equivalent/day

Calorie density increases

Nutrient density decreases
Projected New Cancer Cases

Prostate, breast and colon cancers are thought to be related to obesity.

Causes of Cancer - Harvard pooling project

- Tobacco: 30%
- Diet/Obesity: 25%
- Occupation: 5%
- Reproduction: 5%
- Sedentary Lifestyle: 10%
- Infections: 5%
- Perinatal: 5%
- Family History: 5%
- 2% each

Causes of Cancer-Harvard pooling project

- Diet/Obesity: 35%
- Sedentary Lifestyle: 14%
- Family History: 7%
- Infections: 7%
- Reproduction: 7%
- Occupation: 7%
- Perinatal: 7%
- Other causes: 3% each

# How much can cancer be reduced via diet and exercise?

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>20-30%</td>
</tr>
<tr>
<td>Prostate</td>
<td>10-20%</td>
</tr>
<tr>
<td>Breast</td>
<td>33-50%</td>
</tr>
<tr>
<td>Colon/rectum</td>
<td>66-75%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>33-50%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>50-75%</td>
</tr>
<tr>
<td>Stomach</td>
<td>66-75%</td>
</tr>
<tr>
<td>Liver</td>
<td>33-66%</td>
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</table>

A comprehensive review of the diet and cancer link.

Published in 1997, next edition due in 2006.

Conclusions based on ‘bulk of the evidence’.
<table>
<thead>
<tr>
<th>Evidence</th>
<th>Decreases risk</th>
<th>No relationship</th>
<th>Increases risk</th>
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<tbody>
<tr>
<td>Convincing</td>
<td>Physical Activity: Colon</td>
<td></td>
<td>Rapid Growth, Greater Adult Height: Breast, Endometrium</td>
</tr>
<tr>
<td>Probable</td>
<td>Physical Activity: Lung, Breast, Prostate</td>
<td></td>
<td>High Body Mass: Breast, Kidney</td>
</tr>
<tr>
<td>Insufficient</td>
<td></td>
<td></td>
<td>High Energy Intake: Pancreas, Colon, Rectum, Gallbladder, Colon</td>
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High body mass may usually be equated with obesity (defined as BMI >30)
### Carbohydrate and cancer

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</table>
| Possible         | *Starch a:* Colon, Rectum  
                  | *NSP/Fibre:* Pancreas, Colon, Rectum, Breast | *High Body Mass:* Prostate | *Starch a:* Stomach  
                  | *Sugar:* Colon, Rectum |                |
| Insufficient     | *Resistant Starch:* Colon, Rectum  
                  | *NSP/Fibre:* Stomach |                | *Sugars:* Pancreas |

**a.** Data suggest that any increase in risk is due to very high-starch diets that are monotonous and deficient in various protective factors, or else high-starch diets where the starch is relatively highly refined. Such diets, when associated with an increased risk of stomach cancer, are also high in salt. In the case of colorectal cancer, relatively unrefined starch may be associated with decreased risk.
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<tr>
<td>Mouth and Pharynx</td>
<td>Larynx, Pancreas, Breast,</td>
<td>Ovary, Endometrium, Cervix, Thyroid</td>
<td></td>
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<tr>
<td>Oesophagus, Lung,</td>
<td>Bladder</td>
<td></td>
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<td>Stomach</td>
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Evidence of decreased risk with increased consumption
What is the Function of the Colon and Rectum?

- The colon and rectum comprise the large intestine (large bowel)
- The primary function of the large bowel is to turn liquid stool into formed fecal matter
Colon cancer risk factors, besides age

- Genetic susceptibility (FAP, HNPCC)
- Fiber-poor diet
- Diet rich in animal foods
- Diet rich in alcohol
  - High body mass index
- Too much television watching
To prevent death from colon cancer:

- Do at least 30 minutes of physical activity daily
- Eat > 3 servings of veggies & > 2 servings of fresh fruit daily
- Eat > 4 servings of legumes and whole grains daily, for total fiber intake > 30 g/day
- Get sigmoidoscopy / colonoscopy > age 50
- Get fecal occult blood test yearly > age 50
Cancer preventive vitamins, carotenes, and minerals

- Vitamin A & carotenes (vit.A precursors)
- Vitamin C
- Vitamin D
- Vitamin E
- Calcium
- Selenium
- Folate, etc.
Other bioactive compounds

- Allium compounds (in garlic, onions)
- Isoflavones and lignans
- Polyphenols
- Glucosinolates and indoles
- Flavonoids
- Plant sterols
- Saponins
- Coumarins
Breast Cancer risk factors, besides age

• Reproductive events:
  Early onset of periods (menarche)
  Childlessness (nulliparity)
  Late age at first birth
  Late natural menopause

• Rapid growth early in life
• Greater adult height
• High body mass after menopause
• Adult weight gain
• Alcohol
• Genetic susceptibility (BRCA1, BRCA2)
Relative levels of serum estradiol: Western versus Asian lifestyles
To prevent death from breast cancer:

• Have many children early in life
• Maintain body mass index around 20
• Drink less than one glass of wine a day
• Exercise > 30 minutes per day
• Get mammograms every year after age 40
THE 
taste for living 
WORLD 
COOKBOOK

MORE of Mike Milken’s Favorite Recipes for Fighting Cancer and Heart Disease

by Beth Ginsberg and Mike Milken
With preface by Martha Stewart