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PHARMACOLOGY

BCH 204

ASSIGNMENT:

a. What are coenzymes?

b. Differentiate between fat and water soluble vitamins

c. Describe niacin in relation to its coenzymic function

ANSWER

Coenzyme: A substance that enhances the action of an enzyme. (An enzyme is a protein that functions as a catalyst to mediate and speed a chemical reaction).

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).

Functions of Coenzymes

An enzyme without a coenzyme is called an *apoenzyme*. Without coenzymes or cofactors, enzymes cannot catalyze reactions effectively. In fact, the enzyme may not function at all. If reactions cannot occur at the normal catalyzed rate, then an [organism](https://biologydictionary.net/organism/) will have difficulty sustaining life.

When an enzyme gains a coenzyme, it then becomes a *holoenzyme*, or active enzyme. Active enzymes change substrates into the products an organism needs to carry out essential functions, whether chemical or physiological. Coenzymes, like enzymes, can be reused and recycled without changing reaction rate or effectiveness. They attach to a portion of the [active site](https://biologydictionary.net/active-site/) on an enzyme, which enables the catalyzed reaction to occur. When an enzyme is denatured by extreme temperature or pH, the coenzyme can no longer attach to the [active site](https://biologydictionary.net/active-site/).

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| Fat soluble vitamins | Water soluble vitamins |
| Not soluble in water | Soluble in water |
| They are soluble in fat, lipids | Not soluble in fat |
| They are stored in the liver and fatty( adipose) tissue | No storage |
| Deficiency manifest only when excess is stored | No deficiency cause the body excretes it through urine |
| Hypervitaminosis ( i.e. toxicity) | No toxicity |
| transported in the blood with carrier proteins,  | No carrier protein |
| They come from plant and animal foods or dietary supplements | They are found in plant and animal foods or dietary supplements and must be taken in daily. |

**Niacin**, also called **nicotinic acid** and **vitamin B3**, water-soluble [vitamin](https://www.britannica.com/science/vitamin) of the B complex. It is also called the [pellagra-preventive](https://www.britannica.com/science/pellagra) vitamin because an adequate amount in the diet prevents [pellagra](https://www.britannica.com/science/pellagra), a chronic disease characterized by skin lesions, gastrointestinal disturbance, and nervous symptoms. Niacin is interchangeable in metabolism with its [amide](https://www.britannica.com/science/amide), niacinamide (nicotinamide). Like the vitamins [thiamin](https://www.britannica.com/science/thiamin) (vitamin B1) and [riboflavin](https://www.britannica.com/science/riboflavin) (vitamin B2), niacin functions as part of a coenzyme involved in the metabolism of carbohydrates and acts to catalyze the oxidation of sugar derivatives and other substances

Niacin assists functions of the nervous and digestive system. It plays a role in food metabolism and in the formation of red blood cells and skin. NAD and NADP are coenzymes that are part of the energy production system of the body. This system works by means of oxidation and reduction (redox) reactions. Niacin deficiency occurrence causes many symptoms, such as fatigue, headaches, dry skin, and loss of appetite, ulcers and emotional instability. On rare occasions (mainly in developing countries) people may experience severe deficiency, which leads to a condition known as pellagra. This condition is commonly characterized by the 4 D's: dermatitis, diarrhea, dementia and death. Pellagra literally means raw skin. The conditions were named this because the skin of a patient develops a dark pigmented rash on areas exposed to bright sunlight.

Niacin is part of a range of foods, for example meat, fish, bread, yeast, nuts, seeds, soy beans, potatoes, dried fruit, tomatoes and peas. Milk, green-leaved vegetables and coffee and tea also provide some niacin. Cereals may be fortified with niacin. Some foods, such as corn, may release niacin upon cooking. Before cooking corn only contains bound, unavailable niacin...