GASTROESOPHAGEAL CANCER
EPIDEMIOLOGY AND CLINICAL
PRESENTATION

Andrés Cervantes
Professor of Medicine
Disclosures

Consulting and advisory services, speaking or writing engagements, public presentations:

Servier, Merck Serono, Amgen, Roche, Lilly, Bayer, Novartis, Takeda, Beigene

Direct research support to the responsible project lead:

Servier, Roche, Genentech, Bayer, Janssen, Merck Serono, Medimmune
Outline

• How are data obtained?
• Incidence and Mortality in US
• Global Incidence and Mortality
• Incidence and Mortality in Europe
• Analytical Epidemiology: Etiology
Ten leading cancer types for the estimated new cases in USA by sex in 2016.

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>161,360</td>
<td>252,710</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>116,990</td>
<td>105,510</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>71,420</td>
<td>64,010</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>60,490</td>
<td>61,380</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>52,170</td>
<td>34,940</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>40,610</td>
<td>32,160</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>40,080</td>
<td>25,840</td>
</tr>
<tr>
<td>Leukemia</td>
<td>36,290</td>
<td>25,700</td>
</tr>
<tr>
<td>Oral cavity &amp; pharynx</td>
<td>35,720</td>
<td>23,380</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>29,200</td>
<td>18,860</td>
</tr>
</tbody>
</table>

| Total (All Sites)            | 836,150   | 852,630  |

Ten leading cancer types for the estimated deaths in USA by sex in 2016.

**Estimated Deaths**

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Males</th>
<th>Percentage</th>
<th>Females</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>84,590</td>
<td>27%</td>
<td>71,280</td>
<td>25%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>27,150</td>
<td>9%</td>
<td>40,610</td>
<td>14%</td>
</tr>
<tr>
<td>Prostate</td>
<td>26,730</td>
<td>8%</td>
<td>23,110</td>
<td>8%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>22,300</td>
<td>7%</td>
<td>20,790</td>
<td>7%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>19,610</td>
<td>6%</td>
<td>14,080</td>
<td>5%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>14,300</td>
<td>4%</td>
<td>10,920</td>
<td>4%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>12,720</td>
<td>4%</td>
<td>10,200</td>
<td>4%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>12,240</td>
<td>4%</td>
<td>9,310</td>
<td>3%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>11,450</td>
<td>4%</td>
<td>8,690</td>
<td>3%</td>
</tr>
<tr>
<td>Brain &amp; other nervous system</td>
<td>9,620</td>
<td>3%</td>
<td>7,080</td>
<td>3%</td>
</tr>
<tr>
<td><strong>All Sites</strong></td>
<td><strong>318,420</strong></td>
<td><strong>100%</strong></td>
<td><strong>282,500</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Trends in death rates for selected types of cancer in males in USA.

Trends in death rates for selected types of cancer in females in USA.

Stage distribution of esophageal cancer from 2004-2010 in USA by race.
5 Year relative survival of esophageal cancer by race and stage at diagnosis from 2004-2010 in USA.

Figure 15. International Variation in Stomach Cancer Incidence Rates*, 2012

Males

Rate per 100,000 population
- ≥ 23.8
- 12.8 - 23.7
- 7.2 - 12.7
- 4.3 - 7.1
- 1.4 - 4.2
- ≤ 1.4
- No Data
Figure 8. International Variation in Esophageal Cancer Incidence Rates*, 2012

Males

Rate per 100,000 population
- ≥ 12.9
- 7.9 - 12.8
- 4.4 - 7.8
- 2.3 - 4.3
- 0.8 - 2.2
- < 0.7
Estimated new cancer cases and deaths worldwide

Estimated New Cases

Male
- Lung, bronchus, & trachea: 1,241,600
- Prostate: 1,111,700
- Colon & rectum: 746,300
- Stomach: 631,300
- Liver: 554,400
- Urinary bladder: 330,400
- Esophagus: 323,000
- Non-Hodgkin lymphoma: 217,600
- Kidney: 213,900
- Leukemia: 200,700
- All sites*: 7,427,100

Female
- Breast: 1,676,600
- Colon & rectum: 614,300
- Lung, bronchus, & trachea: 583,100
- Cervix uteri: 527,600
- Stomach: 320,300
- Corpus uteri: 319,600
- Ovary: 238,700
- Thyroid: 229,900
- Liver: 228,100
- Non-Hodgkin lymphoma: 168,100
- All sites*: 6,663,000

Estimated Deaths

Male
- Lung, bronchus, & trachea: 1,098,700
- Liver: 521,000
- Stomach: 469,000
- Colon & rectum: 373,600
- Prostate: 307,500
- Esophagus: 281,200
- Pancreas: 173,800
- Leukemia: 151,300
- Urinary bladder: 123,100
- Non-Hodgkin lymphoma: 115,400
- All sites*: 4,653,400

Female
- Breast: 521,900
- Lung, bronchus, & trachea: 491,200
- Colon & rectum: 320,300
- Cervix uteri: 265,700
- Stomach: 254,100
- Liver: 224,500
- Pancreas: 156,600
- Ovary: 151,900
- Esophagus: 119,000
- Leukemia: 114,200
- All sites*: 3,548,200

Estimated new cancer cases and deaths worldwide in developed countries

Male
- Prostate: 758,700
- Lung, bronchus, & trachea: 490,300
- Colon & rectum: 398,900
- Urinary bladder: 196,100
- Stomach: 175,100
- Kidney: 125,400
- Non-Hodgkin lymphoma: 101,900
- Melanoma of skin: 99,400
- Pancreas: 94,700
- Liver: 92,000
- All sites*: 3,243,500

Female
- Breast: 793,700
- Colon & rectum: 338,000
- Lung, bronchus, & trachea: 267,900
- Corpus uteri: 167,900
- Ovary: 99,800
- Stomach: 99,400
- Thyroid: 93,100
- Pancreas: 92,800
- Melanoma of skin: 91,700
- Non-Hodgkin lymphoma: 88,500
- All sites*: 2,832,400

Male
- Lung, bronchus, & trachea: 416,700
- Colon & rectum: 175,400
- Prostate: 142,000
- Stomach: 106,700
- Pancreas: 93,100
- Liver: 80,400
- Urinary bladder: 58,900
- Esophagus: 56,100
- Leukemia: 51,300
- Kidney: 47,900
- All sites*: 1,591,500

Female
- Lung, bronchus, & trachea: 209,900
- Breast: 197,600
- Colon & rectum: 157,800
- Pancreas: 91,300
- Stomach: 68,000
- Liver: 65,900
- Ovary: 42,700
- Leukemia: 40,300
- Cervix uteri: 35,500
- Corpus uteri: 34,700
- All sites*: 1,287,000

Estimated new cancer cases and deaths worldwide in developing countries

Gastric cancer incidence rate by sex and world area

New cancer cases attributable to infection in 2008

Esophageal cancer incidence rate by sex and world area

Age-specific 5-year relative survival gastric cancer diagnosed in 2000-2007. The EUROCARE-5

Age-standardized 5-year relative survival for gastric cancer followed up in 1999-2007. The EUROCARE-5
European mean age-standardized 5-year relative survival for adult cancer patients diagnosed in 2000-2007. The EUROCARE-5

Trends in incidence rate in men for esophageal cancer in Europe.

### Gastro-esophageal cancer and Body Mass index

#### Table 2. Summary RRs of EGCA and BMI between 25 and 30, and BMI over 30 kg/m², in strata of selected covariates. Summary RRs of EGCA for the increment of 5 kg/m² of BMI

<table>
<thead>
<tr>
<th></th>
<th>BMI 25–30</th>
<th>BMI 30+</th>
<th>Increment of 5 kg/m² of BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>RR (95% CI)</td>
<td>n</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>1.71 (1.50–1.96)</td>
<td>12</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>10</td>
<td>2.13 (1.63–2.78)</td>
<td>5</td>
</tr>
<tr>
<td>Women</td>
<td>8</td>
<td>1.59 (1.20–2.09)</td>
<td>5</td>
</tr>
<tr>
<td><strong>P heterogeneity</strong></td>
<td>0.42</td>
<td></td>
<td>0.65</td>
</tr>
<tr>
<td><strong>Geographic area</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>6</td>
<td>1.51 (1.34–1.70)</td>
<td>3</td>
</tr>
<tr>
<td>Europe</td>
<td>12</td>
<td>1.74 (1.43–2.11)</td>
<td>8</td>
</tr>
<tr>
<td>Asia</td>
<td>2</td>
<td>2.44 (1.01–5.88)</td>
<td>1</td>
</tr>
<tr>
<td><strong>P heterogeneity</strong></td>
<td>0.26</td>
<td></td>
<td>0.68</td>
</tr>
<tr>
<td><strong>Subsite</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA</td>
<td>17</td>
<td>1.87 (1.61–2.17)</td>
<td>10</td>
</tr>
<tr>
<td>GCA</td>
<td>13</td>
<td>1.40 (1.18–1.66)</td>
<td>9</td>
</tr>
<tr>
<td><strong>P heterogeneity</strong></td>
<td>&lt;0.01</td>
<td></td>
<td>0.01</td>
</tr>
</tbody>
</table>

BMI, body mass index; CI, confidence interval; EA, esophageal adenocarcinoma; EGCA, esophageal and gastric cardia adenocarcinoma; GCA, gastric cardia adenocarcinoma; RR, relative risk.

*a* *P* for heterogeneity between strata.

*b* Including Australia.

FACTS ON GASTRIC CANCER EPIDEMIOLOGY-1

- Incidence of gastric cancer is decreasing in developed countries
- Incidence and mortality remains high in developing countries
- However it is still a severe global health issue
- Males:Females 2:1
- Wide variation in incidence across countries
- Highest incidence in East Asia (Korea, Japan, Mongolia and China), Central and Eastern Europe and South America
- Lowest incidence in North America, Northern Europe and Africa
FACTS ON GASTRIC CANCER EPIDEMIOLOGY-2

- Regional variations reflect differences in dietary patterns, food storage and availability of fresh products.
- Prevalence of Helicobacter pylori infection.
- Chronic infection of H. Pylorii accounts for 90% of cases of non cardia gastric cancer.
- Declining incidence may be due to:
  - Increase availability of fresh fruits and vegetables.
  - Decreased reliance in salt preserved food.
  - Decreased incidence of H. pylori infection.
  - Decreased smoking in western countries.

FACTS ON GASTRIC CANCER EPIDEMIOLOGY-3

- Increased Incidence and Mortality of upper third gastric cancer plus junctional and lower third adenocarcinoma of the esophagus
- In USA and Europe and in countries where the incidence of non cardia gastric cancer is low
- Predominant in males with high BMI and tobacco users