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Topic: Vitamins and Minerals

Vitamins and Minerals

Vitamins are a group of organic compounds that are extremely necessary and essential for normal growth and functioning of the human body.

They are required in very small quantities but cannot be synthesized by the body itself, and can only be sourced from outside.

Whereas they are not possible to be synthesized in our bodies they are easily synthesized in plants. So we must rely on these sources for our daily requirements of vitamins.

Like for example, we eat oranges and lemons for Vitamin C. So all our vitamins are obtained via our diet or other supplements.

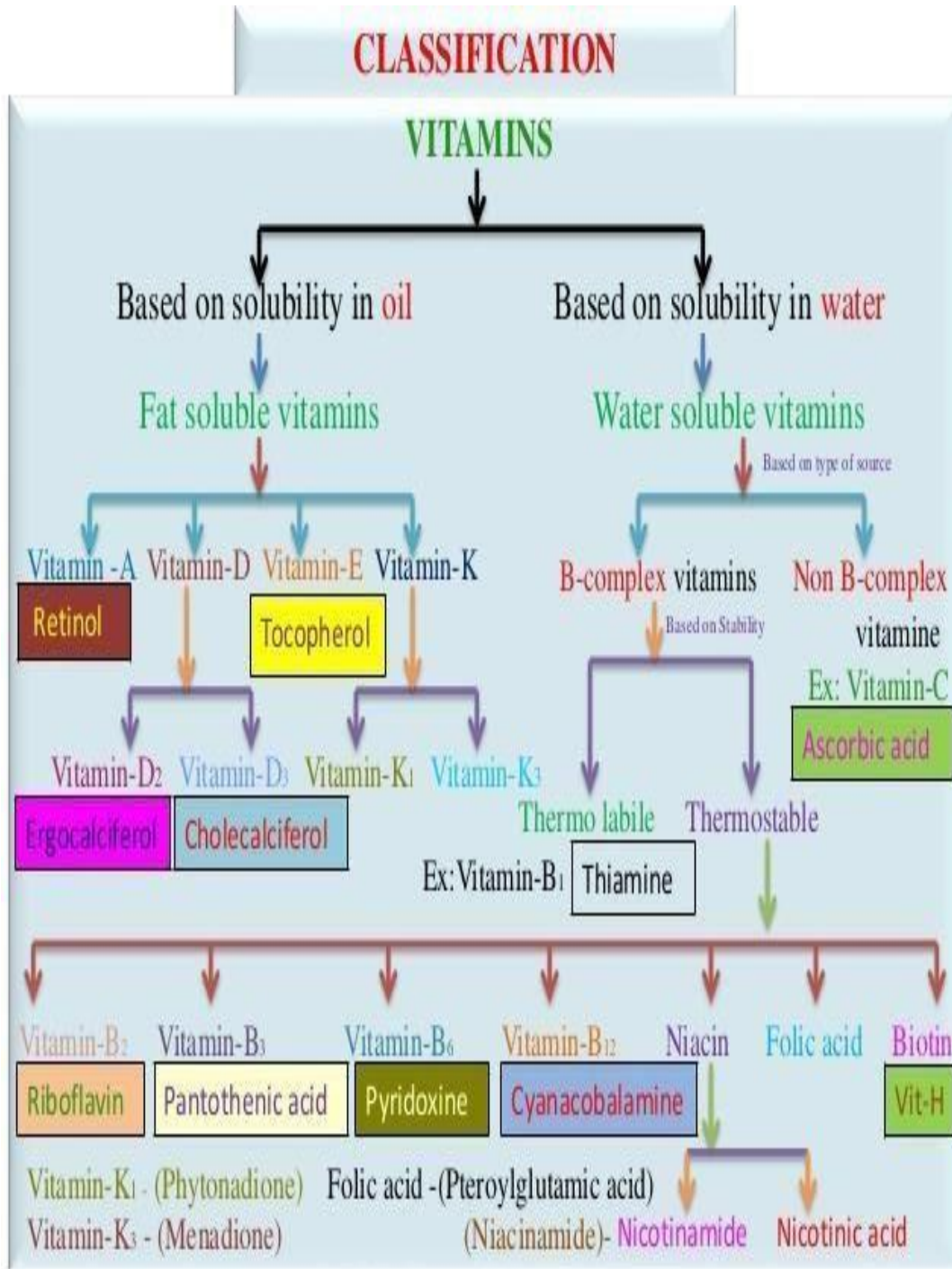
Composition of Vitamins:

Vitamins are of different chemical nature. These are alcohols, aldehydes, organic acids, their derivatives and nucleotide derivatives

Vitamins are classified according to their ability to be absorbed in fat or water.

1. Fat Soluble Vitamins: these are oily and hydrophobic compounds; they are stored in the liver and not excreted out of the body. Bile salts and fats are needed for their absorption. Vitamins A, D, E and K are fat soluble

2. Water Soluble Vitamins: Vitamin B complex and Vitamin C are water soluble. They are not stored in the body, therefore are required daily in small amount.



Fat Soluble Vitamins:

As the name suggests these are soluble in lipids i.e. in fats. They are insoluble in water. Their absorption into the bloodstream happens in the intestines.

They are stored in human bodies as adipose tissues in the liver. Fat-soluble types of the vitamin are not easily excreted, hence it is very much possible to overdose on them if they reach toxic levels in your body, and this disease is hypervitaminosis.

The fat-soluble vitamins are Vitamin A, D, E and K.

Water Soluble Vitamins:

These are readily dissolvable in water. Excess water-soluble vitamin in your body passes out through urine. Since they are excreted so easily they also need to be replaced regularly. Water Soluble Vitamins are Vitamin B and Vitamin C.

Functions of Vitamins:

Vitamin A: is used for growing healthy new cells like skin, bones, and hair. Also is used for surface lining upkeep of the eyes, urinary tract, intestinal tract, and respiratory system.

Night vision is also assisted by Vitamin A. Vitamin A also performs other major functions in the body. It is required for reproductive functions such as normal growth and development of sperm and ovaries.

Vitamin A also helps vision by keeping cells which are used for transduction of light into nerve signals healthy. Vitamin can be found from certain foods such as egg yolk, whole milk, and butter.

Vitamin D: is needed for the body to properly use calcium and phosphorous. It is also used in the formation of some RNA, maintain a normal heart, and keep a stable nervous system and blood clotting.

Along with absorbing calcium, Vitamin D can also help regulate the amount of calcium and phosphorus that is present in the blood. Vitamin D can be found in dairy products, fish, and oysters.

Vitamin D deficiency caused severe growth retardation. The lack of calcium in the bones resulted in deformities of the skeleton, characterized by a widening at the ends of the long bones because of disorganization in the hypertrophy and maturation of chondrocytes in the epiphyseal plates.

Vitamin D deficiency is also associated with low-normal blood calcium, low or low-normal fasting blood phosphorus, and elevated parathyroid hormone (PTH) levels that cause a mineralization defect in the skeleton.

Vitamin E: is an antioxidant that helps the body get rid of free radicals to keep tissues healthy. It is also used in the creation of red blood cells.

The use of vitamin A, C and K are assisted by Vitamin E. Although the role of Vitamin E is not completely understood but it is clear that it presents antioxidant properties in the body.

They get rid of the free radicals in the body by preventing the oxidation of lipid-based cell membranes. Free radicals are very reactive and can steal electrons from membranes which could ultimately damage DNA.

Good sources of Vitamin E are almonds, spinach, wheat, and asparagus. Of the many such dietary components, vitamin E has commanded most interest because of its availability, strong marketing potential, overall health impact, and central role in preventing oxidation at the cellular level.

Vitamin K: assists in creating proteins in the body like those that create blood clots. It also allows for calcium regulation within the body.

Vitamin K's ability to help the clotting of blood is important for healing. The clotting ability could help in slowing or stopping bleeding in injured patients.

During surgery, Vitamin K is often given to patients to reduce bleeding. Sources of Vitamin K include spinach, Brussels sprouts, asparagus, and broccoli.

Vitamin B: are essential for creating dopamine, epinephrine, serotonin, and myelin. They also help the mind focus, help haemoglobin hold oxygen and lower cholesterol.

Vitamin B is essential to good health. It is also used for energy production in the human cells. B vitamins help convert food often consumed as carbohydrates into fuel.

They also help the nervous system function properly. Good sources of Vitamin B are bananas, potatoes, whole grains, and chili peppers.

Vitamin C: helps regulate the immune system and relieve pain caused by tired muscles. It also is needed in the manufacture of collagen and norepinephrine.

Vitamin C is also an antioxidant which can enhance the immune system by stimulating white blood cells in the body. Vitamin C also helps to benefit the skin, teeth, and bones. Vitamin C is often in citrus fruits such as papayas, oranges, and lemons.

The Different types of Vitamin B:

Vitamin B1:

Thiamin is another name for vitamin B1. It helps to convert blood sugar into energy for your body. It also helps the mucous membranes of the muscular, cardiovascular, and nervous systems in good shape.

Some good sources of Vitamin B1 is from some whole grain cereals, pork, navy beans, and wheat germs.

Vitamin B2:

Riboflavin is another name for vitamin B2. It works with the other B vitamin complexes to process the carbohydrates, proteins, and fats into calories for energy in body.

The body also needs this for healthy skin, good vision, growth, and red blood cell creation. Some good sources of Vitamin B2 is Dairy, red meats, and leafy green vegetables.

Vitamin B3:

Niacin is another name for vitamin B3. It also works with other B vitamin complexes to process the carbohydrates, proteins, and fats into calories for energy in the body.

The difference is that it helps the digestive systems functions along with promoting a healthy appetite and healthy nerves

Large doses of niacin could lower LDL cholesterol but large doses are recommended to be taken under physician supervision. Some good sources of Vitamin B3 are yeasts, meat, and peanuts.

Vitamin B5:

Panththenic Acid is another name for vitamin B5. Like B3 and B2 it helps break down carbohydrates, proteins, and fats for energy. Some good sources of Vitamin B5 is from meats, peas, and whole grain cereals

Vitamin B6:

Pyridoxine is another name for Vitamin B6. Vitamin B6 working along with B12 and B9 helps prevent heart attacks.

Just like B2 B3 and B5 this vitamin helps the body process proteins, carbohydrates, and fats into energy. Some good sources of B6 are from meats, eggs, soybeans, whole grains, and nuts.

Vitamin B7:

Vitamin H or Biotin is other names for Vitamin B7. Vitamin B7 helps the formation of fatty acids and glucose to be used as fuel for the body. Some Good sources of B7 are from bananas, yeast, cereal, and liver.

Vitamin B9:

Folic Acid is another name for vitamin B9. It is very important during pregnancy since it is used for making and maintaining new cells.

B9 prevents anemia by keeping up the production of red blood cells and prevent low birth weight and prematurity in births. Some good sources of B9 is from mushrooms, leafy greens, peas, and broccoli.

Vitamin B12:

Cobalamin is another name for vitamin B12. It works with B9 in keeping red blood cells healthy and also helps keep the central nervous system healthy.

Some good sources of B12 are meat, eggs, and dairy. The two organizations that create guidelines for vitamin intake are by the Food and Nutrition Board of the National Academy of Sciences and the Food and Drug Administration (FDA).

Minerals:

Minerals are inorganic elements needed for the functioning of the body. They make up about 4% of body weight of adults; they cannot be changed or broken down.

Some which are needed in high quantities are referred to as macro-elements; examples include Na, K, Mg, Cl etc. Others are needed in smaller quantities and are termed microelements, they include Fe, Cu, F, I etc.

Vitamin Deficiencies and Excess

Vitamin	Deficiency	Excess
	<p><i>mild</i> - night blindness, diarrhea, impaired vision</p> <p><i>severe</i> - eye inflammation, causes blindness in children, keratinization of eyes and skin</p>	
Vitamin A	<p> </p> <p>Headache, vomiting, hair loss, irritability, liver and bone damage, blurred vision</p>	<p>Intracranial pressure, dizziness, nausea, headaches, liver damage.</p>
Vitamin D	<p><i>severe</i> - children will get rickets, or softening and or weakening of bones; adults will get osteomalacia, which is also softening of the bones</p>	<p>brain, cardiovascular, and kidney damage</p>
Vitamin E	<p>Potential of anemia is babies that are born with a low-weight, deterioration of nervous system</p>	<p>Increase the risk of heart failure; can act as an anticoagulant and excessive intake may increase the risk of over bleeding.</p>
Vitamin K	<p>Results in extreme bleeding.</p>	<p>liver damage, anemia</p>
Vitamin C	<p>dry skin, anemia, and bruising.</p>	<p>Gastrointestinal sickness</p>
Vitamin B	<p>(it can be one of eight types of B vitamins)</p> <p>Cheilosis (Inflammation of the lips where there is scaling and fissures), photophobia (fear of bright light), Glossitis (inflammation of the tongue)</p> <p> </p> <p>ranges from symptoms such as liver damage (B2) to poor coordination and numb feet (B6)</p>	

Macro- elements:

The body requires relatively large amounts of about 7 minerals (macro-elements)

1. Calcium (Ca)
2. Phosphorus (P)
3. Sulphur
4. Magnesium
5. potassium
6. Chlorine
7. Sodium

1. Calcium (Ca) Functions: Calcium plays myriad of functions that include Bones and teeth formation, membrane transport, nerve transmission, muscle contraction, hearth rhythm, blood clotting and enzyme cofactor.

Sources: milk, milk products and leafy vegetables

Deficiencies: Osteoporosis and Bone fractures

Excesses: Nausea, vomiting, loss of appetite, kidney toxicity, irregular heartbeat, reduced absorption of iron and zinc.

2. Phosphorus (P) Functions: In bone and teeth formation, ATP formation, creatine phosphate, DNA and RNA, phospholipids and active transport.

Source: Cheese, milk, nuts and eggs.

Deficiencies: hypophosphatemia with symptoms similar to calcium deficiency

Excesses: Reduce body stores of calcium.

3. Sulphur (S): needed by most proteins.

4. Magnesium (Mg): it acts as coenzymes for enzymes

Sources: vegetables, cereals, beans, potatoes, cheese and animal tissues

Deficiencies: can result in poor calcium absorption

Excesses: Heart problems and difficulty in breathing

5. Potassium (K)

6. Chlorine (Cl) and

7. Sodium (Na)

Functions: Osmotic Balance, Nerve impulse, Muscle contractions.

Micro-elements:

The body requires only trace amounts of others (micro-elements). These include:

1. Fluoride (F) Functions: it strengthens bones

Excesses: Browning of teeth, brittle bones, fatigue and muscle weakness.

2. Iodine (I) Functions: Synthesis of thyroid hormones

Deficiencies: Goiter, mental and physical retardation (cretinism).

3. Iron (Fe) Functions: Haemoglobin synthesis

Excesses: has been linked to arthritis, heart disease, diabetes, infectious disease and cancer.

4. Cobalt

5. Chromium and

6. Manganese Functions: Cofactors for enzymes

7. Copper Functions: Cofactors for enzymes

Deficiency: Anemia, impaired immunity, altered iron metabolism.

8 . Zinc Functions: Cofactors for enzymes, synthesis of testosterone and sperm development

Deficiencies: Reduced immune functions, vomiting, gastric upset and slow absorption of copper.

9.Molybdenum: Functions: Cofactors for enzymes.

Excesses: Increased secretion of copper.

10 . Selenium Functions: Cofactors for enzymes.

Deficiencies: muscle pain or weakness and impaired immunity

Excesses: Fragile nails, hair loss, fatigue, abdominal pain, nausea and nerve damage