Differences by HIV Serostatus in Coronary Artery Disease Severity following Stress Testing

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BACKGROUND

HIV and Atherosclerotic Cardiovascular Disease (ASCVD)

HIV: Accelerated and increased risks for ASCVD, including coronary artery disease (CAD) and myocardial infarction (MI)

Clinical Correlates: How should noninvasive clinical tests be interpreted for HIV-infected persons? For instance, does a "positive" stress test concerning for coronary ischemia mean the same thing in HIV as in the general population?

- ***No prior studies to our knowledge have evaluated cardiovascular stress testing for HIV-infected persons***

HYPOTHESIS

HIV-infected persons with abnormal stress tests have more CAD on coronary angiography than uninfected matched controls.

METHODS

Cohort: Northwestern Medicine Enterprise Data Warehouse (NMEDW)

- HIV-CVD e-cohort: HIV-infected patients with prior CVD testing at Northwestern University Medical Center, matched on demographics with uninfected persons who underwent CVD testing (N=6222)
- Studied nested population within this cohort: All patients with abnormal cardiac stress test results who underwent subsequent coronary angiography (N=585)

Primary Outcome: CAD severity on angiography for HIV-infected versus uninfected persons following abnormal stress test with imaging

Secondary Outcomes: CAD severity on angiography for HIV-infected versus uninfected persons following stress test, stratified by imaging modality

RESULTS

Baseline Characteristics

	HIV+ (N=314)	Uninfected (N=453)
Age at Stress Test (Years)	53.5	53.0
Race		
Asian	4 (1.3%)	7 (1.5%)
Black	140 (44.6%)	191 (42.2%)
White	137 (43.6%)	199 (43.9%)
Other	28 (8.9%)	49 (10.8%)
Declined	5 (1.6%)	7 (1.5%)
Sex		
Male	256 (81.5%)	362 (79.9%)
Female	58 (18.5%)	91 (20.1%)
Stress Test Type		
Echo	85 (27.1%)	133 (29.4%)
Nuclear	203 (64.6%)	284 (62.7%)
Treadmill ECG	19 (6.1%)	21 (4.6%)
Unknown	7 (2.2%)	15 (3.3%)

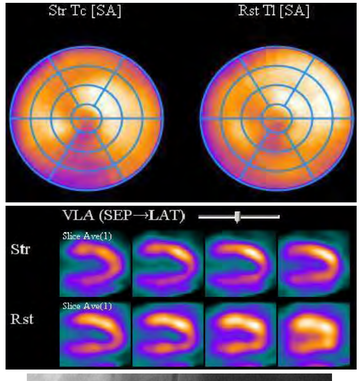
Coronary Artery Disease following Abnormal Stress Test: HIV-Infected vs. Uninfected

	HIV+	Uninfected	Relative Risk (95% CI)	P Value
Abnormal Stress Test Results: All Modalities (Mean Age = 53.3 years)				
Number Abnormal (Total Performed)	239 (314)	346 (453)		
≥50% Stenosis (% of Abnormal)	139 (58.2%)	170 (49.1%)	1.18 (1.01-1.38)	0.03
≥70% Stenosis	114 (47.7%)	141 (40.8%)	1.17 (.97-1.41)	0.09
PCI* Performed	65 (27.2%)	59 (17.1%)	1.59 (1.17-2.18)	<0.01
3 Vessel CAD or L Main	39 (16.3%)	56 (16.2%)	1.01 (.69-1.46)	0.97

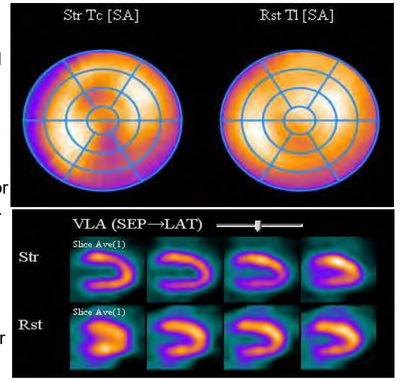
*PCI = Percutaneous Coronary Intervention (e.g., angioplasty/stent)

HIV+ vs. Uninfected Control with Abnormal Inferior Perfusion on Nuclear Stress Tests

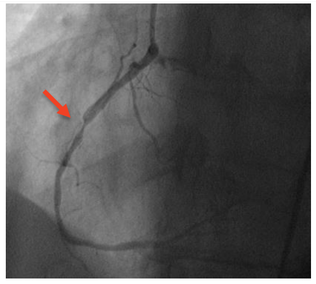
HIV+



Uninfected



Nuclear Perfusion Stress Images (HIV+ Left, Uninfected Control Right): Orange represents myocardial perfusion (uptake of radioactive tracer in coronary arteries and myocardium). Darker color represents less perfusion. The inferior regions of each have less perfusion during stress, which prompted coronary angiography (corresponding images for each patient below).



Angiography of Right Coronary Artery: The patient on the left (HIV+) has severe (≥70%) RCA stenosis corresponding to the above inferior perfusion defect (arrow). The patient on the right (uninfected control) does not have RCA disease despite the inferior perfusion defect on stress.



Results Stratified by Stress Imaging Modality: Coronary Artery Disease following Abnormal Stress Test

	HIV+	Uninfected	Relative Risk (95% CI)	P
Abnormal Echo Stress Tests (Mean Age = 55.2 years)				
Number Abnormal (Total Studies)	46 (85)	85 (133)		
≥50% Stenosis (% of Abnormal)	25 (54.3%)	39 (45.9%)	1.18 (.83-1.68)	0.35
≥70% Stenosis	20 (35.7%)	31 (36.5%)	1.19 (0.77-1.84)	0.43
PCI Performed	14 (30.4%)	10 (11.8%)	2.59 (1.25-5.36)	0.01
3 Vessel CAD or L Main	6 (13.0%)	13 (15.3%)	0.85 (0.35-2.09)	0.72
Abnormal Nuclear Stress Test (Mean Age = 52.6 years)				
Number Abnormal (Total Studies)	178 (201)	239 (284)		
≥50% Stenosis (% of Abnormal)	103 (57.9%)	122 (51.0%)	1.13 (0.95-1.35)	0.16
≥70% Stenosis	85 (47.8%)	101 (42.3%)	1.13 (0.91-1.40)	0.26
PCI Performed	47 (26.4%)	39 (16.3%)	1.62 (1.11-2.36)	0.01
3 Vessel CAD or L Main	40 (22.5%)	42 (17.6%)	1.28 (0.86-1.88)	0.21

CONCLUSIONS

Compared with uninfected persons with abnormal stress tests who underwent coronary angiography, **HIV-Infected** persons with abnormal stress tests who underwent coronary angiography were significantly more likely to:

1) have **at least moderate (≥50% stenosis) CAD**, and
2) **undergo percutaneous coronary intervention**

Whether this finding simply reflects greater pretest probabilities for CAD among HIV-infected persons or characteristics of the stress test modalities themselves requires further study.

LIMITATIONS AND NEXT STEPS

Retrospective cohort study: Potential for selection bias and indication bias. Thus, we limited analyses to patients with abnormal stress tests who subsequently underwent angiography; unknown if differential

Single center: Referral patterns and populations may differ (external validity)

Next steps: Validate in other cohorts with imaging/invasive data; assess test characteristics/yield (need prevalence data); incorporate global risk estimation