MEASURES OF ADIPOSE TISSUE REDISTRIBUTION AND ATHEROSCLEROTIC CORONARY PLAQUE IN HIV

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BACKGROUND

- People with HIV (PWH) who are well treated on antiretroviral therapy remain at increased risk of:
  - body composition changes – such as increased visceral adipose tissue (VAT) and reduced subcutaneous adipose tissue (SAT)
  - cardiovascular disease (CVD)
- The relationship between adipose compartments and coronary disease is not well understood in PWH

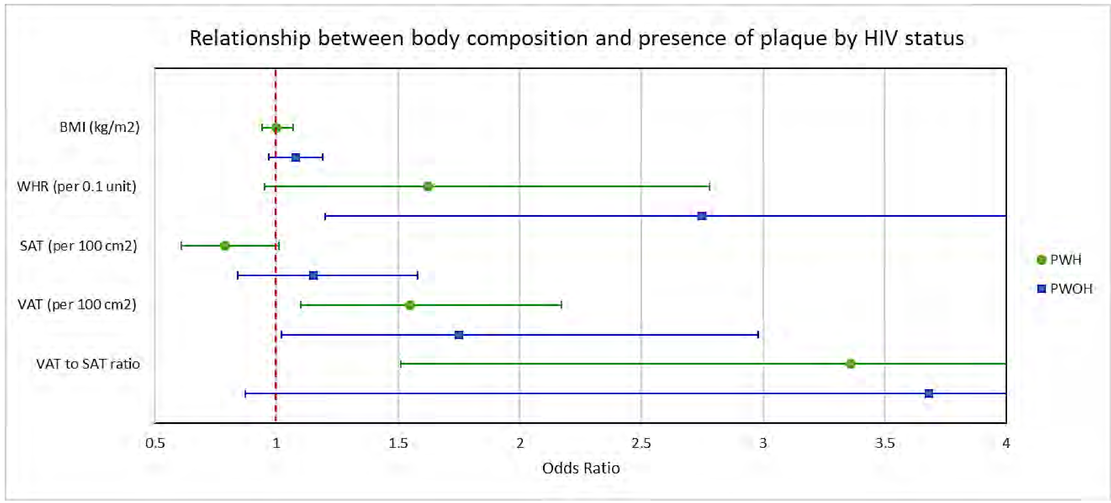
METHODS

- 148 PWH with known HIV >5 years and on ART for >3 months and 68 uninfected individuals without CVD
- VAT and SAT were assessed via single-slice abdominal computed tomography (CT)
- Coronary artery calcium (CAC) score was assessed by non-contrast cardiac CT
- Coronary plaque composition was assessed by coronary CT angiography

Table 1. Baseline Demographic and Clinical Characteristics

	PWH (n=148)	Uninfected Individuals (n=68)	P Value
Demographics			
Age (years)	47±7	46±7	.21
Race (%)			.43
Caucasian	55	53	
African American	37	35	
Male Sex (%)	65	60	.52
HIV-Related Parameters			
CD4⁺ T cell count (cells/μl)	549±293	*	--
CD4⁺ T cell nadir (cells/μl)	189±155	*	--
CD8⁺ T cell count (cells/μl)	918±489	*	--
Log HIV RNA Viral Load (copies/mL)	1.82±0.47	*	--
Undetectable HIV Viral Load (%)	86%	N/A	--
Duration HIV (years)	14±6	N/A	--
Duration ART use (years)	8±5	N/A	--
Current PI use (%)	57	N/A	--
Current NRTI use (%)	95	N/A	--
Current NNRTI use (%)	38	N/A	--
Current INSTI use (%)	15	N/A	--
Body Composition and Metabolic Parameters			
Iliac crest (cm)	97±14	98±15	.80
BMI (kg/m^2)	26.7±4.8	27.8±4.9	.11
Waist to Hip Ratio	0.94±0.07	0.93±0.07	.29
SAT (cm^2)	198 [125, 287]	241 [150, 380]	**.02**
VAT (cm^2)	108 [61, 209]	103 [55, 177]	.45
VAT to SAT Ratio	0.54 [0.30, 1.13]	0.42 [0.23, 0.84]	**.04**
HDL (mg/dL)	49 [40, 61]	49 [42, 62]	.89
LDL (m/dL)	99 [80, 122]	106 [89, 128]	.25
Triglycerides (mg/dL)	97 [76,174]	86 [63, 126]	**.003**
Glucose (mg/dL)	88 [79, 95]	89 [80,96]	.86
Comorbidities			
Current Tobacco use (%)	44	40	.60
Current Diabetes (%)	11	7	.41
Framingham estimate of 10-yr CHD risk (%)	3[1,6]	2[1,5]	.06

Increased VAT to SAT ratio was *associated* with an *increase* in coronary atherosclerosis, including any plaque, calcified plaque, and coronary calcium in persons living with HIV



RESULTS

- Increased VAT was significantly related to *increased* presence of plaque and CAC > 0
- Increased SAT was significantly related to *decreased* presence of plaque and *reduced* CAC > 0
- VAT:SAT ratio showed a strong relationship to presence of plaque, calcified plaque, and CAC > 0
- In the uninfected group, VAT and waist-to-hip ratio but not SAT, were strong predictors of plaque

Table 2. Relationship between body composition and presence of plaque

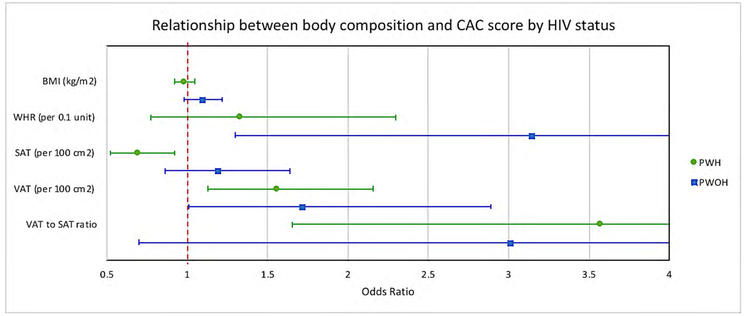
	Presence of Plaque		Presence of Calcified Segments		Presence of Non-Calcified Segments		CAC Score > 0	
	OR (95% CI)	P Value	OR (95% CI)	P Value	OR (95% CI)	P Value	OR (95% CI)	P Value
PWH								
BMI (kg/m^2)	1.00 (0.94, 1.07)	.91	1.01 (0.90, 1.13)	.84	1.03 (0.96, 1.10)	.47	0.98 (0.92, 1.05)	.62
WHR (per 0.1 unit)	1.62 (0.95, 2.78)	.07	1.25 (0.49, 3.17)	.64	1.73 (0.99, 3.02)	.05	1.33 (0.77, 2.30)	.30
SAT (per 100 cm^2)	0.79 (0.61, 1.01)	.06	0.86 (0.56, 1.32)	.46	0.91 (0.71, 1.17)	.46	0.69 (0.52, 0.92)	**.007**
VAT (per 100 cm^2)	1.55 (1.10, 2.17)	**.008**	1.51 (0.97, 2.34)	.07	1.35 (0.98, 1.85)	.06	1.56 (1.13, 2.16)	**.006**
VAT to SAT ratio[a]	3.36 (1.51, 7.48)	**.002**	3.30 (1.12, 9.74)	**.03**	1.68 (0.81, 3.49)	.16	3.57 (1.65, 7.70)	**<.001**
Uninfected Individuals								
BMI (kg/m^2)	1.08 (0.97, 1.19)	.16	1.10 (0.97, 1.25)	.14	0.99 (0.87, 1.12)	.85	1.09 (0.98, 1.22)	.10
WHR (per 0.1 unit)	2.75 (1.20, 6.30)	**.01**	2.18 (0.85, 5.58)	.09	2.50 (0.95, 6.62)	.05	3.14 (1.30, 7.58)	**.006**
SAT (per 100 cm^2)	1.15 (0.84, 1.58)	.39	1.28 (0.87, 1.86)	.21	0.93 (0.63, 1.37)	.72	1.19 (0.86, 1.64)	.30
VAT (per 100 cm^2)	1.75 (1.02, 2.98)	**.03**	1.51 (0.86, 2.64)	.15	1.15 (0.66, 2.00)	.62	1.71 (1.01, 2.89)	**.04**
VAT to SAT ratio[b]	3.68 (0.87, 15.59)	.07	1.55 (0.29, 8.39)	.61	3.23 (0.64, 16.14)	.15	3.01 (0.70, 12.87)	.14

Table 3. Correlations of body composition with calcium-related parameters of plaque

	CAC Score		Total Calcified Plaque Volume	
	r	P Value	r	P Value
PWH				
BMI (kg/m^2)	-0.06	.49	-0.06	.47
WHR	0.01	.91	0.02	.83
SAT (cm^2)	-0.21	**.01**	-0.19	**.02**
VAT (cm^2)	0.18	**.03**	0.19	**.03**
VAT to SAT ratio[a]	0.24	**.004**	0.25	**.004**
Uninfected Individuals				
BMI (kg/m^2)	0.19	.12	0.19	.13
WHR	0.34	**.007**	0.35	**.006**
SAT (cm^2)	0.11	.36	0.11	.39
VAT (cm^2)	0.29	**.02**	0.30	**.01**
VAT to SAT ratio[b]	0.23	.06	0.24	.05

Table 4. Models to assess impact of body composition on calcified plaque indices among persons with HIV

	CAC score		Total Calcified Plaque Volume	
	β estimate	P Value	β estimate	P Value
	Model 1 (r^2=0.19, P<.0001)		**Model 1** (r^2=0.21, P<.0001)	
VAT to SAT ratio[a]	35.884	**.02**	29.829	**.02**
Framingham estimate of 10-yr CHD risk (%)	3.429	**.01**	3.179	**.007**
CD4 T cell count (cells/μl)	-0.003	.90	-0.001	.94
HIV VL (copies/mL)	0.011	.11	.009	.14
	Model 2 (r^2=0.18, P=.0001)		**Model 2** (r^2=0.19, P=.0001)	
VAT (cm^2)	0.139	**.04**	0.116	**.04**
Framingham estimate of 10-yr CHD risk (%)	4.497	**.002**	4.030	**.001**
CD4 T cell count (cells/μl)	-0.011	.61	-0.010	.58
HIV VL (copies/mL)	0.012	.12	0.009	.16
	Model 3 (r^2=0.16, P=.0005)		**Model 3** (r^2=0.17, P=.0003)	
SAT (cm^2)	-0.066	.19	-0.060	.17
Framingham estimate of 10-yr CHD risk (%)	5.135	**.0002**	4.556	**.0001**
CD4 T cell count (cells/μl)	-0.001	.97	-0.001	.96
HIV VL (copies/mL)	0.001	.20	0.008	.25



CONCLUSIONS

- Characterization of VAT and SAT could help identify those PWH who are at higher risk for CVD, potentially at an earlier subclinical stage
- These findings could inform the development of nontraditional risk factors to guide CVD prediction algorithms for PWH
- Interventions to improve body composition may reduce CVD risk among PWH and will need to be studied in the future

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