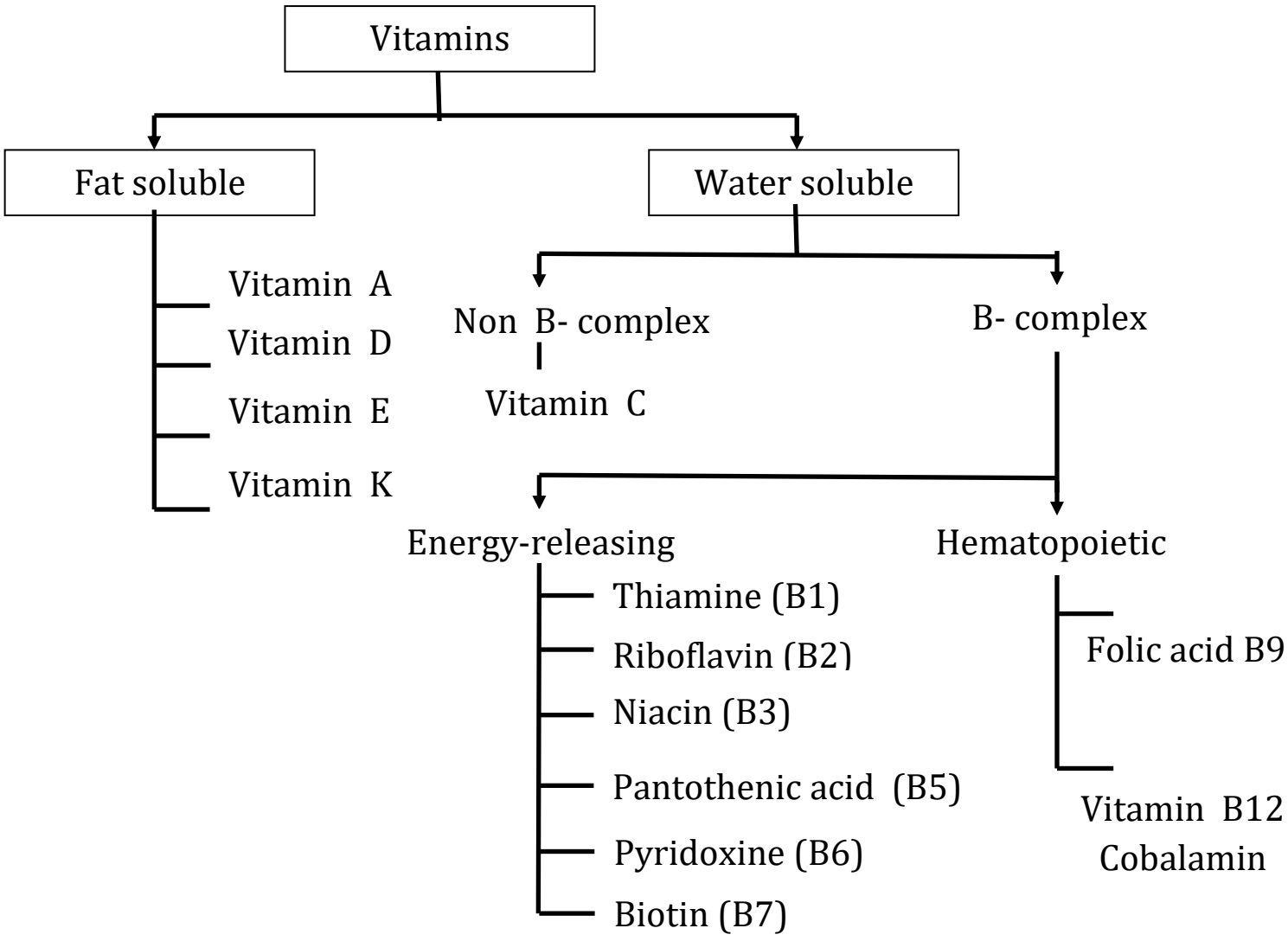
Vitamins

The word "vitamin" was coined in 1911 by the biochemist Casimir Funk , when he isolated a substance that prevented nerve inflammation (neuritis) in chickens raised on a diet deficient in that substance. He named the substance "vitamine" because he believed it was necessary to life (Creek :vita-life), and it was a chemical amine. The "e" at the end was later removed when it was recognized that vitamins need not be amines.

Vitamins :- are organic compounds that's required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism. Vitamins cannot be synthesized by humans and therefore must be supplied by diet.



Classification of vitamins

Vitamins

Classification of vitamins:-

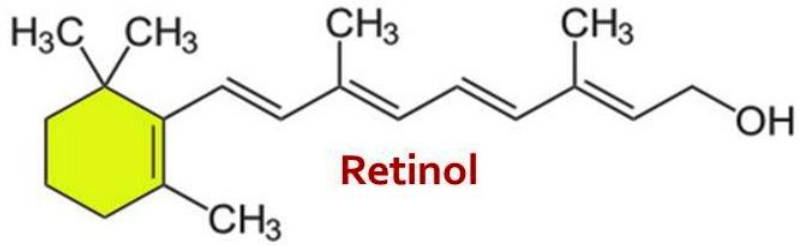
1. Fat soluble vitamins:- they are vitamins that dissolve in fat . is easily stored in the body , fat soluble vitamins can be stored within the fat this means they can accumulate and be saved for late use .the fat soluble vitamins are A,D,E and K.

2. Water soluble vitamins:- they don't stay in the body for long .the body cannot store them , and they are soon excreted in urine. Because of this, water soluble vitamins need to be replaced more often than fat soluble ones. The water soluble vitamins are C and B complex.

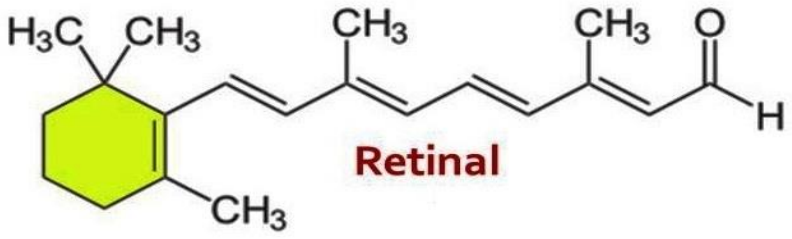
Vitamin A :- fat soluble vitamin, present only in foods of animal origin. However, its provitamins carotenes are found in plants . the term retinoids includes both natural and synthetic forms of vitamin A that may or may not show vitamin A activity.

Vitamin A can be divided up to :-

A. Retinol (vitamin A alcohol) :- it's a primary alcohol containing a β-ionone ring with an unsaturated side chain retinol is found in animal tissues.



B. Retinal (vitamin A aldehyde) :- This is an aldehyde form obtained by the oxidation of retinol. Retinal and retinol are interconvertible.



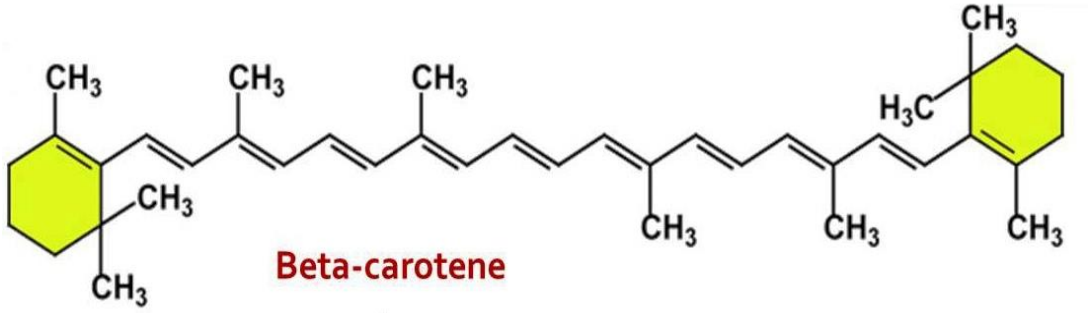
Vitamins

C. Retinoic acid (vitamin A acid) :- This is produced by the oxidation of retinal. Retinoic acid cannot give rise to the formation of retinal or retinol.



Retinoic acid

D. β-Carotene (provitamin A) : This is found in plant foods. lt is cleaved in the intestine to produce two moles of retinal. ln humans, this conversion is inefficient, hence β-carotene possesses about one-sixth vitamin A activity compared to that of retinol.



Beta-carotene

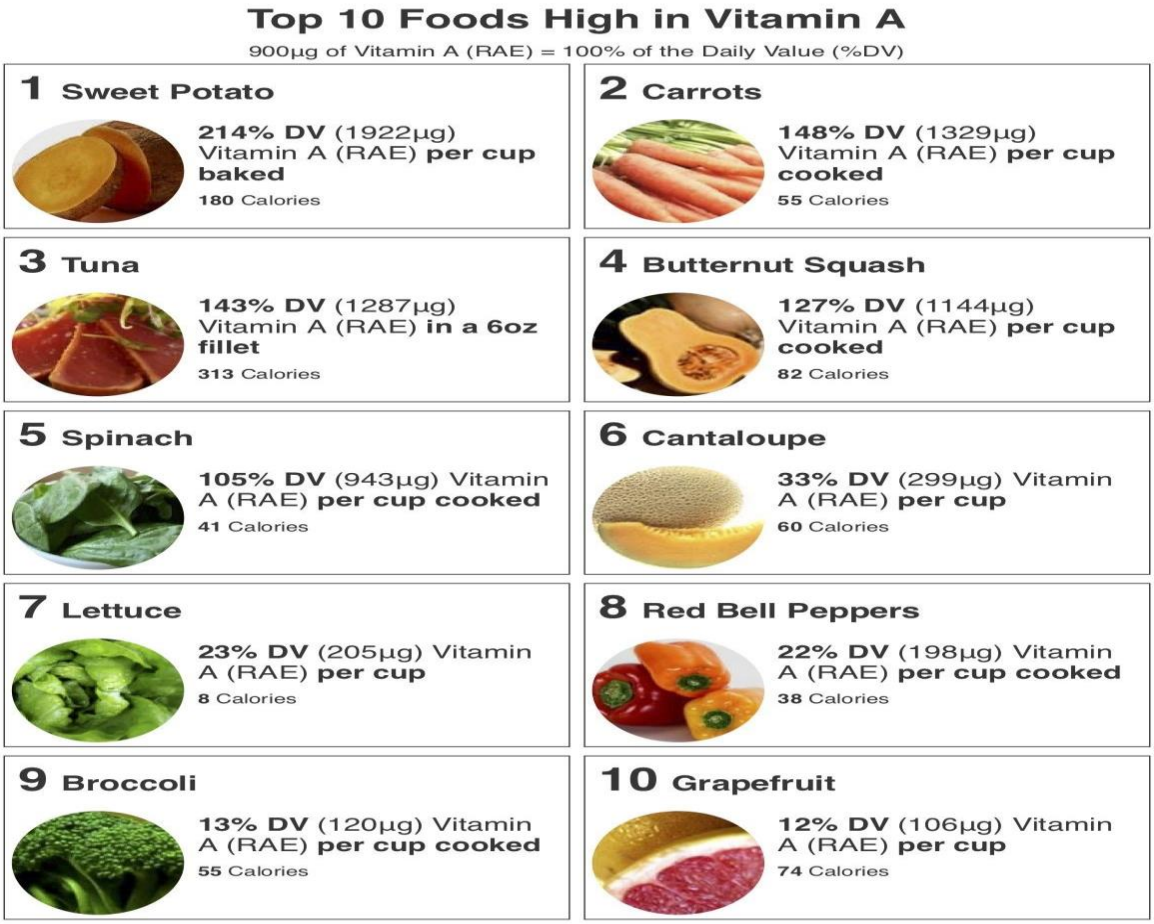
The most common symptoms of vitamin A deficiency:-

1. Dry Skin
2. Dry Eyes
3. Night Blindness
4. Infertility and Trouble Conceiving
5. Delayed Growth
6. Throat and Chest Infections
7. Poor Wound Healing
8. Acne
9. Poor night vision and white growths on the eyes
10. Hair loss

Vitamins

Health benefits of vitamin A :-

1. Protect Eyes from night blindness
2. Powerful Antioxidants
3. Combat free radicals
4. Support a health immune system
5. Reduces the risk of acne
6. Support bone health
7. Promotes healthy growth especially growth babies in The womb

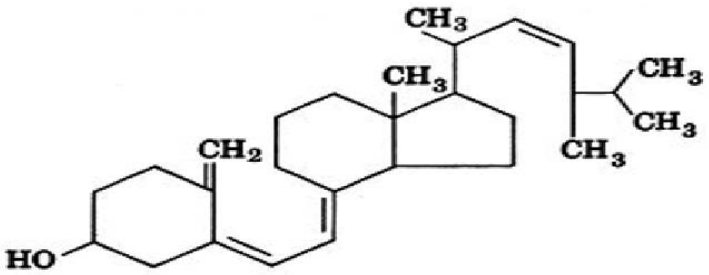


Vitamin D:- is a fat soluble vitamin. it resembles sterols in structure and functions like a hormone. Sun exposure is an easy, reliable way for most people to get vitamin D. during periods of sunlight, vitamin D is stored in fat and then released when sunlight is gone.

Vitamins

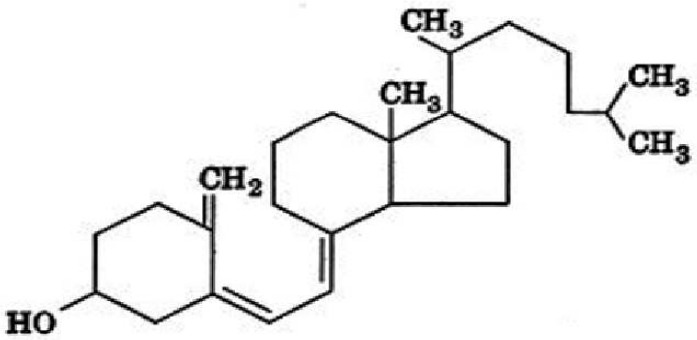
Types of Vitamin D :-

1. Ergocalciferol (vitamin D2):- is present in plants only and supplied to the body by the diet.



Vitamin D_2 (ergocalciferol)

2. Cholecalciferol (vitamin D3) is found in animals. and produced in the skin on exposure to the UV radiation.



Vitamin D_3 (cholecalciferol)

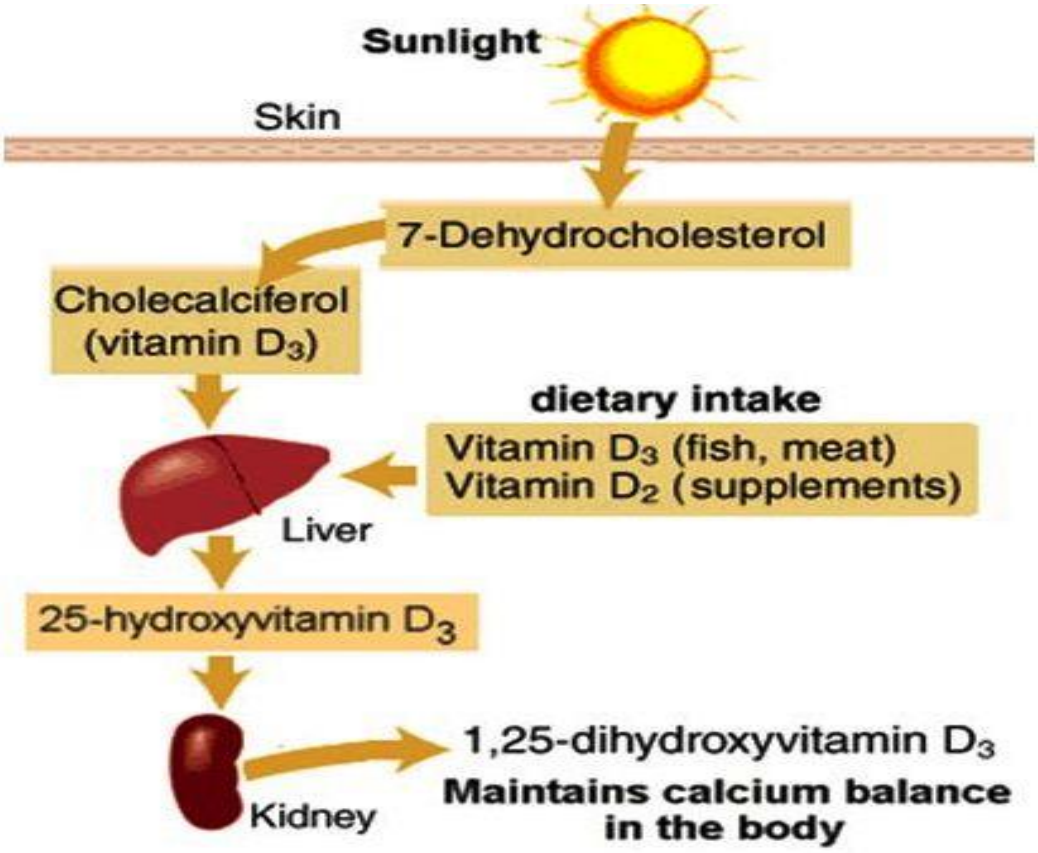
Both the sterols are similar in structure except that Ergocalciferol has an additional methyl group and a double bond. Ergocalciferol and Cholecalciferol are sources for vitamin D activity and are referred to as provitamins.

Vitamin-D Metabolism:-

1. Is a fat soluble vitamin it resembles sterols in structure and functions like a Hormone.
2. During cholesterol synthesis 7-dehydro cholesterol is formed as an intermediate. on exposure to sunlight, it is converted to Cholecalciferol (VitaminD3) in the skin.
3. Cholecalciferol (VitaminD3) is converted in the liver to 25-hydroxy-Cholecalciferol.
4. 25-hydroxy-Cholecalciferol can be measured in the blood to determine a level of vitamin D

Vitamins

5. In the kidney 25-hydroxy-Cholecalciferol is converted to 1,25 dihydroxy Cholecalciferol (1,25DHCC) by the enzyme 1- hydroxylase this form of vitamin d consider as the active form and can work as hormone to regulate calcium and phosphorus which are the minerals essential for healthy bone.



The most common symptoms of vitamin D deficiency

1. Fatigue
2. Not sleeping well
3. Bone pain or achiness
4. Depression or feelings of sadness
5. Hair loss
6. Muscle weakness
7. Loss of appetite
8. Getting sick more easily
9. Pale skin

Vitamins

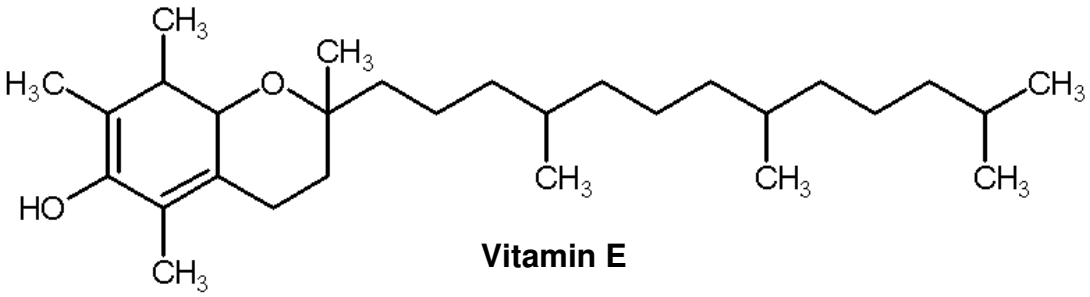
Health benefits of vitamin D :-

1. good for healthy bones and teeth
2. intake reduces Flu risk
3. reduces diabetic risk by regulate the insulin level
4. Help to prevent the cancer
5. Help to balance the blood pressure and relieve stress
6. Help in proper absorption of minerals
7. During pregnancy .it help an infant to grow healthy
8. Help to losing weight
9. Help the body to fight the depression



Vitamin E:- (tocopherol) is a naturally occurring antioxidant. It is essential for normal reproduction in many animals, hence known as anti-sterility vitamin. Vitamin E is described as a 'vitamin in search of a disease. 'This is due to the lack of any specific vitamin E deficiency disease in humans. Evans and his associates (1936) isolated the compounds of vitamin E activity.

Vitamins



Vitamin E

The most common symptoms of vitamin E deficiency:-

1. muscle weakness
2. anemia
3. difficulty or unsteady walking
4. vision problems

Health benefits of vitamin E :-

1. Act as an antioxidant
2. scavenging loose electrons ,which called “free radicals”that can damage cells.

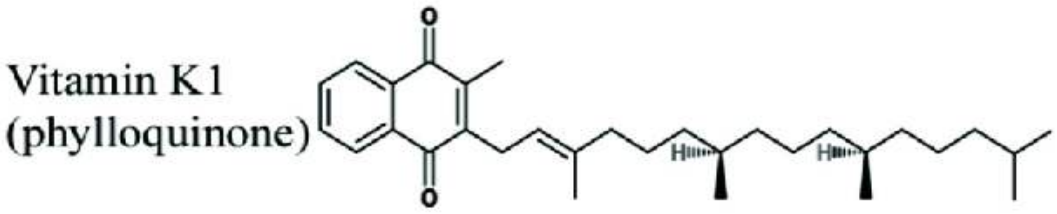


Vitamins

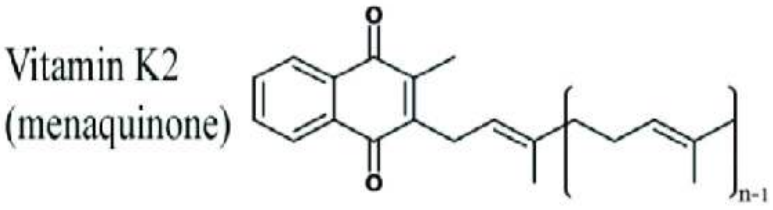
Vitamin K:- is the only fat soluble vitamin with a specific coenzyme function. it is required for the production of blood clotting factors essential for coagulation.

Vitamin K exists in different forms:-

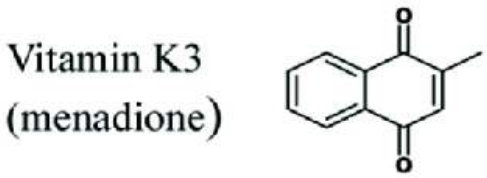
1. Vitamin K1 (phylloquinone) is present in plants .



2. Vitamin K2 (menaquinone) is produced by the intestinal bacteria and found in animals.



3. Vitamin K3 (menadione) is a synthetic form .artificially produced form of vitamin K



All the three vitamins (K1, K2 ,K3) The three vitamins are stable to heat. but Their activity is lost by oxidizing agents, irradiation, strong acids and alkalis.

The most common symptoms of vitamin K deficiency:-

1. excessive bleeding easily
2. bleeding in digestive system
3. bone density loss

Vitamins

Health benefits of vitamin K :-

1. maintenance of strong bones, improves bone density and decreases the risk of fractures
2. Support the cardiovascular health
3. Contain anti-cancer properties
4. Improved episodic memory in older adult

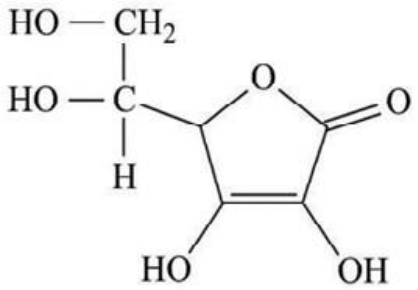


Vitamin C (Ascorbic Acid):-

Vitamin C is a water soluble vitamin (Non B- complex) was discovered in 1912, isolated in 1928, and in 1933, was the first vitamin to be chemically produced. Vitamin C considers the safest and most effective medicines needed in a health system, it plays an important role in human health and disease. It is used to prevent and treat (scurvy) which is a disease caused by vitamin C deficiency and it was the first disease found to be associated with diet,

Vitamins

Vitamin C also known as ascorbic acid, ascorbic acid is a hexose (6 carbon) derivative and closely resembles monosaccharides in structure the acidic property of vitamin C is due to the enolic hydroxyl groups. lt is a strong reducing agent.



Ascorbic Acid

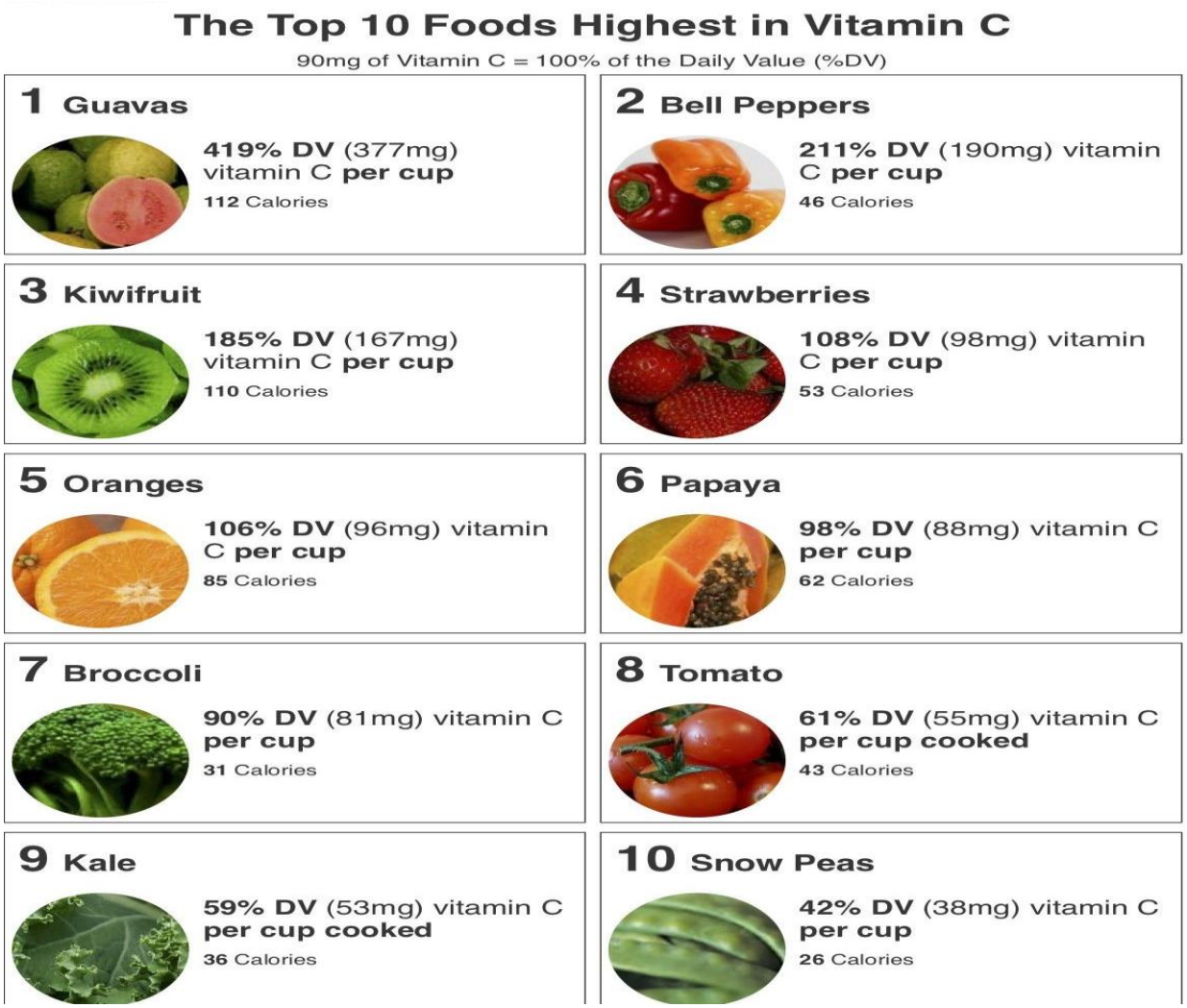
The most common symptoms of vitamin C deficiency

1. Nausea, vomiting and diarrhea.
2. Stomach cramps or bloating.
3. Fatigue and sleepiness, or sometimes insomnia.
4. Headache.
5. Skin flushing.
6. Slow wound healing
7. Swollen or painful joints
8. Gingival swelling with loss of teeth

Health benefits of vitamin C

1. Supports the immune system
2. Helps prevent and fight anemia
3. Supports collagen formation, muscles, and tendons
4. Contains antihistamine properties
5. Acts as a natural laxative
6. Contains cancer-fighting properties

Vitamins



B- complex vitamins :-

A group of is a water soluble vitamins composed

Vitamin B1 (thiamine): Thiamine plays an essential role in metabolism by helping convert nutrients into energy. The richest food sources include sunflower seeds, and wheat germ.

Vitamin B2 (riboflavin): Riboflavin helps convert food into energy and also acts as an antioxidant. Foods highest in riboflavin include organ meats, beef, and mushrooms.

Vitamins

Vitamin B3 (niacin): Niacin plays a role in cellular signaling, metabolism and DNA production and repair. Food sources include chicken, tuna and lentils.

Vitamin B5 (pantothenic acid): Like other B vitamins, pantothenic acid helps your body obtain energy from food and is also involved in hormone and cholesterol production. Liver, fish, yogurt, and avocado are all good sources.

Vitamin B6 (pyridoxine): Pyridoxine is involved in amino acid metabolism, red blood cell production and the creation of neurotransmitters. Foods highest in this vitamin include chickpeas, salmon and potatoes.

Vitamin B7 (biotin): Biotin is essential for carbohydrate and fat metabolism and regulates gene expression. Yeast, eggs, salmon, cheese, and liver are among the best food sources of biotin.

Vitamin B9 (Folate): Folate or Folic acid is needed for cell growth, amino acid metabolism, the formation of red and white blood cells and proper cell division. It can be found in foods like leafy greens, liver, and beans or in supplements like folic acid.

Vitamin B12 (cobalamin): the most well-known of all the B vitamins, B12 is vital for neurological function, DNA production, and red blood cell development. B12 is found naturally in animal sources like meats, eggs, seafood, and dairy.

- The lost B vitamins from the sequence of b-complex vitamins is– B4, B8, B10, B11 ,Where

  Vitamin B4 (also known as adenine)
  Vitamin B8 (also known as inositol)
  Vitamin B10 (para amino benzoic acid – PABA)
  Vitamin B11 (salicylic acid)

The gaps in the list of B vitamins occur because these substances are manufactured in the body ,So no longer considered to meet the

definition of a vitamin, Numbered in the order they were discovered, the remaining B vitamins are needed by the body to maintain good health