Association of Metabolic and Inflammatory Indices With Subclinical Carotid Atherosclerosis in PWH

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BACKGROUND

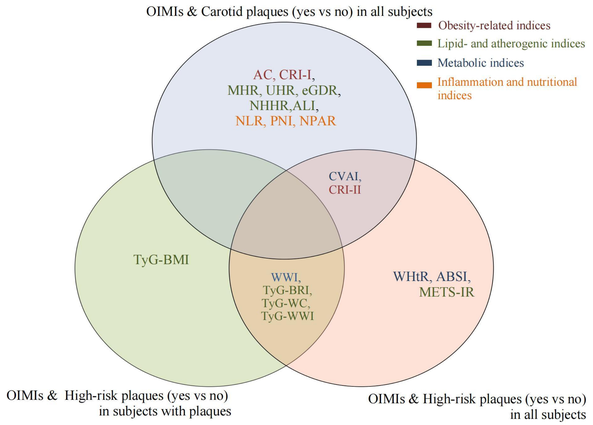
- Although large-scale databases have identified multiple obesity-, lipid-, metabolic-, and inflammation-related indices (OIMIs) linked to cardiovascular disease(CVD), their comparative evaluation—particularly of readily available indices—remains limited among people with HIV(PWH).
- Subclinical atherosclerosis (SCA) is an early marker of CVD. we examined the associations of 38 OIMIs with SCA to evaluate their relative value for cardiovascular risk stratification.

METHODS

- In this cross-sectional study, 1,390 PWH aged ≥40 years were enrolled from Shanghai, China. Using these routinely obtained measures, 38 OIMIs were calculated. Carotid ultrasound was performed to assess SCA and identify high-risk plaque.
- Three models were constructed: unadjusted model; model 1 adjusted for age, sex, diabetes, smoking status, and HDL-C; model 2 further adjusted for CD4 count.
- Participants were stratified into high-risk groups based on the lowest (Q1) or highest (Q4) quartiles.

OIMIs and SCA

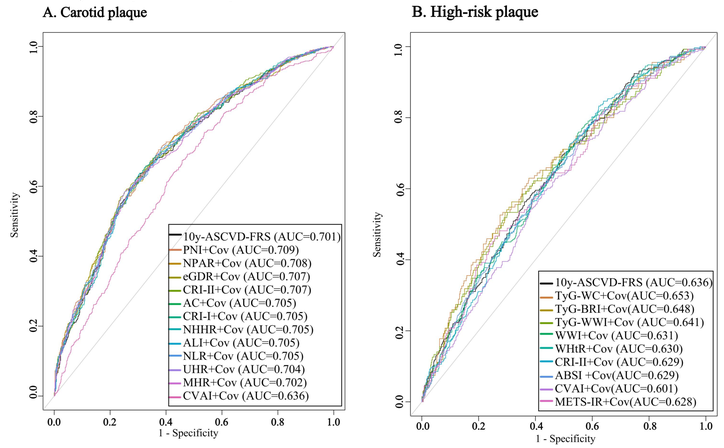
In multivariable analyses, twelve indices were associated with carotid plaque presence, nine with high-risk plaque, and five specifically distinguished high-risk plaque among those with plaques.



Inflammatory and insulin-resistance indices primarily drove carotid plaque, while adiposity indices shaped plaque vulnerability, supporting OIMIs as practical tools for early cardiovascular risk stratification in PWH.

Diagnostic performance of OIMIs

However, when integrated into clinical models (adjusting for age, sex, diabetes, smoking, and HDL-C), several OIMIs significantly improved prediction.



Stratification performance of OIMIS

Individuals with low eGDR or high TyG-WC values showed markedly higher odds of carotid plaque or high-risk plaque (eGDR: OR 1.80; TyG-WC: OR 1.69).

A. Carotid plaque

	OR (95% CI)	*P*-value
eGDR (<7.666)	1.80 (1.40, 2.31)	<0.001
CVAI (>127.976)	1.55 (1.21, 1.98)	<0.001
CRI-II (>2.908)	1.49 (1.17, 1.90)	0.001
AC (>3.713)	1.36 (1.07, 1.73)	0.014
CRI-I (>4.713)	1.36 (1.07, 1.73)	0.014
NHHR (>3.713)	1.36 (1.07, 1.73)	0.014
UHR (>16254.146)	1.33 (1.05, 1.70)	0.020
MHR (>12.811)	1.22 (0.95, 1.55)	0.116
PNI (>60.318)	1.17 (0.92, 1.50)	0.201
NPAR (<1.050)	1.09 (0.85, 1.38)	0.511
NLR (<1.319)	1.04 (0.81, 1.32)	0.777
ALI (>871.304)	1.03 (0.81, 1.32)	0.816

1.0 1.5 2.0 2.5

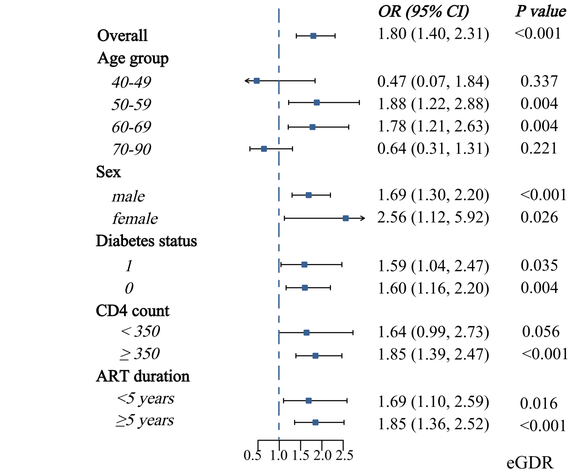
B. High-risk plaque

	OR (95% CI)	*P*-value
TyG-WC (>844.167)	1.69 (1.11, 2.54)	0.013
CRI-II (>2.908)	1.64 (1.23, 2.17)	<0.001
ABSI (>0.834)	1.56 (1.17, 2.07)	0.002
TyG-WWI (>100.637)	1.41 (0.92, 2.13)	0.112
TyG-BRI (>37.266)	1.35 (0.88, 2.04)	0.167
WWI (>10.877)	1.33 (0.99, 1.77)	0.053
CVAI (>127.976)	1.29 (0.96, 1.71)	0.088
WHtR (>0.535)	1.23 (0.91, 1.64)	0.172
METS-IR (>41.450)	1.23 (0.79, 1.87)	0.349

1.0 1.5 2.0 2.5

Subgroup analysis

Low eGDR remained significantly associated with carotid plaque across multiple subgroups, including male, female, age groups 50–59 and 60–69 years, with or without diabetes, CD4 ≥ 350 cells/μL, and ART duration <5 or ≥5 years (all $P < 0.05$)



DISCUSSION

- In conclusion, our findings provide compelling evidence for integrating metabolic index assessment into routine HIV care.
- The persistent association of cardiometabolic dysfunction with SCA, even among virologically suppressed individuals, highlights the necessity of continued attention to metabolic health throughout the course of HIV management.
- These readily calculable indices provide a practical means to identify high-risk individuals for targeted prevention, helping bridge epidemiological evidence and real-world cardiovascular care in PWH.

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