Lifestyle Risk Factors and Cancer Prevention

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Obesity and Cancer Mortality

Obesity Among U.S. Adults in 2030 (BMI ≥ 30)

The continuation in obesity trends will lead to 500,000 additional cases of cancer in the USA by 2030.

But, if every adult decreased their BMI by 1% (~2lb), this would prevent the increased number of cancer cases and actually result in avoidance of ~100,000 new cancer cases.

Wang et al. Lancet 2011
• Lack of PA is a leading cause of death worldwide.
• No other single intervention or treatment is associated with such a diverse array of benefits as physical activity!

Diet Interventions and Breast Cancer Incidence and Mortality

<table>
<thead>
<tr>
<th>Population</th>
<th>WHI</th>
<th>WINS</th>
<th>WHEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>48,835</td>
<td>2,437</td>
<td>3,088</td>
</tr>
<tr>
<td>Time Post Diagnosis</td>
<td>Pre-Diagnosis</td>
<td>Up to 1 year</td>
<td>Up to 4 years</td>
</tr>
<tr>
<td>Menopausal Status</td>
<td>Post</td>
<td>Post</td>
<td>Pre and Post</td>
</tr>
<tr>
<td>Age</td>
<td>50-79</td>
<td>48-79</td>
<td>18-70</td>
</tr>
<tr>
<td>Intervention Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat Intake</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Transient decrease</td>
</tr>
<tr>
<td>Weight Change</td>
<td>0.8 kg loss</td>
<td>2.3 kg loss</td>
<td>Modest weight gain</td>
</tr>
<tr>
<td>HR</td>
<td>HR 0.91 (0.83-1.01)</td>
<td>HR 0.76 (0.60-0.98)</td>
<td>HR 0.96 (0.80-1.14)</td>
</tr>
</tbody>
</table>

Prentice, JAMA 2006; Chlebowski, JNCI 2006; Pierce, Lancet 2007
While obesity and lower levels of physical activity are clearly associated with higher risk of cancer incidence and mortality, it is less clear if weight loss or exercise decreases risk of cancer incidence and mortality.
## Weight Loss and Cancer Incidence

<table>
<thead>
<tr>
<th></th>
<th>Bariatric Surgery, N = 2006</th>
<th>Control ,N = 2036</th>
<th>HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt. 10 yrs</td>
<td>↓ 19.9 kg</td>
<td>↑ 1.3 kg</td>
<td></td>
</tr>
<tr>
<td>Cancers</td>
<td>117</td>
<td>169</td>
<td>0.67 (p=0.0009)</td>
</tr>
<tr>
<td>Cancers - ♀</td>
<td>79</td>
<td>130</td>
<td>0.58 (p=0.0001)</td>
</tr>
<tr>
<td>Cancers - ♂</td>
<td>38</td>
<td>39</td>
<td>0.97</td>
</tr>
</tbody>
</table>
Physical Activity Interventions and Cancer Incidence and Mortality

- There are no exercise trials on cancer incidence.
- One exercise trial in progress on colorectal cancer mortality.

The Colon Health and Life-Long Exercise Change trial: a randomized trial of the National Cancer Institute of Canada Clinical Trials Group

K.S. Courneya PhD, C.M. Booth MD, S. Gill MD, P. O'Brien MSE, J. Vardy MD PhD, C.M. Friedenreich PhD, H.J. Au MD, M.D. Brundage MD, D. Tu PhD, H. Dhillon MA, and R.M. Mayer MD
Obesity and Cancer: Possible Explanations

- **Noncausal:** Healthy person bias; better treatment compliance; other healthy behaviors; less aggressive treatment in obese patients; presentation of cancer at a more advanced stage in obese patients; other biases/confounders?

- **Causal:**
  - **Nonreversible:** Obesity has affected the type of cancer that has developed, leading to fixed biological effect
  - **Reversible:** Obesity affects cancer on an ongoing basis, and this impact can be reversed when weight loss occurs.
ASCO Priorities to Address Obesity-Cancer

1. Increase providers’ and patients’ knowledge about obesity and cancer
2. Develop tools and resources to help oncology providers address obesity with their patients
3. Obesity and cancer research
4. Improve access to obesity treatment services for cancer patients/survivors
Transdisciplinary Research in Energetics and Cancer

- Research
- Training

Exposures

Intermediate Biology
- Glucose
- Insulin
- IGF
- Inflammation
- Adipokines

Models

Outcomes

- Growth
- Proliferation
- Apoptosis

- Tumorigenesis
- Tissue angiogenesis

- Biomarkers of carcinogenesis

Diet
Obesity
Physical Activity

Cells

Animals

Humans

Populations
Lifestyle factors have been shown to modify treatment efficacy (e.g., BMI and AI efficacy).

Lifestyle factors may improve medication adherence via improvement in medication side effects?
Future directions

• We need to generate data needed to incorporate lifestyle interventions into clinical practice and improve outcomes.
  • Identify patients who derive most benefit from lifestyle interventions
  • Novel biomarkers
  • Impact of lifestyle factors on modifying treatment efficacy and treatment adherence
  • Role of lifestyle in uptake of chemopreventive agents
  • Drug and lifestyle interactions
  • Immunotherapy and lifestyle factors
  • Cancer Disparities Research
  • Financial endpoints
  • Dissemination and Implementation research

• It is necessary that we determine the role of lifestyle factors in cancer care with the same intensity as used to test pharmacological and other interventions!