“Cancer Prevention in the 21st Century”

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“Fortify Your Life”
“Healthy At Home” and
“Life Is Your Best Medicine”

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“God grant me the serenity to accept the things I cannot change;
Courage to change the things I can;
And wisdom to know the difference.”

- Reinhold Niebuhr
Statistics

• In 2010, 1.6 million people were diagnosed with cancer.
• In 2030, estimated to increase to 2.3 million.
• Cancer rates are increasing globally, people being diagnosed at younger and younger ages.
• In US, one in four people will die from cancer.
• But many people survive the disease.
• >12 million people have survived cancer treatment and are looking to prevent cancer recurrence.

Recommendations for Cancer Prevention
WCRF/AICR

• Do not smoke or use tobacco products.
• Body Fatness – be as lean as possible within normal range of body wt.
• Physical Activity – be physically active as part of everyday life
• Foods and Drinks that Promote Weight Gain – limit consumption of energy-dense foods. Avoid sugary drinks
• Plant Foods – eat mostly foods of plant origin
• Animal Foods - limit intake of red meat, avoid processed meat
• Alcoholic Drinks – limit 2 serving/d men, 1 serving/d women
• Preservation, Processing, Preparation - limit consumption of salt
• Breastfeeding – mothers to breastfeed, children to be breastfed

Cancer Survivors – follow recommendations above
Dental Team

- Tobacco smoking accounts for 21% of global cancer deaths.
- Smoking cessation dramatically reduces risk for oral cancers.
- Survey of 1,802 dentists found that >90% of dental providers routinely ask patients about tobacco use, 76% counsel patients, and 45% routinely offer cessation assistance, defined as referring patients for cessation counseling, providing a cessation prescription, or both.
- Patients are twice as likely to try quitting with advice from a clinician
- Check www.smokefree.gov for your state quit line number


Alcohol and Cancer

- LACE (Life after Cancer Epidemiology) found women drinking more than half-serving of alcohol/day had 35% increased risk of recurrence and 51% increased risk of death due to breast cancer, especially if postmenopausal and obese.
- Women drinking ~1 serving alcohol/d had increased survival from colorectal cancer compared to non-drinkers.
- Mixed picture. Clear evidence moderate wine consumption has beneficial effects on CVD, longevity.

Inflammation and Cancer

- Activation of NF-κβ is vital for our body’s ability to defend itself against infection and is a central mediator of inflammation.

- Many things activate NF-κβ and when it is persistently “turned on” it induces genes that are responsible for increasing cell survival, proliferation, migration and invasion. It also turns down growth regulators (e.g., p53) that suppress tumor growth.

Factors That Drive Inflammation and Insulin Resistance

- Sedentary lifestyle, lack of exercise
- Pattern of central obesity
- Western-dietary pattern, high fructose
- Prolonged psychosocial stress
- Environmental exposures (smoke, toxins, chemicals)
- Alterations in oral and gut flora and intestinal permeability

WCRF/AICR Recommendations to Reduce Cancer Risk

- Be as lean as possible without becoming underweight.
- Be physically active for at least 30 minutes/d.
• According to AICR, estimated number of US cancers that are currently linked to excess body fat include:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Cancer Site</th>
<th>Cases Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Endometrial cancers</td>
<td>21,300</td>
</tr>
<tr>
<td>35</td>
<td>Esophageal cancers</td>
<td>5,824</td>
</tr>
<tr>
<td>28</td>
<td>Pancreatic cancers</td>
<td>12,079</td>
</tr>
<tr>
<td>24</td>
<td>Kidney cancers</td>
<td>13,978</td>
</tr>
<tr>
<td>21</td>
<td>Gallbladder cancers</td>
<td>2,050</td>
</tr>
<tr>
<td>17</td>
<td>Breast cancers</td>
<td>35,540</td>
</tr>
<tr>
<td>9</td>
<td>Colorectal cancers</td>
<td>12,831</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>103,602</td>
</tr>
</tbody>
</table>

Obesity and Cancer: What is The Connection?

• Fat cells, particularly those in the belly, produce and react to hormones and proteins that drive inflammation and insulin resistance, which promote cell growth. The more often cells divide, the more opportunity there is for cancer to develop.

• Waist measurements indicating increased risk:
  – 31.5 inches or more for women
  – 37 inches or more for men

• High risk
  – 35 inches or more for women
  – 40 inches or more for men
Obesity and Insulin Growth Factors

• Obesity is associated with multiple factors that may cause an increased risk for cancer and cancer-related mortality including insulin resistance, high blood sugar and insulin-growth factors (IGF).

• Elevated insulin increases tumor growth and aggressiveness.

• IGF-1 and IGF-2 have been identified as tumor promoters in multiple studies.

Tumor Type

• The Women’s Healthy Eating and Living (WHEL) trial found carbohydrate restriction associated with a striking five-fold reduction in breast cancer recurrence in 50% of subjects, specifically those whose tumors expressed the IGF-1 receptor.
• Unfortunately, IGF-1 testing of tumors is not yet a routine clinical practice.


Diet and Cancer

• Study > 2000 women confirmed “Western” diet increased breast cancer risk, while Med Diet rich in fruits, vegetables, legumes, oily fish and vegetable oils lowered risk of all breast cancer subtypes, particularly triple-negative tumors.
• Another review found strong evidence of a beneficial role of the Mediterranean diet on oral and pharyngeal cancer.
• High adherence to MD associated with a significant reduction in the risk of overall cancer mortality (10%), colorectal cancer (14%), prostate cancer (4%) and aerodigestive cancer (56%)


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Dietary Fat and Cancer Systematic Review

- No associations were found for prostate, esophageal, gastric, renal cell, bladder, lung, skin, or postmenopausal breast cancer by the total intake or types of dietary fat.
- There may be an association between total dietary fat and premenopausal breast cancer.
- Ovarian cancer there was limited-suggestive evidence for a positive association with intake of saturated fats.


WCRF/AICR Recommendations to Reduce Cancer Risk (2007)

- Limit consumption of red meats (beef, pork, lamb) and avoid processed meats. Aim for no more than 18 ounces per week (10 ounces higher risk)
• **Red meat** refers to beef, pork and lamb— foods like hamburgers, steak, pork chops and roast lamb.

  • Studies show we can eat up to 18 ounces a week of red meat without raising cancer risk.

• **Processed meat** is red meat that is preserved by smoking, curing, salting or adding other chemical preservatives. Sausage, bacon, ham and lunch meats (such as bologna, salami and corned beef) are processed meats.

  • Evidence is convincing that processed meats raise risk of colorectal cancer. *For every ounce and half of processed meat eaten per day, risk rises by 21%.*

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**BENEFITS OF PHYSICAL ACTIVITY**

• Maintain healthy body weight and muscle tone.

• Reduces risk of heart disease and depression.

• Lowers risk of diabetes by enhancing skeletal uptake of blood sugar.

• American Cancer Society, *exercise may reduce risk of cancer by reducing insulin and insulin-like growth factors levels, associated with increased cell/tumor growth.*

• Review of 73 studies found 25% average risk reduction for breast cancer amongst physically active women.

*Lynch, et al. Recent Results Cancer Rev 2011; 186:13-42*
<table>
<thead>
<tr>
<th>Activity</th>
<th>In 1 hour</th>
<th>In 30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running (1 mile in 12 minutes or 5 miles/hour)</td>
<td>590</td>
<td>295</td>
</tr>
<tr>
<td>Swimming (slow freestyle laps)</td>
<td>510</td>
<td>255</td>
</tr>
<tr>
<td>Walking (1 mile in 13 minutes)</td>
<td>460</td>
<td>230</td>
</tr>
<tr>
<td>Playing basketball</td>
<td>440</td>
<td>220</td>
</tr>
<tr>
<td>Weight lifting (vigorous effort)</td>
<td>440</td>
<td>220</td>
</tr>
<tr>
<td>Heavy yard work (chopping wood or clearing brush)</td>
<td>440</td>
<td>220</td>
</tr>
<tr>
<td>Golfing (walking and carrying clubs)</td>
<td>330</td>
<td>165</td>
</tr>
<tr>
<td>Dancing</td>
<td>330</td>
<td>165</td>
</tr>
<tr>
<td>Light gardening/yard work</td>
<td>330</td>
<td>165</td>
</tr>
<tr>
<td>Bicycling (more than 10 miles an hour)</td>
<td>290</td>
<td>145</td>
</tr>
<tr>
<td>Walking (1 mile in 17 minutes)</td>
<td>280</td>
<td>140</td>
</tr>
<tr>
<td>Weight lifting (general light workout)</td>
<td>220</td>
<td>110</td>
</tr>
</tbody>
</table>

Source: USDA, www.mypyramid.gov

Keep Track of Your Movement

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Calcium and Prostate Cancer?

• Harvard review: Health Professionals Study (47,885 men) found that calcium intake > 2000 mg/d was associated with increased risk of advanced-stage/high-grade disease 12-16 y after exposure.

• Current guidelines: 1000 mg/d for men under 70 from all sources is sound.


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### Select Food Sources of Bioactive Food Components & Related Mechanisms of Cancer Prevention

<table>
<thead>
<tr>
<th>Bioactive Food Component</th>
<th>Mechanisms of Cancer Risk Reduction</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avocado</td>
<td>Cell cycle arrest, apoptosis</td>
<td>Ding, et al., 2007</td>
</tr>
<tr>
<td>Broccoli, broccoli sprouts</td>
<td>Histone deacetylation, hormone modulation, reduction in oxidative stress, carcinogen metabolism</td>
<td>Minich &amp; Bland, 2007</td>
</tr>
<tr>
<td>Berries</td>
<td>Reduce malignant transformation, reduction in oxidative stress</td>
<td>Duthie, 2007</td>
</tr>
<tr>
<td>Curcumin</td>
<td>Anti-inflammatory apoptosis, cell cycle arrest</td>
<td>Ferguson &amp; Philpott, 2007; Suh &amp; Chun, 2007</td>
</tr>
<tr>
<td>Garlic/organosulfur compounds</td>
<td>Carcinogen detoxification, antimicrobial, DNA repair, cell cycle arrest</td>
<td>Moriarty, et al., 2007</td>
</tr>
<tr>
<td>Grapes (resveratrol)</td>
<td>Reduce oxidative stress, anti-inflammatory</td>
<td>Jang, et al., 1997</td>
</tr>
<tr>
<td>Green tea</td>
<td>Anti-inflammatory, reduce oxidative stress, inhibition of growth factor cell signaling</td>
<td>Chen &amp; Zhang, 2007</td>
</tr>
<tr>
<td>Tomato products</td>
<td>Reduce oxidative stress, modulation of IGFs</td>
<td>Riso, et al., 2006</td>
</tr>
</tbody>
</table>

### BPA and Estradiol

- BPA is an environmental estrogen used in the manufacture of polycarbonate plastics and epoxy resins used to make food and beverage packaging.
- Bisphenol A may increase risk of uterine, breast and prostate cancer.
- BPA associated with increases in developmental disorders of the brain and nervous system in animals.
- FDA banned BPA in baby bottles and children's cups in 2012.

Canned Goods

- Canned goods are significant source of BPA.
- Researchers at the Harvard School of Public Health found that volunteers consuming one serving of canned soup each day for five days had a more than 1,000% increase in urinary BPA concentrations compared with when the same individuals consumed fresh soup daily for five days.


Insecticides and Cancer

- Meta-analysis of 16 studies found childhood exposure to indoor residential insecticides associated with a significant increased risk of childhood leukemia and lymphomas.
- Positive but not statistically significant association also found for childhood brain tumors.

Hormone Therapy: A Choice

- Transdermal estradiol has least side effect on lipids and renin as it avoids first pass effect on the liver, permitting lower doses to be used with equal efficacy.
- If symptoms primarily urogenital, vaginal estrogen can be used with minimal systemic absorption.
- Oral micronized progesterone more favorable for CV and risk of invasive breast cancer lower than HT with other progestagens (MDPA).

Hormones and Breast Cancer

- Transdermal estradiol has least side effect on lipids and renin as it avoids first pass effect on the liver, permitting lower doses to be used with equal efficacy.
- Adding progestin to an estrogen leads to a slight increase risk of breast cancer after approximately four years of use.
- Three observational French studies and one U.S. study that demonstrate the potential mitigation of that slight risk by using progesterone rather than the progestin.
- Oral micronized progesterone more favorable for CV and risk of invasive breast cancer lower than HT with other progestagens (MDPA).
Gardisil HPV Vaccine

- Advisory Committee on Immunization Practices recommends HPV vaccination for females 11–12 years—ideally before sexually activity. Appears to offer life-long protection.
- “Catch up” vaccination, aged 13–26, also recommended.
- CDC, from June 2006-March 2014, ~67 million doses of HPV vaccines distributed and ~ 25,000 adverse events were reported; 92% were classified as non-serious.
- After careful review, none of these adverse events were any more common after HPV vaccination than among comparison groups.

www.cdc.gov/vaccinesafety/vaccines/HPV/index.html

It’s All Connected

BODY

MIND

SPIRIT
Stress and Cancer

• While stress does not cause cancer, there is growing evidence that chronic stress can promote the growth of tumors that are already present.
• Studies clearly demonstrate that social isolation and depression promote tumor growth.
• Excess sympathetic tone caused by emotional stress, can decrease cancer survival.