# **MACRONUTRIENTS IN HUMAN**

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**ANSWER SHEET**

1. **What are carbohydrates? What is their role in the body?**

**DEFINITION: Carbohydrates are organic compounds of carbon, hydrogen & oxygen.**

* **They are polyhydroxy alcohol with potentially active groups ketone and aldehyde**
* **Glucose contain polyhydroxy aldehyde**
* **Fructose contain Polyhydroxy ketone**
* **These sugar which have free aldehyde r ketone group have reducing properties called reducing sugar.**
* **General formula is Cn(H2O)n**

**CARBOHYDRATES CLASSIFICATION**

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**1.Monosaccharides 2.Diasaccharides 3.Polysaccharides**

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**.Aldose .ketose .sucrose .Lactose .Homopolysaccharide**

**.Maltose .Heteropolysaccharide**

**ROLE OF CARBOHYDRATES**

* **Carbohydrates are fuel of life**
* **Instant source of energy. Basic role of carbohydrates is the production of energy for performance of vital activities in living organisms**
* **Carbohydrates serves as major source of energy in the body.**
* **Human blood contain 60-110 glucose per 100ml of blood.**
* **One mole of glucose on complete oxidation by citric acid cycle produces 36 ATPs**

**C6 H12 O6 + 6O2 --------------> 6CO2 + 6H2O + Energy**

* **1gm of carbohydrates = 4 k calories of energy**
* **Amoung carbohydrates brain utilizes only glucose for its energy requirements.**
* **They are the essential components of production, temperature control and proper functioning of different parts of the body.**
* **The receptors on cell membranes are the complexes of carbohydrates with certain protein e.g glycoproteins**
* **Glucose stored in the form of glycogen in the liver and muscle. When body is deficient in glucose, liver glycogen hydrolysed to glucose according to body need**
* **They are stored as glycogen in the animals and starch in plants, acts as a reserve source of energy**
* **Carbohydrates help to preserve muscle activities by utilizing stored glycogen for energy**
* **By eating carbs in the form of fibres can improve the digestive health by helping wastes get rid of the body more efficiently. They are used as promoting the peristaltic motion of digestive tract.**
* **They help the secretion of digestive juices in gastrointestinal tract.They provide suitable environment for the growth of rumen bacteria and protozoa.**
* **They influence heart health and help in development of brain tissues e.g cerebrosides and gangliosides**
* **In carbs, fructose present in seminal fluid and act as a source of energy for spermetazoa**
* **Carbohdrates are involved in formation of antibodies and blood cloting factors e.g heparin.**
* **They are also component of several important bio-chemical compounds such as nucleic acid, coenzymes and blood group substances.**
* **They play a key role in the metabolism of amino acid and fatty acid. They help in maintaining low cholesterol level, promoting utilization of fat**
* **They are structurally very important for cell wall in plants , exoskeleton in insects.**

**Hence, carbohydrates have wide range of vital functions and important as structurally and functionally.**

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**2.what are impacts of excess and deficit intake of carbohydrates?**

**A 1.EXCESS INTAKE OF CARBOHYDRATES:**

**High carbohydrates intake contributes to high calorie intake which could exceed the individual’s calorie requirement. Thus overweight**

**And obesity eventually result from habitual high intake of carbohydrates .**

**.PROBLEMS ASSOCIATED WITH EXCESS CARBOHYDRATES INTAKE.**

* **Diabetes mellitus: Excess intake of refined sugar may lead to diabetes then excess of glucose passes out in urine cause glycosuria.**
* **Tooth decay: Sweets contain sugar frequently snacking with sweets and foods that are high in sugars, leaving plague acids the leads to tooth decay.**
* **Obesity: Excess of carbohydrates stored in the form fats in adipose tissues cause obesity.**
* **High Blood pressure: Excess insulin forces kidneys to retain Na ions Hence fluid retention increases. Blood retains more fluid which rises blood pressure**
* **Heart diseases: Excessive sugar intake causes coronary heart diseases and other problems of heart.**
* **Overweight: Body get overweight than normal due to excessive storage of glucose in the form of glycogen.**

**2.DEFICITS OF INTAKE OF CARBOHYDRATES:**

**Major source of energy is carbohydrates, without sufficient fuel the body gets no carbohydrates as energy source. Deficient intake of glucose causes dizziness , mental and physical weakness.**

**.PROBLEMS ASSOCIATED WITH DEFICIENT INTAKE OF CARBOHYDRATES**

* **Hypoglycemia: Non availability of glucose occur when glucose level drops causes shakiness, nervous disorders, sweating etc**
* **Weight loss: when carbohydrates intake is reduces causes body weakness and loss of weight than normal BMI**
* **Constipation: It occurs when intake of not enough dietary fibers causes constipation**
* **Ketosis and Aldosis: It caused by not taking glucose in diet, shift energy process from glycolysis to ketosis and Aldosis**
* **Mood swing: Dietary carbohydrate exclusion causes the brain to stop regulating serotonin hormone. Low level of serotonin supply causes mood swings and depression.**
* **Not enough regulation: Body feels cold quickly and slow regulation response of the body occur.**

**Hence the impact of excess and deficit intake of carbohydrates causes problems in the body.Optimization of everything is better**

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**3.what are the functions of proteins? Illustrate the chemical structure of protein?**

**A. DEFINITION: Proteins are complex nitrogenous organic compounds containing hydrogen, oxygen, carbon and nitrogen .They are primarily important as food source.**

**FUNCTIONS OF PROTEINS:**

**Proteins perform tremendous variety of psyiological functions. They are structurally and functionally very important.**

* **Source of energy: Proteins are also source of energy.In starved conditions when there is no more energy to consume, proteins are converted into glucose by process gluconeogenesis**

**PROTEINS gives 4 calories per gram.**

* **Structural Proteins: Some proteins contribute to the structure of tissues e.g collagen, elastin and keratin present in hair, nail and skin.**
* **Plasma Proteins: Proteins are present in plasma membrane with combination of carbohydrates and lipid e.g glycoproteins and lipoproteins.**
* **Catalytic Proteins: Many proteins act as a living catalyst called enzymes.These enzymes increases the rate of biological reactions to the extent required by the body e.g Lipase, hydrolase, Lipase**
* **Heredity Proteins: The nucleoproteins act as carrier of genetic information or characters. They serve as basis for inheritance of traits e.g RNA , DNA**
* **Regulatory Protein: Hormones are the regulatory proteins.They regulate the growth of living organisms and control number of other physiological functions e.g somatostatin.**
* **Carrier Proteins: Some proteins serve as carrier of different substances inside the body e.g Hemoglobin act as carrier of O2 , ceruloplasmin act as carrier of copper in the blood plasma.**
* **Muscle Proteins: Proteins are present in muscle to help in muscular activities, thin and thick filament slides over each other to make cross bridges e.g Actin, myosin, troponin.**
* **Immunity Proteins: Proteins helps in defense system of the body to produce antibodies against foreign bodies e.g IgA, IgE**

**STRUCTURE OF PROTEINS**

**.Amino acids are the building block of proteins.**

**. bond formed between two amino acids called peptide bond.**

**H AMINO ACID STRUCTURE**

**O**

**H N----- C ------ C CARBOXLYIC G**ROUP

**OH**

**H R**

AMINE GROUP VARIABLE GROUP

**PROTEINS being complicated macromolecules have very complicated structure .Following are the four different structures in which proteins appear.**



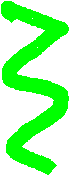
**PRIMARY STRUCTURE: is a sequence of a chain of amino acids.**



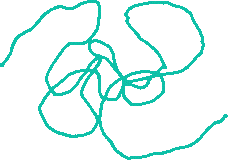
**SECONDARY STRUCTURE: occur when sequence of amino acids are linked by hydrogen bond.**



**Pleated sheet Alpha helix**



**TERTIARY STRUCTURE: occur when attraction present between alpha helix and pleated sheets.**



**TERTIARY STRUCTURE: is a protein consisting of more than one amino acid chain**



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