

# NUTRIENTS



38gm ← 40kg

50kg → 40gm

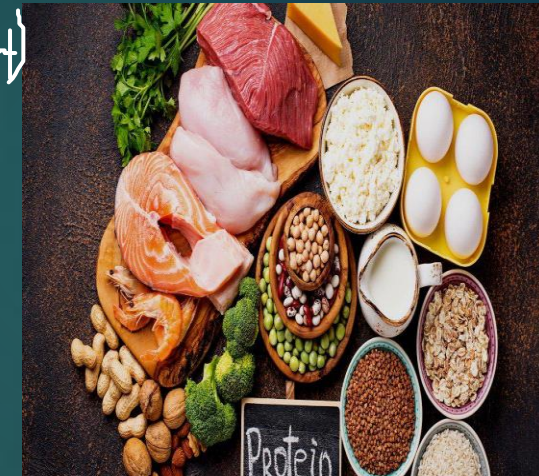
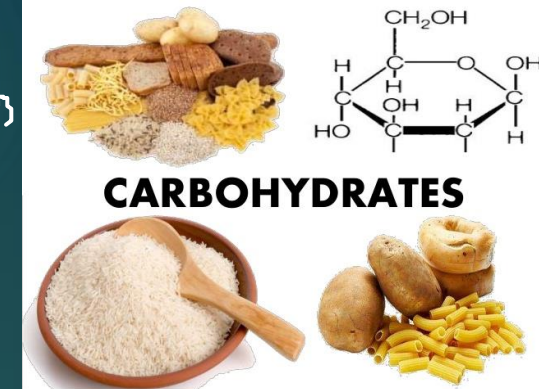
पोषक तत्व

60kg x 0.8  
48gm

# TYPES OF NUTRIENTS:

आवश्यक  
आवश्यक  
आवश्यक

1. Carbohydrates (Sugar शर्करा) - Roti, chawal, चीनी (Sucrose)  
Energy 300gm, 1gm ~ 4kcal
2. Protein (Polypeptides) - {adult: 0.8gm / kg of body weight  
एवस्क  
teen (13-19) yrs - 0.95gm/kg  
child: 2gm / kg  
1gm ~ 4kcal
3. Fats (Lipids) → 80gm  
वसा 1gm - 9kcal
4. Vitamins - mg each
5. Minerals खनिज - mg each
6. Water - (5-6) L → Macro बहुत



## ▶ Carbohydrates:

- ▶ The compounds which is composed of Carbon and water ( $C+H_2O$ )
- ▶ Carbohydrates are mainly composed of three elements namely Carbon, Hydrogen, Oxygen.
- ▶ Commonly Carbohydrates are known as Sugar.
- ▶ General formula of Carbohydrate is  $C_nH_{2n}O_n$ .
- ▶ Main function of Carbohydrate is to provide energy i.e works as an energy fuel.
- ▶ Smallest unit of Carbohydrate is Glucose.

## ► Types of Carbohydrates:

► It can be divided into 3 parts:

1. Monosaccharides: As the name suggest all the carbohydrates which is composed of a single sugar and cannot be hydrolyzed to give simple sugar.

2. Oligosaccharides: The carbohydrates which contain 2-10 monosaccharides. Disaccharide is a subtype of Oligosaccharides.

3. Polysaccharides: The Carbohydrates which is composed of more than 10 Monosaccharides

CARBOHYDRATES			
Monosaccharides (one sugar molecule)	Disaccharides (two sugar molecules)	Oligosaccharides (two to ten sugar molecules)	Polysaccharides (ten or more sugar molecules)
- Glucose	- Sucrose	- Raffinose	- Starch
- Fructose	- Lactose	- Stachyose	- Glycogen
- Galactose	- Maltose		- Cellulose

## ► Examples of Monosaccharides:

### 1. Glucose:

It is a type of Hexose means it is composed of six Carbon.

Formula of Glucose is  $C_6H_{12}O_6$ .

Glucose provides instant energy to our body because it is a type of monosaccharide and it can not be hydrolyzed into further any simple form

### 2. Fructose:

It is also a type of Hexose and the formula is  $C_6H_{12}O_6$

It is the sweetest natural carbohydrate.

The sweetness of Fruits is due to Fructose.

3. Galactose: It is also a type of Hexose. Hence the formula of Hexose is  $C_6H_{12}O_6$ .

4. Ribose: It is a Carbohydrate found in RNA

It is a type of Pentose hence the formula is  $C_5H_{10}O_5$ .

## EXAMPLES OF OLIGOSACCHARIDES:

1. Sucrose:

- ▶ It is a mixture of Glucose ( $C_6H_{12}O_6$ ) and Fructose ( $C_6H_{12}O_6$ ).
- ▶  $\text{Glucose } (C_6H_{12}O_6) + \text{Fructose } (C_6H_{12}O_6) \longrightarrow \text{Sucrose } (C_{12}H_{22}O_{11}) + H_2O$
- ▶ It is also known as Household Sugar/Table sugar

2. Lactose:

- ▶ It is a mixture of Glucose and Galactose.
- ▶ It is commonly known as Milk Sugar.

3. Maltose:

- ▶ It is a mixture of  $\overset{C_6}{\text{Glucose}}$  and  $\overset{C_6}{\text{glucose}}$ .  $C_{12}H_{22}O_{11}$
- ▶ It is found in boiled rice water.

## EXAMPLES OF POLYSACCHARIDES:

### 1. Cellulose:

- ▶ It is commonly known as Plant Carbohydrates (because the cell wall of plant is composed of Cellulose).
- ▶ It is a polymer of Glucose.
- ▶ Used in Textile Industry, Paper Industry

### 2. Starch:

- ▶ Storage form of Carbohydrates in Plants
- ▶ Most edible Carbohydrate in human (rice, wheat, potato).

### 3. Glycogen:

- ▶ Storage form of Carbohydrate in animal including Human.
- ▶ It is stored in Liver.



# FAT (Lipid):

## Function:

- ▶ It provides energy in fasting condition.
- ▶ Acts as an insulator.

Smallest unit: Fatty acid (monoglyceride). It is also composed of carbon, Hydrogen and oxygen.

## Types of Fats:

1. **Saturated Fat:** Hard to digest.

Can't be converted into fatty acid in Normal Condition.

Solid at room temperature (25%)

Animal product

Eg: Cholesterol

Unsaturated fat: Easy to digest.

Can be converted into fatty acid in normal condition.

Liquid at room temperature.

Mainly plant products

Eg: Mustard oil, olive oil, Omega 3

**Polypeptide (Protein):** Composed of Nitrogen, Carbon, Hydrogen and Oxygen.

**Function:**

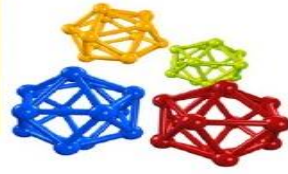
1. Growth and development of body.
2. Helps in Muscle formation.
3. Helps in the formation of Enzymes, Antibodies and Hormones.

\*\*\* All Enzymes and antibodies are protein.

\*\*\* All hormones are not protein.

Smallest Unit: Amino Acid ( $\text{NH}_2 + \text{COOH}$ ) – Amphoteric in nature

## Difference between essential and non-essential amino acids



- There are 20 different amino acids that make up all proteins in the human body.
- These amino acids are needed to replenish tissue, red blood cells, enzymes, and other substances.
- 9 - 12 can be manufactured by the body - non-essential amino acids, not obtained from the diet.
- The remaining 8 to 11 - essential amino acids, must be obtained from the diet.

## Kwashiorkor vs. Marasmus

Clinical parameter	Kwashiorkor	Marasmus
Age of onset	Pre- school (1-5 years old )	Weaned infants (<1 years old)
Main nutritional cause	Low protein intake	Low calorie intake
Body weight	60-80% of normal	< 60% of normal
Growth	Mild retardation	Severe retardation
Abdomen	Protruding	Shrunk
Facial appearances	Moonface	Like old man's face

# Micro अणु ← Vitamin - Organic Compound अम्लक Catalyst कार्बनिक यौगिक

Vitamins	Chemical Names	Disease	Source
A	<u>Retinol</u>	Night Blindness रातोंधी	Fish in general, liver and dairy products; ripe yellow fruits, leafy vegetables, carrots,
C → Immunity प्रतिरोधक क्षमता → Wound healing धातु को भरने	Ascorbic Acid	Scurvy स्कर्वी Amla Lemon	Citrus fruits and vegetables
D → Sunshine Vit. → Synthesized (Liver, kidney धातु)	<u>Calciferol</u>	Rickets मुखा रोग	Egg, liver, Mushroom, Whole Grains, Dairy Product
* E → Beauty Vit → * Antioxidant	<u>Tocopherol</u>	Infertility बांझपन	Many fruits and vegetables, nuts and seeds, and seed oils
<u>B1</u>	<u>Thiamine</u> → <u>Sulfur</u>	Beri Beri	whole meal grains, brown rice, vegetables, potatoes, liver, eggs
<u>B2</u>	<u>Riboflavin</u>	Chelosis (cracking of angle of lips)	Dairy products, bananas, green beans

Vitamin	Chemical Names	Disease	Source
B3	Niacin/Nicotinic Acid	Pellagra (3D disease- diarrhea, Dermatitis, Dementia)	Meat, fish, eggs, many vegetables, mushrooms
B5	Pantothenic Acid	Whitening of Hair, Infertility	Meat, broccoli
B6	Pyridoxin	Muscle Cramp	Meat, vegetables, tree nuts, bananas
B7 (H)	Biotin	Hair loss, Skin Problems	Raw egg yolk, liver, peanuts, leafy green vegetables
B9 (M) → 'Iron' लोहा	Folic Acid	Megaloblastic Anemia	Leafy vegetables, pasta, bread, cereal, liver
B12	Cyanocobalamin	Pernicious Anemia	Meat, poultry, fish, eggs, milk
K → self syn. → Blood Clotting	Naphthoquinone/Phylloquinone	Bleeding	Leafy green vegetables such as spinach; egg yolks; liver

## **WATER:**

70% of our body is composed of water.

Ph of water: 7

## **Function:**

1. Provides humidity to body.
2. Regulates body temperature.
3. Helps in the formation of blood.
4. Helps in Digestion.
5. Reduce the toxicity of body.

A B C D E K

Water Soluble

जल घुलनशील

$B_1 - B_{12} \leftarrow$  B complex  
 $\downarrow$   
 $B_4, B_8, 10, 11$   
C  
9



Fat Soluble

वसा घु.

A  
D  
E  
K  
4

~~Total vit = 12 + 5 = 17~~  
 Total vit = 8 + 5 = 13