

Advanced Body Composition (DXA)

A Clinical Interpretation & Dictation Guide for the General Radiologist

Translating Anthropometric Data to Diagnostic Findings



Modality Precision:
Detects 1% changes
in muscle and 2%
changes in fat.

The Flaw of BMI



BMI quantifies excess weight. It misclassifies patients by failing to assess pathogenic visceral fat depots or muscle depletion.

The DXA Advantage (3-Compartment Model)



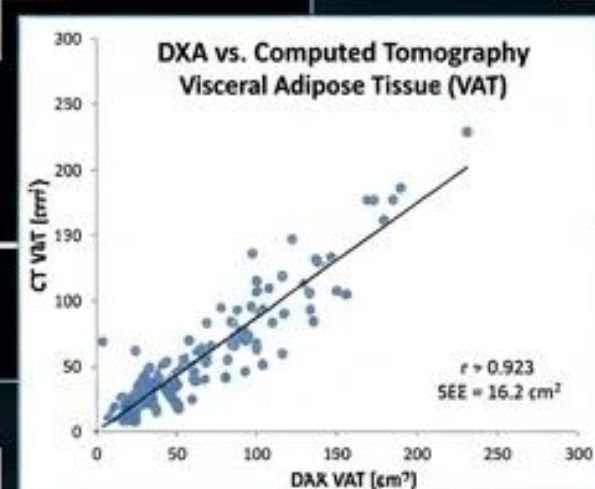
DXA uses dual-energy X-rays to quantify the 3-Compartment Model: **Bone Mineral**, **Soft Tissue Lean Mass**, and **Fat Mass**.



Visceral cavity

Inner abdominal muscle wall

Subcutaneous fat



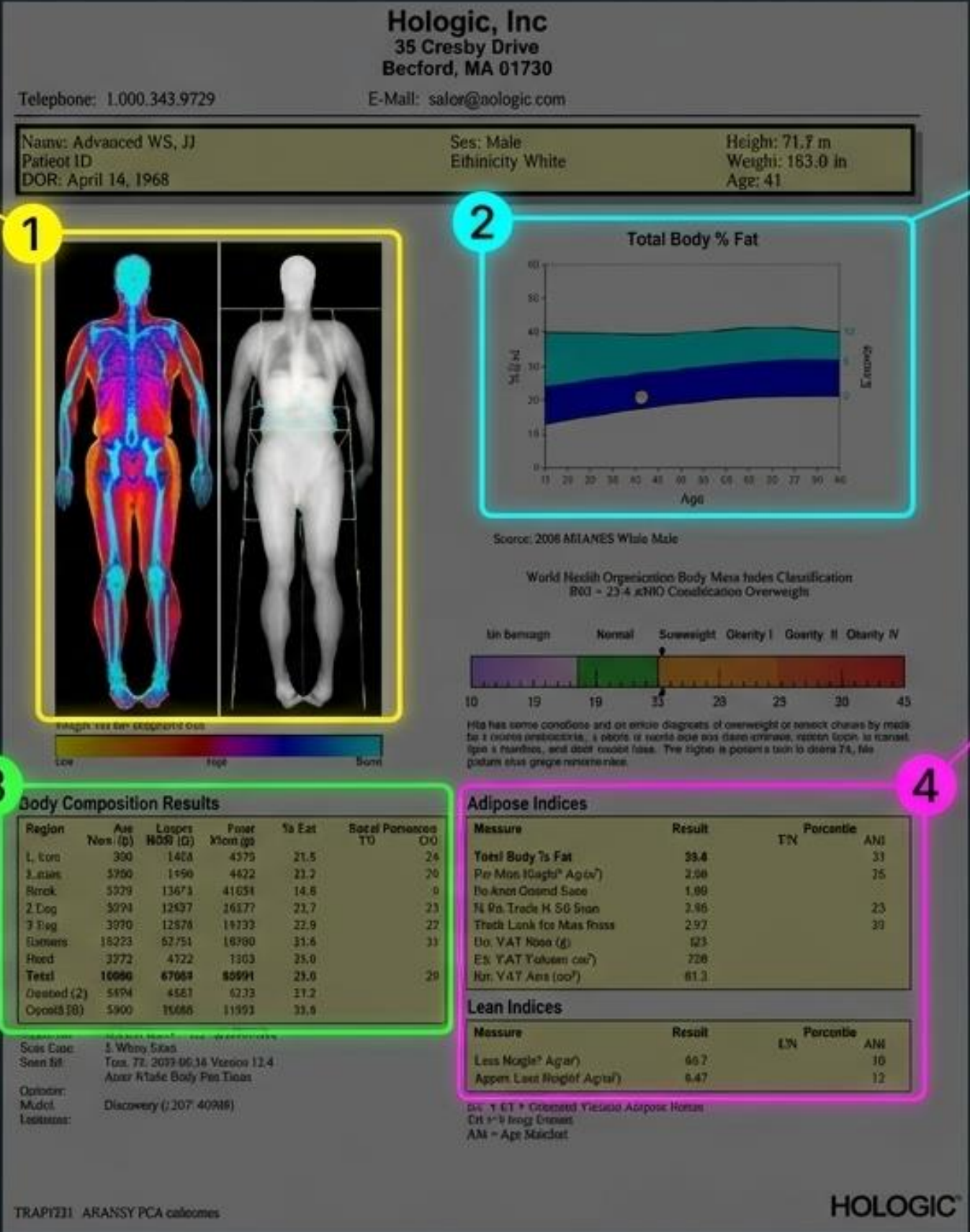
Total Abdominal Fat - Subcutaneous Fat Ring
= Estimated Visceral Fat

DXA accurately models the visceral envelope by subtracting the estimated subcutaneous fat ring from total abdominal fat, yielding a measurement substantially equivalent to CT (SEE = 16.2 cm²).



The Thermal Map: Color-coded map mapping bone, lean mass, and adipose distribution.

Compartmental Breakdown: Precise measurements of arms, legs, trunk, android (abdomen), and gynoid (hips) regions.

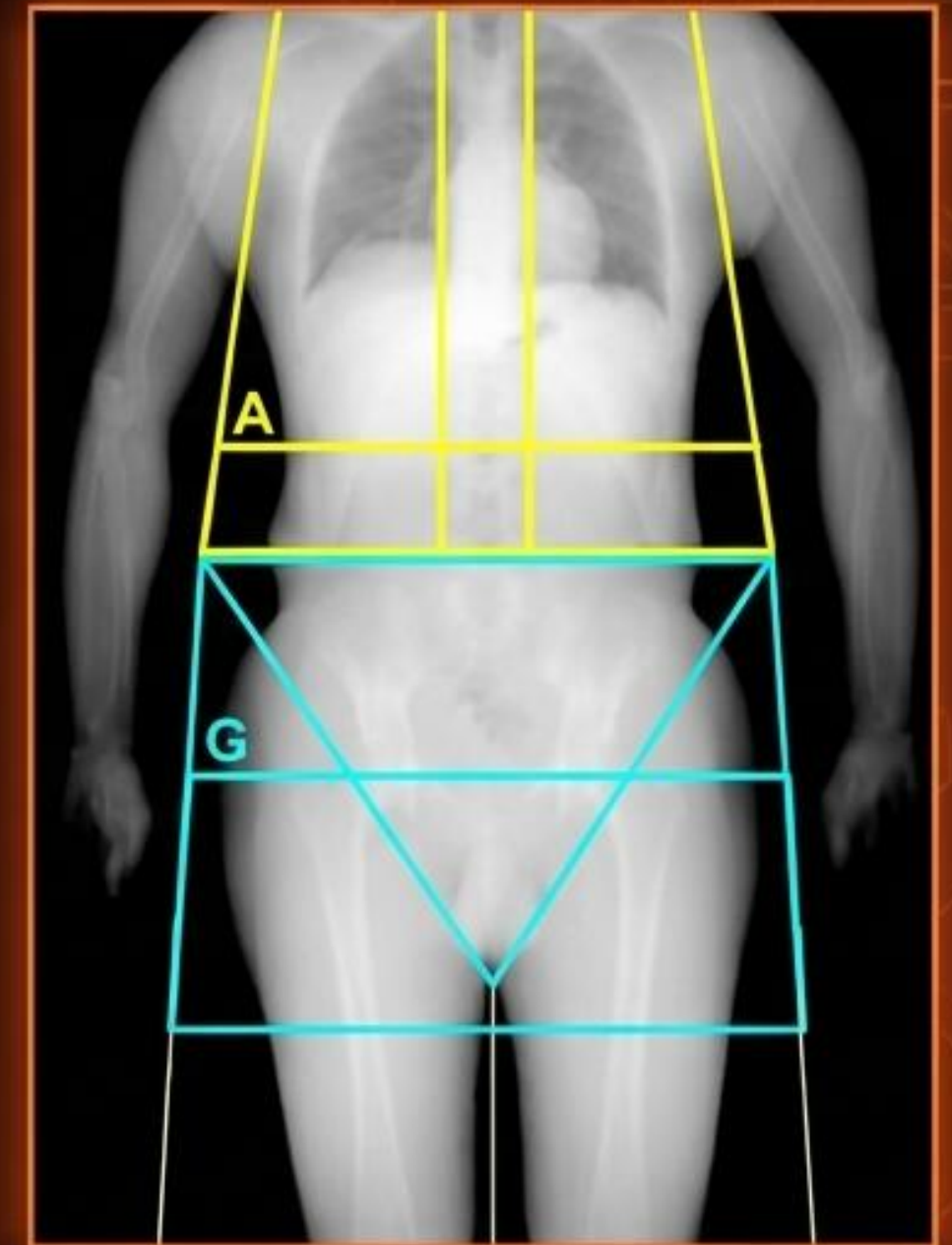


Total Body % Fat Plot: Plots patient's % fat against the NHANES age-matched reference database (Z-scores).

Clinical Indices: The critical diagnostic metrics—separated into Adipose and Lean specific indices.

Adipose Diagnostic Matrix

Metric	Definition	Clinical Implication
Fat Mass Index (FMI)	Fat Mass / Height ²	Superior to BMI; calculates fat relative to height, directly quantifying obesity.
Est. VAT Area (cm ²)	The cross-sectional area of pathogenic fat around organs.	Primary driver of metabolic syndrome and coronary heart disease risk.
Android/Gynoid Ratio	Ratio of abdominal (apple) to hip (pear) fat.	Value >1 indicates higher cardiovascular risk.



Lean Diagnostic Matrix

Metric	Definition	Clinical Implication
Lean Mass Index (LMI)	$\text{Lean Mass} / \text{Height}^2$	Total lean mass relative to height.
Appendicular Lean Mass Index (ALMI)	Functional muscle in appendices (arms + legs) / Height^2	The primary metric for tracking physical performance, muscle wasting, and diagnosing sarcopenia.



Visceral Adipose Tissue (VAT) Risk Tiers

Normal

< 100 cm²

Increased Risk

100 – 160 cm²

High Risk

> 160 cm²

Sarcopenia Diagnostic Thresholds

Definition: ALMI > 2 Standard Deviations below the young normal mean.

Male Threshold

< 7.0 kg/m²

Female Threshold

< 5.25 kg/m²

Thresholds derived from NHANES reference database (n > 20,000 subjects).

Findings Checklist

- ☐ Record Total Body % Fat and FMI against age-matched mean.
- ☐ Document Estimated VAT Area (cm²).
- ☐ Note Android/Gynoid Ratio (>1 or <1).
- ☐ Record ALMI (Appendicular Lean Mass Index).



Impression Synthesis

1. Metabolic Status

State whether VAT area places the patient in Normal, Increased, or High Risk for metabolic syndrome.

2. Functional Status

State whether ALMI meets the diagnostic criteria for Sarcopenia.