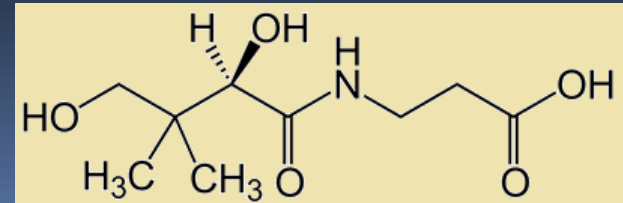


Vitamin B₅ (Pantothenic Acid)

- Necessary for energy metabolism (carbohydrate, fat and protein metabolism)
- It is especially required for the construction of fatty acids
- Necessary for the construction of red blood cells and antibodies
- It plays an important role for the function and hormones of endocrine glands



Vitamin B₅ (Pantothenic Acid)

- Found in all foods from herbal and animal origin (liver, kidney, egg yolk, avocado, hazelnut, walnut, unprocessed rice, soybean, lentil, broccoli, milk, brewer's yeast, tuna and eggs of codfish etc.)
- It is also synthesized by bacteria in the intestines.
- Not resistant to exposure to oxygen and high temperature
- It is found in the form of calcium pantothenate in dietary supplements at the dose of 5-10 mg.

Pantothenic Acid Deficiency

- Since it is found in several nutrients, deficiency is rarely seen.
- Immunodeficiency
- Headache
- Insomnia
- Bowel disorders
- Numbness in hands and feet
- Decrease in antibody production
- Problems in insulin and glucose metabolism

Use of Pantothenic Acid

- Pantothenic acid is transformed to CoA in the body
- It provides the food we take to be converted into molecules that can be used by the body or converted into fatty acids and some proteins
- Has role in the production of red blood cells
- Immune function; necessary for the construction of antibodies (immune function)
- Hormonal function; required for the construction of adrenaline and other stress hormones in adrenal glands
- Neural function; required to transform choline into acetylcholine form

Use of Pantothenic Acid

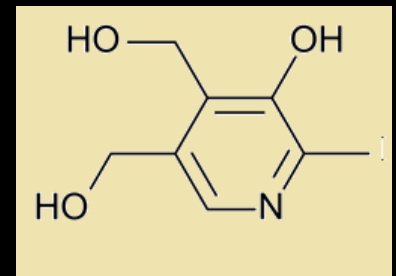
- It is reported that high doses of pantothenic acid reduce symptoms of rheumatoid and osteoarthritis.
- The effect is thought to be due to the role of pantothenic acid in the production of cortisone.
- In the study performed in individuals with high blood cholesterol levels, it was determined that serum cholesterol and triglyceride levels were decreased by the treatment with 900 mg pantetin which is the biologically active metabolite of the pantothenic acid.

Use of Pantothenic Acid

- Although it is not clinically proven, it is known that pantothenic acid;
 - prevents hair loss and whitening,
 - increases athlete performance,
 - provides alcohol detoxification,
 - slows down the aging process.

Vitamin B₆ (Pyridoxine)

- It is a vitamin that acts as a coenzyme in many metabolic functions.
- Found in three different forms;
 - Pyridoxine
 - Pyridoxal
 - Pyridoxamine
- Pridoxin is the most widely used derivative and is more resistant to degradation.




Vitamin B₆ (Pyridoxine)

- Interacts with oral contraceptives and levadopa
- Processing of the foods causes degradation of pyridoxine
- Classical cooking methods leads to loss of ≈50% of pyridoxine content. This loss can be reduced by using less water or steaming.



Main Sources

- Meat
 - Salmon
 - Nuts
 - Potatoe
 - Banana
 - Grains
 - In most vegetables, nuts, legumes and whole grain products contain varying amounts of pyridoxine.
 - Meat, fish, poultry and other animal foods contain pridoxal and pyridoxamine.
- 

Pyridoxine Deficiency

- Pyridoxine intake is generally enough in a normal daily diet, therefore deficiency is especially seen in case of malabsorption syndrome.
- Pyridoxine deficiency is more common among women.
- Deficiency symptoms are;
 - lesions in the eye, mouth and nose,
 - neurological disorders.

Use of Pyridoxine

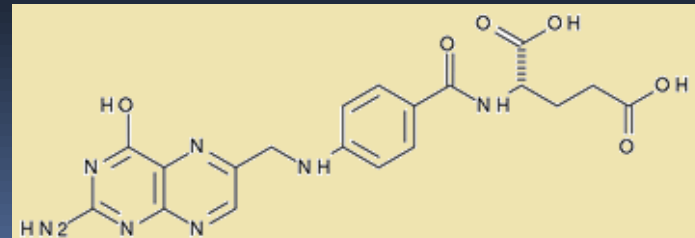
- Has an active role in protein metabolism; necessary for growth and development, health and repair of tissues.
- Important for carbohydrate and fat metabolism as well as including energy production
- Immune system functions; necessary for the construction of antibodies. It is reported that use of vitamin B₆ supplement strengthens the immune system in the elderly people and slows down the tumor growth in animal trials.

Use of Pyridoxine

- Neural functions; necessary for the production of serotonin and other neurotransmitters, thus used for the treatment of anxiety and mild depression
- Necessary for the production of red blood cells
- When homocysteine, which is a product of protein metabolism, is found in blood vessels at high levels, the vessels become more sensitive to damage and the risk of arteriosclerosis increases. Pyridoxine support balances the level of homocysteine in the blood.

Vitamin B₉ (Folic Acid)

- Cooking causes loss of 90% of folic acid content
- Production of genetic material and red blood cells
- Wound healing
- Formation of muscle tissue
- Metabolic functions
- Regulates the blood homocysteine level and protects against heart disease




Vitamin B₉ (Folic Acid)

- Required for the development of fetus, therefore folic acid need increases in pregnancy period
- Folic acid deficiency during early pregnancy causes some abnormalities especially on the the brain and nerves of the baby (neural tube defect).
- Besides, it may cause some other serious pregnancy problems such as miscarriage, blood poisoning and placenta abnormalities
- Deficiency causes megaloblastic anemia (defects in DNA synthesis, large and immature erythrocytes in blood)



Main Sources

- Meat
 - Green leafy vegetables
 - Orange and orange juice
 - Whole wheat bread
 - Cereals
- 

Folic Acid Need of the Body

Age/Period	Daily Dose (μg)
0-12 months	65-80
1-3 years	150
4-8 years	200
9-18 years	300-400
19 + years (female)	400
Pregnancy	600
Lactation	500

Use of Folic Acid

- For the treatment of megaloblastic anemia (alone or with vitamin B₁₂)
- Used for the treatment of heart diseases, along with vitamin B₆ and B₁₂
- Inflammation of intestines (intestines can not absorb some necessary nutrients); at high doses of folic acid and vitamin B₁₂
- For the prevention of neural tube defect



Interactions

- Alcohol
- Oral contraceptives
- Too much tea/coffee consumption
- Some drugs, such as corticosteroids, barbiturates, some antibiotics and anticancer drugs, aspirin (at high doses)




can effect folic acid absorption and may lead to deficiency.

Vitamin B₁₂ (Cobalamin)

- Found in intestinal flora
- Accumulated in the liver
- Required for carbohydrate, protein and fat metabolism
- Necessary for the production of red blood cells and choline, the maintainment of the health of neural tissue and homocysteine metabolism
- 5 µg/day intake is recommended
- The level of vitamin B₁₂ decreases in smokers.
- Not resistant to heat and light



Main Sources

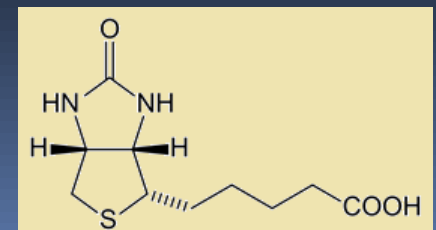
- Animal sources
 - Liver extract
 - Meat
 - Sea products
- 

Cobalamin Deficiency

- Deficiency can cause pernicious anemia which is a fatal disease.
- Deficiency can be seen in patients with stomach disease or vegetarians who don't take vitamin B₁₂ as dietary supplement.
- Fatigue
- Loss of appetite
- Pernicious anemia is treated with cobalamin at the dose of 15-30 µg

Vitamin H (Biotin)

- Essential for energy production using blood sugar
- It has similar functions to pantothenic acid
- Necessary for the construction of fatty acids
- Involved in many metabolic events
- Synthesized by intestinal bacteria
- Biotin is resistant to heat, exposure to oxygen, UV light, strong acids or alkali cause degradation of biotin.
- Powdering process of cereals causes loss of most of the biotin content
- 30-60 μg daily dose is recommended.



Biotin Deficiency

- Rarely seen
- Consumption of large amounts of raw eggs deficiency can be seen due to avidin content of raw egg. Avidin in raw eggs is bound with biotin and inhibits absorption (when egg is cooked, avidin becomes inactive)
- Neurological abnormalities
- Depression
- Hallucinations
- Paralysis of the extremities
- Blushing of eye, nose, mouth and ears