Precision of the Hologic Horizon A dual energy X-ray absorptiometry in the assessment of body composition

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Introduction

With obesity rates doubling over the past 40 years, obesity-related chronic diseases have also been rising and represent a vexing clinical problem [1,2]. The need to understand the impact of excess fat and fat distribution in individuals at highest cardiometabolic risk has become increasingly more important, especially in the context of targeting intervention and treatment strategies to those at greatest risk. It is well known that BMI is not a reliable measurement of cardiometabolic risk because it is a measure of excess weight, not excess fat, and because it does not account for fat distribution, age, gender, and ethnicity. Studies have demonstrated a strong association between excess visceral adipose tissue (VAT) and adverse cardiometabolic outcomes [3,4]. To address these issues healthcare providers need a safe, cost effective, and sensitive method to assess obesity-related chronic diseases risk in a heterogenous population.

Methods

Cross-sectional study involving all adults aged ≥18 years with a clinical indication for a DXA scan between May 2019 and August 2019. Participants were excluded if they were <18 years of age, pregnant, non-English speaking, had non-removable abdominal metal implants, or did not consent to two scans.

Thirty patients underwent two consecutive whole body exams on the Horizon® A DXA scanner (Hologic Inc, Marlborough, MA) in accordance with ISCD precision guidelines.

Results and Discussion

The coefficient of variation (CV) for all body composition parameters was less than 3% except for SAT area, an unreported ancillary value, which was 3.86%. The CV for VAT area was 2.63% with a 95% LSC of 7.28%.

The CV of the Horizon® A DXA scanner was independent of BMI and age for all measured body composition parameters. Gender specific differences were observed for Android-Gynoid ratio and SAT CV, but were not statistically different for all other measures.

Coefficient of variation of body composition parameters

Region	CV%	LSC 95% confidence
Android/gynoid ratio	2.75	7.62
Appendicular lean/height^2 (kg/m^2)	1.24	3.44
Lean/height^2 (kg/m^2)	0.52	1.44
SAT area (cm^2)	3.86	10.7
Total body FM (g)	0.89	2.47
Total body LM (g)	0.51	1.41
Total body mass (g)	0.22	0.61
VAT area (cm^2)	2.63	7.28

Conclusion

Horizon® precision, expressed as the CV, was less than 3% for all reported body composition parameters. The ability to detect changes in body composition is directly related to precision error. Lower precision error can be exploited to detect small changes sooner with a higher degree of clinical confidence, an important consideration in the evaluation of a treatment intervention or a disease. The present study supports a previous study on two Horizon® A scanners demonstrating exceptional precision of body composition measurements [5].

The marked difference in same day CV for VAT reported for the GE iDXA (16%) compared to the Horizon® A (2.63%) may be explained by differences in the software used. As noted in the iDXA study [6], one patient with a low BMI had a VAT mass of 0 g. Such findings
have not been observed using the Hologic software.

The authors conclude:

...in a time where body composition assessment is becoming a major focus in the prediction and management of metabolic and chronic diseases, our results demonstrate that precise measurements of body composition parameters can be achieved. Our results reassuringly show that all body composition parameters, in particular VAT area, can be measured with precision, and that clinicians can be confident that differences between scans are reflective of a true change.

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