



Body Composition Information and FAQ's Sheet

Body composition refers to the relative proportions of body weight in terms of lean body mass and body fat. Lean body mass represents the weight of muscle, bone, internal organs, and connective tissue. Body fat represents the remaining fat tissue. Body fat serves three important functions:

1. As an insulator to conserve heat.
2. Provides metabolic fuel for the production of energy.
3. Acts as padding to cushion your internal organs.

It's essential to maintain some body fat, but an excess level poses a serious health risk. Below are some frequently asked questions regarding body composition:

How is body composition measured?

Body composition (particularly body fat percentage) can be measured in several ways. The most frequently used techniques are listed and described below.

- **Bioelectrical Impedance Analysis (BIA):** The analysis that you just received is BIA. BIA uses a scale to send an undetectably low voltage electric current up one leg and down the other. Since fat is a poor conductor of electricity, fat will impede the current more so than lean muscle tissue. By measuring the resistance to the current, the machine estimates the percent body fat. If the pre-test protocol is followed the test has $\pm 3\%$ accuracy. This form of measurement is the most widely used due to yielding timely results within seconds.
- **Skinfold Testing:** When performed by a trained professional skinfold testing is more accurate than BIA. This type of testing is offered at the Pottruck center for a minimal fee. Skinfold testing uses a tool called a caliper to pinch multiples places on the body in order to measure the thickness of the fold. Skinfold testing can include at the minimum three fold sites and at the maximum nine sites including areas such as the chest, subscapular region, arms, thighs, and abdominal areas. These measurements are used to estimate total body fat with a margin of error of approximately four percentage points depending on the experience and accuracy of the tester and by the adherence of the pre-test protocol followed by the participant.

How should I interpret my BIA body composition results from today?

When reviewing your results from today's body composition analysis please remember that BIA is not a "gold standard" or reference method. Like all assessment tools, the result is only as good as the test done. Although the instruments are straightforward to use, careful attention to the method of use and the protocol must be taken. If the pre-test protocol is followed BIA has an accuracy of $\pm 3\%$. If the protocol is not followed results can vary up to $\pm 10\%$. Additionally it should be noted that individuals who are excessively lean or over-fat can yield inaccurate results.

Remember that your BIA measurement is an estimate and that several factors contribute to the result. **Once the baseline estimate is established any future readings should be used to evaluate relative changes rather than absolute numbers.**

What are the classifications of body composition in relative age groups?

Women – % Bodyfat / Age	20-29	30-39	40-49	50-59	60-69
Low (Increased Health Risk)	<14	<14	<14	<14	<14
Excellent/Fit (Healthy)	</=16.5	</=17.4	</=19.8	</=22.5	</=23.2
Good/Normal (Healthy)	16.6-19.4	17.5-20.8	19.9-23.8	22.6-27	23.3-27.9
Fair/Average (Healthy)	19.5-22.7	20.9-24.6	23.9-27.6	27.1-30.4	28-31.3
Poor (Increased Health Risk)	22.8-27.1	24.7-29.1	27.7-31.9	30.5-34.5	31.4-35.4
High (Increased Health Risk)	>27.2	>29.2	>31.3	>34.6	>35.5

Men – % Bodyfat / Age	20-29	30-39	40-49	50-59	60-69
Low (Increased Health Risk)	<8	<8	<8	<8	<8
Excellent/Fit (Healthy)	</=10.5	</=14.5	</=17.4	</=19.1	</=19.7
Good/Normal (Healthy)	10.6-14.8	14.6-18.2	17.5-20.6	19.2-22.1	19.8-22.6
Fair/Average (Healthy)	14.9-18.6	18.3-21.3	20.7-23.4	22.2-24.6	22.7-25.2
Poor (Increased Health Risk)	18.7-23.1	21.4-24.9	23.5-26.6	24.7-27.8	25.3-28.4
High (Increased Health Risk)	>/=23.2	>/=25	>/=26.7	>/=27.9	>/=28.5

Is there an ideal body fat percentage?

The ideal weight and fat-lean ratio varies considerably for men and women by age. The average healthy adult body fat range regardless of age is 15 to 20% for men and 20 to 25% for women. A woman with more than 32% body fat and males with more than 25% body fat are considered to be at increased risk for disease.

Trained athletes tend to be at the low end of this scale due to their increased lean weight (muscle mass) compared to untrained individuals. While low levels of body fat seem to be related to improved performance, body composition alone is not a great predictor of sports success. **There is little evidence of any health benefit when men drop under 8% and women drop under 14% body fat.**

How low is too low?

While the average body fat percent in the United States is increasing, extremely low body fat percent is also a health problem. A certain amount of body fat is vital for the body to be healthy and function normally.

Body fat percentage measurements calculate **total** body fat. This total body fat can be split into the following 2 categories:

- *Storage Fat* - This consists mainly of fat deposited just under the skin or subcutaneous fat. Storage fat for men and women is fairly similar. For the average man 12% of bodyweight is storage fat and for the average woman 15% of bodyweight is storage fat.
- *Essential Body Fat* - Essential fat is the amount of fat necessary for maintenance of life and reproductive functions. For women the average amount of essential fat is 13% of bodyweight and for men it is 3%.

Trying to achieve a body fat percentage that is so low it affects your essential fat stores is not healthy and can cause many health complications. Some storage fat is also necessary as it is used to protect organs in the chest and abdomen.

What health effects result from having an extremely low body fat percentage?

The attempt to reduce body fat by extreme measures not only leads to decreased exercise performance, but it also can lead to severe health complications. Nutrient deficiencies and fluid/electrolyte imbalance from low food intake can lead to increased risk of fractures, illness, loss of reproductive function and serious conditions such as dehydration, and starvation. The medical complications of a very low body fat involve almost every body function and include the cardiovascular, endocrine, reproductive, skeletal, gastrointestinal, renal, and central nervous systems with the possibility to develop conditions such as heart damage, gastrointestinal problems, shrinkage of internal organs, immune system abnormalities, disorders of the reproductive system, loss of muscle tissue, damage to the nervous system, abnormal growths, and even death.

What health effects result from having an over-fat or obese body fat percentage range?

Body fat percentage charts are used as a tool to determine whether an individual is at greater risk for developing high blood pressure, high cholesterol, diabetes, sleep apnea, cardiovascular disease, gallstones, osteoarthritis, and certain cancers. The higher your percentage of body fat (above 25% for women and above 20% for men) the greater your risk for developing these life-threatening chronic diseases.

How do I manage my bodyfat?

The three most important factors to maintain a healthy bodyfat percentage are:

1. Maintaining your lean muscle mass through routine strength training (minimum 2x/week for each muscle group)
2. Maintaining a healthy well-balanced diet that is low in fat (<30% of calories from fat)
3. Maintaining consistent sleep patterns (minimum 7 hours/night)

Always seek the assistance of a medical or health and fitness professional for personal program guidance in reducing or managing your bodyfat.

Helpful Resources

If you are interested in speaking to someone on campus or researching body composition issues further below is a list of helpful resources.

Student Health (General Website) - <http://www.vpul.upenn.edu/shs/>; 215.746.3535

Student Health (Men's Health) - <http://www.vpul.upenn.edu/shs/menshealth.php>; 215.746.3535

Student Health (Women's Health) - <http://www.vpul.upenn.edu/shs/whealth.php>; 215.746.3535

Counseling and Psychological Services (CAPS) - <http://www.vpul.upenn.edu/caps/>; 215.898.7021

Penn Women's Center - <http://www.vpul.upenn.edu/pwc/main2.html>, 215.898.8611

National Eating Disorders website - <http://www.nationaleatingdisorders.org>

American College of Sports Medicine – www.acsm.org

Sources: Wikipedia, mayoclinic.com, Exercise and Physical Fitness Webpage by the Department of Kinesiology and Health at Georgia State University, about.com:sports medicine, American College of Sports Medicine