Retrospective Cohort Study of Disease Incidence Among Residents of Naval Air Facility (NAF) Atsugi, Ayase, Japan

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Objective

To determine if the incidence of diseases associated with exposure to emissions from the SIC was significantly different for residents of NAF Atsugi from 1985 to 2001 when compared to a similar population over the same time period.
Interaction of Personal Risk Factors

- Genetics
- Environment
- Behaviors

Exposure → Personal Risk → Outcome
Study Design: Cohort

- Population
  - Exposed
    - Diseased
    - Not Diseased
  - Not Exposed
    - Diseased
    - Not Diseased
Study Design: Case Control

- Population
  - Diseased
    - Exposed
    - Not Exposed
  - Not Diseased
    - Exposed
    - Not Exposed
## Study Design

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort</td>
<td>Known exposure, follow to observe outcome.</td>
<td>• Difference in exposed and non-exposed populations.</td>
<td>• Loss to follow-up.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Difficulty identifying rare disease occurrences.</td>
</tr>
</tbody>
</table>
| Case-Control   | Known disease matched to control, look retrospective for risk factors. | • Evaluate a rare disease  
• Identify possible causes of adverse health outcomes. | • Requires memory of exposures and risk factors.  
• Bias introduced with control selection  
• More expensive, requires interviews |
Comparison Population

- Fleet Activities Yokosuka selected as non-exposed comparison population
  - Overseas screening
  - General environmental conditions
  - Occupational differences
  - Misclassification of exposure
Population Selection

• Both populations selected using the same criteria
• Personnel records:
  – Zip codes
  – 180 day minimum
  – All family members
  – Loss dates
### Medical Data

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Type of Care</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient</td>
<td>Military</td>
<td>October 1988</td>
</tr>
<tr>
<td>Purchased</td>
<td>October 1993</td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td>Military</td>
<td>October 1998</td>
</tr>
<tr>
<td>Purchased</td>
<td>October 1993</td>
<td></td>
</tr>
</tbody>
</table>
Non-Cancer: Case Definition

• Target organs of SIC chemicals identified in health risk assessment
  – Significant, scientifically sound, human evidence to support association between chemical and cancer

• All cancer diagnoses included
  – Primary, Secondary, Uncertain Behaviors
Non-cancer outcomes by diagnosis code

<table>
<thead>
<tr>
<th>Disease Type</th>
<th>Diagnosis Code (ICD-9-CM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>473, 476-478, 493</td>
</tr>
<tr>
<td>Eye</td>
<td>372 (excluding 372.2 and 372.4)</td>
</tr>
<tr>
<td>Dermal</td>
<td>691-692 (excluding 691.0)</td>
</tr>
</tbody>
</table>
Non-Cancer: Time Periods

• All diagnoses considered
• Stratified analysis:
  – During exposure v. after first exposure
  – Before and after 1996 for respiratory
Cancer: Case Definition

- Target organs of SIC chemicals identified in health risk assessment
  - Significant, scientifically sound, human evidence to support association between chemical and cancer
- All cancer diagnoses included
  - Primary, Secondary, Uncertain Behaviors
<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Diagnosis Code(s) (ICD-9-CM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Cancers</td>
<td>140-195, 235-238, 239</td>
</tr>
<tr>
<td>Bladder</td>
<td>188, 236.7, 239.4</td>
</tr>
<tr>
<td>Colon</td>
<td>153 (excluding 153.5)</td>
</tr>
<tr>
<td>Kidney</td>
<td>189.0, 189.1, 236.91</td>
</tr>
<tr>
<td>Leukemia</td>
<td>203.1, 204-207</td>
</tr>
<tr>
<td>Liver</td>
<td>155.0, 235.3, 239.0</td>
</tr>
<tr>
<td>Lung</td>
<td>162, 235.3, 239.0</td>
</tr>
<tr>
<td>Lymphosarcoma</td>
<td>200.1</td>
</tr>
<tr>
<td>Nasopharyngeal</td>
<td>147</td>
</tr>
<tr>
<td>Prostate</td>
<td>185, 236.5</td>
</tr>
<tr>
<td>Reticulosarcoma</td>
<td>200.0</td>
</tr>
</tbody>
</table>
Cancer: Latency

- Typical Cancer Models: 15 years
- Promotion Model: 5 Years
- Leukemia Model: 1 Year
Methods: Case Identification

- Match Population to Medical Data
  - Diagnosis by person from any location

- Statistical Analysis
  - ≥ 5 cases
  - Risk Ratios
  - Confidence Intervals
Sources of Bias

- Missed cases
- Environmental awareness
- Healthy population effect
Questions?

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