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COURSE BCH202

Number one

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).

A number of the water-soluble vitamins such as vitamins B1, B2 and B6 serve as coenzymes.

1B

Fat Soluble

Vitamins A, D, E, and K

Fat-soluble vitamins are soluble in fats. They are absorbed by fat globules that travel through the small intestines and into the general blood circulation within the body. Unlike water-soluble vitamins, fat-soluble vitamins are stored in the body when they are not in use. Typically, they are stored in the liver and fat tissues. Although only small amounts of these vitamins are necessary to maintain good health, Vitamin D deficiency has been reported as a growing public health concern. It has been associated with an increased risk of certain diseases. Fat-soluble vitamins include Vitamin A (palmitate form), Vitamin D, Vitamin E and Vitamin K.

The role of fat-soluble vitamins:

VITAMIN A Enhancing vision, immunity, bone growth, and the production of new cells are just a few of the roles this powerful antioxidant plays. Available in fat-soluble (Palmitate) and water-soluble (Beta Carotene) forms.

VITAMIN D The sunshine Vitamin’s myriad talents include supporting heart health, blood sugar levels, healthy aging, immunity, and strengthening bones. It plays a key role in helping the body absorb calcium.

VITAMIN E Vitamin E is an antioxidant that supports the immune system, helps to improve blood circulation, protects against cell damage, and promotes the healing of tissues.

VITAMIN K Sometimes known as “the forgotten vitamin” Vitamin K is a fat-soluble vitamin that is well known for its blood clotting capabilities and is absolutely essential to building strong bones and cardiovascular health. It is found in spinach, soybeans, and eggs, but is hard for the body to absorb.

Water Soluble

Vitamins B and C

Water-soluble vitamins dissolve in water, which means these vitamins and nutrients dissolve quickly in the body. Unlike fat-soluble vitamins, water-soluble vitamins are carried to the body’s tissues, but the body cannot store them. Any excess amounts of water-soluble vitamins simply pass through the body. Because these vitamins are needed by our bodies, we need to make sure we intake these vitamins on a regular basis. Water soluble vitamins include Vitamin C and the vitamin B complex: thiamin (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), Vitamin B6, biotin (B7), folic acid (B9), Vitamin B12. Vitamin A in its Beta-Carotene form is also water-soluble.

The role of water-soluble vitamins play:

VITAMIN C This famous “cold” fighter is a strong antioxidant known for strengthening the immune system by fighting off colds and other infectious diseases. It helps promote cardiovascular and eye health, and ward off wrinkles and the signs of aging skin.

THIAMIN HCL (Vitamin B1) The body needs B1 to convert food into energy, and for DNA and RNA to work together. It plays a role in maintaining heart function and a healthy nervous system.

RIBOFLAVIN (VITAMIN B2) The “yellow” B Vitamin that can be used for food coloring is essential to the creation of red blood cells and cell growth. It promotes healthy muscle, nerve, and heart function and affects certain enzyme functions.

NIACIN (VITAMIN B3) Essential for converting food to energy, Niacin helps to maintain cardiovascular health. It also promotes a healthy nervous system, as well as healthy skin, hair, and eyes.

PANTOTHENIC ACID (VITAMIN B5) Vitamin B5 supports metabolism and helps to convert food into energy. It aids in overall growth and development, supports the adrenal glands, and is critical in the production of hemoglobin.

VITAMIN B6 (PYRIDOXINE) This Vitamin B superstar supports healthy brain function and reduces the risk of cardiovascular disease. It aids in the production of serotonin and helps to maintain the health of the nervous system, immune system, and red blood cells.

BIOTIN Biotin, also known as B7, promotes healthy skin, hair, and nails. It is needed for the metabolism of protein and carbohydrates, and regulating blood sugar levels.

FOLIC ACID (VITAMIN B9) Vitamin B9 is an essential player in the development of a healthy central nervous system in embryos. Ongoing, it supports nervous system function, repairs DNA damaged by toxins, and aids in the production of blood cells.

VITAMIN B12 This powerful B vitamin, that the body does not produce, has a hand in nerve function and development. It helps to keep blood cells healthy and to produce DNA. It can also aid in the prevention of certain types of anemia. It is the exception to water soluble vitamins as it can be stored in your liver.

1C

Description Vitamin B3

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.

Functions Vitamin B3

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.

Vitamin B3 in food

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 vegeatbles and coffe 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.

Vitamin B3 as a supplement

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.

Interactions

Antituberculaosis drugs such as isoniazid may result in niacin deficiencies. Women that take oestrogen contraceptives have a larger requirement for niacin resulting from increased niacin synthesis in their bodies.

Warning

Pregnant or breastfeeding women can only take niacin under supervision. Children under age 12 and people suffering from kidney disease are not recommended to take niacin. One should not take more than 150 mg of niacin, because this leads to facial flushing. Very large intakes (>3000 mg) may cause liver damage. People with liver disease or diabetes are more susceptible to problems caused by niacin over dose.