The Future of Cancer Prevention

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Why Prevent Cancer?

Cancer Trends Progress Report, NCI, U.S. NIH 2018

Estimates of national expenditures for cancer care in 2017 (in billions of dollars) by cancer site and phase of care

- Female Breast
- Colorectal
- Prostate
- Lymphoma
- Lung
- Leukemia
- Ovary
- Brain
- Kidney
- Bladder
- Head and Neck
- Melanoma
- Uterus
- Pancreas
- Stomach
- Esophagus
- Cervix
- All Other Sites

Expenditures (billion)

Initial care
Continuing care
Last year of life

Cancer Trends Progress Report, NCI, U.S. NIH 2018
Burden of Cancer Is Huge (and growing)

Figure 1: Estimated cancer prevalence by age in the US population from 1975 (216 M) to 2040 (380 M)

Signifies the year at which the first baby boomers (those born 1946-1964) turned 65 years old

CEBP (AACR, 2016): 1029-1036.
Trends in Cancer Incidence Since 1975:

U.S. Men, 1975 - 2014

U.S. Women, 1975 - 2014
Cervical Cancer: A Prevention Success Story

New Cases, Deaths and 5-Year Relative Survival

- New Cases over Time
- Deaths over Time
- 5-Year Relative Survival (%)

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<tbody>
<tr>
<td>New Cases</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Deaths</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Survival</td>
<td>68.1%</td>
<td>68.0%</td>
<td>66.3%</td>
<td>72.1%</td>
<td>74.9%</td>
<td>74.4%</td>
<td>70.1%</td>
<td>70.9%</td>
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Pap smear → HPV vaccine
Cervical Cancer Remains a Common Killer Around the Globe:

Future prevention: Screening vs. Immunization against HPV?
HPV Causes Only A Subset of Cancers

Source: U.S. Centers for Disease Control
What Causes Cancer?

• Smoking
• Pollution
• Carcinogens
• Viruses
• Alcohol
• Obesity
• Genetic changes
• Unknown factors
What Causes Breast Cancer?

• Genetics (only 5 – 15%)
• Estrogen
• Obesity
• Alcohol
• Lifestyle?
• Chemicals
Invasive Breast Cancer Affects All Demographics of American Women

Figure 6a. Trends in Female Breast Cancer Incidence Rates by Race/Ethnicity, 1975-2014, US

- White
- Black
- Asian/Pacific Islander
- Hispanic/Latina

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<th>Year</th>
<th>Rate per 100,000</th>
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<td>1975</td>
<td>90.2</td>
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<tr>
<td>1980</td>
<td>120.5</td>
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<td>1985</td>
<td>140.7</td>
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<td>1990</td>
<td>160.9</td>
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<td>1995</td>
<td>181.2</td>
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<td>2000</td>
<td>191.5</td>
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<td>2005</td>
<td>201.8</td>
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<tr>
<td>2010</td>
<td>212.1</td>
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<td>2014</td>
<td>222.4</td>
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<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Incidence Rate per 100,000</th>
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<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>128.7</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>125.5</td>
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<tr>
<td>Hispanic/Alaska Native</td>
<td>100.7</td>
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<td>Hispanic/Latina</td>
<td>91.9</td>
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<tr>
<td>Asian/Pacific Islander</td>
<td>90.7</td>
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Breast Cancer Incidence and Mortality in U.S. women 1975 – 2013

Invasive tumors* (up):

Deaths* (down):

NCI/SEER population data, *rates are per 100,000 U.S. women

Decline in deaths due to early detection? Better Rx? Both
Breast Cancer Screening ≠ Prevention

Screening detects cancer before it causes serious health problems. It is not preventive. It is not full-proof.

Methods:

Physical examination
- clinical • self-exam (out of favor)

Mammography
- Traditional x-rays (film) • Digital (2-D) • Tomosynthesis (3-D)

Supplemental imaging:
- MRI (mainly for high-risk) • Ultrasound (helpful for evaluating dense breasts) • Molecular Breast Imaging, MBI (new)

There is no blood test to detect breast cancer.
ASCO Survey Reveals Concerning Trends in Americans’ Knowledge About Cancer Risks and Impact of Costs on Compliance

Limited Awareness of Key Cancer Risk Factors

- Only 31% of Americans recognize obesity as a risk factor for cancer — even though it is the second leading preventable cause of the disease.
- Most Americans correctly identify tobacco use (78%).
- Few Americans are aware of other lifestyle factors that increase the risk of cancer:
  - 30% identify alcohol as a cancer risk factor.
  - 25% identify lack of exercise as a cancer risk factor.
- 66% understand and sun exposure as major cancer risk factors.

ASCO Survey Key Findings

- Nationally representative survey of 4,016 U.S. adults:
  - 4% have or had cancer themselves.
  - 32% have an immediate family member who has or had cancer.

Modest Steps to Reduce Cancer Risk

- Fewer than half of Americans say they are doing the following things to reduce their cancer risk:
  - 48% using sunblock
  - 48% limiting their exposure to the sun without sunblock
  - 48% exercising regularly
  - 41% maintaining a healthy weight
  - 38% limiting alcohol consumption

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How To Persuade Individuals to Adopt Cancer-Preventing Measures?
How To Persuade Individuals to Reduce Their Personal Cancer Risk?

Education, discussion...

Medical interventions
• vaccines (hepatitis, HPV)
• checks for precancerous conditions
  (PAP or HPV tests, colonoscopy, ?)

Nudges → healthier lifestyle
• smoking
• exercise
• moderate diet, alcohol
• weight
How Can Society Lower Cancer Risks?

Incentivize Research into Cancer’s Causes
Regulation
Financial support (for medical interventions)
Encouragement

Thank you!
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