

Body Composition

What is it?

Body composition is a breakdown of the total mass of a human body into a ratio of comprising tissues, including bone, organs, fascia, tendons, ligaments, muscle, and fat. In medical and athletic environments, body composition is typically considered in two categories: lean body mass and body fat (or fat-free-mass and fat mass). Based on total body fat percentages, individuals can be quantitatively categorized as either underweight, healthy, overweight, obese or morbidly obese.



Why is it important?

High body fat has been linked to over 30 diseases, including coronary heart disease, type II diabetes, stroke, various cancers, sleep apnea, osteoarthritis, and even infertility. Additionally, more than one-quarter of health care costs are now obesity related. Body composition assessment is an essential component of overall fitness tracking and health risk reduction. Conventionally, body weight measures by a scale have been used to serve this purpose, however, body weight alone is unable to differentiate between tissue types. This can lead to an overestimation of risk for extremely muscular frames or an underestimation of risk for small-framed individuals.

Understanding the actual tissue make-up of the body gives a far more accurate measure of health risk and fitness status than body weight alone.

How is it assessed?

In the past body composition has been estimated using body weight and height to calculate a Body Mass Index (BMI). While this was certainly an improvement over body weight alone, it still fails to differentiate between fat mass and lean tissue. The gold standard measure of body composition is Dual-Emission X-ray Absorptiometry (DEXA) Scans. The drawback to DEXA scans is high cost, lack of portability, specialized training and certification required to perform, and relative invasiveness of the technique. As such, several alternative methods of estimating the percentage of lean body mass versus body fat have been developed. Dependent on your selection of packages, your assessment will include some or all of the following parameters:

1. **Body Fat Determination via Bioelectrical Impedance Analysis (BIA):** This is a device that resembles a standard bathroom scale, but runs a low, undetectable ampere current between skin contacts throughout the body. The basic assumption is that the resistance (impedance) to the electrical current varies inversely with the water and electrolyte content of the body's tissues (where the muscle has more than fat). Using this information, weight, and height the BIA estimates body fat percentage. Over the past several years, research has shown these devices to be within 2-4% accuracy of a DEXA scan. In UC Fit, we use a InBody BIA, which is an octopolar, multi-frequency BIA device that we have personally validated with a peer-reviewed research study and shown it to have an extremely high correlation ($r=0.98$) to DEXA.
2. **Body Fat Determination via Skin Fold Caliper:** This is a manual procedure using calipers to measure the thickness of skin and subcutaneous body fat at each of 3-7 anatomical sites. While typically not as accurate as BIA, it has been shown to have good intra-rater reliability when employed by a trained assessor which can be an economical and easily repeatable measure.

What to expect during the assessment:

1. The testing window is usually between 5-8 minutes when choosing one of the above options.
2. A staff member will perform the skinfold and circumference measures in a private location within the lab

Participant preparation:

Test validity and data accuracy are greatly improved by adhering to the following guidelines prior to your assessment. Your test(s) will be given on the assumption that you have followed these recommendations:

1. Patient must be well hydrated; drink 2 glasses of water within 4 hours before the test
2. No food or caffeine consumption for 4 hours before the test; no alcohol consumption for 12 hours

before the test

3. No exercise within 8 hours of the test; patient needs to be relatively dry
4. If you will be assessed using skin fold calipers or limb circumference measurement, clothing should permit access to the skin at the calf, thigh, waist, arm, and shoulder.