

DATE: 29/07/24

Assignment: GSA

Nicora Pervaiz

Ques:

Classification of Carbohydrates, proteins and fats.

Carbohydrates, proteins and fats are three major classes of macromolecules essential for human nutrition, each playing distinct roles in the body.

1. Carbohydrates:

The term "Carbohydrates" is a combination of two words 'Carbo' and 'hydrate'. 'Carbo' is the short term of Carbon and hydrate means water, so they contain C, H, O with empirical formula $C_x(H_2O)_y$. They are commonly called "sugars".

Function:

- Primarily serve as a source of energy.
- Proper working of human brain, mental performance.

Source:

Wheat, Pulses, Milk, Sweet fruits

Deficiency:

Energy provision disturbs
Organ working prevent/damage

Excess:

Weight gain, Obesity, Diabetes

Classifications:-

Classified into simple carbohydrates (monosaccharides, oligosaccharides and polysaccharides)

→ Monosaccharides:

- These are simple sugars which cannot be hydrolyzed.
- Common examples are Glucose, Fructose. Their sources are grape sugar, blood sugar, sweet fruits and honey.
- They are sweet in taste and soluble in water.
- They play vital roles in cellular energy production, metabolism, and the structure of larger carbohydrate molecules.

→ Oligosaccharides:-

They are formed when 2 to 9 monosaccharides units combine through a bond (Glycosidic linkage)

- Common disaccharides are Sucrose (common table sugar), lactose and maltose and trisaccharides example in raffinose.
- Their source are sugar cane, sugar beet, mango, apricot, almond, coffee.
- They are crystalline solids, soluble in water and sweet in taste.
- They are collectively known as sugars.

→ Polysaccharides:

- They are insoluble in water and tasteless.
- They are called non-sugars.
- They are used as energy storage compounds in animals and plants in the form of Glycogen and Starch respectively.

Monosaccharides	Polysaccharides	Oligosaccharides
<ul style="list-style-type: none"> • Mono → one sacchar-ynyl • Simplest sugar • Cannot be hydrolyzed 	<ul style="list-style-type: none"> • Greek word 'many' • On hydrolysis these are more than 10 or hundreds • 10 thousands monosaccharides units 	<ul style="list-style-type: none"> • Greek word oligo = few • Hydrolyzed and gave 2-9 units of monosaccharides
<ul style="list-style-type: none"> • They contain 3 to 9 carbons, name as triosis, tetrosis, pentosis etc 	<ul style="list-style-type: none"> • They are homopolysaccharides + starch, lectin and heteropolysaccharides e.g hyaluronic acid 	<ul style="list-style-type: none"> • Depending on no of monosaccharides - Produced on hydrolysis named disaccharides, trisaccharides etc
<ul style="list-style-type: none"> • Glucose: blood sugar • Galactose: Milk, yogurt • Fructose: Honey 	<ul style="list-style-type: none"> • Starch • Glycogen • Cellulose 	<ul style="list-style-type: none"> • Sucrose: Glucose + Fructose • Lactose: Glucose + Galactose • Maltose: Glucose + Glucose
<ul style="list-style-type: none"> • Crystalline in nature • Soluble in water • Sweet in nature • Reducing 	<ul style="list-style-type: none"> • Amorphous solid • Not soluble in water • Tasteless • Non-Reducing 	<ul style="list-style-type: none"> • White crystalline solid • Soluble in nature • Sweet in nature • Reducing

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→ Proteins:-

The name protein is derived from 'Protein' meaning "Prime importance".

Characteristics:

- They are polymers of amino acids.
- Proteins are colourless and tasteless.
- The solubility of proteins depends upon pH (solubility increases with increase in acidity or alkalinity).
- They are high molecular weight biomolecules.
- There are 10,000 different kinds of proteins in human body.
- Good source of energy.
- essential for healing, repairing.
- Help in tissue building.
- Muscle Building.

Source:

Milk, Meat, Pulse, Fish.

Deficiency:-

- Disturb energy provision.
- Muscle weakness.
- Tissue weakness.
- Weak immunity.

Excess:-

Chances of heart related problems.

→ Proteins are classified based on their properties and structure.

⇒ Based on Physical-Chemical Properties:-

• Simple Protein:-

These proteins are made up of only one type of amino acids as structural component. On decomposition with acids they liberate constituent amino acids. They are mostly globular type of proteins. Example are albumin, globulin, collagen etc. They are most abundant in animal kingdom.

• ~~Compound and Conjugated proteins~~

• **Derived proteins:-** These proteins, which are derived from simple or conjugated proteins, enzyme from the action of heat, enzyme or chemical agents. For example Pepsin, enzymes, peptones etc.

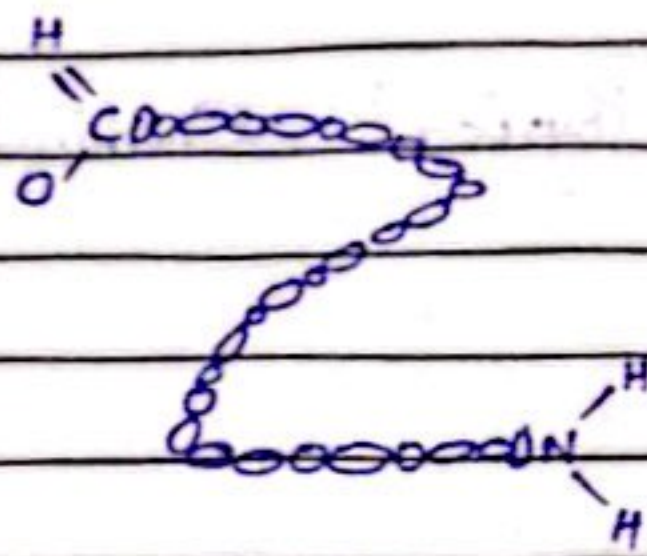
• ~~Compound and Conjugated proteins:-~~

The proteins which is attached to some non-proteins groups - (Prosthetic group) - Example are Phospho-protein, lipo-protein

⇒ Based on the Structure of Proteins

• Primary Protein:-

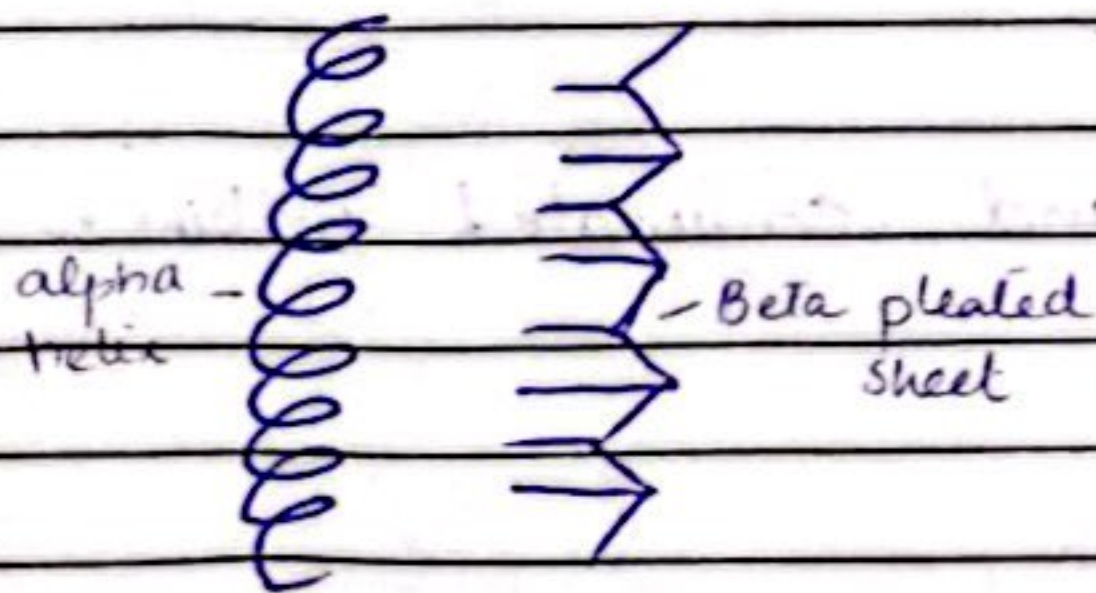
Primary structure of protein is the linear sequence of amino acid that make up the polypeptide chain



Primary Structure.

Secondary Proteins:

The linear, unfolded structure of polypeptide chain assumes helical shape to produce the secondary structure. The secondary structure regular folding pattern of twists and kind of the polypeptide chain.



Secondary Structure.

Tertiary Proteins:

It is three-dimensional structure formed by bending and twisting of the polypeptide chain. The structure formed by the bending and twisting of chain. The linear sequence of polypeptide chain.

is folded into compact globular structure.



Tertiary Structure.

⇒ FATS / Lipids:-

'Lipids' word is derived from 'lipos' means 'Fat'

Primary building blocks of lipids are fatty acids, Glycerol and steroids.

Lipids are necessary for the insulation of vital organ of the body.

Fats play a role in the production and regulation of various hormones in the body. They are integral to the structure of cell membranes, helping maintain their integrity and function.

Source:

Meat, Milk, Oils.

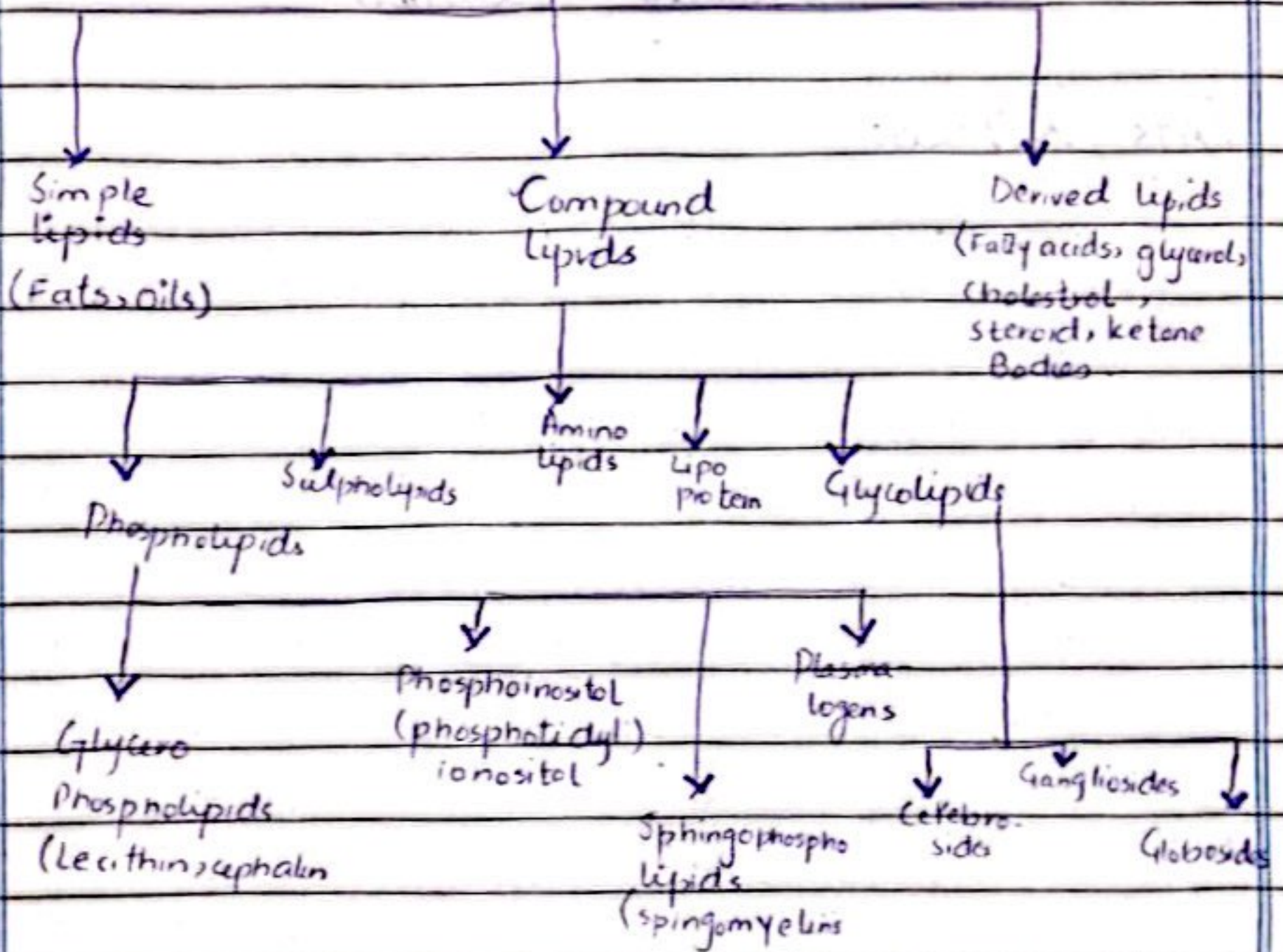
Deficiency:

Fat soluble vitamins deficiency
Inhibition disturbs

Excess:-

- Blood lipid profile increase
- Cholesterol level increase
- BP increase which cause heart problems

Classification of lipids:-



Importance of lipids:-

- Good source of energy.
- They form steroids
- They are good energy reservoir in body