THE ROAD TO MORE BIRTHDAYS

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Edgar P. Simard, PhD MPH
Background

• Although incidence rates for the most common cancers in the U.S. have been declining, incidence rates for some cancers are increasing

• These increases are in part, due to changes in risk factors and screening and detection practices
Selection of cancer sites

Seven cancer sites selected based on >1%/year increases noted among men or women during 1999–2008 in SEER CSR or *a priori* knowledge

- HPV-related squamous cell carcinoma of the oral cavity & oropharynx
- Esophageal adenocarcinoma
- Pancreas
- Liver & intrahepatic bile duct
- Thyroid
- Kidney & renal pelvis
- Melanoma of the skin
# Important cancer risk factors, by site

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>Major risk factors or etiologic agents</th>
<th>Other known or suspected risk factors or co-factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV-related oral cavity/oropharynx</td>
<td>HPV</td>
<td>Tobacco, alcohol</td>
</tr>
<tr>
<td>Esophageal adenocarcinoma</td>
<td>Obesity</td>
<td>GERD, Barrett’s esophagus</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Tobacco</td>
<td>Obesity, diabetes, genetics</td>
</tr>
<tr>
<td>Liver</td>
<td>HCV, HBV</td>
<td>Alcohol, metabolic syndrome</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Radiation exposure, diet</td>
<td>Genetics</td>
</tr>
<tr>
<td>Kidney/renal pelvis</td>
<td>Obesity, smoking</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>UV exposure</td>
<td>Immune suppression, fair skin</td>
</tr>
</tbody>
</table>
Objectives

• Assess 10-year incidence trends
  – Which groups are experiencing increasing trends, differences by sex, race/ethnicity, age group and stage

• Evaluate changes in stage-specific 5-year relative survival over time
Data sources


– SEER and NPCR combined (*incidence* in 41 states, 86% coverage)

– SEER (*survival* in 13 areas, 14% coverage)
Methods

• Restricted to people 15+ years of age
• Trends in incidence during 1999–2008
  – AAPC (average annual percentage change) calculated through joinpoint regression with a maximum of 1 joinpoint allowed, rates stratified by sex, race/ethnicity
  – Age groups and stage
  – Incidence rates are presented per 100,000 population, age-standardized to the 2000 U.S. population

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>White</th>
<th>Black</th>
<th>Asian or Pacific Islander</th>
<th>American Indian or Alaskan Native</th>
<th>Hispanic Ethnicity (Any Race)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex/anatomic site</strong></td>
<td>AAPC</td>
<td>APPC</td>
<td>APPC</td>
<td>AAPC</td>
<td>AAPC</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPV-related oropharynx</td>
<td>4.4*</td>
<td>-0.1</td>
<td>0.7</td>
<td>-0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Esophageal adenocarcinoma</td>
<td>1.8*</td>
<td>0.9</td>
<td>4.0</td>
<td>-0.1</td>
<td>2.8*</td>
</tr>
<tr>
<td>Pancreas</td>
<td>0.9*</td>
<td>0.5</td>
<td>0.3</td>
<td>-0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Liver and intrahepatic bile duct</td>
<td>3.8*</td>
<td>5.4*</td>
<td>-0.2</td>
<td>3.4</td>
<td>2.4*</td>
</tr>
<tr>
<td>Thyroid</td>
<td>6.3*</td>
<td>5.6*</td>
<td>5.0*</td>
<td>0.6</td>
<td>4.5*</td>
</tr>
<tr>
<td>Kidney and renal pelvis</td>
<td>2.3*</td>
<td>3.1*</td>
<td>3.5*</td>
<td>1.9</td>
<td>2.0*</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>2.1*</td>
<td>-0.1</td>
<td>0.0</td>
<td>0.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPV-related oropharynx</td>
<td>1.9*</td>
<td>-0.6</td>
<td>-2.2</td>
<td>NA</td>
<td>-0.7</td>
</tr>
<tr>
<td>Esophageal adenocarcinoma</td>
<td>2.1*</td>
<td>1.0</td>
<td>6.4</td>
<td>3.2</td>
<td>-1.1</td>
</tr>
<tr>
<td>Pancreas</td>
<td>1.0*</td>
<td>0.4</td>
<td>-0.4</td>
<td>-0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Liver and intrahepatic bile duct</td>
<td>1.5</td>
<td>2.7*</td>
<td>0.2</td>
<td>4.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Thyroid</td>
<td>7.3*</td>
<td>6.8*</td>
<td>6.4*</td>
<td>3.1*</td>
<td>6.7*</td>
</tr>
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<td>3.7*</td>
<td>3.4*</td>
<td>2.7*</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>2.4*</td>
<td>1.0</td>
<td>-1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
</tbody>
</table>

AAPC, average annual percentage change; HPV, human papillomavirus; NA, not available due to sparse data. *AAPC is significantly different from zero (2-sided Z-test, \( P < .05 \)).

Source: SEER and NPCR data submitted to NAACCR
Cancers with increasing incidence trends in the U.S. by site, sex, and age group, 1999–2008

HPV-related oropharynx

Males

Females

Source: SEER and NPCR data submitted to NAACCR
Cancers with increasing incidence trends in the U.S. by site, sex, and age group, 1999–2008

Liver and intrahepatic bile duct

Males

Females

Source: SEER and NPCR data submitted to NAACCR
Cancers with increasing incidence trends in the U.S. by site, sex, and age group, 1999–2008

Source: SEER and NPCR data submitted to NAACCR
Cancers with increasing incidence trends by site and stage at diagnosis in the U.S., 1999–2008

Note: Stage classified according to SEER Historic Stage Variable. Source: SEER 13 data.
5-year relative survival (%) for cancers with increasing incidence trends in the U.S., by site, stage and calendar period

**HPV-related oropharynx**


**Esophageal adenocarcinoma**

- Distant: 1992-1995 = 1.9, 2001-2007 = 2.8

**Pancreas**

- Distant: 1992-1995 = 1.6, 2001-2007 = 1.8

**Liver and intrahepatic bile duct**

- Regional: 1992-1995 = 5.8, 2001-2007 = 8.8
- Distant: 1992-1995 = 1.6, 2001-2007 = 1.8

**Thyroid**


**Kidney and renal pelvis**


Note: Melanoma of the skin is not shown. Source: SEER 13
Summary of findings

• By cancer site we saw substantial heterogeneity in increasing incidence trends by sex and race/ethnicity
  – HPV-related oropharynx, esophageal adenocarcinoma, pancreas and melanoma of the skin (white men and women only)
  – Liver (white, black and Hispanic men and black women only)
  – Broad increases in thyroid and kidney

• 5-year survival rates were high for patients diagnosed at an early stage for most sites except for pancreas and liver cancers
  – Promising increase in survival from localized liver cancer
Implications

• Cancers with increasing incidence trends will contribute to a growing fraction of the overall number of cancer cases
  – Access to care: early detection, treatment & palliation
  – Growing number of people living with cancer with complex medical & societal needs

• Additional research needed
  – Clarify role of obesity in many cancers
  – Early detection
  – Targeted therapies
  – Prevention

Edgar P. Simard, PhD, MPH; Elizabeth M. Ward, PhD; Rebecca Siegel, MPH; Ahmedin Jemal, DVM, PhD

Abstract

Despite declines in incidence rates for the most common cancers, the incidence of several cancers has increased in the past decade, including cancers of the pancreas, liver, thyroid, and kidney and melanoma of the skin, as well as esophageal adenocarcinoma and certain subsites of oropharyngeal cancer associated with human papillomavirus (HPV) infection. Population-based incidence data compiled by the North American Association of Central Cancer Registries were used to examine trends in incidence rates from 1999 through 2008 for the 7 cancers listed by sex, age group, race/ethnicity, and stage at diagnosis. Joinpoint regression was used to calculate average annual percent changes in incidence rates (1999-2008). Rates for HPV-related oropharyngeal cancer, esophageal adenocarcinoma, cancer of the pancreas, and melanoma of the skin increased only in whites, except for esophageal adenocarcinoma, which also increased in Hispanic men. Liver cancer rates increased in white, black, and Hispanic men and in black women only. In contrast, incidence rates for thyroid and kidney cancer increased in all racial/ethnic groups, except American Indian/Alaska Native men. Increases in incidence rates by age were steepest for liver and HPV-related oropharyngeal cancers among those aged 54 to 64 years and for melanoma of the skin in those aged 65 years and older. Notably, for HPV-related oropharyngeal cancer in men and thyroid cancer in women, incidence rates were higher in those aged 55 to 64 years than in those aged 65 years and older. Rates increased for both local and advanced stage diseases for most cancer sites. The reasons for these increasing trends are not entirely known. Part of the increase (for esophageal adenocarcinoma and cancers of the pancreas, liver, and kidney) may be linked to the increasing prevalence of obesity as well as increases in early detection practices for some cancers. These rising trends will exacerbate the growing cancer burden associated with population expansion and aging. Additional research is needed to determine the underlying reasons for these increasing trends. CA Cancer J Clin 2012;62:118-128. ©2012 American Cancer Society.
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