Virologic and Immunologic Outcomes in HIV-infected Patients with Non-AIDS-Defining and AIDS-Defining Cancers

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Background

HIV infection substantially increases the risk of certain malignancies. Mortality due to cancer has been notably higher among HIV-infected patients with cancer compared to HIV-uninfected patients with cancer. However, there is little data regarding HIV-specific outcomes (i.e. CD4 count recovery and virologic suppression) after a cancer diagnosis. Achievement and maintenance of virologic suppression after cancer diagnosis has been associated with improved outcomes in HIV-infected patients, but few studies have analyzed the virologic and immunologic outcomes after a cancer diagnosis.

Methods

We conducted a retrospective cohort study to compare the virologic and immunologic outcomes between HIV-infected patients with non-AIDS-defining cancers (NADC) and those with AIDS-defining cancers (ADC). All HIV-infected patients with a diagnosis of cancer from 2000-2011 in an urban clinic population in Baltimore, MD were included for review. HIV-related outcomes (HIV-1 RNA viral load and CD4 cell count) were abstracted and compared for patients with NADCs and ADCs. HIV suppression was defined as an HIV-1 RNA of ≤400 copies/ml. Mean CD4 cell count following cancer diagnosis was modeled using multivariable liner mixed models for repeated measures with an unstructured covariance matrix.

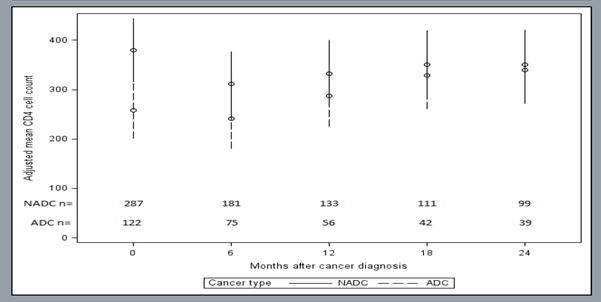
Results

412 patients with baseline CD4 or HIV-1 RNA viral load data were analyzed. There were 122 (30%) diagnoses of ADCs and 290 (70%) NADCs. The most frequent cancer among patients diagnosed with an ADC was non-Hodgkin lymphoma (76), followed by Kaposi sarcoma (37), unspecified lymphatic (5), and invasive cervical cancer (4). Among patients diagnosed with an NADC, lung cancer was the most frequent (59), followed by prostate (46), head and neck (35), liver (23), and Hodgkin lymphoma (17). Patients with NADCs had a higher median age (54 years vs. 43 years, p<0.0001) and a higher frequency of hepatitis C co-infection (52% vs. 36%, p=0.002). The median baseline CD4 was lower for patients with ADCs (137 cells/mm3 vs. 314 cells/mm3) and patients with NADCs were more likely to be suppressed at cancer diagnosis (59% vs. 25%, p<0.0001). The median CD4 for patients with NADCs was significantly higher than patients with ADCs at 6 and 12 months after diagnosis, and higher at 18 and 24 months but not significantly. Patients with ADCs were less likely than those with NADCs to be suppressed at each time interval from baseline to 24 months. Patients with an NADC had 2.19 times (95%CI 1.04-4.62) the adjusted odds of being suppressed at 12 months and 2.17 times the odds (95%CI 0.92-5.16) at 24 months compared to patients with an ADC diagnosis.

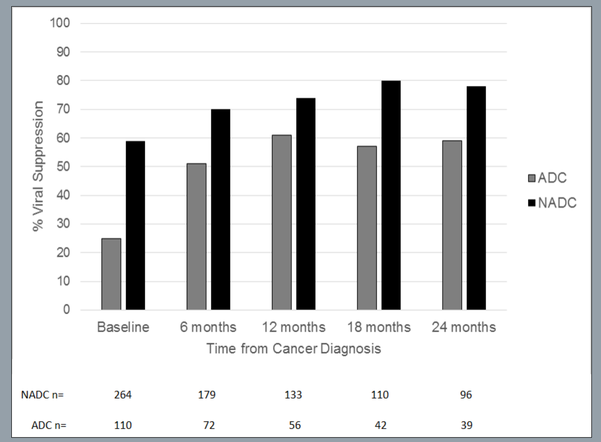
Baseline characteristics of HIV infected patients by cancer type (n=412)

Characteristic	Total (n=412)	ADC (n=122)	NADC (n=290)	p-value
Median age, years (IQR)	52 (45 - 57)	43 (36 - 49)	54 (49 - 59)	<0.0001
Male, n (%)	331 (80)	93 (76)	238 (82)	0.17
Race, n (%)				0.05
Black	357 (87)	100 (82)	257 (88)	
White	51 (12)	19 (16)	32 (11)	
Other	4 (1)	3 (2)	1 (1)	
Primary risk factor, n (%)				<0.01
Injection drug use	177 (43)	41 (34)	136 (47)	
Heterosexual	136 (33)	40 (33)	96 (33)	
Men who have sex with men	74 (18)	33 (27)	41 (14)	
Other/unknown	25 (6)	8 (6)	17 (6)	
Hepatitis B infection, n (%)	34 (8)	11 (9)	23 (8)	0.71
Hepatitis C infection, n (%)	196 (48)	44 (36)	152 (52)	0.002
Median time from HIV dx, years (IQR)	9 (4 - 14)	5 (0.5 - 12)	11 (6 - 15)	<0.0001
CD4 cell count at cancer dx, median (IQR)	268 (114 - 443)	137 (29 - 282)	314 (169 - 528)	<0.0001
CD4 cell count, n (%)				<0.0001
≤ 200	153 (37)	71 (58)	82 (29)	
201 – 500	173 (42)	45 (37)	128 (45)	
> 500	83 (21)	6 (5)	77 (27)	
VL (copies/ml) at cancer dx, median (IQR)	464 (0 - 39,120)	30,710 (884-135,020)	62 (0 - 9,151)	<0.0001
Suppressed ≤400 copies/ml at cancer dx, n (%)	184 (49)	27 (25)	157 (59)	<0.0001
ART at cancer dx, n (%)	274 (67)	56 (46)	218 (75)	<0.0001
ART regimen at cancer dx, n (%)				
None	138 (34)	66 (54)	72 (25)	<0.0001
NNRTI	69 (17)	13 (11)	56 (19)	0.03
Protease inhibitor	100 (24)	25 (20)	75 (26)	0.25
Other	105 (25)	18 (15)	87 (30)	0.001

Mean CD4 cell counts adjusted for sex, baseline CD4 cell count, ART at cancer diagnosis, HCV co-infection, and HBV co-infection.



Proportion of cases with virologic suppression ≤400 copies/ml over time.



Unadjusted and adjusted odds ratios for the association of cancer type and viral suppression at 12 months

Covariate	OR	95% CI	p-value	aOR	95% CI	p-value
Cancer type						
ADC	1.0	-	-	1.0	-	-
NADC	1.81	0.94 - 3.51	0.08	2.19	1.04 - 4.62	0.04
Sex						
Female	1.0	-	-	1.0	-	-
Male	2.38	1.14 - 4.99	0.02	2.21	0.99 - 4.92	**0.05**
Race						
White or Hispanic	1.0	-	-			
Black	0.53	0.20 - 1.38	0.19			
Mode of Transmission						
Injection drug use	1.0	-	-	1.0	-	-
Men who have sex with men	1.72	0.75 - 3.95	0.20	2.01	0.78, 5.20	0.15
Heterosexual	1.55	0.75 - 3.23	0.24	1.86	0.86, 4.00	0.11
Other mode	1.72	0.33 - 9.14	0.52	1.73	0.32, 9.42	0.53
Hepatitis B infection						
No	1.0	-	-			
Yes	1.01	0.25 - 4.05	0.99			
Hepatitis C infection						
No	1.0	-	-			
Yes	0.77	0.42 - 1.44	0.42			
ART Regimen						
None	1.0	-	-			
NNRTI	3.09	1.10 - 8.73	0.03			
Protease Inhibitor	1.38	0.63 - 3.01	0.43			
Other	2.31	0.97 - 5.49	0.06			

Discussion

For patients diagnosed with ADCs and NADCs in this urban clinic setting, both virologic suppression and immunologic recovery improved over time. Patients with NADCs were typically diagnosed with cancer while on ART, with high CD4 counts, and while virologically suppressed. Patients diagnosed with ADCs were largely not taking ART at baseline; the proportion of ADC patients with virologic suppression improved over time, yet a significant proportion (42%) remained unsuppressed even at one year after cancer diagnosis. Overall, patients with NADCs had the highest odds of virologic suppression in the 2 years following cancer diagnosis. Significant proportions of patients with both ADCs and NADCs remained unsuppressed after cancer diagnosis, indicating that new strategies are urgently needed for engaging and treating HIV-infected patients who are diagnosed with cancer.

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