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POSTER ABSTRACTS

905.OUTCOMES RESEARCH-LYMPHOID MALIGNANCIES

Investigation of Age-Specific Differences in Survival and Cause of Death Among Diffuse Large B-Cell Lymphoma Patients with and without HIV in the Modern Era of Antiretroviral Therapy: A Population-Based Analysis from 2010 to 2017

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Introduction
Despite improved prognosis with combined antiretroviral therapy (cART) among patients with human immunodeficiency virus (PWHIV) diagnosed with diffuse large B-cell lymphoma (DLBCL), population-based studies suggest inferior survival rates compared to patients without HIV. Uncertainty remains about the persistence of this survival difference across age groups. Examining outcomes across ages may help identify higher-risk groups in the current era of cART, providing insights for designing and conducting age-specific interventions.
Methods
A retrospective population-based cohort was conducted using US population-based cancer registry data among patients aged 15-79 years with newly diagnosed DLBCL from 2010 to 2017, with follow-up through 2019. The 2010-2017 period reflects the availability of integrase inhibitors and the introduction of distinct lymphoma subtypes to the World Health Organization classification system in cancer registries. HIV status was reported at lymphoma diagnosis. Patients were classified into three age groups: adolescents and young adults (AYAs, 15-39 years), adults (40-59 years), and older adults (60-79 years). Overall survival (OS) was defined from diagnosis to death of any cause. Probabilities were estimated using the Kaplan-Meier method and compared with the log-rank test. Multivariable Cox regression models were fitted to assess all-cause mortality, adjusting for cancer stage, race/ethnicity, sex, year of diagnosis, and age. We estimated the cumulative incidence of infections and HIV-related deaths using the competing risk method.
Results
Patient characteristics: A total of 26,905 DLBCL patients were identified (1,030 PWHIV and 25,758 patients without HIV). Compared to patients without HIV, PWHIV were younger (median age at diagnosis 48 years vs. 62 years), predominantly male (85% vs. 56%), more likely to be non-Hispanic Black (38% vs. 8%) and Hispanic (24% vs. 18%), and more likely to have advanced-stage disease at diagnosis (71% vs. 56%) (Table 1).
OS in DLBCL PWHIV vs. patients without HIV:Within each age group, OS was significantly lower among PWHIV with DLBCL compared to patients without HIV(Table 1 and Figure 1). With a median follow-up of 67 months, 5-year OS was particularly low among AYAs (53% vs. 87%, $p<0.0001$) and adults (48% vs. 74%, $p<0.0001$). Similarly, older adults experienced lower 5-year OS rates (45% vs. 57%, $p<0.0001$). Multivariable Cox models suggest that PWHIV has an increased risk of all-cause mortality within each age group (Figure 1).
OS in different age groups by HIV status: For PWHIV, age was not a significant factor for increased all-cause mortality, with 5-year OS rates ranging from 45% in adults to 53% in AYAs ($p=0.170$). Conversely, in DLBCL patients without HIV, AYAs had superior 5-year OS rates (87%, $p<0.001$) compared to adults (74%) and older adults (57%).
Cause of death by HIV status: Among both PWHIV and without HIV, lymphoma/leukemia-related mortality was the most common cause of death reported in death certificates (47% and 73% respectively). However, the 5-year cumulative incidence of infection mortality was higher among PWHIV (range 3-4% across age groups) compared to patients without HIV (1% across age groups). For PWHIV, other HIV-related mortality had a 5-year cumulative incidence ranging from 9% to 14% across age groups.
Results stratified by cancer stage (early- or advanced-stage disease) were consistent with those presented above.
Conclusion

This study highlights worse outcomes among PWHIV diagnosed with DLBCL compared to patients without HIV within each age group at the population level in the modern era of cART, notably among AYAs. Unlike the findings in DLBCL patients without HIV, age was not significantly associated with mortality among PWHIV with DLBCL. Future studies should explore age-specific demographic, biological, or healthcare system factors mediating these outcome disparities. The considerable HIV-related mortality suggests refining HIV surveillance approaches among PWHIV with DLBCL in prospective studies or clinical trials. Identifying the optimal integration of chemotherapy and cART may improve outcomes in this vulnerable population.

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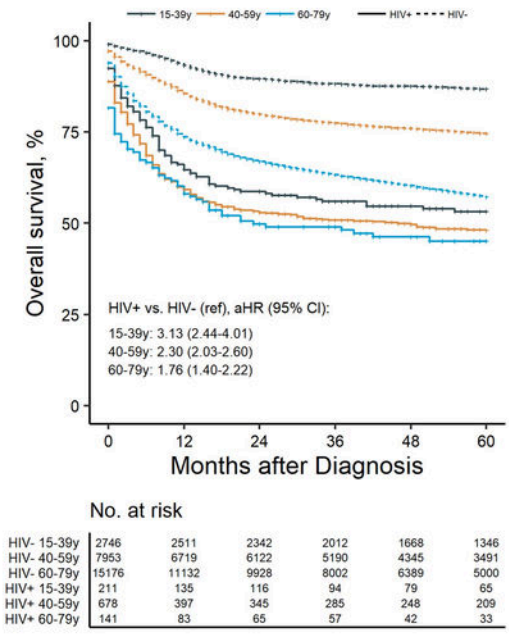
Table 1. Patient characteristics and survival outcomes of patients with diffuse large B-cell lymphoma by HIV status, SEER-16, 2010-2017.

Characteristics	All patients, No. (%)	HIV status, No. (%)		P-value
		HIV+	HIV-	
No. of patients	26,905	1,030	25,875	
Median age at diagnosis, years	62	48	62	< 0.001
Age group, years				< 0.001
15-39y	2,957 (11)	211 (20)	2,746 (11)	
40-59y	8,631 (32)	678 (66)	7,953 (31)	
60-79y	15,317 (57)	141 (14)	15,176 (59)	
Sex				< 0.001
Female	11,448 (43)	158 (15)	11,290 (44)	
Male	15,457 (57)	872 (85)	14,585 (56)	
Race and ethnicity				< 0.001
Non-Hispanic White	16,986 (63)	352 (34)	16,634 (64)	
Hispanic	4,937 (18)	249 (24)	4,688 (18)	
Non-Hispanic Black	2,357 (9)	396 (38)	1,961 (8)	
Others	2,625 (10)	33 (3)	2,592 (10)	
B symptoms				< 0.001
No	14,617 (65)	452 (49)	14,165 (65)	
Yes	8,018 (35)	468 (51)	7,550 (35)	
Missing	4,270	110	4,160	
Cancer stage				< 0.001
I-II	11,154 (43)	293 (29)	10,861 (44)	
III-IV	14,649 (57)	706 (71)	13,943 (56)	
Missing	1,102	31	1,071	
Cause of death, at 5 years				< 0.001
Lymphoma/Leukemia [a]	6,376 (72)	241 (47)	6,135 (73)	
Infections [b]	141 (2)	39 (8)	102 (1)	
Other HIV-related deaths [c]	143 (2)	130 (25)	13 (0)	
Other causes of death	2,245 (25)	103 (20)	2,142 (26)	
5-year OS (95% CI) [d]				
15-39y	84 (83-86)	53 (47-61)	87 (85-88)	< 0.0001
40-59y	72 (71-73)	48 (44-52)	74 (74-76)	< 0.0001
60-79y	57 (56-58)	45 (37-54)	57 (56-58)	< 0.0001

Abbreviations: HIV, human immunodeficiency virus; OS, overall survival; CI, confidence interval
Patients with primary effusion lymphoma, primary central nervous system lymphoma, and plasmablastic lymphoma were excluded. ICD-O-3 code for plasmablastic lymphoma was introduced in 2010.
[a] Mortality due to lymphoma or leukemia was grouped because of misclassification concerns in death certificates. Includes causes of death due to HIV-related hematologic malignancies (International Classification Disease-10 codes from B21.1 to B21.3)
[b] Includes causes of death due to HIV-related infections (International Classification Disease-10 codes from B20.0 to B20.9)
c Includes causes of death due to other HIV-related causes (International Classification Disease-10 codes from B21.7 to B24.9 and B21.0)
[d] P-values of the Log-rank test represent survival comparisons between DLBCL patients with and without HIV within each age group.

Figure 1. Five-year overall survival Kaplan-Meier curves for DLBCL patients with and without HIV by age groups, 2010-2017.



Abbreviations: HIV, human immunodeficiency virus; aHR, adjusted Hazard ratio; CI, confidence interval

Figure 1

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