

# Performance of Waist Circumference and Waist to Hip Ratio for Excess Visceral Abdominal Fat Screening in People with HIV in the Modern ART Era – Findings from the VAMOS STUDY

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## Background

- ▶ In the current era of antiretroviral therapy (ART), the prevalence of overweight and obese persons with HIV (PWH) has increased, changing the clinical presentation of PWH with fat redistribution.<sup>1-2</sup>
- ▶ Concern for central adiposity (CA) marked by excess visceral abdominal fat (EVAF), a major contributor to metabolic dysfunction, has accompanied this trend.<sup>3</sup>
- ▶ While the consequences of EVAF are well established<sup>4-7</sup>, the prevalence of EVAF in the modern ART era is unclear. Furthermore, there is limited data evaluating the performance of anthropometric measurements to identify EVAF in PWH on modern ART.

**Here, we aimed to identify the methods for screening EVAF in daily HIV clinical practice that would best reflect findings on advanced imaging.**

## Methods

- ▶ The **V**isceral **A**diposity **M**easurement and **O**bservations **S**tudy (**VAMOS**) is a cross-sectional, multi-center observational study in PWH who:
  - ▶ Had virologic suppression on ART for at least 1 year; and,
  - ▶ BMI between 20 to 40 kg/m<sup>2</sup>
- ▶ *Study period:* Measurements were completed in 2023.
- ▶ EVAF was quantified via CT abdominal scan at the L4-5 vertebrae and defined as a visceral adipose tissue (VAT) surface area  $\geq 130$  cm<sup>2</sup>. Weight, BMI, waist circumference (WC) at the Iliac crest and umbilicus and hip circumference were also measured. Waist to hip ratio (WHR) was calculated using both iliac and umbilical WC.
- ▶ *Statistical analysis:* Receiver operating characteristic (ROC) curves, stratified by sex, were calculated to evaluate the performance of each anthropometric measurement for identifying EVAF.

## Results

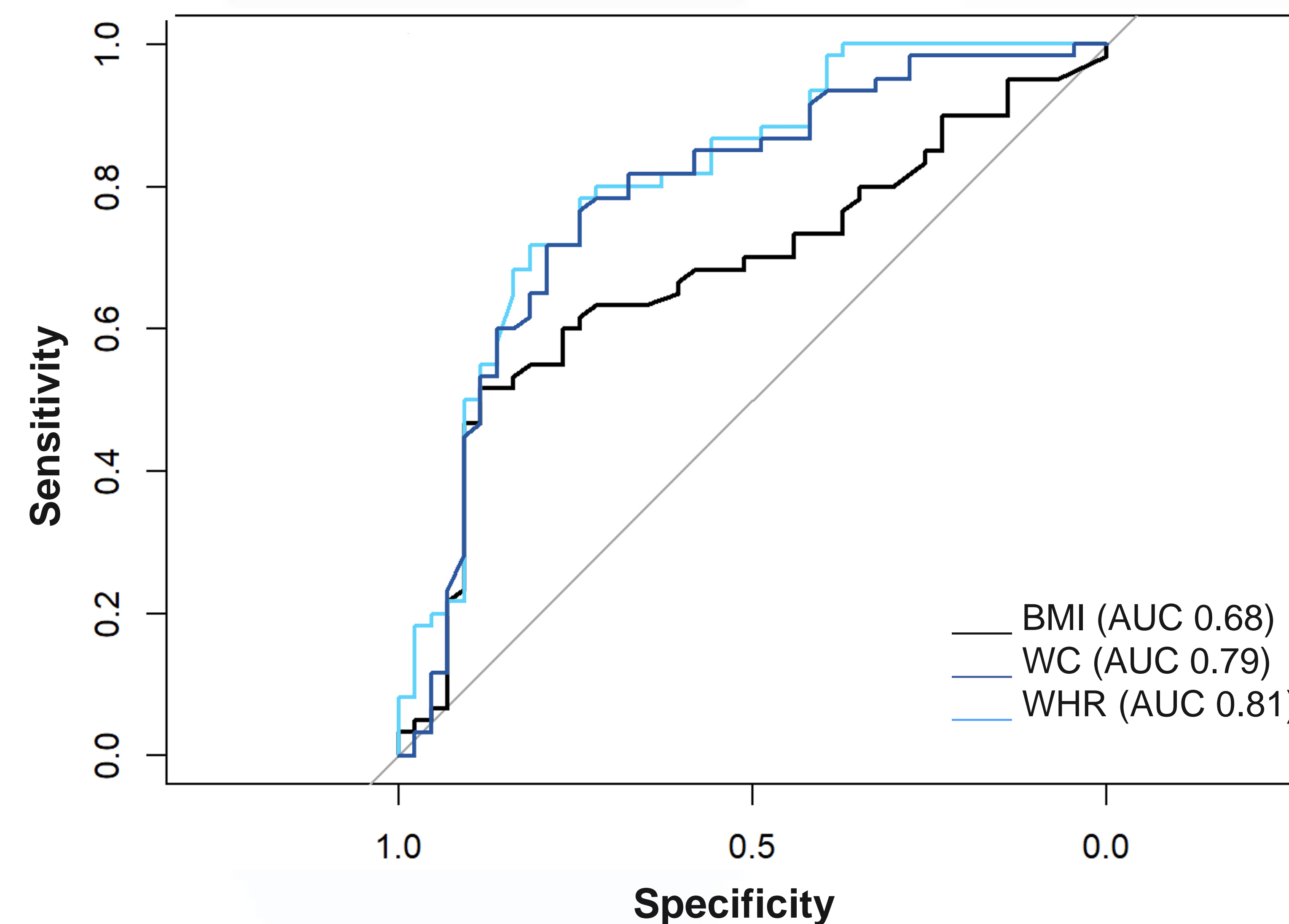
### Study Population

- ▶ A total of 116 participants had paired CT scans and anthropometric measurements, at the time of this analysis. Overall, 89% were male, 78% white, with a mean age 53 years.

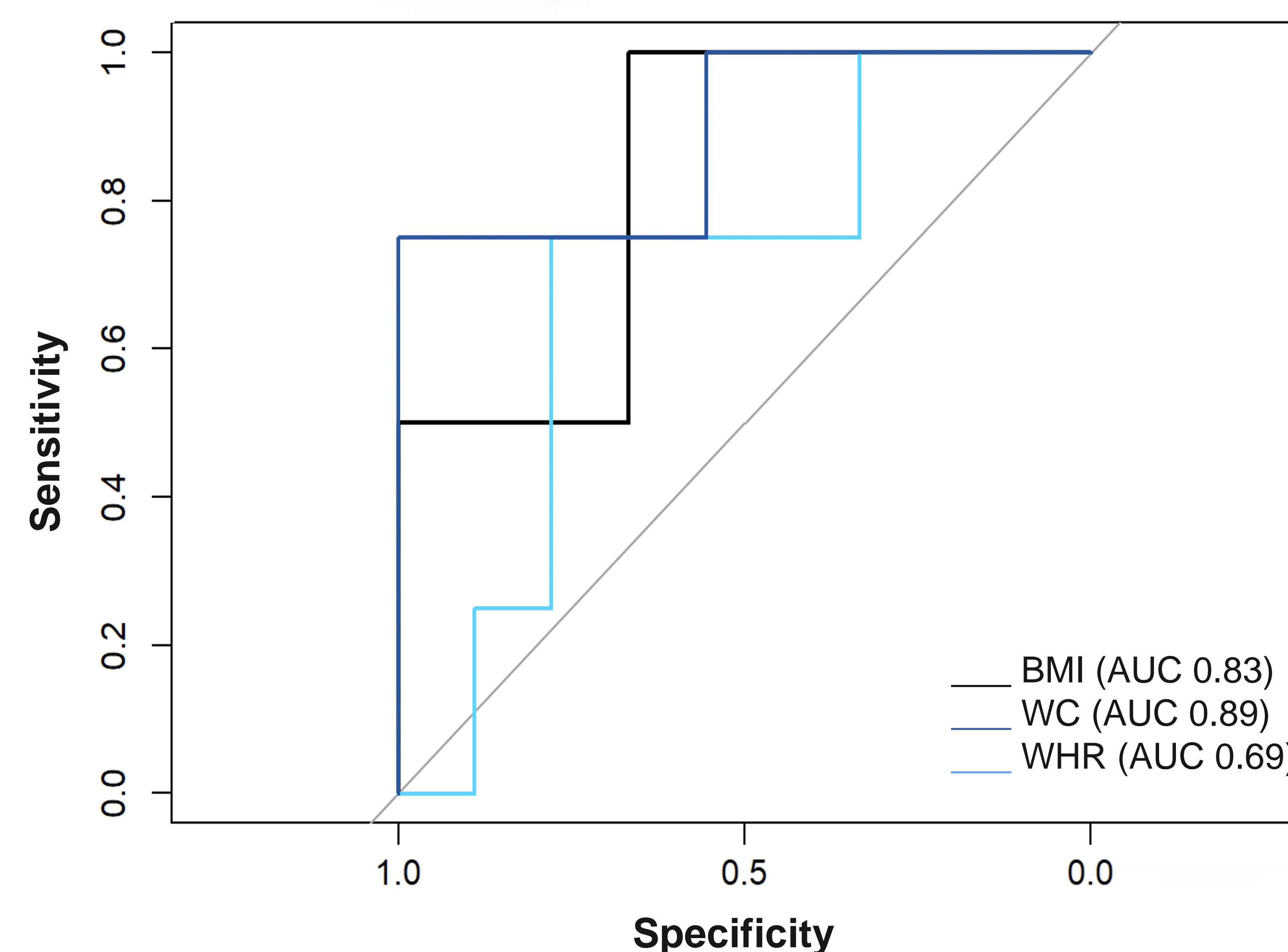
## Results

**Figure 1: Performance of BMI, WC and WHR in measuring excess visceral abdominal fat (EVAF) in both men and women.**

### A. Men



### B. Women



Area under the curve was calculated to evaluate the performance of each anthropometric measurement (BMI, WC, and WHR) in identifying EVAF in male (n=103) and female (n=13) participants.

## Results (continued)

**Table 1: Participant characteristics.**

Mean (SD)	Age y.o.	Weight kg	BMI kg/m <sup>2</sup>	WC cm	WHR WC/HC
<b>Men</b>	52.0 (11.0)	89.1 (15.7)	28.3 (4.2)	99.5 (12.5)	0.99 (0.08)
<b>Women</b>	54.6 (9.9)	78.8 (17.5)	29.9 (6.4)	98.1 (15.6)	0.90 (0.1)

- ▶ The average weight for men was 89.1 kg (196.4 lb) with a BMI of 28.3 kg/m<sup>2</sup>. Average WC was 99.5 cm, and the WHR was 0.99.
- ▶ On average, women had lower weight (78.8 kg; 173.7 lb), WC (98.1 cm) and WHR (0.9) than men, but a higher BMI (29.9 kg/m<sup>2</sup>).
- ▶ **The mean VAT surface area among participants was 160.28 (92.05) cm<sup>2</sup>, with an EVAF prevalence of 51%.** The median VAT surface area was 140.55 (93.62 – 213.8) cm<sup>2</sup>.
- ▶ The prevalence of EVAF was higher among women (62%) than in men (50%), and rose with increasing BMI, waist circumference, and waist-to-hip ratio.

**Table 2: AUC of measurement performances of EVAF.**

		WC	WHR	BMI	Weight
<b>Men</b>	AUC	0.79	0.81	0.68	0.65
<b>Women</b>	AUC	0.89	0.69	0.83	0.81

- ▶ Amongst men, umbilical WC and WHR performed the best, outperforming standard measurements of weight and BMI.
- ▶ Among women, iliac and umbilical WC were best and performed equally with AUCs of 0.89. WHR performed worst in women with AUCs of 0.69 and 0.67. Only 13 women were included in the analysis.

## Conclusions

- ▶ EVAF remains a prevalent condition among PWH on modern ART.
- ▶ Our study underscores that WC and WHR continue to outperform weight and BMI to detect EVAF in the current population on modern ART regimens, of which some have been associated with weight gain.
- ▶ These simple anthropometric measurements continue to be optimal screening tools for central adiposity with EVAF in PWH.

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<sup>1</sup>Koethe et al, *AIDS Res Hum Retroviruses* 2016; <sup>2</sup>Sax et al, *CID* 2020; <sup>3</sup>Venter et al, *Lancet HIV* 2020; <sup>4</sup>Scherzer et al, *AIDS* 2011; <sup>5</sup>Orlando et al, *JAIDS* 2012; <sup>6</sup>Grunfield et al, *JAIDS* 2011; <sup>7</sup>Fourman et al, *CID* 2020.