

Module 8: Lifelong Health and Wellness

Topic 1 Content: Water-Soluble Vitamins

Introduction

Water-Soluble Vitamins

Introduction

Vitamins are a type of nutrient needed in small amounts by the body to promote growth and maintain health. Vitamins are categorized according to their ability to dissolve in fat or water. A vitamin that is classified as water-soluble is able to dissolve in water after entering the body. As a result, water-soluble vitamins cannot be stored in the body for future use. The body needs nine water-soluble vitamins to perform properly. In this interactivity, use the **NEXT** button or the numbered tabs to learn more about nine important water-soluble vitamins.



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Module 8: Lifelong Health and Wellness

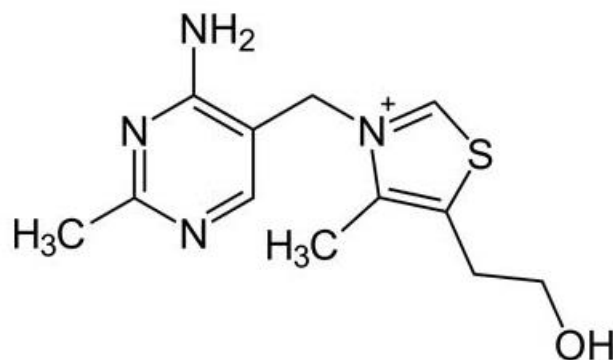
Topic 1 Content: Water-Soluble Vitamins

Vitamin B₁ (Thiamin)

Water-Soluble Vitamins

Vitamin B₁ (Thiamin)

Thiamin supports the body's nervous system and assists the body in metabolizing carbohydrates and amino acids. Thiamin can be found in pork, peas, enriched and whole grains, and in most vegetables.



1 2 3 4 5 6 7 8 9

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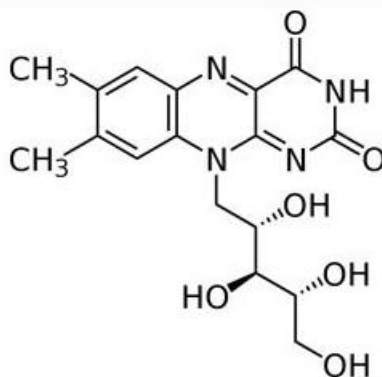
Topic 1 Content: Water-Soluble Vitamins

Vitamin B₂ (Riboflavin)

Water-Soluble Vitamins

Vitamin B₂ (Riboflavin)

Riboflavin is needed to promote growth and healthy skin. Additionally, it assists the body in metabolizing fats, proteins, and carbohydrates. Whole grains, beans, milk, meat, and green and leafy vegetables all contain riboflavin.



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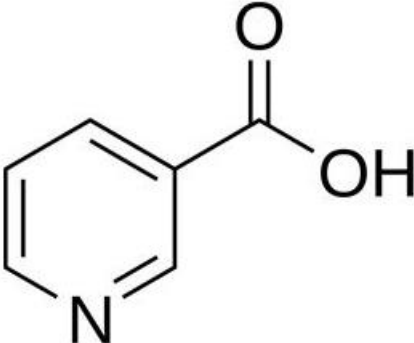
Topic 1 Content: Water-Soluble Vitamins

Niacin (Vitamin B₃)

Water-Soluble Vitamins

Niacin (Vitamin B₃)

Niacin supports the body's nervous and digestive systems and assists the body in metabolizing fats, proteins, and carbohydrates. Fish, meat, enriched and whole-grain breads and cereals, beans, and seeds all contain niacin.



The chemical structure of Niacin (Vitamin B₃) is shown as a pyridine ring with a carboxylic acid group (-COOH) attached to the 3-position. The pyridine ring is a six-membered aromatic ring with one nitrogen atom. The carboxylic acid group consists of a carbon atom double-bonded to an oxygen atom and single-bonded to a hydroxyl group (-OH).

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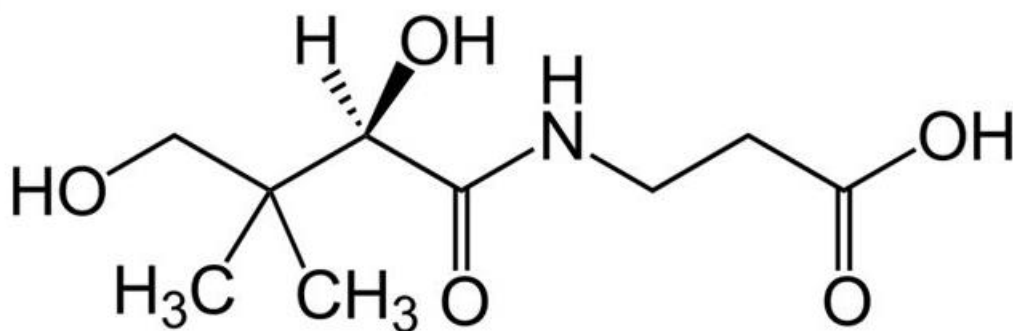
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Pantothenic Acid (Vitamin B₅)

Water-Soluble Vitamins

Pantothenic Acid (Vitamin B₅)

The body uses pantothenic acid to produce energy from proteins, fats, and carbohydrates. Pantothenic acid also assists the body with producing hormones and cholesterol. Fish, meat, whole grains, green and leafy vegetables, and peas all contain pantothenic acid.



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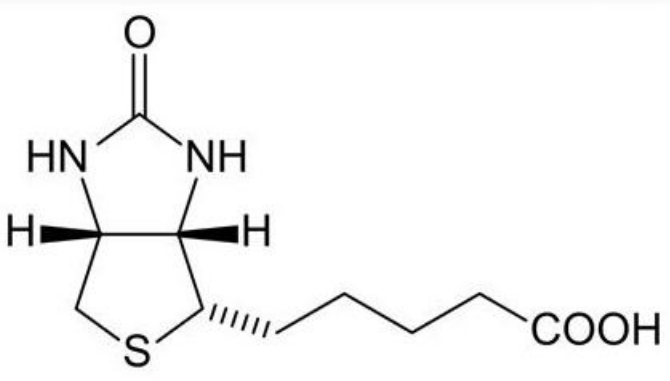
Topic 1 Content: Water-Soluble Vitamins

Biotin

Water-Soluble Vitamins

Biotin

Biotin assists the body in metabolizing fats, proteins, and carbohydrates. Yogurt, peas, beans, nuts, and egg yolk all contain biotin.



The chemical structure of biotin is shown. It consists of a central bicyclic ring system. The upper ring is a five-membered imidazole ring with a carbonyl group (=O) at the 2-position. The lower ring is a five-membered thiophene ring with a sulfur atom (S) at the 4-position. Two hydrogen atoms (H) are attached to the bridgehead carbons of the bicyclic system, one on a wedge and one on a dash. A propionic acid side chain (-CH₂-CH₂-CH₂-COOH) is attached to the thiophene ring at the 3-position via a dashed bond.

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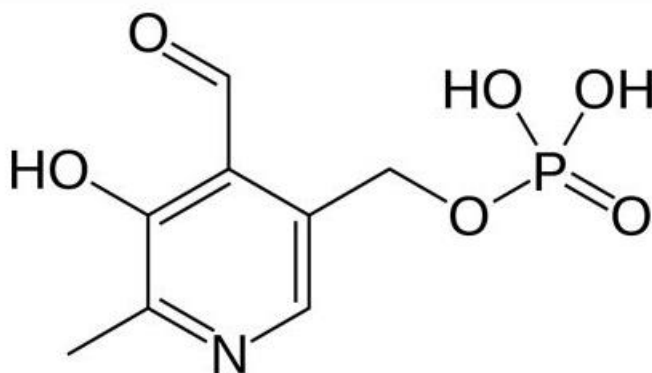
Topic 1 Content: Water-Soluble Vitamins

Pyridoxine (Vitamin B₆)

Water-Soluble Vitamins

Pyridoxine (Vitamin B₆)

Vitamin B₆ assists the body in breaking down glycogen and in producing nonessential amino acids. It also promotes healthy immune and nervous systems, and it assists the body in metabolizing fats, proteins, and carbohydrates. Whole grains, meat, fish, green and leafy vegetables, peas, and beans, all contain vitamin B₆.



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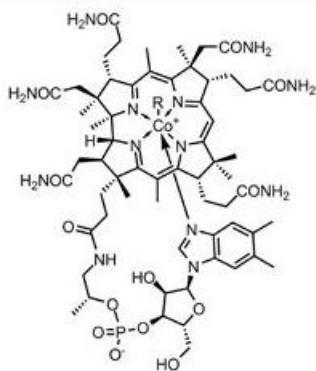
Topic 1 Content: Water-Soluble Vitamins

Cobalamin (Vitamin B₁₂)

Water-Soluble Vitamins

Cobalamin (Vitamin B₁₂)

Vitamin B₁₂ assists the body in maintaining a healthy nervous system and in metabolizing fatty acids and amino acids. Meat, eggs, dairy products, and fortified foods contain vitamin B₁₂.



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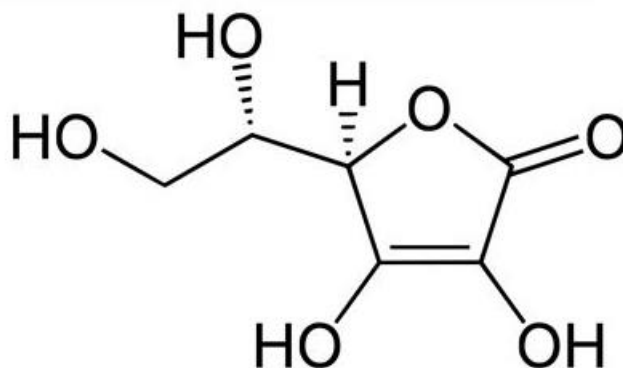
Topic 1 Content: Water-Soluble Vitamins

Vitamin C

Water-Soluble Vitamins

Vitamin C

Vitamin C is necessary to make collagen, the most abundant protein found in the body. Collagen is essential to maintaining healthy skin, teeth, bones, and blood vessels. Vitamin C also acts as an antioxidant in the body and stimulates the healing of wounds. Strawberries, melons, citrus fruits, peppers, and green vegetables all contain vitamin C.



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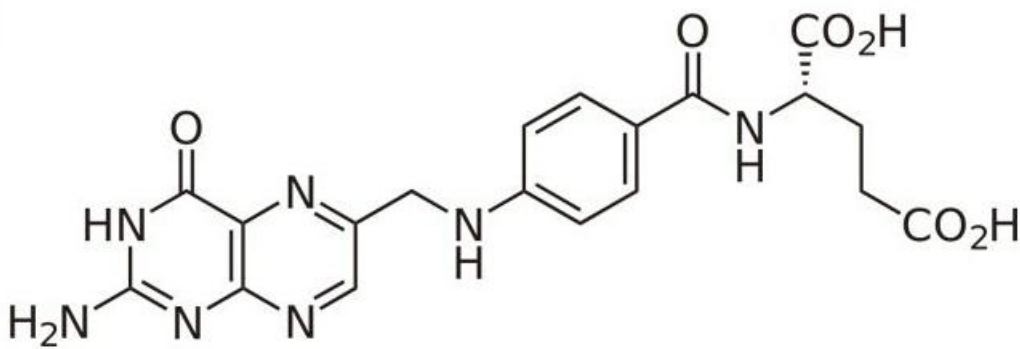
Topic 1 Content: Water-Soluble Vitamins

Folate

Water-Soluble Vitamins

Folate

The body uses folate to create DNA and form healthy cells. Folate has a vital part in the prevention of birth defects during pregnancy. Whole and enriched grains, peas, beans, orange juice, and green vegetables all contain folate.



The chemical structure of folate is shown. It consists of a pteridine ring system (a fused bicyclic ring with two nitrogen atoms) attached to a methylene group (-CH₂-), which is further attached to an amino group (-NH₂). This pteridine ring is connected via a methylene group (-CH₂-) to an amino group (-NH-), which is attached to a para-substituted benzene ring. The benzene ring is further attached to a carbonyl group (-C(=O)-), which is connected to an amide group (-NH-). The amide group is attached to a chiral carbon atom, which is also bonded to a hydroxyl group (-OH) shown with a dashed bond, and a propionic acid side chain (-CH₂-CH₂-CO₂H).

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