

NAME:ETINOSA-OGBAHON OSASENAGA

18/MHS07/019

PHARMACOLOGY

BCH 204

•What are coenzymes?

These are cofactors that are loosely bound to the enzyme. They are organic in nature. A coenzyme is an organic non-protein compound that binds with an enzyme to catalyze a reaction.

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).

•Differentiate fat and water soluble vitamins?

Fat soluble vitamins	Water soluble vitamins
•They are soluble in fat	•Not soluble in fat
•Not soluble with water	•Soluble in water

•Absorption of fat-soluble vitamins occur along with lipids and require bile salts	•Absorption simple
•Carrier protein present	•Carrier protein absent
Fat soluble vitamins are stored in the liver	•Water-soluble vitamins have no storage
•Deficiency manifests only when stores are depleted	•Deficiency manifests rapidly as there is no storage
Hypervitaminosis (leads to toxicity)	•Toxicity is unlikely since excess is excreted
•Treatment of deficiency involves single large doses to prevent the deficiency	•Regular dietary supply is required
•Fat soluble vitamins- vitamin A, D, E, K	•Water soluble vitamins- vitamin B1, B2, B3, B5, B6, Biotin, folic acid, B12, vitamin C
Hydrophobic	Hydrophilic

Water-soluble vitamins

As the name suggests, a water-soluble vitamin is one that dissolves in water—and as a result, is easily absorbed into the tissues of the body and metabolized more quickly than fat-soluble vitamins.

The majority of vitamins, including the B vitamin complex and Vitamin C, are water-soluble (1):

- Vitamin B1 (thiamine)
 - Vitamin B2 (riboflavin)
 - Vitamin B3 (niacin)
 - Vitamin B5 (pantothenic acid)
 - Vitamin B6
 - Vitamin B7 (biotin)
 - Vitamin B9 (folate)
 - Vitamin B12 (cobalamin)
 - Vitamin C
-
- Vitamin B1 (thiamine) helps to release energy from foods and is important in maintaining nervous system function.
 - Vitamin B2 (riboflavin) helps promotes good vision and healthy skin and is also important in converting the amino acid tryptophan into niacin.
 - Vitamin B3 (niacin) aids in digestion, metabolism, and normal enzyme function as well as promoting healthy skin and nerves.
 - Vitamin B6 (pyridoxine) aids in protein metabolism and the production of red blood cell, insulin, and hemoglobin.
 - Folate (folic acid) also aids in protein metabolism and red blood cell formation and may reduce the risk of neural tube birth defects.

- Vitamin B12 (cobalamin) aids in the production of normal red blood cells as well as the maintenance of the nervous system.
- Biotin helps release energy from carbohydrates and aids in the metabolism of fats, proteins, and carbohydrates from food.
- Pantothenic acid aids in metabolism and the formation of hormones.
- Vitamin C (ascorbic acid) is central to iron absorption and collagen synthesis. It aids in wound healing and bone formation while improving overall immune function

Any excess of water-soluble vitamins, like the Vitamin B complex or Vitamin C, are excreted through the urination process. Many B vitamins and Vitamin C can be found in vegetables (like leafy greens and other green vegetables) and fruits (like citrus fruits).

The main difference between water-soluble vitamins and fat-soluble vitamins is how they're absorbed into and act within the body—but there are other considerations to keep in mind for all vitamin types.

One major benefit to water-soluble vitamins? The chance they'll build up within the body is highly unlikely, even at large amounts; any excess exits the body when you pee. This also means that because water-soluble vitamins are either used or excreted so quickly, if you want to reap the health rewards associated with water-soluble vitamins, you'll need to consistently get them into your system through nutrient-dense foods and supplements that help fill the gaps in your diet

Fat-soluble vitamins

Fat-soluble vitamins dissolve in—you guessed it—fat. These vitamins are absorbed by fat globules within the body and then carried throughout the bloodstream. There are four fat-soluble vitamins, which include:

- Vitamin A
 - Vitamin D
 - Vitamin E
 - Vitamin K
-
- Vitamin A is integral to bone formation, tooth formation, and vision. It contributes to immune and cellular function while keeping the intestines working properly.
 - Vitamin D aids in the development of teeth and bone by encouraging the absorption and metabolism of phosphorous and calcium.
 - Vitamin E is an antioxidant that helps fight infection and keeps red blood cells healthy.
 - Vitamin K is central to blood clotting and also keeps bones healthy

Fat-soluble vitamins are found in high-fat food sources like egg yolks, liver, beef, fatty fish, and dairy products. Unlike water-soluble vitamins, any excess of fat-soluble vitamins don't immediately leave the body. Instead, they're stored in the liver or fatty tissue for later use.

Fat-soluble vitamins, on the other hand, don't immediately leave the

body—and, instead, are stored in the liver and fatty tissue. Because these vitamins are stored in the body, excess is more likely—and that's not necessarily a good thing.

• Describe niacin in relation to its coenzymic function

Niacin-Vitamin B3

Active forms of niacin are:

- Nicotinamide adenine dinucleotide (NAD⁺) {coenzymes}
- Nicotinamide adenine dinucleotide phosphate (NADP⁺) {coenzymes}

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 and its coenzyme function

Niacin, also known as vitamin B3, is the only B vitamin your body can produce from another nutrient — the amino acid tryptophan. Active forms of niacin are:

- Nicotinamide adenine dinucleotide (NAD⁺) {coenzymes}
- Nicotinamide adenine dinucleotide phosphate (NADP⁺) {coenzymes}

Niacin is a group of related nutrients. The most common forms are:

- Nicotinic acid: The most common form in supplements. Also found in

both plant- and animal-sourced foods. High-dose nicotinic acid supplements may cause a condition called niacin flush.

- Nicotinamide (niacinamide): Found in supplements and foods.

The compound nicotinamide riboside also has vitamin B3 activity. It is found in trace amounts in whey protein and baker's yeast

Role and Function

All dietary forms of niacin are eventually converted into nicotinamide adenine dinucleotide (NAD⁺) or nicotinamide adenine dinucleotide phosphate (NADP⁺), which act as coenzymes.

Like the other B vitamins, it functions as a coenzyme in the body, playing an essential role in cellular function and acting as an antioxidant.

One of its most important roles is to drive a metabolic process known as glycolysis, the extraction of energy from glucose (sugar).