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Anatomy

1a) Coenzymes are small molecules. They cannot by themselves catalyze a reaction but they can help enzymes to do so. In technical terms, coenzymes are organic nonprotein molecules that bind with the protein molecule (apoenzyme) to form the active enzyme (holoenzyme).

Coenzymes assist enzymes in turning substrates into products. They can be used by multiple types of enzymes and change forms. Specifically, coenzymes function by activating enzymes, or acting as carriers of electrons or molecular groups.

b) Fat-soluble vitamins are soluble in fats. They are absorbed by fat globules that travel through the small intestines and into the general blood circulation within the body. Unlike water-soluble vitamins, fat-soluble vitamins are stored in the body when they are not in use. Typically, they are stored in the liver and fat tissues. Although only small amounts of these vitamins are necessary to maintain good health, Vitamin D deficiency has been reported as a growing public health concern. It has been associated with an increased risk of certain diseases. Fat-soluble vitamins include Vitamin A (palmitate form), Vitamin D, Vitamin E and Vitamin K.

-Water-soluble vitamins dissolve in water, which means these vitamins and nutrients dissolve quickly in the body. Unlike fat-soluble vitamins, water-soluble vitamins are carried to the body’s tissues, but the body cannot store them. Any excess amounts of water-soluble vitamins simply pass through the body. Because these vitamins are needed by our bodies, we need to make sure we intake these vitamins on a regular basis. Water soluble vitamins include Vitamin C and the vitamin B complex: thiamin (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), Vitamin B6, biotin (B7), folic acid (B9), Vitamin B12. Vitamin A in its Beta-Carotene form is also water-soluble.

c) Niacin is a coenzyme, like thiamine and riboflavin, that is responsible for energy release from carbohydrates. A niacin deficiency can lead to pellagra, a disabling disease with symptoms that may be characterized by four “Ds”: depression, diarrhea, delirium and dementia.

Niacin is found in fortified breads and cereals. Protein foods, such as eggs, fish, meat, dairy milk and poultry, are naturally rich in niacin. They are also plentiful in the amino acid tryptophan, which can be synthesized into niacin by the liver. Chicken breast, ground beef, halibut, tuna and turkey are particularly good sources of tryptophan. In the vegetable kingdom, asparagus, baked potatoes and cantaloupe have significant amounts of tryptophan.

Niacin has been used to lower LDL cholesterol and raise HDL cholesterol when administered as a drug under medical guidance. In heavy doses, niacin has been known to cause a “niacin flush” due to the capillaries increasing in size. This condition can lead to fatigue and even liver damage. Caution should be used if one is taking niacin or B-complex supplements.

Sources of niacin: eggs, fish, legumes, meats nuts, peanuts, poultry, pork.