



HIV Infection, Hepatitis C Infection, and the Risk of Stroke in the Veterans Aging Cohort Study Virtual Cohort (VACS-VC)



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Abstract

Background: Some evidence suggests that HIV/HCV co-infection is associated with an increased risk of cardiovascular disease. We asked whether HIV/HCV co-infection is associated with stroke.

Methods: We analyzed data on 8579 male participants (28% HIV+, 9% HIV+ HCV+) from the Veterans Aging Cohort Study Virtual Cohort (VACS-VC) who participated in the 1999 Large Health Study of Veteran Enrollees.¹ All participants were free of baseline cardiovascular diseases and cancer. We analyzed data collected on HIV and HCV status, risk factors for and the incidence of stroke, and mortality from 1/2000-7/2007. Diagnoses of stroke were identified by inpatient and outpatient ICD-9 codes. We compared models using traditional and propensity adjusted Cox proportional hazard models to assess stroke risk when death was treated as a censoring event and a competing risk, respectively.

Results: During the median 7.3 years of follow-up, there were 160 stroke events and 1181 deaths. HIV/HCV co-infected veterans had an increased risk of stroke compared with HIV and HCV uninfected veterans, regardless of whether death was censored or treated as a competing risk.

Conclusion: These data suggest that HIV and HIV/HCV co-infection is associated with an increased risk of stroke. The risk of stroke in HIV and HIV/HCV infected people may be under appreciated due to the excess competing risk of death. If confirmed in other studies, these findings have important implications for clinical management of those aging with HIV infection.

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Introduction

➤ Annual incidence rate of stroke in HIV thought to be less than entire cohort in United States (216 versus > 240 per 100,000).²

➤ HIV is associated with an increased risk of hemorrhagic stroke.³

➤ Because of the excess competing risk of death in this patient population, risk of stroke may be under appreciated.

➤ Those with coinfection have higher risk of cardiovascular disease,⁴ whereas its association with stroke is unclear.

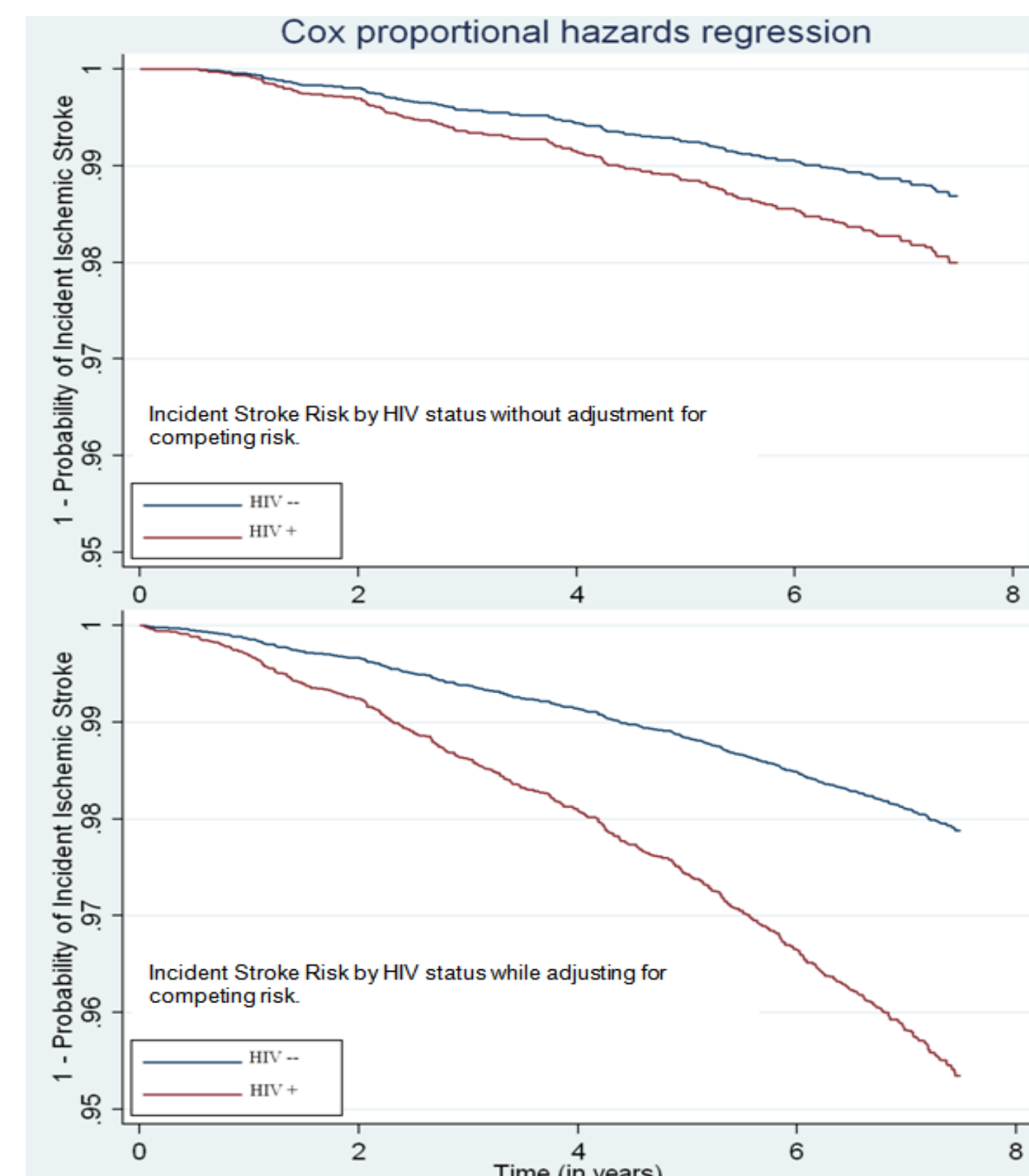


Figure 1: Kaplan-Meier Analysis of Incident Stroke by viral status before and after adjusting for death as a competing risk.

Methods

Design: prospective

Sample: VACS-VC male participants of 1999 Large Health Study of Veteran Enrollees: 8579 (28% HIV+, 9% HIV+ HCV+)

Statistical Analysis: Cox proportional hazards model; competing risk analysis, modeling death as a censoring event and competing risk⁵

Results

Table 1: Characterization of Stroke Events by Viral Status

Viral Status	No. of death events (%)	Adjusted mortality rate* (95% CI)	No. of stroke events (%)	Adjusted stroke incidence rate* (95% CI)	Model 1: HR for stroke (95% CI)†	Model 2: HR for stroke (95% CI)‡
HIV+HCV+ N=738	252 (21.3)	60.6 (58.5-62.6)	29 (18.1)	6.99 (6.68-7.30)	2.08 (1.31-3.31)	2.21 (1.62-3.02)
HIV+HCV- N=1687	380 (32.2)	39.0 (37.6-40.5)	28 (17.5)	2.93 (2.79-3.07)	1.34 (0.87-2.07)	2.13 (1.65-2.75)
HIV-HCV+ N=701	94 (8.0)	20.5 (19.8-21.1)	19 (11.9)	4.13 (3.96-4.29)	1.36 (0.79-2.35)	1.44 (0.99-2.11)
HIV-HCV- N=5453	455 (38.5)	12.9 (12.6-13.1)	84 (52.5)	2.38 (2.33-2.44)	1.0	1.0

*Rates are per age and race adjusted per 1000 person years.

† Model 1 adjusted for age, race, education, body mass index, hypertension, diabetes, smoking, hypercholesterolemia, alcohol abuse and dependence, cocaine abuse and dependence, congestive heart failure in the follow-up period prior to stroke, and death as a censoring event.

‡ Model 2 treated death as a competing risk, adjusting for all covariates in Model 1.

Conclusions

➤ Chronic HIV infection with and without Hepatitis C coinfection is associated with an increased risk of stroke.

➤ This association may have been under appreciated because of excessive risk of death in this patient population.

➤ These findings may have treatment implications for clinical management of those aging with HIV.

Future Analyses

➤ Chart review and adjudication of stroke endpoints to determine the etiology of stroke events (e.g., cardioembolic, thromboembolic, and small-vessel disease).

➤ Explore mechanisms of increased risk of stroke (e.g., inflammatory markers, cryoglobulins, and altered coagulation.)

References

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