26-year Kaposi sarcoma incidence and mortality trends in the population-based PISCIS cohort

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Raquel Martin-Iguacel[1,2,3], Sergio Moreno-Fornés[1,4], Georgia Escaramis[1], Josep M Llibre[5,6], Dani Podzamczer[7], Pere Domingo[8], Adrian Curran[9], Robert Güerri-Fernández[10], David Dalmau[11], Joaquim Peraire[12,16], Beatriz Borjabad[13], Laia Arbones Fernandez[14], Josep M Miró[15,16], Jordi Casabona[1,16], Arkaitz Imaz[7], on behalf of the PISCIS Cohort Study Group.

[1] Centre of Epidemiological Studies of HIV/AIDS and STI of Catalonia (CEEISCAT), Health Department, Generalitat de Catalunya, Badalona, Spain; [2] Department of Infectious Diseases, Odense University Hospital, Odense, Denmark; [3] University of Southern Denmark, [4] CIBER Epidemiología y Salud Pública (CIBERESP), Spain; [5] Infectious Diseases Department, University Hospital Germans Trias i Pujol, Badalona, Barcelona, Spain; [6] Fight Infections Foundation, Badalona, Barcelona, Spain; [7] Department of Infectious Diseases, Hospital Universitari de Bellvitge–Bellvitge Biomedical Research Institute (IDIBELL), University of Barcelona, L'Hospitalet de Llobregat, Barcelona, Spain; [8] Infectious Diseases Unit, Hospital Universitari de la Santa Creu i Sant Pau, Barcelona, Spain; [9] Department of Infectious Diseases, Hospital Universitari de la Vall d'Hebron, Barcelona, Spain; [10] Department of Infectious Diseases, Hospital del Mar–Parc de Salut MAR, Barcelona, Spain; [11] Department of Infectious Diseases, Hospital Universitari Mútua Terrassa, Barcelona, Spain; [12] Department of Internal Medicine, Hospital Universitari de Tarragona Joan XXIII, IISPV, Universitat Rovira i Virgili, Tarragona, Spain; [13] Department of Internal Medicine, Consorci Sanitari Integral, L'Hospitalet del Llobregat, Barcelona, Spain; [14] Department of Internal Medicine, Hospital de Mataró, Mataró, Spain; [15] Department of Infectious Diseases, Hospital Clínic–Institut d'Investigacions Biomèdiques August Pi i Sunyer, University of Barcelona, Barcelona, Spain; and [16] CIBERINFEC, Instituto de Salud Carlos III, Madrid, Spain.

BACKGROUND

Kaposi sarcoma (KS) remains an important AIDS-defining malignancy in the antiretroviral therapy (ART) era, yet its contemporary epidemiology and outcomes are not well characterized.

METHODS

Population-based cohort study in Catalonia, Spain, including all adult with HIV (PWH) in the PISCIS Cohort (1998–2023) without prior KS. We estimated KS incidence rates (IR), and all-cause mortality rates (MR) after KS diagnosis and assessed risk and prognostic factors using multivariable Poisson regression.

Table 1. Baseline Characteristics

Characteristic	No Kaposi sarcoma N = 31,730	Kaposi sarcoma N = 768	P value
Male sex, n (%)	25,994 (81.9)	732 (95.3)	<0.001
Age at baseline, years	35 (29–42)	37 (31–45)	<0.001
<30 years	9,251 (29.2)	149 (19.4)	
30–39 years	12,731 (40.1)	312 (40.6)	
40–49 years	6,628 (20.9)	192 (25.0)	
≥50 years	3,120 (9.8)	115 (15.0)	<0.001
Transmission mode: MSM	15,567 (52.2)	556 (75.0)	<0.001
CD4 at baseline (cells/μL)	397 (216–610)	189 (69–423)	<0.001
Nadir CD4 (cells/μL)	296 (147–463)	153 (50–304)	<0.001
HIV-RNA at baseline (log_{10})	4.50 (3.34–5.18)	5.13 (4.46–5.60)	<0.001
Viraemia copy-years ≥5 log_{10}	9,964 (31.4)	508 (66.2)	<0.001
AIDS-defining event*, n (%)	5,041 (15.9)	143 (18.6)	0.041
Charlson score 0	28,637 (90.3)	476 (62.0)	0.001
Charlson score 1–2	2,727 (8.6)	264 (34.4)	0.001
Charlson score ≥3	366 (1.2)	28 (3.7)	0.001
Hepatitis B, n (%)	5,303 (16.7)	59 (7.7)	0.001
Hepatitis C, n (%)	9,199 (29.0)	70 (9.1)	0.001

* AIDS-defining events excluding KS

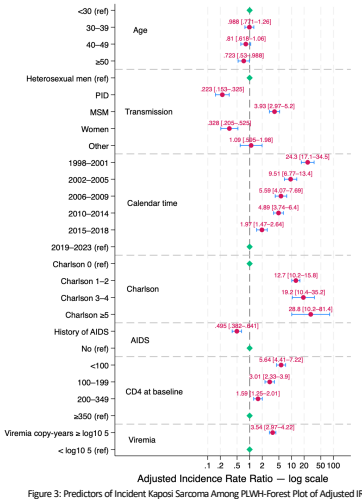


Figure 3: Predictors of Incident Kaposi Sarcoma Among PLWH-Forest Plot of Adjusted IRRs.

Although KS incidence and mortality declined with ART, KS persists, with risk concentrated among MSM and individuals with immunosuppression, including those with cancer, autoimmune disease, uncontrolled viremia, and low CD4 counts.

RESULTS

Among 32,498 PWH contributing 334,485.2 person-years (PY) of follow-up (median 10.1 years [IQR 4.6-16.4]), we identified 768 KS events (IR 2.3/1,000 PY (95% CI: 2.1–2.5). IR declined steadily over time, from 8.6/1,000 PY (95% CI: 7.1-10.3) (1998–2001) to 0.8/1,000 PY (95% CI: 0.7-1.0) (2019-2023) (p<0.001) (Table 1 and Fig. 1).

Among PWH receiving ART, 321 developed KS after ART initiation, corresponding to an IR of 1.0/1,000 PY (95% CI: 0.9–1.1). Incidence differed markedly according to cumulative viraemia exposure (Fig. 2).

Multivariable analysis showed higher KS risk among MSM, individuals with greater comorbidity burden, low baseline CD4 counts, and high cumulative viraemia (≥5 log_{10} copy-years) (Fig. 3). Among Charlson comorbidities, cancer (aIRR 102, [95% CI: 77.8–135]) and autoimmune diseases (aIRR 7.01, [95% CI: 1.55–31.6]) emerged as key driver of KS incidence. Findings were consistent across calendar period and among individuals who developed KS after ART initiation.

PWH diagnosed with KS showed marked immune recovery (median CD4: 159 → 406 cells/μL at 2 years). During 8,542.7 PY of follow-up, mortality was 19.2/1,000 PY and declined over time (p=0.007) (Fig. 1). Mortality was higher among individuals with low CD4 counts at KS diagnosis (<200 cells/μL: aMRR 1.51, [95% CI: 1.03–2.23]) and severe comorbidity (CCS ≥5: aMRR 4.10, [95% CI 1.49–11.33]). In contrast, MSM had lower mortality compared with heterosexual men (aMRR 0.57, [95% CI: 0.35–0.93]).

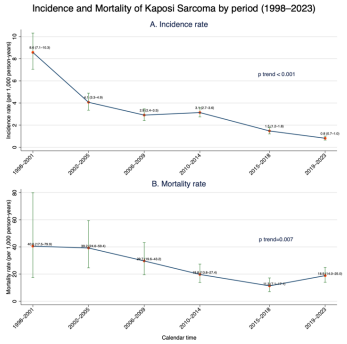


Figure 1: Kaposi Sarcoma Incidence and All-cause Mortality by Period (1998-2023).

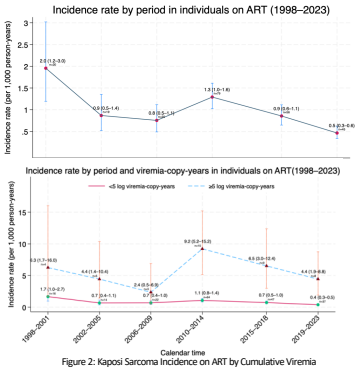


Figure 2: Kaposi Sarcoma Incidence on ART by Cumulative Viremia

CONCLUSIONS

- KS incidence in PWH declined over time, yet it remains a persistent malignancy in the modern ART era.
- Risk of KS was highest among MSM, individuals with uncontrolled viremia, low CD4 counts and greater comorbidity burden, particularly those with cancer or autoimmune disease.
- Cumulative viremia exposure is significantly associated with KS incidende.
- Although mortality decreased over time, it remained higher among individuals with severe comorbidity and advanced immunosuppression.
- Early HIV diagnosis and ART, sustained viral suppression, and optimized management of immune-related comorbidities should be prioritized to further reduce the KS burden.

Author Contact Information:
Raquel Martin Iguacel: raquel@bisaurin.org
Arkaitz Imaz: aimaz@bellvitgehospital.cat

PLAIN LANGUAGE SUMMARY

Over 26 years in Catalonia, Kaposi sarcoma became much less common and less deadly among people living with HIV, but it has not disappeared. Risk remains higher in people with weakened immune systems, especially those with poor HIV control or immune-related conditions such as cancer or autoimmune disease.

PISCIS POPULATIONAL HIV COHORT FROM CATALONIA AND BALEARIC ISLANDS

Region Syddanmark OUH Odense Universitetshospital Svendborg Sygehus SDU