PROTEIN

Definition – Protein come from a Greek word 'Proteo' means 'to take the first place.' are very complex nitrogenous organic compound. It is made up of carbon, hydrogen, oxygen, nitrogen. The present of nitrogen distinguished protein from carbohydrate& fats. Apart from nitrogen, elements like sulphur, phosphorous, copper, & iron are also found in some proteins. Lipid combined with protein formed lipo-protein.

The basic units from which protein are built are the amino acid. Each amino acid contains a carboxyl group (COOH) or acid group & an amino group or basic group.

Structure of amino acid given in class

Proteins consist of chains of amino acids that are linked to each other by a peptide linkage (-CO-NH-).

22 different amino acid are widely distributed in nature. The protein obtained from plants and animals are quite different both in amounts present & in quality. The protein contain of any food can be estimated by measuring the nitrogen contain of the food.

Essential Amino Acid – Those amino acids which cannot be synthesized in sufficient amounts by the body & must be provided by the diet are called essential amino acids. There are 10 essential amino acids. Among those 9 are essential for adults with it 1 for children.

Non essential amino acid – There are 12 non essential aminoacid**.**This Amino Acid can be synthesized in our body from other amino acid.(total – 22 amino acids)

Essential AminoAcid		**Non essential amino acid**
Adults	Additional for children	Alanine
• Isoleucine		Asparagine
• Leucine	Arginine	Aspartic acid
• Lysine		Cystine
• Methionine		Glutamine
• Phenylalanine		Glutamic acid
• Threonine		Trosine
• Tryptophan		
• Valine		
• Histidine		

Classification of protein – (follow class note)

1. According to nature – plant & animal
2. According to quality - 1st class, 2nd class & incomplete
3. According to structure – Simple, compound& derived

Functions of protein - Protein performs three main functions

- Structural function
- Regulatory function
- Energy

Structural function –

Growth –

- Protein helps us in growth & development.
- All body fluid except urine & bile are made up of protein
- Proteins are the major constituent of muscles, organs, endocrine gland, & collagen.
- Collagen is the main structural protein of bone, ligament, skin etc.
- All enzymes, some hormones are like insulin are made up of proteins

Maintenance or wear & tear

It also helps to repair the dead cell.

Regulatory functions – Certain amino acid & protein have highly specialized functions in the regulation of body process & protection against disease.

Hemoglobin, an iron containing protein in the blood cells, performs an important role by transporting oxygen to the tissue cell.

Plasma protein maintains water balance & regulates the osmotic pressure in blood.

All enzymes & some hormones are made up of protein.

Energy – Like carbohydrate protein too provides 4kcal/gm.

Sources –

Food	gm/100gm
Rice	6.4
Wheat	11.8
Lentil	25.1
Rajmah	22.9
Cheese	24.1
Cow's milk	3.2
Egg (hen)	13.3
Mutton	18.5

Effect of deficiency & excess

It is known as PCM (Protein calorie malnutrition) **OR** PEM (Protein energy Malnutrition)

Protein deficiency is more marked during periods when protein needs are more specially among pre – school children in developing country.

Leads with only protein deficiency known as Kwashiorkor symptom moon face, oedema,pot belly, irritated in nature, red colour hair etc.

Marasmus is a combined disease of calorie + protein deficiency. Symptoms skeleton like features, very eager to take food,etc.

Excess amount of protein causes kidney & cholesterol problem.

Fat

It belongs to lipids groups. We found as triglycerides in foods. It converts to Glycerid & fatty acid. It is made up of Carbone hydrogen & oxygen. Main source is providing energy i,e 9 kcal/gm. It is aster of fatty acid & glycerol.

The lipids are important to our health are fatty acid,fats,oils, phospholipids, sulpholipids& sterol.

Classification sources given in class

Saturated fatty acdis – These are found in animal food like meat, fish,eggyolk etc.No double bond, solid in nature.example- steric, palmitic,butyric etc.Maximum of 10 persent of our total calorie should come from our total calorie.

Unsaturated fatty acid – One, two or more double bonds, liquid in nature.

It is classified in 2 –

- **MUFA- example** Oleic acid & has one double bond .found in ground nut, olive oil; corn oiletc.they may help to lower the blood cholesterol level.
- **PUFA** – example- linoleic,lilonenic, arachidonic acid has two or more double bond. They help in lowering blood cholesterol levels & prevent atherosclerosis & coronary heart diseases.

Essential Fatty Acid: Poly unsaturated fatty acid cannot synthesized in our body. We have to take it through our diet. Example- linoleic, lilonenic, arachidonic acid.

Cholesterol - It is a fat like substance present in food. It is different in structure from triglycerids.It is present in all cell of the body & in large amount in brain & nervous tissue. The diseases related are cardiovascular disorder. The normal blood sugar level will be 200mg/100ml of blood.

Human get cholesterol from-

- Synthesis of liver
- Food rich in cholesterol

Functions of cholesterol are –

- It is precursor of all storied hormones
- A precursor of vit D, 7- dehydrochlosterol, is present in the skin which is irradiated by UV ray of sunlight to form vit D
- It is required for formation of bile
- It is an essential component of cell membrane.

Function /deficiency given in class

WATER

An important nutrient .75 to 80 percent of our total body is water. The total body fluid is distributed among two major components

Extracellular fluid – contain sodium

Intercellular fluid – contain potassium

Water is made up of hydrogen & oxygen the ratio is 2:1

Sources visible & invisible water.

Visible water that we can see are- plain water, fruit juices, tea, milk, coffee etc

Invisible water that is inside the food s & metabolic water.

Function-

- Water quenched our thirst and is the most refreshing & cooling of all liquids.
- It is a structural component of all cell
- Water is a medium in which all chemical reaction takes place
- It is an essential components of all body fluid such as blood, ceribospinal fluid, bile,digestive fluid,urine.
- It acts like a lubricant & helps us to swallowed food or to digest food.
- It acts like a solvent for the products of digestion & help in transporting this product in different pare of body.
- It regulates the body temperature.
- It helps to throw the waste product from the body.

Water balance –

In a normal individual, the maintenance of water balance is archived by adjusting both water intake & excretion as needed. The major inputs of water are –

- Fluids that we consume asbeverages, including water depending on climatic condition & habits.
- Different type of foods & fruits that we take as solid form.
- Metabolic water.

Output or loss of water from body

- Renal loss – Kidneys excrete about 1-2 liter of water daily
- Skin – The water loss from skin is through perspiration.
- Intestine – A small quantities of water is normally loss in faeces.
- Lungs – The air expired from the lungs also contains water.
- Sweat – It depends on the physical activity & environmental condition.

Daily intake & output of water

Intake	ml/day	Output	ml/day
Fluid we take	2,200	Skin	350
From metabolism	200	Lungs	350
	---------- ---	Sweat	100
	2,400	Faeces	100
		Urine	1,500
			2,400

Dehydration – It is defined as an excessive loss of body water. It may occur because of inadequate intake of, or abnormal loss of body water or a combination of both.

The symptoms of dehydration are –

- Thirst
- Loss of appetite
- Decreased urination
- Nausea
- Impaired temperature regulation
- Muscular spasms
- Increased pulse rate

Symptoms of severe dehydration appear when Fluid level fall by more than 10 percent. A 20 percent loss of fluid from the body can be fatal.

A dehydrated person is usually managed by **Oral Rehydration Therapy (ORT).** The WHO recommended ORS **(Oral Rehydration Salt)** that are to be dissolved in 1 liter of water & make a **Oral Rehydration Solution** & have to be finished within 24 hours. He also can take HAF.(**Home Available Fluid)**

Home Available Fluid –

Normally we prepared in home 1 glass of water + 2 spoon full of sugar + a pinch of salt + few drops of lime juice (lime juice contained potassium & salt contain sodium which help to maintained the equilibriums among intra cellular & extra cellular fluid .)

ORS (WHO) for 1 liter

Content	**amount in gm**
Glucose	**20.0**
Sodium Chloride (salt)	**3.5**

Sodium bicarbonate (baking soda) **1.5**

Potassium chloride **1.5**

A minimum +8 glass of water is recommended daily.

Excess amount of water causes oedema. (Swelling of the skin).