

# Lower peripheral fat persists in HIV-infected subjects despite viral suppression in the era of highly-active antiretroviral therapy

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## Background

Body composition changes have been well documented in HIV-positive individuals. This includes loss of lean tissue (wasting), loss of peripheral fat (lipoatrophy), and gain in truncal fat. Lipoatrophy is associated with the use of the older antiretrovirals zidovudine and stavudine.<sup>1</sup>

## Objectives

We compared body composition parameters in older HIV-positive individuals on stable antiretroviral therapy to age-matched HIV-seronegative controls to assess whether differences in body composition parameters persist in the era of potent antiretroviral therapy.

## Methods

Inclusion criteria to the Hawaii Aging with HIV-Cardiovascular Disease cohort required subjects to have documented HIV disease, be  $\geq 40$  years old and be on stable antiretroviral therapy for  $\geq 6$  months. Only subjects with undetectable plasma HIV RNA ( $<50$  copies/ml) were included in the current analysis to eliminate the effects of uncontrolled HIV disease.

Control subjects were also  $\geq 40$  years old and had documentation of negative HIV status.

Weight and height were measured in triplicate and averaged. Body composition (total fat, truncal fat, peripheral fat, lean tissue, and bone mineral content) was measured by dual-energy x-ray absorptiometry using Lunar Prodigy scanner (GE Medical Systems, Inc., Milwaukee, WI).

Statistical analyses utilized were Wilcoxon rank-sum test, Chi-square test, and univariate followed by multivariate linear regression.

## Results

HIV-positive individuals (N=133) were slightly younger than HIV-seronegatives (N=74) (medians: 51 years vs 54 years,  $p=0.04$ ), comprised of more males (88% vs 80%,  $p<0.001$ ), but were similar in ethnic composition (see Table 1). Among HIV-positive individuals, the median CD4 count was 510 cells/ml.

HIV-positive individuals had similar body mass index (BMI) (25.9 kg/m<sup>2</sup> vs 26.8 kg/m<sup>2</sup>,  $p=0.25$ ), but lower total fat (medians: 20,168 g vs 24,817 g,  $p=0.005$ ) which was accounted for by differences in peripheral fat (6,811 g vs 9,634 g,  $p<0.001$ ). Bone mineral content was significantly lower in HIV-positive individuals compared to HIV-seronegatives (2,723 g vs 2,953.5 g,  $p=0.006$ ) (Table 1).

In a multivariate linear regression model, HIV positivity was a significant risk factor for lower log<sub>10</sub>peripheral fat, adjusting for age, gender, ethnicity, BMI and past use of zidovudine or stavudine ( $\beta=-0.15$ ,  $p=0.02$ ) (Table 2).

**Table 1.** Demographics and Body Composition of HIV-Seronegative and HIV-Positive Subjects

	HIV-Seronegative (N=74)	HIV-Positive (N=133)	P-value
Age	54.52 (48.02, 60.51)	50.95 (45.86, 57.29)	0.04
Male	59 (79.73%)	117 (87.97%)	<0.001
Female	15 (20.27%)	16 (12.03%)	
Caucasian	49 (66.22%)	80 (60.15%)	0.39
Non-Caucasian	25 (33.78%)	53 (39.85%)	
BMI (kg/m <sup>2</sup> )	26.82 (23.55, 29.40)	25.89 (23.96, 27.93)	0.25
Waist to Hip Ratio	0.94 (0.88, 0.98)	0.94 (0.91, 0.98)	0.47
Waist to Hip Ratio: Male	0.95 (0.91, 1.00)	0.94 (0.91, 0.98)	0.69
Waist to Hip Ratio: Female	0.84 (0.81, 0.90)	0.92 (0.82, 0.95)	0.19
Total Fat (g)	24817 (18199, 31455)	20168 (15554, 27147)	0.005
Trunk Fat (g)	14265.5 (9546, 17890)	12954 (9375, 15789)	0.20
Peripheral Fat (g)	9634 (7367, 13557)	6811 (5079, 9609)	<0.001
Lean Tissue (g)	54188.5 (45732, 60599)	53316 (47489, 59074)	0.87
Bone Mineral Content (g)	2953.5 (2506, 3241)	2723 (2406, 3065)	0.006

**Table 2.** Multiple Linear Regression Analysis of the Factors Associated with Log<sub>10</sub>Peripheral Fat

Variable	Regression Coeff	Std Error	P-value
Age	-0.0009973	0.0016925	0.556
Male	-0.1837536	0.0352754	<0.001
Caucasian	0.0391146	0.0267193	0.145
BMI	0.0315046	0.0026825	<0.001
Past use of zidovudine or stavudine	-0.0540913	0.0329398	0.102
HIV status	-0.0788941	0.0340103	0.021

## Conclusions

Infection with HIV is still characterized by differences in body composition despite use of potent antiretroviral therapy. Specifically, HIV is associated with lower peripheral fat content independent of past use of antiretroviral therapy known to cause peripheral fat loss.

## Reference

1. Carr A et al. A syndrome of lipoatrophy, lactic acidemia and liver dysfunction associated with HIV nucleoside analogue therapy: contribution to protease inhibitor-related lipodystrophy syndrome. AIDS 2000, 14: F25-32.

