The Real Cancer Problem in Hinkley

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Since the mid-1990s, staff in the Desert Sierra Cancer Surveillance Program (DSCSP) have monitored cancer occurrence in the Hinkley Census Tract of San Bernardino County in response to concerns about a potential cancer excess.

Findings released by the DSCSP in 1997 and in 2000 failed to identify an excess in the occurrence of cancer in the Hinkley Tract.
In spite of the absence of evidence of a cancer excess in Hinkley …

“I would like to thank the academy … .”
Regions forming the California Cancer Registry

- Region 1 (Santa Clara)
- Region 2 (Central Valley)
- Region 3 (Sacramento)
- Region 4 (Tri-County)
- Region 5 (Desert Sierra)
- Region 6 (North)
- Region 7 (San Diego)
- Region 8 (Bay Area)
- Region 9 (Los Angeles)
- Region 10 (Orange)

Regions: Santa Clara, Tri-County, North, Sacramento, Desert Sierra, San Diego, Bay Area, Los Angeles, Orange.
PG&E Pumping Station Cooling Ponds
Inhaled Cr[VI] powder is accepted as a carcinogen, while the role of aqueous Cr[VI] as a human carcinogen has been challenged. Aqueous Cr[VI]$_{aq}$ exists in equilibrium with Cr[III]$_{aq}$, with the valence state determined by pH and other dissolved minerals.

Ingested CR[VI] is reduced to Cr[III] in saliva, blood, and the stomach; Cr[III] is essential for glucose metabolism and is an ingredient in multiple vitamin supplements that include minerals
Hypothesis:

$H_A$: The number of new invasive cancer cases in Census Tract 119.00 (Hinkley) will exceed the number of cases expected for the demographic configuration of the tract during 1996-2008.
Methods:
The *Standardized Incidence Ratio* (SIR) was used to evaluate the ratio of *Observed* to *Expected* new cancer cases in census tract 119.00 for 1996-2008, balancing the effects of age, sex, race/ethnicity, and population size.

\[
SIR = \frac{\text{Observed Cases}}{\text{Expected Cases}}
\]

**Unique (Hinkley)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Tract 119.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>measured in</td>
</tr>
<tr>
<td>R/E</td>
<td>2000 Census</td>
</tr>
<tr>
<td>Size</td>
<td></td>
</tr>
</tbody>
</table>

**Average (DSCSP)**

<table>
<thead>
<tr>
<th>Age</th>
<th>DSCSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1996-2008</td>
</tr>
<tr>
<td>R/E</td>
<td>Size</td>
</tr>
</tbody>
</table>

**SIR > 1:** Observed Count Greater Than Expected Count
The *Standardized Incidence Ratio* (*SIR*) was used to evaluate the ratio of *Observed* to *Expected* new cancer cases in census tract 119.00 for 1996-2008, balancing the effects of age, sex, race/ethnicity, and population size.

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- **Unique (Hinkley)**
- **Average (DSCSP)**

**SIR > 1:** Observed Count Greater Than Expected Count

**SIR = 1:** Observed Count Same As Expected Count
The *Standardized Incidence Ratio* (SIR) was used to evaluate the ratio of *Observed* to *Expected* new cancer cases in census tract 119.00 for 1996-2008, balancing the effects of age, sex, race/ethnicity, and population size.

\[
SIR = \frac{\text{Observed Cases}}{\text{Expected Cases}}
\]

**Unique (Hinkley)**

- **Age**  measured in Tract 119.00
- **Sex**  measured in 2000 Census
- **R/E**  2000 Census
- **Size**

**Average (DSCSP)**

- **Age**  measured in DSCSP
- **Sex**  measured in 1996-2008
- **R/E**  1996-2008
- **Size**

**SIR > 1**: Observed Count Greater Than Expected Count

**SIR = 1**: Observed Count Same As Expected Count

**SIR < 1**: Observed Count Less Than Expected Count
Results:
Table 3. Numbers of observed and adjusted expected new invasive cancers, SIRs, and 95 percent confidence interval limits for SIRs for all cancers and for selected cancer types - Hinkley Tract 1996-2008.

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Observed</th>
<th>Adjusted Expected</th>
<th>SIR</th>
<th>95% CI for SIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cancer Sites (combined)</td>
<td>196</td>
<td>216.42</td>
<td>0.91</td>
<td>0.78, 1.04</td>
</tr>
<tr>
<td>Nasopharynx (nasopharyngeal ca)</td>
<td>0</td>
<td>0.21</td>
<td>&lt;1</td>
<td>undefined</td>
</tr>
<tr>
<td>Respiratory</td>
<td>38</td>
<td>32.97</td>
<td>1.15</td>
<td>0.82, 1.72</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>34</td>
<td>30.12</td>
<td>1.13</td>
<td>0.78, 1.58</td>
</tr>
<tr>
<td>Digestive</td>
<td>29</td>
<td>40.55</td>
<td>0.72</td>
<td>0.48, 1.03</td>
</tr>
<tr>
<td>Pancreas</td>
<td>0</td>
<td>5.00</td>
<td>&lt;1</td>
<td>undefined</td>
</tr>
<tr>
<td>Cervix uteri</td>
<td>7</td>
<td>2.48</td>
<td>2.83</td>
<td>1.12, 5.86</td>
</tr>
<tr>
<td>Childhood cancer (age &lt;20)</td>
<td>5</td>
<td>2.44</td>
<td>2.05</td>
<td>0.65, 4.82</td>
</tr>
<tr>
<td>Esophagus &amp; stomach</td>
<td>7</td>
<td>5.21</td>
<td>1.34</td>
<td>0.53, 2.79</td>
</tr>
<tr>
<td>Hematopoietic system</td>
<td>20</td>
<td>16.86</td>
<td>1.19</td>
<td>0.72, 2.04</td>
</tr>
<tr>
<td>Thyroid gland</td>
<td>&lt;5</td>
<td>&lt;5</td>
<td>0.34</td>
<td>&lt;0.10, 1.97</td>
</tr>
<tr>
<td>Oral cavity &amp; oropharynx</td>
<td>&lt;5</td>
<td>&gt;5</td>
<td>0.38</td>
<td>&lt;0.10, 1.38</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>5</td>
<td>9.25</td>
<td>0.54</td>
<td>0.17, 1.27</td>
</tr>
<tr>
<td>Cutaneous melanoma</td>
<td>6</td>
<td>9.81</td>
<td>0.61</td>
<td>0.22, 1.34</td>
</tr>
<tr>
<td>Brain &amp; other nervous system</td>
<td>&lt;5</td>
<td>&lt;5</td>
<td>0.68</td>
<td>&lt;0.10, 2.49</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile ducts</td>
<td>&lt;5</td>
<td>&lt;5</td>
<td>0.74</td>
<td>&lt;0.10, 2.73</td>
</tr>
<tr>
<td>Breast</td>
<td>27</td>
<td>34.52</td>
<td>0.78</td>
<td>0.51, 1.14</td>
</tr>
<tr>
<td>Intestine (SI, CRC, &amp; R/S JX)</td>
<td>18</td>
<td>22.71</td>
<td>0.79</td>
<td>0.47, 1.26</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>5</td>
<td>5.30</td>
<td>0.94</td>
<td>0.30, 2.22</td>
</tr>
</tbody>
</table>
The SIR for colorectal cancer (CRC) cases was 0.87, although 33% of the cases in the Hinkley Tract were diagnosed at advanced stage, compared to 18% in the county, region, and statewide.
Conclusions/Discussion:

No evidence of a generalized cancer excess was detected in the Hinkley Tract for 1996-2008. This is consistent with three previous cancer assessments extending back to 1988 and is now enlarged to include childhood cancer and 18 cancer site groups.

Evidence of deficits in the number of:

A. digestive system cancers, including pancreatic cancer, and of
B. prostate cancer

Evidence of the need to promote screening for prevention and early detection of cancer of the:

A. Cervix uteri
B. Colon and Rectum

in remote desert communities like Hinkley
Thank You
For Your Attention

I would like to thank the academy
for the opportunity to present these findings.