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HIV Severity and Incident Heart Failure Among Adults in a Large Healthcare System

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BACKGROUND

- Persons with HIV (PWH) are at increased risk for developing heart failure (HF) compared with uninfected persons.
- Few studies have evaluated whether HF risk varies by HIV severity among patients with equal access to care.

METHODS

Study design, setting and population

- Observational cohort study from 1/1/2000 to 12/31/2016
- Kaiser Permanente integrated healthcare delivery systems: Northern California, Southern California, and Mid-Atlantic States (Maryland, D.C. and Virginia)
- All adult (≥21 years old) PWH and HIV-uninfected persons frequency-matched 1:10 by sex, age, race/ethnicity, baseline year and medical facility

Data sources

- Electronic health records and HIV registry

Primary outcome

- Incident diagnosed HF (any type)

Analyses

- Poisson regression was used to estimate rate ratios (RR) of incident HF by HIV status, with PWH stratified by recent CD4, nadir CD4 or recent HIV RNA level
- CD4 and HIV RNA measures were included only if they preceded HF measurement by at least 6 months
- Models adjusted for:
  - Sex, current age, race/ethnicity, census-based neighborhood income
  - HF risk factors: BMI>30, current smoking, and ever documented history of acute myocardial infarction, coronary heart disease, hypertension, diabetes mellitus, dyslipidemia, alcohol use disorder or drug use disorder

People with HIV who are immunosuppressed or have higher HIV viremia are at greater risk of developing heart failure than people without HIV

RESULTS

Table 1. Baseline characteristics of study population

Characteristic at baseline	PWH N = 38,868	HIV-uninfected N = 386,569
Male	88%	88%
Average age (years)	41	41
Race/ethnicity		
White	38%	38%
Black	21%	21%
Hispanic	20%	20%
Other/Unknown	21%	21%
Obese (BMI>30)	5%	12%
Prior acute myocardial infarction	0.25%	0.26%
Coronary heart disease	0.40%	0.50%
Hypertension	7%	12%
Diabetes	3%	5%
Dyslipidemia	8%	15%
Current smoking	40%	30%
Alcohol use disorder diagnosis	11%	7%
Other drug use disorder diagnosis	16%	5%

Unknown BMI: 27% of PWH and 29% of HIV-uninfected

Table 2. Rate ratios of incident heart failure in PWH compared with HIV-uninfected, by HIV severity

	Cases of HF n	Adjusted[1] RR (95% CI)	p
Recent CD4 count			
HIV-uninfected	3,298	Ref	
PWH, ≥500	160	0.99 (0.84-1.16)	0.91
PWH, 200-499	189	1.52 (1.31-1.77)	<0.001
PWH, <200	65	2.83 (2.21-3.63)	<0.001
Nadir CD4 count			
HIV-uninfected	3,298	Ref	
PWH, ≥500	26	1.00 (0.68-1.48)	0.99
PWH, 200-499	150	1.17 (0.99-1.38)	0.07
PWH, <200	238	1.55 (1.35-1.77)	<0.001
Recent HIV RNA level			
HIV-uninfected	3,298	Ref	
PWH, ≤200	269	1.40 (0.52-3.75)	0.51
PWH, 201-9,999	52	2.03 (1.36-3.02)	<0.001
PWH, ≥10,000	93	2.13 (1.46-3.12)	<0.001

SUMMARY

- Elevated HF risk was observed only among PWH with lower recent CD4 count, lower nadir CD4 count and higher recent HIV RNA level.
- PWH with recent CD4≥500, nadir CD4≥200 and recent HIV RNA level ≤200 did not have significantly higher risk of HF compared with uninfected persons.
- Limitations: lack of data on diabetes, hypertension and dyslipidemia treatment; data on diet and exercise not systematically recorded in EHR
- Strengths: comparison to well-matched HIV-uninfected group within the same healthcare delivery system; adjustment for multiple HF risk factors

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