

Nutrition and Nutritional Factors

The mode of obtaining and utilizing food by an organism is called Nutrition. Green plants are Autotrophs, which utilize solar energy to synthesize carbohydrates as food. This mode of nutrition is called Autotrophic nutrition. Heterotrophs depend directly or indirectly on plants to get food materials.

1. **Autotrophs** may be **Phototrophs** (Green plants, Euglena, Volvox etc) utilize sunlight as energy source and **Chemotrophs** (Iron bacteria, Sulphur bacteria, Nitrosomonas etc) use chemical energy produced by the oxidation of inorganic materials.
2. **Scavengers** (Vulture) feed on decaying flesh, **Detritivores** (Earthworm) feed on decaying organic matter, **Sanguivores** (Female mosquito, Leech) feed on blood are heterotrophs. Animals like **Herbivores** (Plant feeders), **Carnivores** (Flesh eaters) and **Omnivores** (feed on both plants and animals) are also heterotrophs.
3. **In Saprozoic nutrition** (Fungi, Bacteria, Protozoan) organism consumes decaying organic matter. Some animals like Tapeworm absorb food materials through the body surface. These are called as **Osmotrophic** animals.

Nutritional factors

1. The substances required for the normal growth and functioning of the body are called Nutrients. This includes Carbohydrates, Fats (Energy producers), Proteins (Body builders) and Vitamins, Minerals (Regulators) etc.
2. **Carbohydrates** form the major energy producer and its calorie value is **4.1 k Cal**.
3. Normal level of glucose in the blood is 80 – 120 mg / dl of blood.
4. **Fats** are used as stored food for the production of energy. **Adipose tissue** is the largest storage area of fats. The calorie value of fat is **9.45 k Cal**. Fats are classified into **Simple lipids** (Palmitic acid, Stearic acid, Unsaturated fatty acids like Oleic acid, Linoleic acid etc.) and Compound lipids (Cholesterol, Cephalin, Lecithin etc).
5. **Proteins** are body builders made up of amino acids. The calorie value of protein is 5.65 k Cal. Amino acids may be **Essential amino acids** (Methionine, Tryptophan, Threonine, Valine, Isoleucine, Leucine, Phenylalanine and Lysine) or **Non essential** (Alanine, Asparagine, Aspartic acid, Cysteine, Glutamic acid, Proline, Serine, Tyrosine and Glutamine).
6. **Vitamins** are regulators necessary for the normal metabolic activities. Deficiency of vitamins (**Hypovitaminosis**) causes Deficiency diseases. Vitamins are classified into **Fat soluble** (Vit. A, D, E and K) vitamins and **Water soluble** (Vit. B complex and Vit. C) Vitamins.

Fat-soluble vitamins

7. **Vitamin A** is called as **Retinol**, which is necessary for the synthesis of visual pigment **Rhodopsin** in the retina. It is richly present in red coloured fruits and vegetables, milk etc. Deficiency of Vitamin A causes **Nyctalopia** (Night blindness) and **Xerophthalmia** (hardening of cornea).
8. **Vitamin D** is the **Ergostertol** synthesized in the skin from **7-dehydro cholesterol** by the action of UV rays of sunlight. Vitamin D is present in butter, liver, eggs etc and is essential for the absorption of calcium and phosphorous from the intestine. Deficiency of vitamin D causes **Rickets** (malformed skeleton) in children and **Osteomalacia** (weakening of bones) in adults.

9. **Vitamin E** or **Tocopherol** is necessary for the reproductive functions. It is present in green vegetables, egg yolk etc.
10. **Vitamin K** or **Phylloquinone** is the **Coagulation vitamin** necessary for the synthesis of **Prothrombin** in the blood. It is present in leafy vegetables, egg, yolk etc. The colon bacteria also synthesize it.

Water soluble vitamins

11. **Vitamin B complex** and **Vitamin C** are water-soluble and cannot be stored in the body. Therefore daily supply of these vitamins is required.
12. **Vitamin B1** or **Thiamine** is present in rice bran, yeast etc. It forms a major component of coenzyme carboxylase. Deficiency of Thiamine leads to **Beriberi** (loss of appetite, weakness etc.)
13. **Vitamin B2** is **Riboflavin** is necessary for the formation of FAD. It is present in green vegetables and its deficiency is **Cheilosis** (ulcers in the lips and tongue)
14. **Vitamin B3** or **Niacin** is the active part of NAD and is available in yeast, milk, pulses etc. **Pellagra** (inflammation of skin, diarrhoea) is the deficiency disease.
15. **Vitamin B5** (Panthothenic acid), **Vitamin B6** (Pyridoxine) **Vitamin H** (Biotin) are also necessary for the cellular activities.
16. **Vitamin B12** or **Cyanocobalamin** is a Cobalt containing vitamin present in milk, fish etc. It is also synthesized in the intestine by the bacteria. Cobalamine is necessary for the synthesis of haemoglobin so the deficiency leads to **Pernicious anemia**.
17. **Vitamin C** or **Ascorbic acid** is richly available in Citrus fruits like lemon, orange etc. The richest source of Vit. C is Gooseberry. Vit.C is necessary for the immune system, skin, connective tissue etc. Deficiency of Vit. C leads to **Scurvy**.

Minerals

18. Minerals necessary for the body are classified into **Microelements** and **Macro elements**.
19. Microelements are required in small quantities and include Iron, Iodine, Zinc, Copper etc.
20. Macro elements are required in large quantities. Sodium, Potassium, Calcium, Magnesium, Phosphorous, Chlorine etc. are some of the macro elements.