

BODY COMPOSITION

What is Body Composition?

Body composition refers to the percentages of bone, water, muscle, and fat in a person's body. Body composition is, however, generally described as 3 components: bone, fat-free or lean mass (muscle and water), fat-mass (body fat). The measurement is a more accurate assessment of body fatness than Body Mass Index (BMI). BMI is a person's weight in kilograms (kg) divided by their height in meters squared and cannot distinguish between excess fat, muscle, or bone mass. In most people, a high BMI *is a good* indicator of high body fatness and therefore is used as a screening tool.

How is Body Composition Measured?

Body composition can be estimated using many techniques, including skinfolds, bioelectrical impedance analysis (BIA), Dual-Energy X-Ray Absorptiometry (DXA), Bod Pod, and underwater weighing. Skinfold measurements utilize calipers to assess skinfold thickness at various body sites on the body, which are then summed and used to calculate percent body fat. With BIA, a low voltage electric current is sent up one leg (or arm) and down the other. It is based on water content and a higher body water content indicates more muscle. DXA uses X-rays to measure body fat and muscle amount and location, as well as bone mineral density. The Bod Pod uses air displacement to measure body volume. Underwater weighing is very accurate and involves a person submerging in a pool of water several times. It is based on the principal that fat is lighter than muscle and floats in water. A person's weight in water, when all air is expelled from the lungs, only reflects fat-free mass. Human error, hydration status, remaining air in lungs, and body size are among factors that can impact the accuracy of these methods.

How is Body Composition Evaluated?

When assessing for health risk, body composition is often evaluated based on percent body fat. A healthy fat percent range changes with age and is higher in woman than men. For good health it is generally recommended that men stay within 10-22% fat and women 20-32%. The accompanying chart classifies fat percent by fitness and chronic disease risk for men and women.

General Body Fat Percentage Categories		
Classification:	Women:	Men:
Essential Fat	10 - 12%	2 - 4%
Athletes	14 - 20%	6 - 13%
Fitness	21 - 24%	14 - 17%
Acceptable	25 - 31%	18 - 25%
At Risk	32% plus	25% plus

Health Effects from Having Too Much or Too Little Body Fat

A body fat percentage above the normal range (greater than 25% for women and 20% for men) puts an individual at greater risk for developing high blood pressure, high cholesterol, diabetes, sleep apnea, cardiovascular disease, gallstones, osteoarthritis, and certain cancers.

Fat serves vital functions in the body and extremely low body fat percentages (below 3% for men and below 12% for women) are dangerous. Nutrient deficiencies (particularly of fat-soluble vitamins A, D, E, and K) and fluid/electrolyte imbalance from low food intake can result in dehydration and an increased risk of fractures. Extremely low levels of body fat can impact nearly all of your body systems, possibly leading to heart and nervous system damage, gastrointestinal problems, shrinkage of internal organs, immune system abnormalities, disorders of the reproductive system, and even death.

References

Body Mass Index. Centers for Disease Control and Prevention website.

<http://www.cdc.gov/healthyweight/assessing/bmi/> May 15, 2015. Accessed January 6, 2016.

Doyle JA. Body Composition. Georgia State University website.

<http://www2.gsu.edu/~wwwfit/bodycomp.html#DEXA> March 18, 1998. Accessed January 6, 2016.

Esmat T. Measuring and evaluating body composition. American College of Sports Medicine website.

<https://www.acsm.org/public-information/articles/2012/01/12/measuring-and-evaluating-body-composition> January 11, 2012. Accessed January 6, 2016.