

CANCER INCIDENCE AMONG PERSONS ON MODERN SUPPRESSIVE ANTIRETROVIRAL THERAPY, 2000-12

"The median age at cancer diagnosis (Q1, Q3) was 48 years (41, 55) among HIV-positive and 68 years (58, 77) among HIV-negative cases. Specific cancers diagnosed among people with HIV are shown in **Figure 1**. The five most common cancers were non-Hodgkin lymphoma, Kaposi's sarcoma, lung, anal and liver cancers, which altogether accounted for 75% of the 195 cases. Combining all cancers across all years, there was 58% excess cancer among people with HIV (age-adjusted incidence rate ratio, aIRR = 2.4 [2.0, 2.9]). This was higher among males at 74% (aIRR = 3.9 [3.2, 4.7]) compared to 38% among females (aIRR=1.6 [0.26, 2.9])."

Reported by Jules Levin

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Conclusions

Our findings confirm higher risk for AIDS-defining malignancies and cancers with infectious causes among people with HIV, even among those who initiated modern suppressive cART therapy and had few economic barriers to its access.

Cancer rates declined over time, largely due to dramatic decreases in AIDS-defining malignancies. Nevertheless, by 2008-12, AIDS-defining malignancies remained 9 times more common and infectious cancers were 7 times more common, respectively, than in the general population.

Limitations

Differences in age-adjusted cancer rates by HIV status may be due to residual confounding by cancer risk factors, e.g., exposure to infectious agents and smoking, which are typically higher among persons with HIV than in the general population.

from Jules: and nadir CD4, current CD4, time with low CD4, viral load, time spent with detectable viral load; lifestyle: smoking, exercise, diet.

Background

International studies suggest that the incidence of some cancers is rising among people with HIV due to longevity gains from combination antiretroviral therapy (cART) and longer exposures to carcinogens.

We sought to quantify cancer risk among people with HIV who initiated modern cART in a setting with free and universal access to cART, and compare this to the general population.

We hypothesized that AIDS-defining malignancies would have decreased while non-AIDS-defining malignancies would have increased over time, most notably for cancers with infectious causes.

Methods

In British Columbia (BC), Canada, we conducted a population-based cohort study of adults (≥ 19 years) living with and without HIV via record linkage between the BC Centre for Excellence in HIV/AIDS and Population Data BC.

The comparison sample of HIV-negative individuals was generated from a 10% random sample of the total BC population.

For people with HIV, we included only those who initiated cART in 2000 and later. Person-time for cancer outcome ascertainment started at cART initiation.

Incident primary cancer diagnoses were ascertained using ICD-O codes from 2000 to 2012 via record linkage with the BC Cancer Agency registry.

Cancers were classified in two ways:

- **ADMs** (AIDS-defining cancers: Kaposi's sarcoma, non-Hodgkin lymphoma, cervical cancer) versus **NADMs** (non-AIDS-defining cancers: all other cancers)
- **Infectious** (Kaposi's sarcoma, non-Hodgkin lymphoma, cervical, anal, other genital, oropharyngeal, liver, stomach, and Hodgkin lymphoma) versus **non-infectious** (all other cancers)

Using the 2011 Canadian population as the standard, we report age-adjusted incidence rates per 1,000 person years (PY) with 95% confidence intervals (CI) and age-adjusted incidence rate ratios (aIRR) comparing rates between HIV-positive and HIV-negative individuals. The percentage excess cancer risk was calculated as $(aIRR - 1)/aIRR$.

Results

A total of 4,320 HIV-positive and 480,127 HIV-negative individuals were followed for 21,077 PY and 4,372,011 PY, respectively ([Table 1](#)).

Between 2000 and 2012, new cancers were diagnosed among 195 HIV-positive and 21,538 HIV-negative residents. The median age at cancer diagnosis (Q1, Q3) was 48 years (41, 55) among HIV-positive and 68 years (58, 77) among HIV-negative cases. Specific cancers diagnosed among people with HIV are shown in [Figure 1](#). The five most common cancers were non-Hodgkin lymphoma, Kaposi's sarcoma, lung, anal and liver cancers, which altogether accounted for 75% of the 195 cases.

Combining all cancers across all years, there was 58% excess cancer among people with HIV (age-adjusted incidence rate ratio, aIRR = 2.4 [2.0, 2.9]). This was higher among males at 74% (aIRR = 3.9 [3.2, 4.7]) compared to 38% among females (aIRR=1.6 [0.26, 2.9]).

However, cancer risk among people with HIV varied considerably by calendar period and cancer classification ([Figure 2](#), [Table 2](#)).

Figure 1. Anatomic site of 195 primary cancers among people with HIV, 2000-2012, British Columbia, Canada

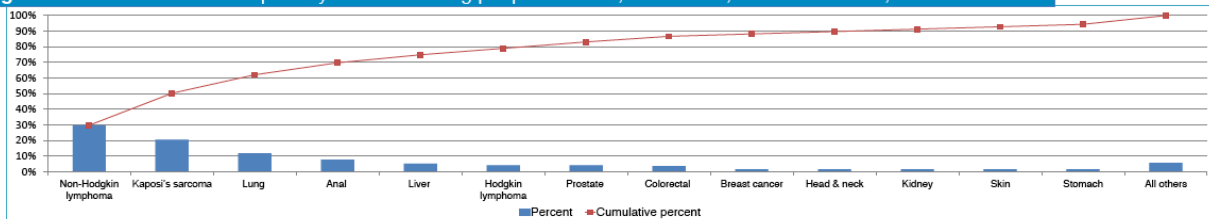


Figure 2. Incidence of primary cancers among people with HIV, 2000-2012, British Columbia, Canada

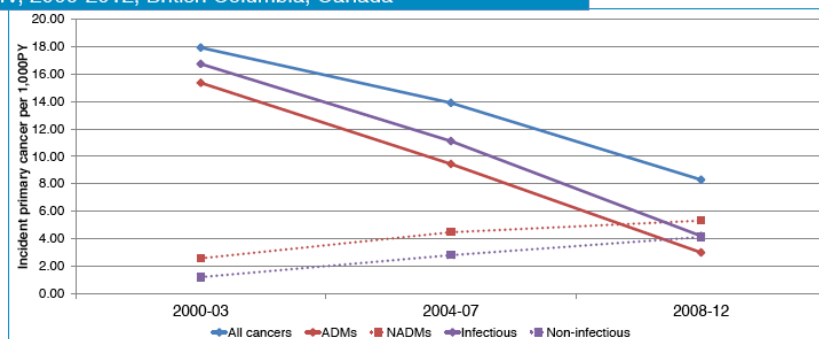


Table 1. Characteristics of cohort participants at baseline, British Columbia, Canada, 2000-2012

	HIV-positive (n=4,320)	HIV-negative (n=480,127)
Age Group		
19 to 39 years	27.2%	36.3%
40 to 49 years	36.8%	17.3%
50 to 59 years	25.6%	17.3%
60 to 69 years	8.4%	13.0%
70 years or older	1.9%	16.1%
Sex		
Male	80.4%	50.0%
Female	19.6%	50.0%
HIV risk factors*		
Male sex with male	23.6%	n/a
Heterosexual	22.2%	
Injection drug use	37.5%	
Blood products	1.3%	
Other risks	3.2%	
Unknown risk	35.3%	
Median CD4 within 6 months of start of cART (Q1, Q3)	210 (110, 330)	n/a

* HIV risk factors sum to >100% because people may have reported >1 risk factor.

Table 2. Age-adjusted incidence of primary cancers per 1,000PY (95%CI), by calendar period and HIV infection status, British Columbia

	2000-03			2004-07			2008-12		
	HIV+	HIV-	aIRR	HIV+	HIV-	aIRR	HIV+	HIV-	aIRR
All cancers	17.93 (10.31-25.54)	3.75 (3.66-3.85)	4.77 (2.75-8.80)	13.90 (9.69-18.11)	3.90 (3.81-4.00)	3.56 (2.48-4.64)	8.29 (5.90-10.69)	4.83 (4.73-4.93)	1.72 (1.22-2.21)
ADMs	15.36 (8.18-22.54)	0.26 (0.23-0.29)	59.10 (31.49-86.72)	9.44 (5.87-13.02)	0.30 (0.27-0.33)	31.56 (19.60-43.52)	2.98 (1.57-4.40)	0.34 (0.31-0.37)	8.79 (4.62-12.95)
NADMs	2.56 (0.00-5.18)	3.49 (3.40-3.59)	0.73 (0.00-1.48)	4.46 (2.22-6.69)	3.61 (3.51-3.70)	1.24 (0.62-1.86)	5.31 (3.37-7.25)	4.49 (4.40-4.49)	1.18 (0.75-1.61)
Infectious	16.74 (9.26-24.22)	0.43 (0.39-0.46)	39.05 (21.60-56.51)	11.11 (7.36-14.86)	0.48 (0.45-0.52)	23.01 (15.24-30.78)	4.19 (2.68-5.70)	0.56 (0.53-0.60)	7.41 (4.74-10.09)
Non-infectious	1.19 (0.00-2.64)	3.33 (3.23-3.42)	0.36 (0.00-0.79)	2.79 (0.87-4.71)	3.42 (3.33-3.51)	0.82 (0.25-1.38)	4.11 (2.24-5.98)	4.27 (4.17-4.36)	0.96 (0.52-1.40)

aIRR, age-adjusted incidence rate ratio