Chapter 16

Nutrients That Regulate Body Functions

Regulation of body functions is an extremely complex process. It is important to remember that nutrients and functions are intricately interrelated. No single nutrient can function alone; thus regulation of body functions depends on many nutrients.

Vitamins as Regulators

Vitamins are needed in extremely small amounts, but they are essential for normal body function. Vitamins frequently depend upon one another to perform their functions. Vitamins are needed and used in specific amounts. Large excesses do not serve any useful function and in some instances are known to be harmful. Toxic effects have long been known form excesses of vitamin A and vitamin D. Recent research has described neurological damage resulting from large amounts of vitamin B6 and kidney stone formation and destruction of vitamin B12 stores as a result of mega dose of vitamin C (ascorbic acid). Megadoses are usually defined as 10 times the recommended daily amount for an adult. There is not enough information to define toxic doses of all vitamins for young children; it is certainly smaller than the amount required producing toxicity symptoms in an adult. Therefore, extreme caution should be used in giving children vitamin supplements without the advice of a physician. “If a little bit is good, a lot is better” is a dangerous practice relative to vitamins. Vitamins can supplements a “hit or miss” diet but should not be given as a replacement for an adequate diet. Don’t depend on supplements to meet your usual nutrient needs.”

• Vitamins in Energy Metabolism

A slow steady release of energy is important to body needs. If energy is released in a haphazard fashion, much of it is lost as heat. Primary vitamins involved in the regulation of metabolism for the release of energy are:

1. Thiamin
2. Niacin
3. Riboflavin
4. Pantothenic

As part of coenzymes, these four vitamins act as a team to release energy from carbohydrates and fats.

• Vitamins in Cellular Reproduction and Growth

Two vitamins that are absolutely essential for cell growth are folacin and cobalamin (B12). Both vitamins participate in the synthesis of DNA and RNA, which are the chemicals that provide the pattern for cell division and growth.

• Vitamins that Regulate Bone Growth

The minerals calcium and phosphorous are the major structural components of bones and teeth. However, bone growth also depends on a number of other nutrients as regulators including vitamins A, C, and D.

• Vitamins that Regulate Neuromuscular Function

Vitamins play a role in neuromuscular function either through the synthesis of neurotransmitters (chemical messengers) or through growth or maintenance of nerve cells.

• Vitamins that Regulate Blood Formation

Some vitamins play an important role in the formation of blood cells and hemoglobin. Hemoglobin, the red pigment of the red blood cells, carries oxygen to all cells of the body
and carries waste product, carbon dioxide, away from the cells to the lungs. Vitamins needed for the production of red blood cells and hemoglobin are: vitamins E, B6, B12, pantothenic acid, and folacin.

Minerals as Regulators

- Minerals in energy Metabolism
  Minerals also play an important role in the steady, efficient release of energy. This process of energy metabolism (production, storage, and release) depends on adequate amounts of phosphorus, magnesium, iodine, and iron.

- Minerals in Cellular Reproduction and Growth
  Minerals required for cellular reproduction and growth include phosphorus, magnesium, and zinc.

- Minerals that regulate neuromuscular function
  Passage of nerve impulses from nerve cell to nerve cell or from nerve cell to muscle is dependent on the presence of sodium, potassium, calcium, and magnesium.

- Minerals in Blood formation
  Blood is the transport medium of all regulatory minerals. Iron is a structural part of hemoglobin, an important component of blood.

Proteins as regulators

Proteins are the only class of nutrients that can perform all three general functions of nutrients. They build and repair body tissue, regulate body functions, and provide energy.

- Proteins in Energy Metabolism and Growth Regulation
  Proteins (amino acids) are important components of enzymes and some hormones and thus play a major role in regulation of energy metabolism. The body must have an adequate supply of protein in order to produce these important enzymes and hormones. Hormones are substances that are secreted by glands for action on tissue elsewhere in the body, and they regulate many body functions.

- Water as a regulator
  The initial step of processing food for use by the body is digestion. Food composition is changed during chemical digestion through the breaking down of nutrient molecules by the addition of water. Water is essential for many processes as the medium in which chemical reactions take place. Water also is the major components of body secretions such as salivary juice, gastric juice, bile, perspiration, and expirations from the lungs. Water plays a major role in ridding the body of waste material. Water regulates body temperature during changes in environmental temperature and activity related heat production. It is important that children be given plain water rather than juice or other sweetened beverages. Sugar greatly reduces the absorption of water.