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**DEPARTMENT: PHYSIOLOGY**

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**ASSIGNMENT**

● **WHAT ARE COENZYMES?**

They are cofactors that are loosely bound to the enzyme. They are organic in nature. They are any of a number of freely diffusing organic compounds that function as cofactors with enzymes in promoting a variety of metabolic reactions. Coenzymes participate in enzyme-mediated catalysis in stoichiometric (mole-for-mole) amounts, are modified during the reaction, and may require another enzyme-catalyzed reaction to restore them to their original state. Examples include nicotinamide adenine dinucleotide (NAD), which accepts hydrogen (and gives it up in another reaction), and ATP, which gives up phosphate groups while transferring chemical energy (and reacquires phosphate in another reaction).

● **DIFFERENTIATE BETWEEN FAT SOLUBLE AND WATER SOLUBLE VITAMINS**

<u>FAT SOLUBLE VITAMINS</u>	<u>WATER SOLUBLE VITAMINS</u>
1. Soluble in fat	Not soluble in fat
2. Not soluble in water	Soluble in water
3. Absorption of fat soluble vitamins occurs with lipids and requires bi-salts	Absorption is simple
4. Carrier proteins are present	No carrier proteins are present
5. Fat soluble vitamins are stored in the liver	There is no storage
6. Deficiency only manifests when stores are depleted	Deficiency manifest rapidly as there is no storage

- **DESCRIBE NIACIN IN RELATION TO ITS COENZYMIC FUNCTION**

Firstly, Niacin is a coenzyme, like thiamine and riboflavin that is responsible for energy release from carbohydrates. The nicotinamide adenine dinucleotides (NAD, NADP, NADH, and NADPH) function primarily as either hydride donors (NADH, NADPH) or hydride acceptors (NAD, NADP).

Over 400 enzymes require the niacin coenzymes, Living organisms derive most of their energy from redox reactions, which are processes involving the transfer of electrons. NAD and NADP, mainly to accept or donate electrons for redox reactions. NAD and NADP appear to support distinct functions NAD functions most often in energy-producing reactions involving the degradation (catabolism) of carbohydrates, fats, proteins, and alcohol. NADP generally serves in biosynthetic (anabolic) reactions, such as in the synthesis of fatty acids, steroids (e.g., cholesterol, bile acids, and steroid hormones), and building blocks of other macromolecules NADP is also essential for the regeneration of components of detoxification and antioxidant systems To support these functions, the cell maintains NAD in a largely oxidized state (NAD<sup>+</sup>) to serve as oxidizing agent for catabolic reactions, while NADP is kept largely in a reduced state (NADPH) to readily donate electrons for reductive cellular processes

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. Niacin is recommended for dizziness, Post Menstrual Syndrome (PMS) and arthritis. It is a useful preparation for burn treatment. Niacin can also be useful for alcohol addicts and people with high cholesterol, mental problems, severe stress problems or hyperthyroid, for athletes and for elderly people. Niacin is suspected to decrease the possibility of introduction of certain types of cancer such as leukaemia, as a result of increase levels of DNA-repairing coenzymes (NAD). People suffering from HIV may be given extra niacin to postpone symptoms and elongate their life.