

Understanding Body Composition Analysis

Mass and fluid compartments



Body composition analysis is the clinical assessment of tissue and fluid distribution in the human body. The body is modeled as a series of tissue and fluid compartments.

Fat Mass (FM) is the total amount of stored lipids in the body and consists of the following types of fat:

Subcutaneous Fat is located directly beneath the skin. Subcutaneous fat serves as an energy reserve and as insulation against outside cold.

Visceral Fat is located deeper within the body. Visceral fat serves as an energy reserve and as a cushion between organs.

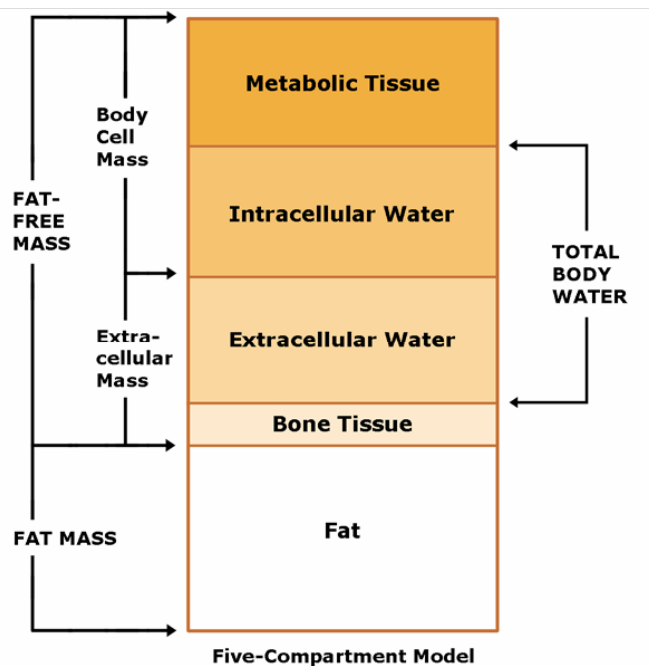
Fat-Free Mass (FFM), also called Lean Body Mass (LBM), is the total amount of nonfat (lean) parts of the body. It consists of approximately 73% water, 20% protein, 6% mineral, and 1% ash.

Fat-free mass is further divided into body cell mass and extracellular mass:

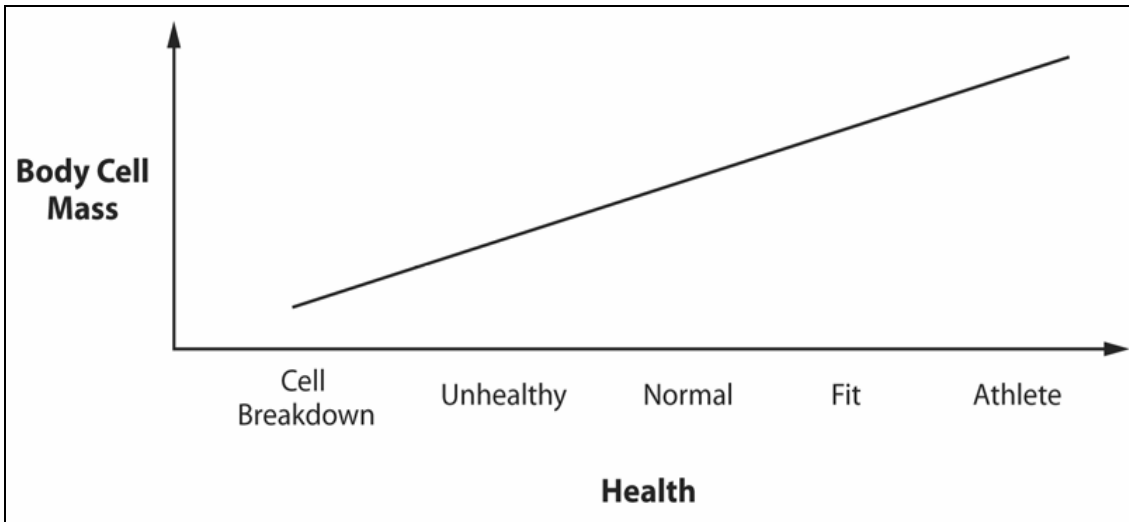
Body Cell Mass (BCM) contains all the metabolically active tissues (living cells) of the body, including muscle cells, organ cells, blood cells, and immune cells. BCM includes the "living" portion of fat cells, but not the stored fat lipids. BCM also includes water inside living cells. This water is called Intracellular Water (ICW). The main electrolyte of intracellular water is potassium.

Extracellular Mass (ECM) contains all the metabolically inactive (non-living) parts of the body, such as bone minerals and blood plasma. ECM includes water contained outside living cells. This water is called Extracellular Water (ECW). The main electrolyte of extracellular water is sodium.

The figure below provides a graphical representation of the relationship of mass and water distribution



Body Composition and Health:



Phase angle is an indicator of cellular health and integrity:

Research in humans has shown that the relationship between phase angle and cellular health is increasing and nearly linear. A low phase angle is consistent with an inability of cells to store energy and an indication of breakdown in the selective permeability of cellular membranes. A high phase angle is consistent with large quantities of intact cell membranes and body cell mass.

Phase angle reflects the ratio of body cell mass to fat-free mass:

Phase angle is proportional to the ratio of reactance and resistance. Therefore, phase angle is proportional to the ratio of body cell mass to fat-free mass.

What causes the phase angle to increase?

- An increase in body cell mass relative to fat-free mass.
- An increase in fat-free mass relative to body weight.
- Improving hydration of fat-free mass.

Research has shown that body composition correlates directly to a continuum of health, ranging from mortality and morbidity to immunity, longevity, high function, and athletic performance. The purpose of body composition analysis is to provide estimates of mass distribution and water compartments.



To schedule your Optimal Body Composition appointment, call 503-866-9739 or go to www.OptBodyComp.com and fill out the "Contact Dr. Irving" form in the green side bar on the right of the website.

Yours in Health,



Tim Irving DC, MS, LMT, Nutritionist, CKTP

References:

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2. Mattar JA, et al. Application of total body bioimpedance to the critically ill patient. *New Horizons*, 1995, Vol 4., No. 4; 493-503.
3. Ott M, et al. Bioelectrical impedance analysis as a predictor of survival in patients with human immunodeficiency virus infection. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 1995; 9:20-25.