

translation are the processes by which DNA is read and the message sent to the endoplasmic reticulum (ER) where it is pieced together to form new proteins. These proteins are then released for immediate use by the cell or can be stored for later use in what are known as Golgi bodies. The mitochondria are the powerhouse of the cell whose purpose is to provide the cell and therefore the body with energy.

Skeletal muscle is composed of specialized cells called myocytes. These myocytes are interspersed throughout the muscle with connective tissue. Myocytes contain the usual cellular components but are different from many other types of cells in that they are multinucleated and have a complex system of contractile proteins⁶. These contractile proteins, when activated by calcium ions and ATP cause a shortening of the cell (also known as a muscle fiber) length. This shortening pulls on the fibrous connective tissue that connects myocytes to each other and extends to the bone as a tendon. The shortening of the muscle fibers results in a muscle contraction, which moves the bone or other muscle to which it is connected. As the fiber shortens, in length, it bulges in width. The contractile proteins are pulled past one another in what is called the sliding filament model. The majority of human musculature consists of muscles whose fibers span the entire length of a muscle from one end to the other⁷. In order for a muscle to contract, all of the fibers in that muscle must contract. This is known as the all or none principle of muscle contraction.

Skeletal muscle is the most abundant tissue in the body⁸. Muscle tissue, like most body tissues, is constantly being broken down and repaired. The process of breaking down is known as catabolism while building up/repair is known as anabolism. The net of these two processes is the equilibrium state. This does not necessarily mean that anabolism equals catabolism at equilibrium. In fact, beyond puberty, in the average, sedentary person, there is a net catabolism that increases as we age⁹. Anabolism/catabolism in skeletal muscle depends, in large part, on what is referred to as nitrogen balance. Skeletal muscle is not built during the actual exercise but in the recovery period following the exercise which can last up to 48 hours^{10,11}.

The contractile proteins in skeletal muscle are composed of amino acids, which are characterized by the presence of nitrogen in their molecular structure. A positive nitrogen balance is usually correlated with anabolism while a negative nitrogen balance is usually found in catabolism. Adipose (fat tissue) anabolism differs in that adipocytes (fat cells) contain little protein, instead containing pools of triglycerides. Therefore, anabolism in adipocytes occurs with a positive triglyceride balance and catabolism occurs with a negative triglyceride balance. Adipocytes and myocytes also differ in that a positive triglyceride balance is itself, the stimulus for anabolism of adipocytes. This