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Medical laboratory science

Medical biochemistry

### Question

1a. What are coenzymes

b. Differentiate between fat and water soluble vitamins

c. Describe niacin in relation to its coenzymic function

### Answers

1a. Coenzymes

These are reusable non-protein molecules that contain carbon (organic). They bind loosely to an enzyme at the active site to help catalyze reactions. Most are vitamins, vitamin derivatives, or form from nucleotides.

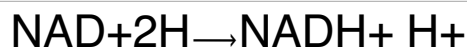
1b. Differences between fat and water soluble vitamins

| Fat soluble vitamins  | Water soluble vitamins                              |
|---|---|
| They require carrier proteins to be transported within the body | They do not require carrier protein                 |
| They are stored in the liver                                    | They are not stored in the body                     |
| Their absorption require bile salt                              | Absorption does not require bile salt               |
| They're not excreted  | They are usually excreted                           |
| Deficiency manifests only when stores are depleted              | Deficiency manifests rapidly as there is no storage |

### 1c. Niacin- coenzymic function

The active forms of niacin are Nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP) which function as coenzymes.

In cells, most oxidations are accomplished by the removal of hydrogen atoms. Both of these coenzymes play crucial roles in this. Each molecule of NAD<sup>+</sup> (or NADP<sup>+</sup>) can acquire two electrons; that is, be reduced by two electrons. However, only one proton accompanies the reduction. The other proton produced as two hydrogen atoms are removed from the molecule being oxidized is liberated into the surrounding medium. For NAD, the reaction is thus:



NAD participates in many redox reactions in cells, including those in glycolysis and most of those in the citric acid cycle of cellular respiration.

They are involved in various redox reactions catalysed by dehydrogenases in metabolism. They are therefore involved in many metabolic pathways of carbohydrates, lipid and protein.