New Strategies to Prevent Cancer: Obesity and Other Common Risk Factors

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Disclosures

• I have no financial conflicts to disclose
What is the impact of environment on cancer risk? Cancer rates in Hawaii 1973-1977
Number 1 in cancer prevention

Tobacco use causes cancer of the lung, larynx, mouth, esophagus, throat, bladder, kidney, liver, stomach, pancreas, colon, rectum, cervix & acute myeloid leukemia [NIH]

E-cigarette use is surpassing cigarette use among middle and high school kids [CDC]

--- Consequences?
Potential for cancer prevention

- Smoking: 33%
- Overweight/Obesity: 20%
- Diet: 5%
- Lack of Exercise: 5%
- Occupation: 5%
- Viruses: 5%
- Family History: 5%
- Alcohol: 3%
- UV & Ionizing Radiation: 2%
- Prescription Drugs: 1%
- Reproductive Factors: 3%
- Pollution: 2%

Modified from Colditz, Sci Trans Med, 2012
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Modified from Colditz, Sci Trans Med, 2012
<table>
<thead>
<tr>
<th>Type of Tumor</th>
<th>Classification of Evidence</th>
<th>Protective effects of physical activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectum</td>
<td>Convincing</td>
<td>Convincing</td>
</tr>
<tr>
<td>Breast</td>
<td>Probable [postmenopausal]</td>
<td></td>
</tr>
<tr>
<td>Endometrium</td>
<td>Convincing</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oesophagus</td>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>Kidney</td>
<td></td>
<td></td>
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<tr>
<td>Gallbladder</td>
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</tbody>
</table>

16 types of cancer associated with obesity


www.dietandcancerreport.org (2017)
A multitude of biologic mechanisms link physical activity and obesity to cancer risk

Urich et al, Nature Reviews Gastroenterology & Hepatology 2018
Adipose tissue is emerging as a key player in cancer development

→ potential to intercept “cross-talk” between adipose tissue and tumors

- Adipose tissue = not just fat storage
  - active in metabolism and synthesis of IL-6, TNFalpha, sex steroid metabolism...

- Many tumors are directly surrounded by adipose tissue
  - novel research on the “cross-talk” or microenvironment

- There are several different types of fat tissue, and visceral/abdominal fat is emerging as a key player
  - can elevate the body’s inflammatory state and foster cancer development

U.S. Obesity Trends

12.7 million U.S. youth are obese (2016)

National Academies of Sciences, Engineering, and Medicine. 2017
<table>
<thead>
<tr>
<th>Country</th>
<th>MVPA Minutes (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>72.48 (71.62, 73.34)</td>
</tr>
<tr>
<td>Belgium</td>
<td>50.58 (48.52, 52.64)</td>
</tr>
<tr>
<td>Brazil</td>
<td>47.41 (44.81, 50.01)</td>
</tr>
<tr>
<td>Denmark</td>
<td>66.00 (64.80, 67.20)</td>
</tr>
<tr>
<td>Estonia</td>
<td>74.86 (71.84, 77.89)</td>
</tr>
<tr>
<td>Norway</td>
<td>83.57 (79.51, 87.63)</td>
</tr>
<tr>
<td>Portugal</td>
<td>63.28 (61.23, 65.32)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>78.96 (77.56, 80.37)</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>63.84 (63.40, 64.28)</td>
</tr>
<tr>
<td>United States</td>
<td>45.94 (45.54, 46.34)</td>
</tr>
<tr>
<td>Overall (I-Squared = 99.9%, p=0.000)</td>
<td>64.65 (56.50, 72.81)</td>
</tr>
</tbody>
</table>

Hallal et al., 2012
Sugar Sweetened Beverage (SSB) Tax Implementation in the U.S.

- States with rejected SSB sales tax bill
- States with SSB sales tax
- States who don’t have an SSB sales tax bill on file

Summary

• Up to 60% of cancers can be prevented
• Obesity likely to surpass smoking as the number 1 cause of cancer
• Diverse biologic mechanisms link obesity & energy balance to cancer risk
• Obesity development can be impacted by a broad spectrum of factors
  ‣ Individual, community, policy
  ‣ Requires transdisciplinary research and a multi-dimensional approach for intervention