Background

HIV infection is associated with higher risk of a number of cancer types. Unclear if the magnitude of this elevated risk is consistent across age groups. In the general population, the elderly have higher cancer risk than other age groups. In the HIV population, the proportion of people over age 65 is increasing over time. The absolute cancer risk in this population has not been assessed.

Study Aims:
1) Evaluate the relationship between HIV infection and cancer incidence among people ≥65 years of age.
2) Estimate the absolute risk of cancer among the HIV-infected ≥65 years of age.

Statistical Analyses

- Case-cohort sampling within a cohort study.
- Non-cancer cases in subcohort: weight=20.
- Cancer cases: weight=1.
- Weighted Cox regression was used to estimate hazard ratios relating HIV and cancer incidence.
- HIV considered a time-varying exposure.
- Multivariable regression adjusted for race, sex, age, and calendar year.
- Cumulative incidence estimates were calculated accounting for the competing risk of death.

Study Population and Measurements

- We addressed our aims using the Surveillance, Epidemiology, and End Results (SEER)-Medicare linkage (Figure 1).
- A linkage between SEER cancer registries and Medicare claims.
- Includes all cancer cases in SEER areas as well as a 5% random sample of all Medicare recipients from 2002-2009.
- HIV diagnoses identified through Medicare.
- 1 hospital claim for HIV or 2 outpatient/provider claims for HIV at least 30 days apart (ICD-9 044.X or V08).
- Cancer diagnoses identified through SEER.
- Excludes basal and squamous cell skin cancers.

Results

- 469,954 individuals were included in the 5% subcohort.
- 361 (0.08%) of these had an HIV diagnosis.
- 42,485 cancer diagnoses made in the subcohort.
- 792,965 cancer diagnoses outside the subcohort were identified.

Table 1: Cancer incidence among the HIV-infected and HIV-uninfected individuals over the age of 65

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>HIV</th>
<th>HIV-</th>
<th>Hazard Ratio (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaposi sarcoma</td>
<td>64 (12)</td>
<td>0.9 (398)</td>
<td>79.2 (42.9,146)</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>304 (57)</td>
<td>113.2 (49,918)</td>
<td>3.01 (2.24,4.05)</td>
</tr>
<tr>
<td>Diffuse large B-cell lymphoma</td>
<td>139 (26)</td>
<td>301 (13,235)</td>
<td>5.56 (3.69,8.39)</td>
</tr>
<tr>
<td>Burkitt lymphoma</td>
<td>16 (&lt;10)</td>
<td>0.7 (304)</td>
<td>21.8 (6.91,68.5)</td>
</tr>
<tr>
<td>Other Specified</td>
<td>75 (14)</td>
<td>68 (30,071)</td>
<td>1.16 (0.67,1.99)</td>
</tr>
<tr>
<td>Unspecified</td>
<td>75 (14)</td>
<td>14 (6,308)</td>
<td>6.78 (3.93,11.7)</td>
</tr>
<tr>
<td>Hodgkin lymphoma</td>
<td>42 (&lt;10)</td>
<td>4 (1,752)</td>
<td>9.96 (4.89,20.3)</td>
</tr>
<tr>
<td>Anus</td>
<td>142 (27)</td>
<td>5 (2,212)</td>
<td>32.4 (21.6,48.5)</td>
</tr>
<tr>
<td>Liver</td>
<td>117 (22)</td>
<td>22 (9,806)</td>
<td>3.83 (2.46,5.97)</td>
</tr>
<tr>
<td>Lung</td>
<td>582 (111)</td>
<td>337 (148,217)</td>
<td>1.52 (1.21,1.91)</td>
</tr>
<tr>
<td>Colorectum</td>
<td>213 (40)</td>
<td>230 (101,085)</td>
<td>0.97 (0.69,1.36)</td>
</tr>
<tr>
<td>Breast\†</td>
<td>42 (&lt;10)</td>
<td>362 (94,257)</td>
<td>0.96 (0.56,1.65)</td>
</tr>
<tr>
<td>Prostate\†</td>
<td>855 (111)</td>
<td>854 (148,504)</td>
<td>0.78 (0.61,0.99)</td>
</tr>
</tbody>
</table>

*Incidence is per 100,000 person-years.
‡Hazard ratios are adjusted for sex, race, age at start of follow-up, and calendar year at start of follow-up.
\†Breast cancer incidence was only assessed among women. Prostate cancer incidence was only assessed among men.

Conclusions

- HIV infection in the elderly is associated with higher risk for many cancers identified as HIV-associated in younger populations.
- However, the relative elevation was lower for a number of cancers, notably non-Hodgkin lymphoma.
- This reflects the higher frequency of non-Hodgkin lymphoma subtypes less strongly associated with HIV.
- The most frequently identified cancers in HIV-infected men and women were those related to aging.
- Reflecting the effects of both HIV and aging, the absolute risk of cancer was sizeable in HIV-infected men and women.
- This highlights a need for cancer prevention and screening efforts in this group.

Acknowledgments

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