



An Initiative by अमरउजाला

NUTRIENTS



TYPES OF NUTRIENTS:

1. Carbohydrates → Energy, 300gm 1gm - 4kcal

2. Protein (Polypeptides) - 1gm - 4kcal

3. Fats (Lipids) : 80gm 1gm - 9Kcal

4. Vitamins : mg

5. Minerals : mg

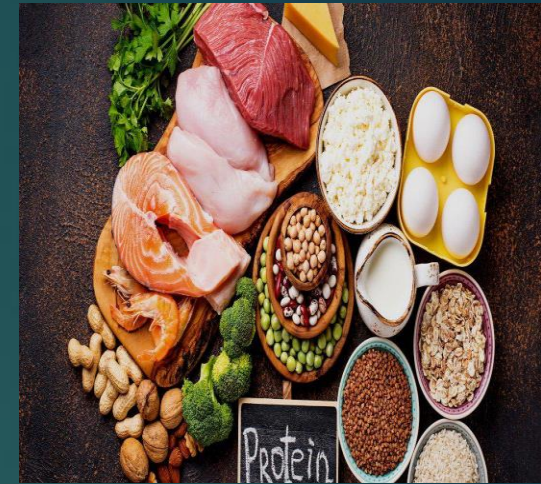
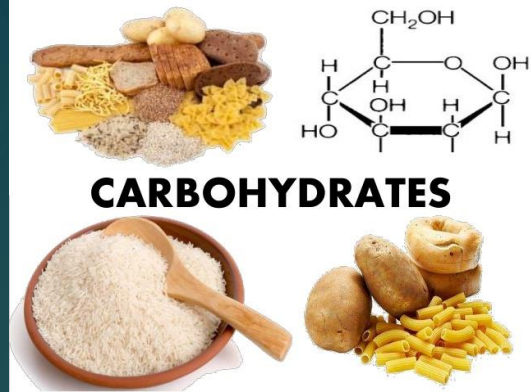
6. Water : (5-6L)

• Adult :
(0.8 gm/kg)

• Child (teen):
(0.95 gm/kg)

• child
(2gm/Kg)

• Pregnant
(55-70) gm



▶ Carbohydrates:



Que: C, H, O

• Sugar शर्करा



$n = 3$



triose

- ▶ 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:

Single Sugar

► 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 - 10 }

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

{ 11 - ∞ }

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

Glucose }
Fructose } Isomers
 $C_6H_{12}O_6$
 ↓
 Ketone
 ↓
 Aldehyde

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.

Que: Aldohexose

↓
Glucose,
Galactose
Ketohexose → Fructose

Honey - Fructose

→ Aldehyde

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 (Ribo Nucleic Acid)
 ✱ It is a type of Pentose hence the formula is $C_5H_{10}O_5$.

EXAMPLES OF OLIGOSACHARIDES:- (2-10)

1. Sucrose:

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

2. Lactose: ($C_{12}H_{22}O_{11}$)

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

3. Maltose: ($C_{12}H_{22}O_{11}$)

- ▶ It is a mixture of Glucose and glucose.
- ▶ It is found in boiled rice water.

EXAMPLES OF POLYSACCHARIDES: (11-∞)

1. * Cellulose: $(\text{glucose})_{n>10}$

► 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

Most abundant

2. Starch: $\text{C}_6\text{H}_{10}\text{O}_5$

► Storage form of Carbohydrates in Plants

► Most edible Carbohydrate in human (rice, wheat, potato).

3. Glycogen:- Animal Carbs

► Storage form of Carbohydrate in animal including Human.

► It is stored in Liver.



Cell Wall



FAT (Lipid): वसा (C, H, O) Stored: Ad.
1gm - 9Kcal

Function:

- ▶ It provides energy in fasting condition. एन (12hrs)
- ▶ Acts as an insulator. कुचालक

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



Types of Fats:

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

संतृप्त वसा

(Bad Fat)

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

Solid at room temperature (25%)

Animal product

Coconut oil

Eg: Cholesterol, Ghee, Milk, Vanaspati Ghee (dalda) "Adipose tissue"

Unsaturated fat: Easy to digest.

↓
(Good fat)

Can be converted into fatty acid in normal condition.

Liquid at room temperature.

Mainly plant products

Eg: Mustard oil, olive oil, Omega 3 (Fish)

Cis Fat

Polypeptide (Protein): ^{N, C, H, O} Composed of Nitrogen, Carbon, Hydrogen and Oxygen.

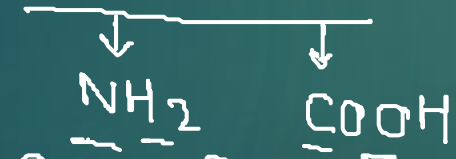
Function:

1. Growth and development of body. ^{वृद्धि विकास}
2. Helps in Muscle formation. ^{Bio Ca. immunity}
3. Helps in the formation of Enzymes, Antibodies and Hormones.

*** All Enzymes and antibodies are protein.

*** All hormones are not protein. (Pro + Fat)

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

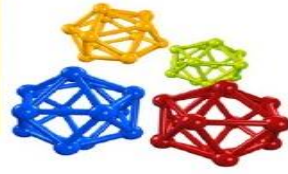


Que: Enzymes in nature

\downarrow
 अम्लीय/क्षारीय (both acid & basic)

Que: Child: Protein

Difference between essential and non-essential amino acids



- There are 20 different amino 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-nonessential amino acids, not obtained from the diet.
- The remaining 8 to 11 -essential amino acids, must be obtained from the diet.

Essential : Diet
आवश्यक

Non Essential : Body
आवश्यक

Source : Meat मांस

Egg

Soya

Pulse दाल

Beans

↓ Disease: ^{Malnutrition} Kwashiorkor vs. Marasmus

Clinical parameter	Kwashiorkor	Marasmus
Age of onset	Pre- school (1-5 years old)	Weaned infants (<1years 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	Shrunken
Facial appearances	Moonface	Like old man's face

Fructose Malabsorption

Vitamins	Chemical Names	Disease	Source
A (Fat)	<u>Retinol</u>	Night Blindness <u>रातोंधी</u>	Fish in general, liver and dairy products; ripe yellow fruits, leafy vegetables, carrots,
C - (Water) - Immunity, Wound healing ↖ (heat, salt)	<u>Ascorbic Acid</u>	<u>Scurvy</u>	Citrus fruits and vegetables
D - Self Synthesised (Kidney) ↳ PTH ↳ Immunity	<u>Calciferol</u>	<u>Rickets</u>	Egg, liver, Mushroom, Whole Grains, Dairy Product
E	Tocopherol	Infertility	Many fruits and vegetables, nuts and seeds, and seed oils
B1	Thiamine	Beri Beri	whole meal grains, brown rice, vegetables, potatoes, liver, eggs
B2	Riboflavin	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	Biotin	Hair loss, Skin Problems	Raw egg yolk, liver, peanuts, leafy green vegetables
B9	Folic Acid	Megaloblastic Anemia	Leafy vegetables, pasta, bread, cereal, liver
B12	Cyanocobalamin	Pernicious Anemia	Meat, poultry, fish, eggs, milk
K	Naphthoquinone/ Phylloquinone	Bleeding	Leafy green vegetables such as spinach; egg yolks; liver

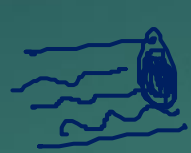
65x0.8 Pro → Peptide → Amino acid

Vegan $\frac{1}{10}$

Vitamins



Organic Compound



Low Den.
Volume ↑
↓
Bad.



Density ↑
Volume ↓

HDL

↓
Good *
chol.

Catalyst ~~3x2x~~



Fibrin + Blood



{ Fructo Natural sweetest sugar
Sacharine - Anti " "

↓ vit_k

Clot ↑

Casimir Funk



Google Play Store



B₄x B₈x B₁₀, 11x

Water Soluble

Fat Sol.

B₁-B₁₂

↓
B-complex

A
D
E
K

Dextrose - C₆H₁₂O₆

$\frac{C}{9}$

Total: 13