Myocardial Infarction by Atherosclerotic Cardiovascular Disease (ASCVD) Risk Score

0000

@NAACCORD @iedeaglobal

Keri N Althoff[1], Todd T Brown[2], Greer Burkholder[3], Heidi M Crane[4], Joseph Delaney[4], Richard A Elion[5], Karla Galaviz[6], Stephen J Gange[1], Michael A Horberg[7], Frank J Palella[8], Michael J. Silverberg[9], Janet Tate[10], Richard D Moore[11], for the North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD) of IeDEA

[1]Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA, [2]Johns Hopkins University School of Medicine, Baltimore, MD, USA, [3]University of Alabama at Birmingham, Birmingham, AL, USA, [4]University of Washington, Seattle, WA, USA, [5]George Washington University, Washington, DC, USA, [6]Emory University, Atlanta, GA, USA, [7]Kaiser Permanente Mid-Atlantic States, Rockville, MD, USA, [8]Northwestern University, Chicago, IL, USA, [9]Kaiser Permanente, Oakland, CA, USA, [10]VA Connecticut Healthcare System, New Haven, CT, USA

BACKGROUND

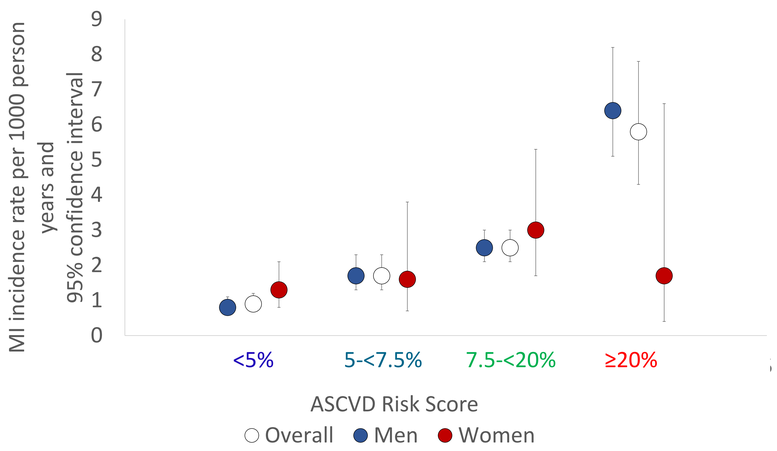
- We aimed to estimate the **risk** and **rate** of type 1 myocardial infarction (**MI**) by AHA/ACC 10-year atherosclerotic cardiovascular disease **(ASCVD) risk score** among men and women with HIV in North America (2000-2015).
- ASCVD risk score estimates the risk of a) myocardial infarctions, b) stroke, or c) death from coronary disease or stroke within 10 years.

Why? Physicians who care for people with HIV (PWH) need to know a patient's risk for MI relates to the occurrence of incident MI to inform discussions about preventive interventions.

METHODS

- A sub-set of NA-ACCORD cohorts (n=7) **validated type 1 MIs** (induced by plaque rupture with thrombus)
- For participants:
  - Study entry = later date of enrollment, age 40, ART initiation date, 1 Jan 2000, or the cohort start date of MI observation
  - Study exit = earliest of MI date, death date, loss to follow up (2 years with no HIV RNA or CD4 measurements), age 80 years, 31 Dec 2015, or the cohort stop date of MI observation
- **10-year AHA/ACC ASCVD risk score** at study entry
  - Categorized: <5%, 5-<7.5%, 7.5-<20%, ≥20%
- **Risk:** Cumulative incidence of MI from the time of study entry up to 10 years were estimated using Kaplan-Meier methods and compared using log-rank tests
- **Rate:** MI incidence rates (per 1000 person years) with 95% confidence intervals [,] estimated using Poisson regression models

Figure 2: MI incidence **rates** (per 1,000 person-years), by ASCVD risk score and sex



There are differences in the rate and risk of type 1 myocardial infarction among men and women with HIV. ASCVD risk scores do not fully reflect these differences.

Contact information and Acknowledgements

Keri N Althoff, PhD, MPH, kalthoff@jhu.edu, @kerinalthoff on Twitter

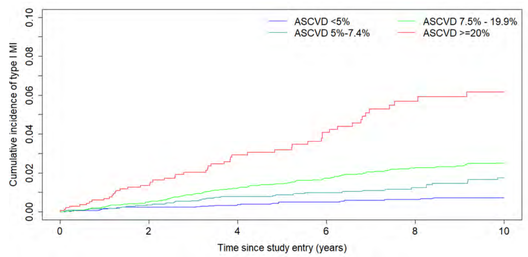
The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. This work was supported by National Institutes of Health grants U01AI069918, F31AI124794, F31DA037788, G12MD007583, K01AI093197, K01AI1318915, K23EY013707, K24AI065298, K24AI118591, K24DA000432, KL2TR000421, M01RR000052, N01CP01004, N02CP055504, N02CP91027, P30AI027757, P30AI027763, P30AI027767, P30AI036219, P30AI050410, P30AI094189, P30AI110527, P30MH62246, R01AA016893, R01CA165937, R01DA011602, R01AG053100, R24AI067039, U01AA013566, U01AA020790, U01AI031834, U01AI034989, U01AI034993, U01AI034994, U01AI035004, U01AI035039, U01AI035040, U01AI035041, U01AI035042, U01AI037613, U01AI037984, U01AI038855, U01AI038858, U01AI042590, U01AI068634, U01AI068636, U01AI069432, U01AI069434, U01AI103390, U01AI103397, U01AI103401, U01AI103408, U01DA03629, U01DA036935, U01HD032632, U10EY008057, U10EY008052, U10EY008067, U24AA020794,U54MD007587, UL1RR024131, UL1TR000004, UL1TR000083, UL1TR000454, UM1AI035043, Z01CP010214 and Z01CP010176; contracts CDC-200-2006-18797 and CDC-200-2015-63931 from the Centers for Disease Control and Prevention, USA; contract 90047713 from the Agency for Healthcare Research and Quality, USA; contract 90051652 from the Health Resources and Services Administration, USA; grants CBR-86906, CBR-94036, HCP-97105 and TGF-96118 from the Canadian Institutes of Health Research, Canada; Ontario Ministry of Health and Long Term Care; and the Government of Alberta, Canada. Additional support was provided by the National Cancer Institute, National Institute for Mental Health, National Institute on Drug Abuse, the National Heart, Lung, and Blood Institute, the National Institute on Alcohol Abuse and Alcoholism, the National Institute of Diabetes and Digestive and Kidney Diseases, the Fogarty International Center, and the National Library of Medicine

RESULTS

- A total of 20,596 people (17,175 men and 3,421 women) contributed 140,003 person-years and 271 incident MIs (244 in men, 27 in women)
  - 183 individuals with a type 2 MI and were censored
- Median (interquartile range [IQR]) follow-up = 6.0 [3.0 ,10.1] years
- At study entry (overall):
  - median [IQR] age = 44.4 [40.0, 50.0) years
  - median [IQR] CD4 count = 381 [203, 597] cells/mm^3
  - proportion with a suppressed (<200 copies/mL) HIV RNA = 45%
  - ASCVD risk: n=7,672 with risk <5%; n=3,742 with risk 5-<7.5%; n=7,597 with risk 7.5-<20%; n=1,585 with risk ≥20%

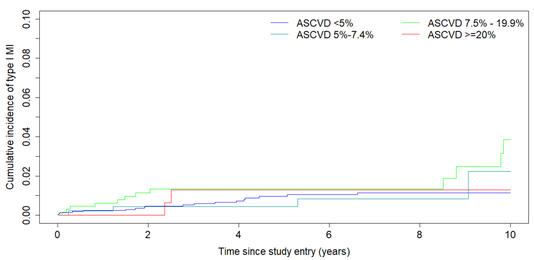
Figure 2: Cumulative incidence (**risk**) of MI, by ASCVD risk score at study entry among a) men and b) women

a) Men (log rank p-value <0.001)



ASCVD	# of MIs	N
<5%	30	5,601
5-<7.5%	40	3,268
7.5%-<20%	119	6,935
≥20%	55	1,371

b) Women (log rank p-value = 0.165)



ASCVD	# of MIs	N
<5%	8	2,071
5-<7.5%	5	474
7.5%-<20%	12	662
≥20%	2	214

LIMITATIONS

- Only type 1 MIs were included in our outcome; the ASCVD risk score predicts multiple cardiovascular disease outcomes
- Participants were those who remained in care (otherwise they were censored); weighting for censoring is needed
  - Only 25% of participants were followed for ≥10 years
- Information on aspirin therapy is needed to estimate ASCVD risk; this information was not available so everyone was presumed to not be using aspirin therapy
- Transgender and non-binary individuals were not included these analyses due to the small number of MI events.

CONCLUSIONS

- In a longitudinal cohort collaboration with validated type 1 MIs, the rate of MI by ASCVD risk score was different by sex:
  - The rate of MI increased with increasing ASCVD risk score in men, reaching 6.4 MIs per 1000 person years among those with the highest (≥20%) ASCVD risk score
  - The rate of MI increased with ASCVD risk score in women, but peaked at a rate of 3.0 among those with an ASCVD risk score 7.5-<20% and only 2 MIs occurred among women with ASCVD risk ≥20%
- Although results specific to women should be interpreted with caution due to small numbers, the risk of MI was not differentiated by ASCVD risk score among women

Table 1: Crude (IRR) and adjusted (aIRR) incidence **rate ratios** and 95% confidence intervals (95% CI) for MI

ASCVD risk score at study entry	IRR (95% CI)	aIRR (95% CI)
Overall		
< 5%	**0.5 (0.4, 0.8)**	**0.6 (0.4, 0.9)**
5 - <7.5%	Ref	Ref
10 - <20%	**1.5 (1.1, 2.1)**	1.3 (0.9, 1.9)
≥20%	**3.4 (2.3, 5.1)**	**2.6 (1.6, 4.0)**
Men		
< 5%	**0.5 (0.3, 0.7)**	**0.5 (0.3, 0.8)**
5 - <7.5%	Ref	Ref
10 - <20%	**1.4 (1.0, 2.1)**	1.3 (0.9, 1.9)
≥20%	**3.8 (2.5, 5.6)**	**2.8 (1.8, 4.5)**
Women		
< 5%	0.8 (0.3, 2.2)	0.8 (0.3, 2.3)
5 - <7.5%	Ref	Ref
10 - <20%	1.9 (0.7, 5.5)	1.6 (0.5, 4.6)
≥20%	1.1 (0.2, 5.4)	0.7 (0.1, 3.9)

aIRRs were adjusted for age, sex, race, ethnicity, HIV risk, CD4 count at entry and HIV RNA suppression (<200 cells/mm^3) at study entry.