NAME: KOLAWOLE OLUREMI GRACE

DEPARTMENT: HUMAN ANATOMY

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COURSE TITLE: MEDICAL BIOCHEMISTRY II

1a. What are coenzymes

b. Differentiate between fat and water soluble vitamins

c. Describe niacin in relation to its coenzymic function

COENZYMES

A coenzyme is an organic non-protein compound that binds with an enzyme to catalyze a reaction. Coenzymes are often broadly called cofactors, but they are chemically different. A coenzyme cannot function alone, but can be reused several times when paired with an enzyme. 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.

DIFFERENCES BETWEEN FAT SOLUBLE AND WATER SOLUBLE VITAMINS

|  |  |
| --- | --- |
| Fat Soluble | Water Soluble |
| 1. They are soluble in fat | They are not |
| 1. They are not soluble in water | They are soluble in water |
| 1. Absorption occurs along with lipids and requires bile salt | Absorption is simple |
| 1. Carrier proteins are present | No carrier protein is needed |
| 1. They are stored in the liver | No storage |
| 1. Deficiency manifests only when stores are depleted. | Deficiency manifests rapidly as there is no storage |

NIACIN

Vitamin B3, generally referred to as niacin, is a water-soluble vitamin. This vitamin can generally be found in two distinctive forms, namely nicotinic acid and nicotinamide. These substances are used by the body to form the coenzymes NAD and NADP. Niacin coenzymes degrade carbohydrates, fats, proteins and alcohols and synthesize fatty acids and cholesterol. They play a role in cell signaling. 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, 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 conditions is commonly characterized by the 4 D's: dermatitis, diarrhoea, dementia and death. Pellagra literally means raw skin. The conditions was named this because the skin of a patient develops a dark pigmented rash on areas exposed to bright sunlight.