

# BIOLOGY

## FOOD, NUTRITION AND HEALTH

### Nutrition

- The sum total of all the processes from taking the food upto its utilization is called **nutrition**.
- Various components of balanced diet are carbohydrates (60%), fats (25%), proteins (15%), including vitamins, mineral, roughage and water.

### Carbohydrates

- Main constituents of carbohydrates are C, H and O.
- They are categorised as **monosaccharides** (eg, glucose), **disaccharides** (eg, sucrose, lactose, maltose), **oligosaccharides** and **polysaccharides** (eg, glycogen, starch, cellulose).
- Its 1.0 gm gives 4 kcal energy.
- Living cells receive carbohydrate from blood mostly as glucose.
- Excess of glucose is stored in liver and muscles as glycogen, ie, **glycogenesis**.
- When level of bloodglucose fall, glycogen of liver is hydrolyzed to produce it, ie, **glycogenolysis**.
- Excess carbohydrate of food is changed into fat through the process of **lipogenesis**.
- Cereals (wheat, rice and maize), sugarcane, milk (lactose sugar), fruits, honey, beet etc are the sources of carbohydrates.

### Lipids

- Lipids are of two types – **simple** (eg, fat and oil) and **compound** (eg, lecithin, glycolipid).
- Lipids provide two times more energy (9 kcal/g) than carbohydrates.

- Fat is the major stored food kept in adipose tissue.
- Lipase enzyme digests fats and break it into fatty acids and glycerol.
- There are two types of fatty acids. **Saturated** (solid at room temperature) and **unsaturated** (liquid at room temperature).
- Our diet should contains less saturated fats (butter, ghee, hydrogenated vegetable oils etc) in comparison to unsaturated fats (simple vegetable oil).
- Excess of saturated fats in diet may lead to heart attack as they increase blood cholesterol and the disease known as **hypercholestroemia**.
- Human diet should have more unsaturated fatty acids as they cannot synthesized in the body itself. Such fatty acids are called **essential fatty acids** (eg, linoleic acid, etc).
- Fat functions as a cushion and shock absorber for eye balls, gonads, kidney, etc.
- Excess of lipids cause obesity; blood pressure and a number of cardiac problems.
- Daily requirement of an adult is 50 g.

### Proteins

- They are made up of carbon, hydrogen, nitrogen and oxygen.
- These play a vital role in growth, development and repair of the body.
- Proteins are polymer of amino acids.

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- Amino acids are of two types:
  - (i) **Essential:** These cannot synthesized in the body and must be taken in diet, eg, lysine, methionine, valine tryptophan, phenylalanine, etc.
  - (ii) **Non-essential:** Synthesized in the body, eg, alanine, arginine, aspartic acid, glutamine, cysteine, proline, serine, hystidine, tyrosine.
- 1 g of proteins may yield 5.65 kcal energy.
- Daily requirement of protein is 70–100 g.
- They build up various protoplasmic structures including cell membrane.
- Haemoglobin, visual pigments and cytochromes, all are proteins.
- Blood contains proteins for different functioning including blood clotting and antibodies, eg, gamma globulins.
- Main sources are groundnuts, soybean, meat, pulses, fish, egg, etc.

**Minerals**

- Metals and non-metals and their salts are

called minerals. Minerals of followings types are formed in body.

**Vitamins**

- Term vitamin was coined by C. Funk in 1912. Vitamins are of two types-fat soluble (A, D, E and K) and water soluble (B and C).

**Roughage**

- It is fibrous matter present in food.
- This fibrous matter cannot digest hence, do not take part in growth.
- It maintains water proportion inside the body and stimulates peristalsis (muscular activity) of alimentary canal.
- Its sources are salad, outer layer of grains, vegetables and porridge (dalia).

**Water**

- Human body contains about 60–80% water.
  - It regulates body temperature by sweating and evaporation.
- It also helps in digestion, transportation and excretion.

**PHYSIOLOGY AND HUMAN DISEASES**

**Important points :**

- Skin is an integumentary system that covers the body.
- The epidermis of the skin contains melanocytes which give colour to the skin.
- The Dermis of the skin contains sweat glands and sebaceous glands.
- Skin can prepare vitamin D with the help of sunlight.
- Muscles are classified into three types - skeletal, visceral and cardiac muscles.
- The skeletal muscles are attached to bones by tendons.
- Skeletal system consists of bones, cartilages and ligaments.
- The human skeletal system is divided into axial skeleton and appendicular skeleton.
- There are 12 pairs of ribs.
- The vertebral column is made up of 33 vertebrae.
- There are 206 bones in the human body.
- Digestion is of two types - Extra cellular digestion and Intra cellular digestion.
- There are 3 pairs of salivary glands - Parotid, sub-maxillary and sub-lingual.
- The liver is the largest glandular organ in human.
- Bile is stored in the gall bladder.
- Pancreas acts as an exocrine and endocrine gland.

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- Absorption of food takes place in the villi of the small intestine.
- Excretion is of three types based on the waste matter produced, Ammonotelism, Ureotelism, Uricotelism.
- Kidney is the chief excretory organ in human.
- Nephron is the structural and functional unit of the kidney.
- Lungs, skin and liver also function as excretory organs.
- Circulatory system is of two types, open blood vascular system and closed blood vascular system.
- The heart is covered by pericardium.
- Human heart consists of 4 chambers.
- Blood is made up of plasma and corpuscles.
- Respiration is of two types - Aerobic and Anaerobic respiration.
- The alveoli of lungs help in exchange of gases.
- The lungs are covered by pleura.
- Testis is the male sex organ.
- Male sex hormones are called androgens.
- The sertoli cells provide nourishment to developing sperms.
- The sperms consists of head, neck, midpiece and tail.
- Ovary is the female sex organ.
- The human egg is alecithal.
- The fertilized ovum is called zygote.
- The extra embryonic membranes are amnion, chorion, allantois.
- The placenta helps in exchange of gases between the mother and the foetus.
- Mother's milk is clean, uncontaminated and sterile.
- Mother's milk has a calorific value of 70 per 100 ml of milk.
- **Health** : It is a state of physical, mental and social well being of an individual.
- **Disease** : The condition of malfunctioning of the organ system is called disease.
- **Normal blood sugar level** : 80-120mg/100ml of blood under fasting conditions.
- **Diabetes mellitus** : It is a state of expulsion of excess unused glucose in the urine due to less production of insulin.
- **Albinism** : It is an inherited disorder of melanin metabolism, characterised by the absence of melanin in the skin.
- **Marasmus** : It is a protein deficiency disease. The child loses weight and suffers from severe diarrhoea.
- **Kwashiorkar** : Disease caused due to protein deficiency in the food. The child develops an enlarged belly.
- **Toxins** : Poisonous substances produced by parasitic microbes inside the body.
- **Virus** : It is an obligate parasite, shows living characteristics inside the host and behaves as dead particles outside the host cell.
- **Prokaryotes** : Organism which do not have well developed nucleus. e.g. Bacteria.
- **Saprophytic** : Organisms living on dead and decaying organic matter is called saprophytic.
- **Parasitic** : Organism which derives energy from living organisms.
- **Protozoan** : They are unicellular animalcules.
- **Fomites** : The objects used by sick people like hand kerchief, bedding, clothes, utensils, toilet articles etc., are called fomites get contaminated and are called fomites.
- **Transmission** : The transfer of a disease causing germ from an infected person to a normal healthy person through certain agents is called transmission.
- **Antigens** : Foreign protein entering the body.
- **Antibodies** : Immune system produces suitable proteinaceous substances called antibodies to detoxify the antigens.

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- **Active Acquired Immunity** : Immunity developed by our body during the first infection by any pathogen.
- **Passive Acquired Immunity** : Immunity acquired by using readymade antibodies introduced from outside instead of stimulating the body to produce antibodies.
- **MMR** - Mumps, Measles, Rubella.
- **DPT** - Diphtheria, Pertussis, Tetanus.
- **DT** - Diphtheria, Tetanus.
- **TT** - Tetanus Toxoid.
- **HIV** - Human Immuno Deficiency Virus
- **AIDS** - Acquired Immune Deficiency Syndrome.
- **ELISA** - Enzyme Linked Immuno Sorbent Assay.
- **Natural or Innate immunity** : Naturally got immunity from the mother by birth.
- **Photophobia** - High sensitivity to light.
- **Germ Theory of disease** - Proposed by Robert Koch and Louis Pasteur.

**MULTIPLE CHOICE QUESTIONS**

1. The secretion of ..... gland keeps the skin shiny.  
A) Salivary                      B) Sweat  
C) Endocrine                    D) Sebaceous
2. Skin can prepare ..... in the presence of sunlight.  
A) Sebum                        B) Oil  
C) Vitamin D                    D) Proteins
3. Skin can be stretched because the dermis contains .....  
A) Protein                        B) Fat  
C) Oil                                D) Sweat
4. Facial expression is brought about by more than ..... different muscles.  
A) 20                                B) 30  
C) 25                                D) 50
5. The skeletal muscles are attached to bones by .....  
A) Nerves                        B) Ligament  
C) Cartilage                      D) Tendons
6. The ..... muscle is present in the back of upper arm.  
A) Calves                         B) Triceps  
C) Biceps                         D) Deltoids
7. Skull consists of ..... bones.  
A) 22                                B) 23  
C) 25                                D) 30
8. The bones of ..... are flat bones.  
A) Ribs                              B) Vertebral column  
C) Leg                                D) Cranium
9. Choose the structure that is not a part of thoracic cavity.  
A) Sternum                        B) Ribs  
C) Vertebral Column            D) Pelvis
10. There are ..... pairs of ribs.  
A) 8                                 B) 12  
C) 10                                D) 9
11. The vertebral column consists of ..... vertebrae.  
A) 31                                B) 33  
C) 35                                D) 42
12. The bones of the wrist are called .....  
A) Carpels                        B) Humerus  
C) Tibia                              D) Phalanges
13. The longest bone in our body is .....  
A) Humerus                        B) Vertebral column  
C) Femur                         D) Radius
14. The knee bone is called .....  
A) Patella                         B) Radius  
C) Phalanges                      D) Femur
15. The bone marrow is the site of production of .....  
A) Blood                         B) RBC  
C) Calcium                        D) Cerebrospinal fluid