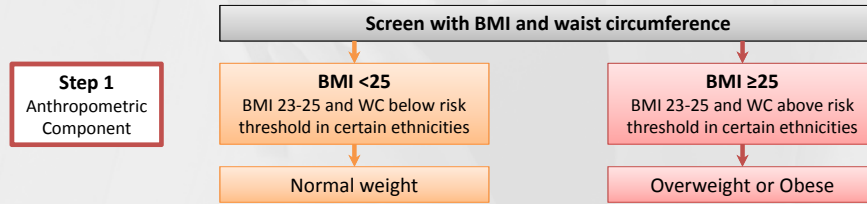


AAACE Obesity Algorithm Step 1: Anthropometric Assessment

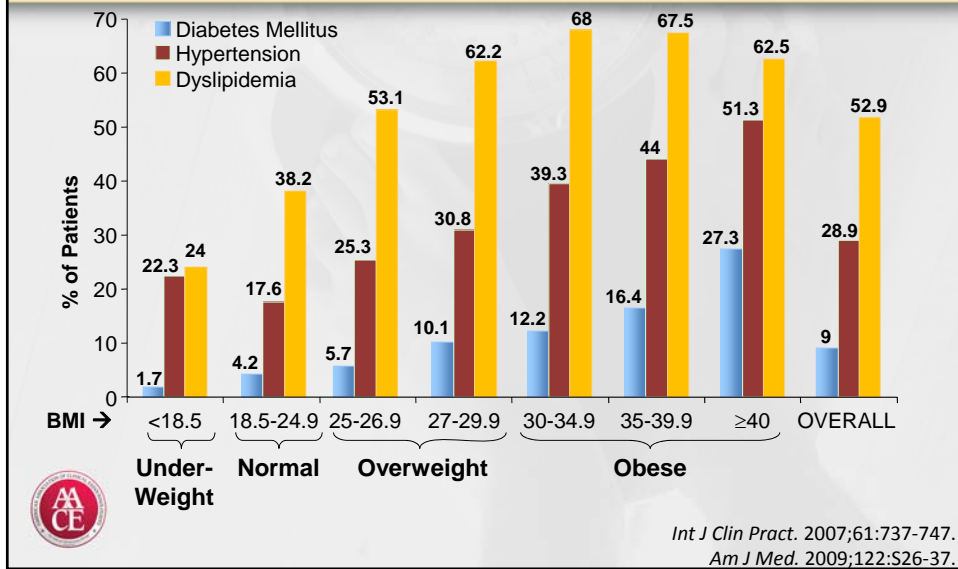


Garvey TW, et al. AAACE 2014 Advanced Framework for a New Diagnosis of Obesity.
Available at: <https://www.aace.com/files/2014-advanced-framework-for-a-new-diagnosis-of-obesity-as-a-chronic-disease.pdf>.

Is the classification of overweight
and obesity based on BMI the best
predictor of health risk?



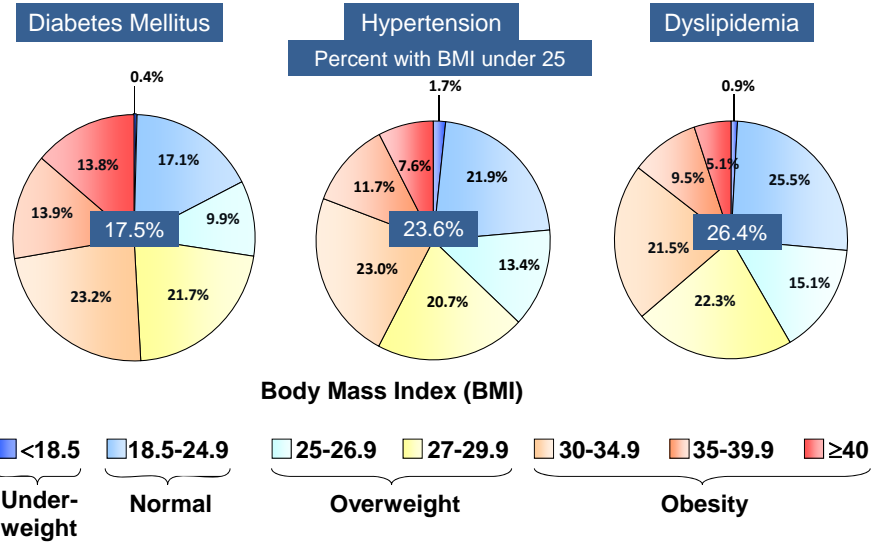
BMI and Prevalence of Metabolic Disease by BMI -- NHANES 1999-2002



Not all patients who have overweight or obesity by BMI criteria have adiposopathy (sick fat)



BMI Among Patients With Metabolic Disease NHANES 1999-2002



Int J Clin Pract. 2007;61:737-747.
Am J Med. 2009;122:S26-37.

Not all patients with metabolic
disease have overweight or
obesity by BMI criteria

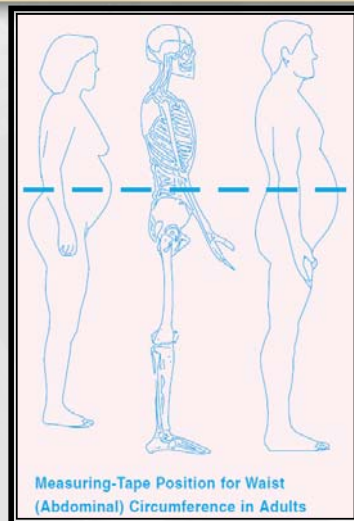


Are there alternative ways to stratify health risk for patients who have overweight or obesity by BMI criteria?

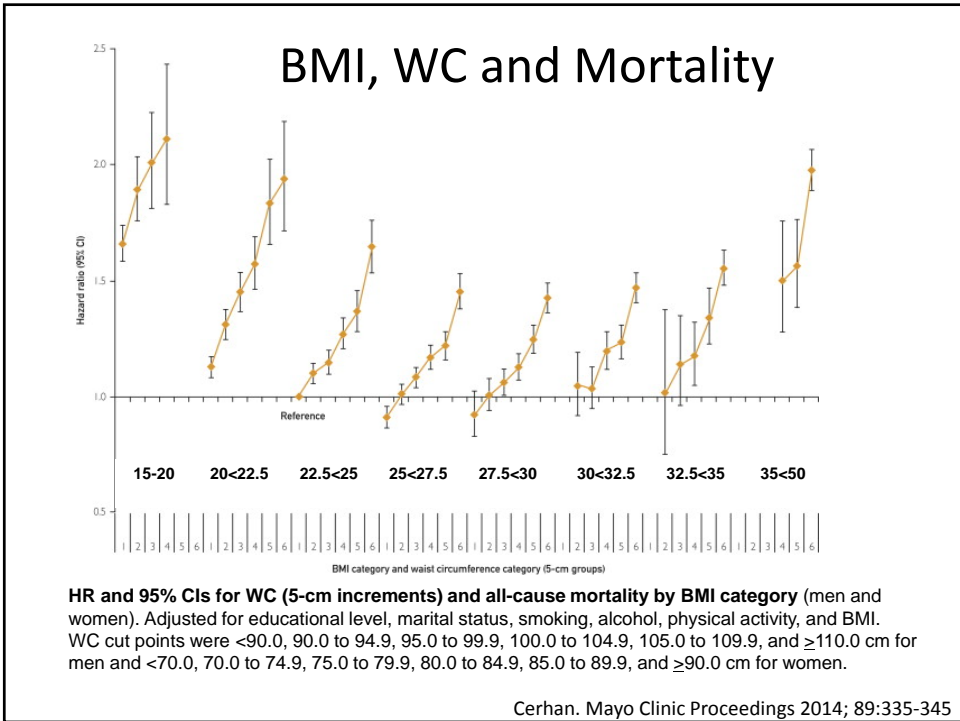
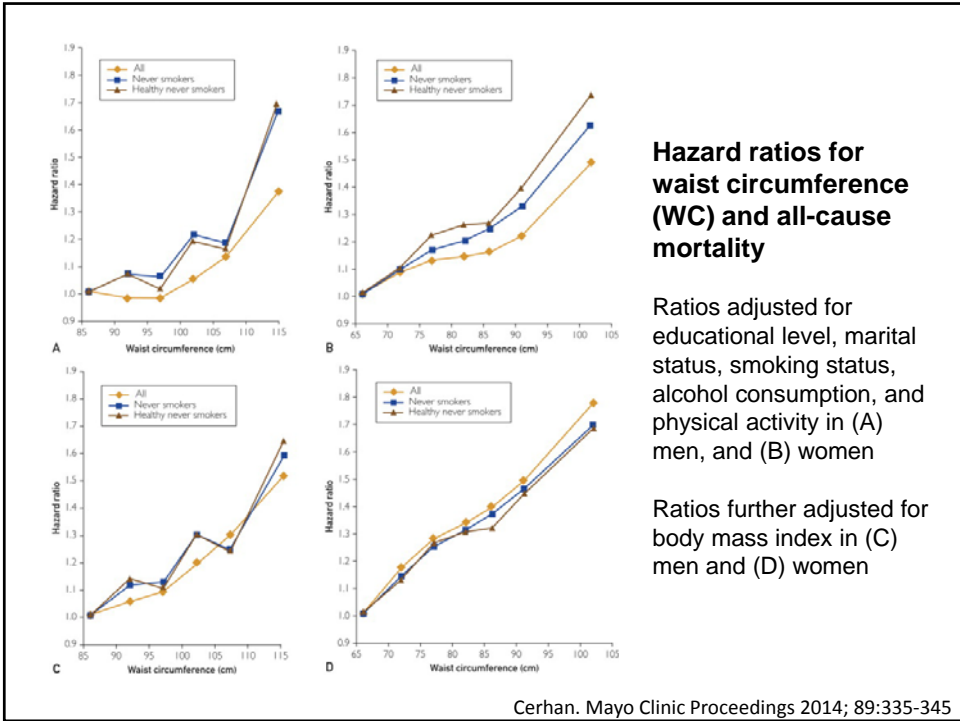


Clinical Tools: Measuring Waist Circumference

- Locate the superior iliac crests and the lower rib margins
- Place measuring tape around abdomen above iliac crests, keeping it parallel to the floor
- Ensure tape is snug but not compressing the skin



NHLBI Obesity Education Initiative.
Obesity in adults. http://www.nhlbi.nih.gov/guidelines/obesity/prctgd_c.pdf.



Ethnic Variations in Waist Circumference Risk Thresholds

Joint Recommendations of the IDF, NHLBI, AHA, WHF, IAS, and IASO

Ethnic/Regional Origin	Men, in (cm)	Women, in (cm)
Europid	≥37 (94)	≥31 (80)
Caucasian	≥37 (94)	≥31 (80)
North American, European	≥40 (102)	≥35 (88)
Asian	≥35 (90)	≥31 (80)
Middle Eastern, Mediterranean	≥37 (94)	≥31 (80)
Sub-Saharan African	≥37 (94)	≥31 (80)
Central and South American	≥37 (94)	≥31 (80)



AHA, American Heart Association; IDF, International Diabetes Federation; IAS, International Atherosclerosis Society; IASO, International Association for the Study of Obesity; NHLBI, National Heart, Lung, and Blood Institute; WHF, World Heart Federation.

Alberti KGMM, et al. *Circulation*. 2009;120:1640-1645.

NHLBI Classification of Weight, Waist Circumference, and Disease Risk

Classification	BMI (kg/m ²)	Disease Risk*	
		Men WC ≤40 in Women WC ≤35 in	Men WC >40 in Women WC >35 in
Underweight	<18.5		
Normal	18.5 – 24.9		
Overweight	25.0-29.9	Increased	High
Obesity Class I	30.0-34.9	High	Very high
Obesity Class II	35.0-39.9	Very high	Very high
Obesity Class III	≥40	Extremely high	Extremely high

*Type 2 diabetes, hypertension, and cardiovascular disease.



NHLBI Obesity Education Initiative. Obesity in adults.
http://www.nhlbi.nih.gov/guidelines/obesity/prctgd_c.pdf.

Assessment of Body Composition

- Know your payers.
- Most measurements of body composition are not paid by third party payers.
- Depending on patient mix, may represent good additional income for the practice.



Lee SY, Gallagher D. *Curr Opin Clin Nutr Metab Care.* 2008;11:566-572.

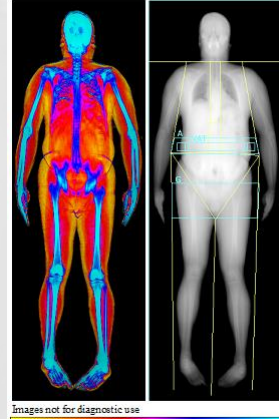
Assessment of Body Composition

Method	Feature measured	Advantages	Limitations
Bioelectrical impedance analysis (BIA)	Total body water Extracellular and intracellular fluid spaces	Ease of use Low cost Speed (fast)	Population specific, poor accuracy in individuals
Dual-energy X-ray absorptiometry (DXA)	Total and regional body fat Total and regional lean mass	Ease of use Low radiation exposure Accurate	Biased for body size, sex, fatness High equipment cost Specially trained personnel
Dilution techniques	Total body water Extracellular fluid	Ease of use OK for all ages	Inaccurate in disease High equipment cost Labor-intensive analysis
Air displacement plethysmography	Total body volume Total body fat	Relatively good accuracy Speed (fast)	Less accurate in disease High equipment cost
3D photonic scanning	Total and regional body volume	OK for very obese Ease of use	Limited availability
Quantitative magnetic resonance	Total body water Total body fat	Ease of use Safety Speed (fast)	High equipment cost Limited availability
Magnetic resonance imaging (MRI)	Total and regional adipose tissue Skeletal muscle	Highly accurate and reproducible	Costly



Lee SY, Gallagher D. *Curr Opin Clin Nutr Metab Care.* 2008;11:566-572.

DXA - BCA



Images not for diagnostic use
Fat Lean Bone



© MNCOME

22 yo man; BMI 29.4



© MNCOME

22 yo man; BMI 29.4

DXA Results Summary:

Region	BMC (g)	Fat (g)	Lean (g)	Lean+BMC (g)	Total Mass (g)	% Fat
L Arm	331.51	526.3	5807.6	6139.1	6665.4	7.9
R Arm	334.14	518.3	5975.6	6309.8	6828.1	7.6
Trunk	1199.42	4023.5	37006.8	38206.3	42229.8	9.5
L Leg	721.60	1290.7	12890.7	13612.3	14903.0	8.7
R Leg	807.87	1537.2	13977.8	14785.7	16322.9	9.4
Subtotal	3394.54	7896.1	75638.6	79033.1	86949.3	9.1
Head	752.20	1065.8	4199.0	4951.2	6017.0	17.7
Total	4146.74	8961.9	79857.6	84004.3	92966.2	9.6

TBAR102

Senior center for Mankato State
University hockey team



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What is the fat mass index?



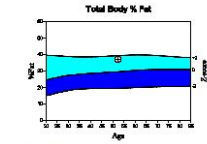
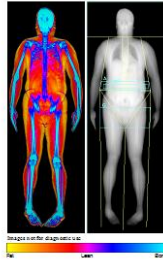
Fat Mass Index

Minnesota Center for Obesity, Metabolism & Endocrinology, PA
1185 Town Centre Drive
Eagan, MN 55123

Telephone: 651 379 1600 Fax: 651 379 1650

Name: Gonzalez-Campoy, Michael Sex: Male Height: 65.7 in
Patient ID: 441247 Ethnicity: Hispanic Weight: 217.6 lb
DOB: October 20, 1970 Age: 35

$$\frac{\text{Fat Mass (kg)}}{\text{Height (m}^2\text{)}}$$



Source: 2002 ISAADES Hispanic Study

World Health Organization Body Mass Index Classification

BMI < 18.5 Underweight
18.5 - 24.9 Normal Weight
25.0 - 29.9 Overweight
30.0 - 34.9 Class I Obesity
35.0 - 39.9 Class II Obesity
40.0 - 49.9 Class III Obesity

BMI: 32.8 (kg/m²)

Classification: Class II Obesity

20% of the population is at or below this BMI. 80% of the population is at or above this BMI.

Region	Fat	Lean	Total	% Fat	% Lean
Head	12.00	18.00	30.00	40.00	60.00
Trunk	10.00	15.00	25.00	40.00	60.00
Upper Limb	8.00	12.00	20.00	40.00	60.00
Lower Limb	12.00	18.00	30.00	40.00	60.00
Total	42.00	63.00	105.00	40.00	60.00

Measure	Result	Percentile
Total Body % Fat	37.2	96
Fat Mass/Height ² (kg/m ²)	11.8	93
Android/Gynoid Ratio	1.10	
% Fat Trunk/% Fat Legs	1.13	85
Trunk/Limb Fat Mass Ratio	1.24	78
Est. VAT Mass (g)	1095	
Est. VAT Volume (cm ³)	1184	
Est. VAT Area (cm ²)	227	

Measure	Result	Percentile	
		YN	AM
Total Body % Fat	37.2	96	94
Fat Mass/Height ² (kg/m ²)	11.8	93	87
Android/Gynoid Ratio	1.10		
% Fat Trunk/% Fat Legs	1.13	85	40
Trunk/Limb Fat Mass Ratio	1.24	78	23
Est. VAT Mass (g)	1095		
Est. VAT Volume (cm ³)	1184		
Est. VAT Area (cm ²)	227		

TABLE 1: NIAHES SCA Classification

HOLOGIC

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