Essentials of Macronutrients

Unit I : Basic Concepts of Nutrition

What is Nutrition?

- Nutrition is how food affects the health of the body. Food is essential—it provides vital nutrients for survival, and helps the body function and stay healthy.
- Nutrition is the combination of processes by which the living organism receives and uses the food materials necessary for growth, maintenance of functions and repair of component part.

We need food(nutrients) to-

- Obtain energy
- Obtain materials for growth
- Obtain materials for repair of the damaged body parts
- Carry out life processes

Role of nutrition in health and physical development

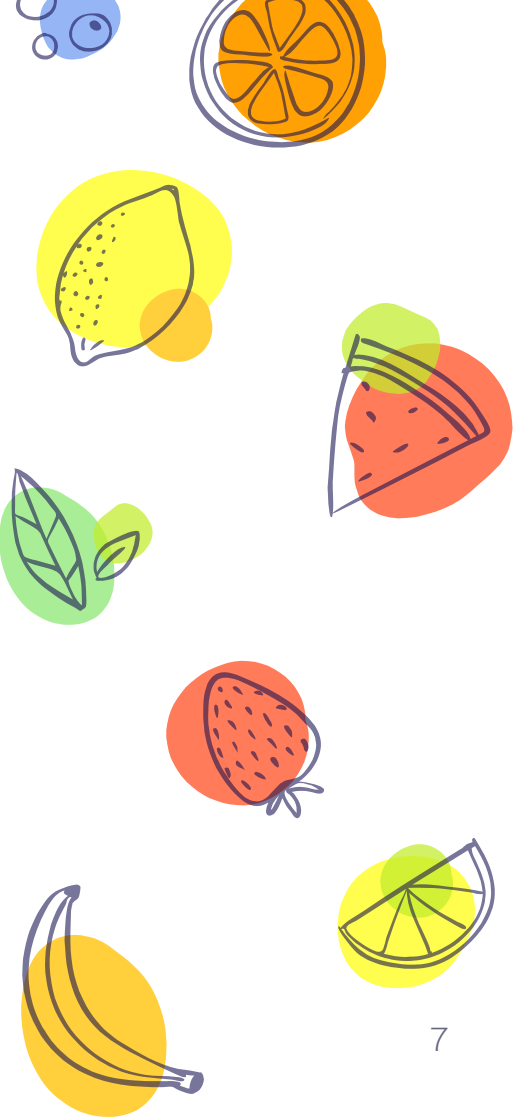
- Good **nutrition**, **physical** activity, and a **healthy** body weight are essential parts of a person's overall **health** and well-being. Together, these can help decrease a person's risk of developing serious **health** conditions, such as high blood pressure, high cholesterol, diabetes, heart disease, stroke, and cancer
- **Nutrition** is an input to and foundation for health and **development**. Interaction of infection and malnutrition is well-documented. Better **nutrition** means stronger immune systems, less illness and better health. Healthy children learn better

Relationship between Food, Nutrition & Health

Introduction

- Food has been a basic part of our existence. By knowing the food composition , the nutritional content of food is known.
- Intake of food ensures growth in children and youth, maintains good health throughout life, meets special needs of pregnancy and lactation and for recovery from illness.

- A large part of our food heritage is scientifically beneficial and needs to be retained, some aspects may need to be modified in view of changes in our lifestyles
- Most of the articles are published in news papers and magazines may be correct but most of it may not be.
- Therefore this course will give a proper information on food and the knowledge gained can be spread to people around, so that the false ideas about foods which interfere with food selection are erased and health is not affected



Definitions

- Food - is one that nourishes the body.
- Food may also be defined as any substance eaten or drunk which meets the needs for energy, body building, regulation and protection of the body.
- Food is the material from which our bodies are made.
- Eating right kind of food in right amounts ensures good nutrition and health.

• Nutrition - is food at work in the body. It includes everything that happens from eating food to its usage in various functions of body.

Nutrients are components of foods needed for body in adequate amounts for proper growth, reproduction and leading normal life.

The science of nutrition deals with what nutrients we need, in what quantity, how to get them and how the body utilizes them.

- Adequate, optimum and good nutrition - indicates the right amount and proportion of nutrients for proper utilization for achieving highest level of physical and mental health.

- Nutritional status - state of the body as a result of foods consumed and their utilization by the body. Nutritional status can be good, fair and poor.

- Good nutritional status - characterized by an alert, good natured personality, a well developed body with normal weight for height, well developed and firm muscles, healthy skin, reddish pink colored eyelids and membranes of mouth, good layer of subcutaneous fat, clear eyes, smooth and glossy hair, good appetite and excellent general health which is recognized by stamina to work, regular meal time, sound sleep, normal elimination and resistance to disease.

• Health - as defined by WHO is the ‘state of complete physical, mental and social well being and not mere absence of disease or infirmity’.

| Malnutrition - undesirable kind of nutrition leading to ill health. It results from lack, excess or imbalance of nutrients in the diet. It includes both under and over nutrition. Under nutrition is a state of insufficient supply of essential nutrients.

- Malnutrition can be primarily due to insufficient supply of one or more essential nutrients or it can be secondary, which means it results from an error in metabolism, interaction between nutrients or nutrients and drugs used for treatment.

- Over nutrition refers to an excessive intake of one or more nutrients which creates a stress on bodily functions.

- Diet - refers to what ever is eaten or drunk each day. It includes normal diet that is consumed either individually or in groups. Diets may be modified for making it suitable for sick individuals as a part of treatment - therapeutic diets

- Nutritional care - using knowledge of nutrition for meal planning and preparation to make it in an attractive and acceptable form. In this the existing meals can be modified to improve in terms of nutrition, and acceptability. Diet can be planned for individuals or a group to suit their requirements like health status, nutritional status, place of living, climate etc,.

Functions of food

Physiological Function		Social Function		Psychological Function

Physiological Functions Of Food

- First function of food is to provide energy. Body needs energy to sustain involuntary processes essential for continuing life. It is also required for various activities like professional, household and recreational activities, convert foods into utilizable nutrients required for growth and warmth.

- Another important function is body building. An infant at birth weighs 2.5-3.0 kgs and grows to 50-60 kgs during adulthood , which is possible only if right food in right amount is given from birth to adulthood. Food eaten also help to maintain the structure of the body and helps in repair of worn out tissues

- Food regulates the activities of the body including - heart beat, maintaining body temperature, muscle contraction, water balance, blood clotting and removal of waste products from the body.

- Food helps in improving the immune system and improves resistance power of the body.

Social Functions Of Food

- Food has always been the central part of our existence, social cultural and religious life
- Special foods are distributed during religious functions in homes, temples, churches etc.
- Feasts are given in different stages of life like birth, cradle ceremony, birthdays, marriages etc. many feasts call for feeding specific segment of people.

- Certain menus are associated with specific foods in each region.
- Food has been used as expression of love friendship and social acceptance
- Food is also used to express happiness like success in exams, job, marriages, birth of a baby etc.
- Food for get together, meetings or functions should be planned in a proper manner to bring people together.

Psychological Functions Of Food

- In addition to physical and social needs, food must satisfy certain emotional needs.

- It includes a sense of security, love and attention.

- Familiar foods usually make us feel secure.

^Sharing of food is a token of friendship and acceptance.

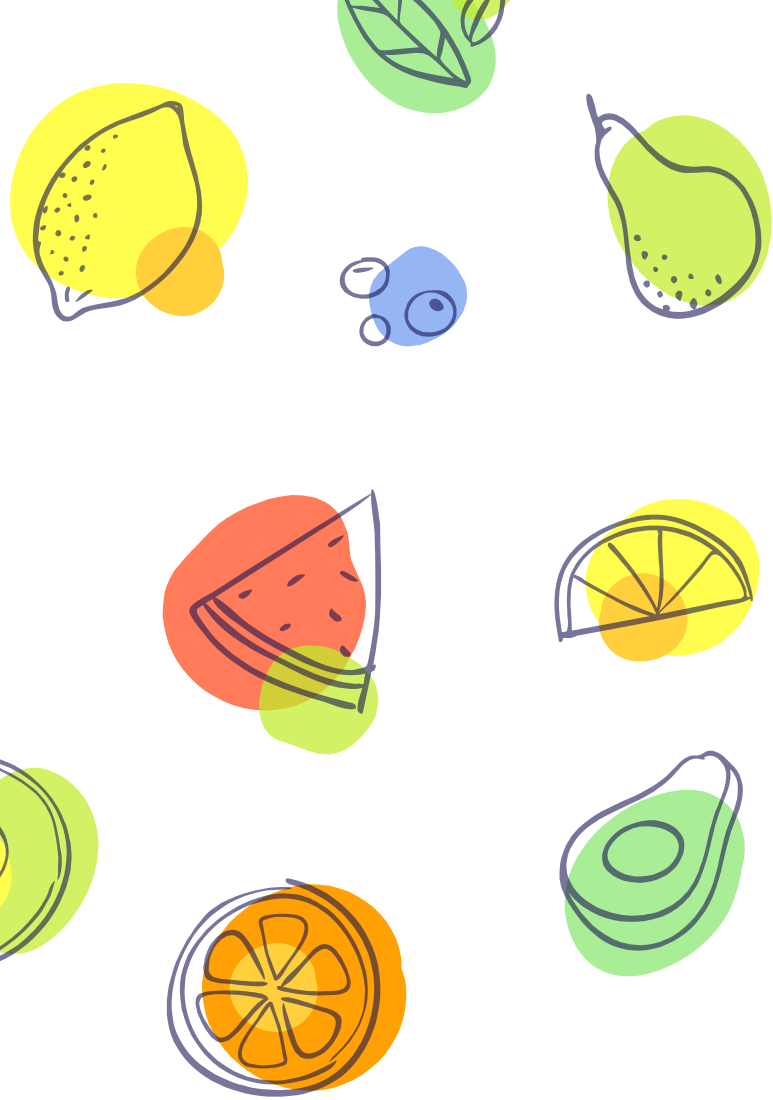
•In a friendly gathering we try unfamiliar foods and thus enlarge our food experiences.

- Anticipating needs and fulfilling these are expressions of love and attention.

- These sentiments are the basis of the normal attachment to mother's cooking or home food.

- If the foods included are unfamiliar or not tasty, then even nutritionally balanced foods may not be satisfactory.
- With time and repeated experience unfamiliar and strange foods become familiar and one develops taste for those foods.
- Therefore these aspects are to be kept in mind while planning meals which are nutritionally adequate and also enjoyable.

Types of nutrients in food



Macronutrients

Carbohydrates

- Provides energy for daily activities.
- Helps mental functioning
- Needed for heart to beat, muscles to move and lungs to breathe
- Carbohydrates provide 45-65% of daily calories

Types of Carbohydrates

- **SIMPLE**
  - Sugars
  - Provide quick energy
  - Sweet to the taste: honey, fruit, candy, etc.

- **COMPLEX**
  - Starches/fibers
  - Provide long-lasting energy
  - Ex) potatoes, pasta bread, etc.

Good vs. Bad Carbs

Good	Bad
non-starchy vegetables	soda
starchy vegetables	white pasta
fruits	white rice
greens	sugary cereal

Macronutrients

Protein

- Essential for the growth and repair of tissue
- Important for making hormones and enzymes
- Can be used as an energy source when energy from carbs is limited
- Every cell in the body contains proteins and used in the formation of many molecules essential for life
- 10% to 35% of total calories comes from protein

Macronutrients

Fat

- Helps the absorption of fat soluble vitamins(A,B,E & K)
- Insulate the body
- Helps the body store energy. Excess fat storage may lead to health complications
- Essential fats play an important role in basic metabolism and may prevent heart disease
- 10-35% of calories comes from fat

Micronutrients

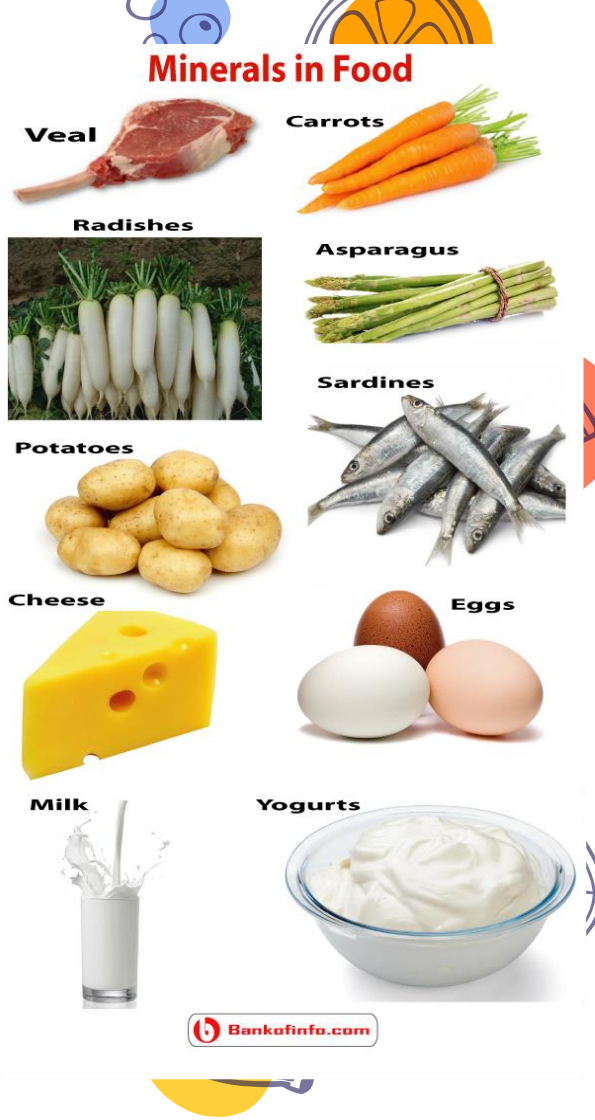
Vitamins

- Vitamin A- Good for eyes , teeth ,and skin
- Vitamin B- Good for immune function, iron absorptior and energy production.
- Vitamin C- Good for strengthening blood vessels, skin elasticity, absorption and anti-oxidant function.
- Vitamin D- Good for strong and healthy bones.
- Vitamin E- Good protection from free radicals, improves blood circulation.
- Vitamin K- Good for blood coagulation and wound healing.

Micronutrients

Minerals

- Ca- Formation of bones and teeth
- Mg- Cofactors for metabolic enzymes
- Fe- Transportation of oxygen
- K- Regulates heart beat, membrane potential
- Zn- Boost body immunity and heal wounds
- Cl- Produce hydrochloric acid in stomach
- I- Produce thyroid hormones
- P- Synthesis of DNA and bones
- Na- Regulates body fluids, maintain pH balance
- Cu- Metabolism of iron and enzymes
- Se- Functioning of antioxidant enzymes



ESSENTIALS OF MACRO-NUTRIENTS

UNIT II

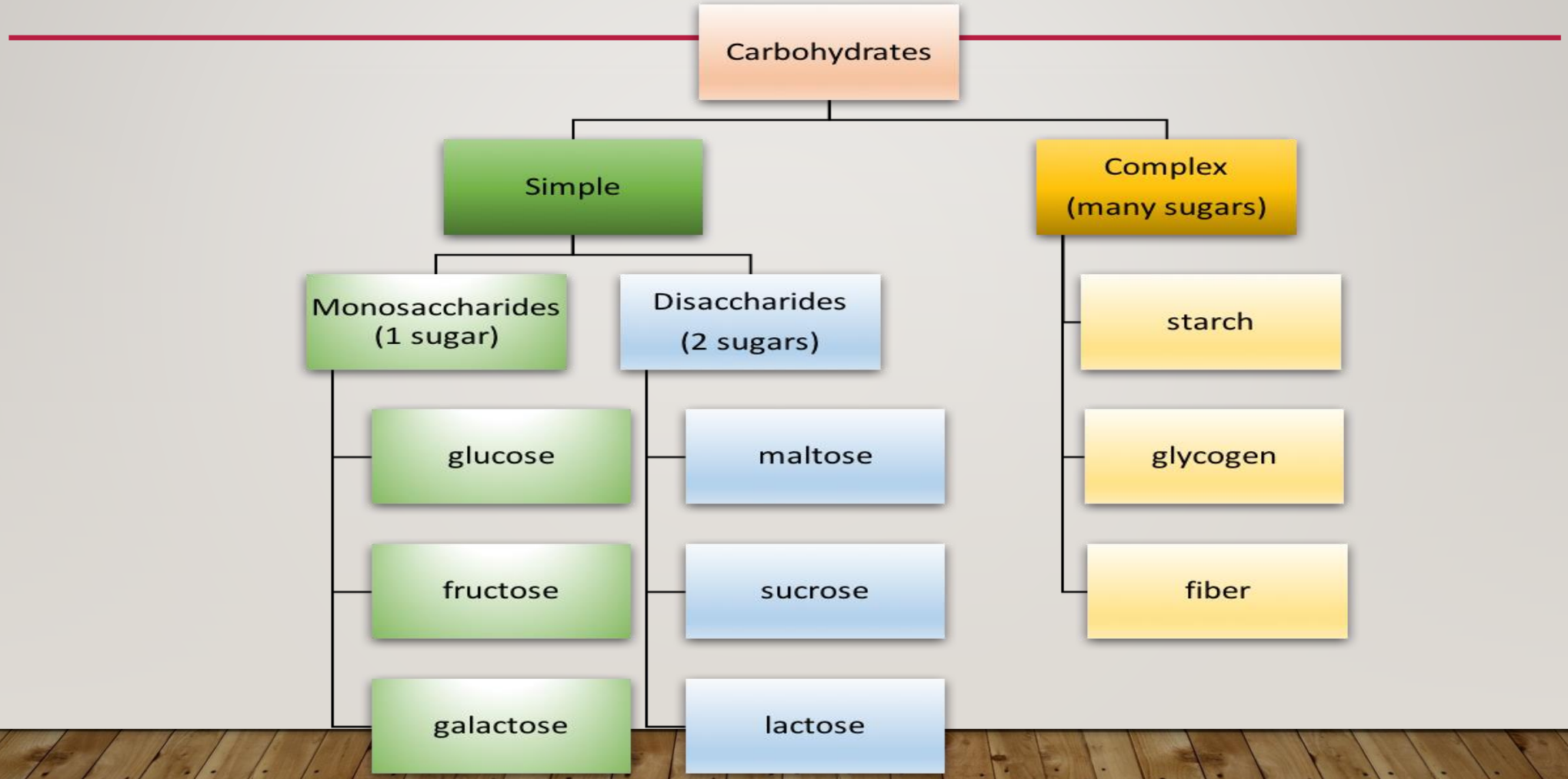
CARBOHYDRATE

CARBOHYDRATES

DEFINITION

- **Carbohydrates** are the sugars, starches and fibers found in fruits, grains, vegetables and milk products.
- Though often maligned in trendy diets, **carbohydrates** — one of the basic food groups — are important to a healthy diet.
- "Carbohydrates are macronutrients, meaning they are one of the three main ways the body obtains energy, or calories," said Paige Smathers, a Utah-based registered dietitian.

CLASSIFICATION



FUNCTIONS

- Carbohydrates provide fuel for the central nervous system and energy for working muscles.
- They also prevent protein from being used as an energy source and enable fat metabolism, according to Iowa State University.
- Also, "carbohydrates are important for brain function," Smathers said.
- They are an influence on "mood, memory, etc., as well as a quick energy source."

REQUIREMENTS

- The Dietary Guidelines for Americans recommends that carbohydrates make up **45 to 65** percent of your total daily calories.
-

Carbs Per Day	
Body weight	**2-2.5g per lb.**
100 lbs.	200-250g
120 lbs.	240-300g
140 lbs.	280-350g
160 lbs.	320-400g
180 lbs.	360-450g
200 lbs.	400-500g

Age	Recommended minimum carbohydrate intake grams/day	Carbohydrate as percent of daily calorie intake
0-6 months	60 g	
7-12 months	95 g	
1 - 8 years	130 g	45 - 65
9 – 18 yrs	130 g	45 - 65
19+ years	130 g	45 - 65
Pregnancy	175 g	45 - 65
Lactation	210 g	45 - 65

SOURCES

- Carbohydrates are found in a wide array of both healthy and unhealthy foods some of them are ;
  bread, **beans**, **milk**, **popcorn**, **potatoes**, cookies, spaghetti, soft drinks, **corn**, and **cherry pie**.
- Variety forms : The most common and abundant forms are sugars, fibers, and **starches.**

SOURCES


COMPLEX
CARBS
Brown rice
Kidney beans
Whole wheat pasta
Raspberries
Green peas
Bananas
Sweet potatoes
Oatmeal
Quinoa
Chickpeas
Black beans
Parsnips

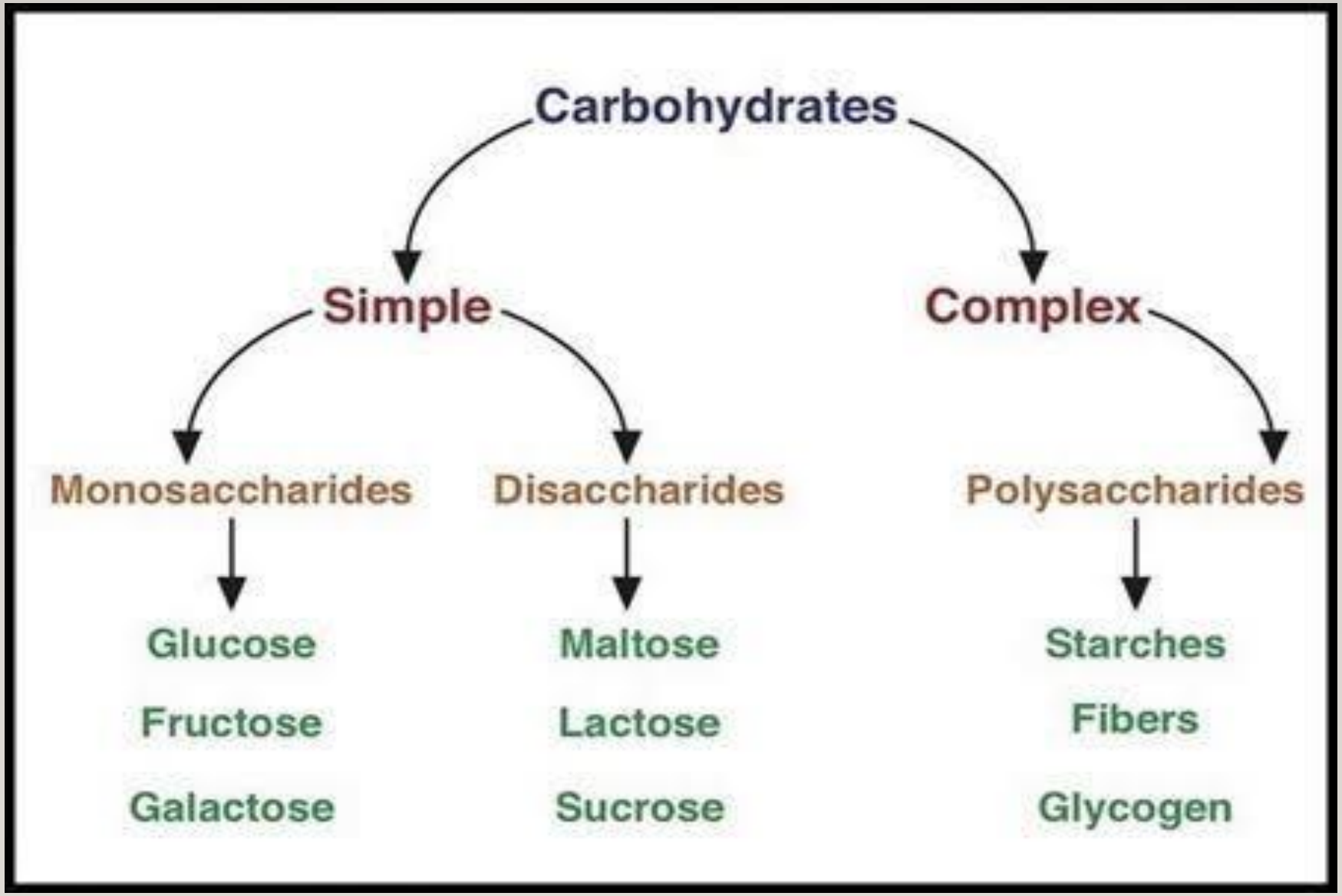

SIMPLE CARBS
VS.
COMPLEX CARBS

CARBOHYDRATES

- Carbohydrates, or carbs, are sugar molecules. Along with proteins and fats, carbohydrates are one of three main nutrients found in foods and drinks.

- The energy produced by carbohydrates is 4 calories per gram.

- Carbohydrates, together with lipids, proteins and nucleic acids, are one of the four major classes of biologically essential organic molecules found in all living organisms.


Carbohydrates
Simple
Complex
Monosaccharides
Disaccharides
Polysaccharides
Glucose
Fructose
Galactose
Maltose
Lactose
Sucrose
Starches
Fibers
Glycogen

CHEMICAL CLASSIFICATION OF CARBOHYDRATES :

On the basis of the number of forming units, four major classes of carbohydrates can be defined:

*Monosaccharides
*Oligosaccharides
*polysaccharides

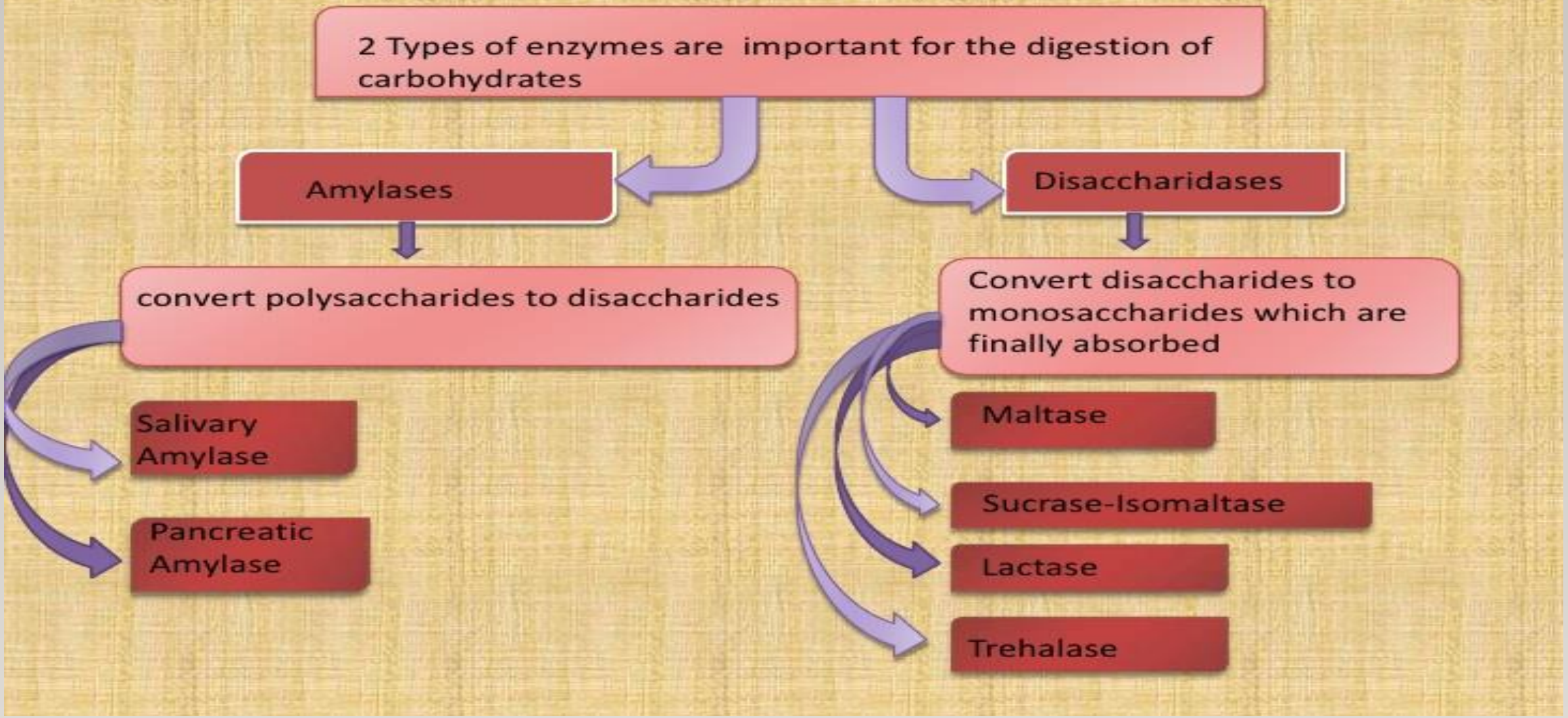
- Monosaccharides - These are simple carbohydrates, which are made of one sugar.

- Oligosaccharides-These are complex carbohydrates that consist of two ten sugars.

- Polysaccharides - These are also complex carbohydrates,they have larger numbers of sugars than an oligosaccharide.

STEPS OF DIGESTION OF CARBOHYDRATES

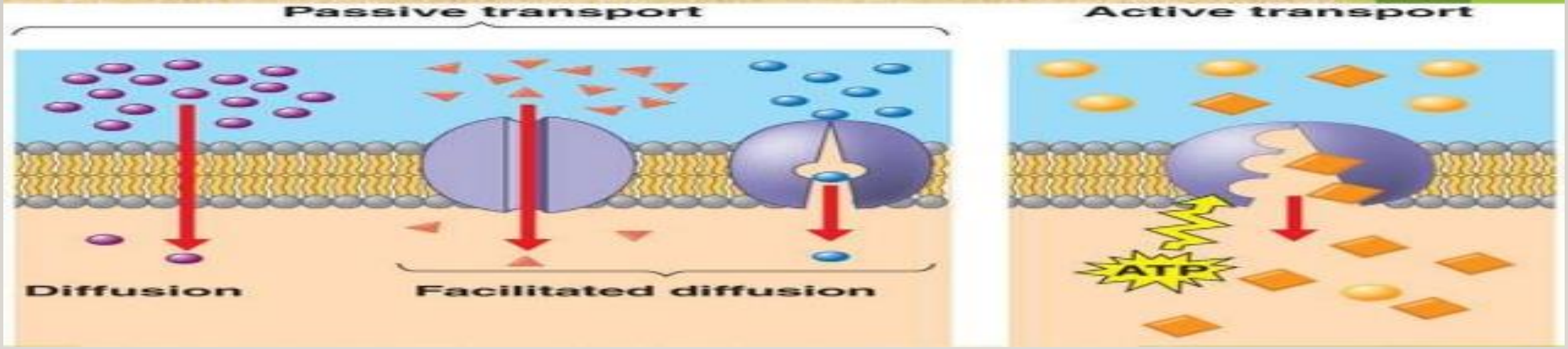
Details of digestion of carbohydrates



Absorption of carbohydrates

3 mechanisms

- Passive diffusion
- Facilitated diffusion/Carrier mediated
- Active transport

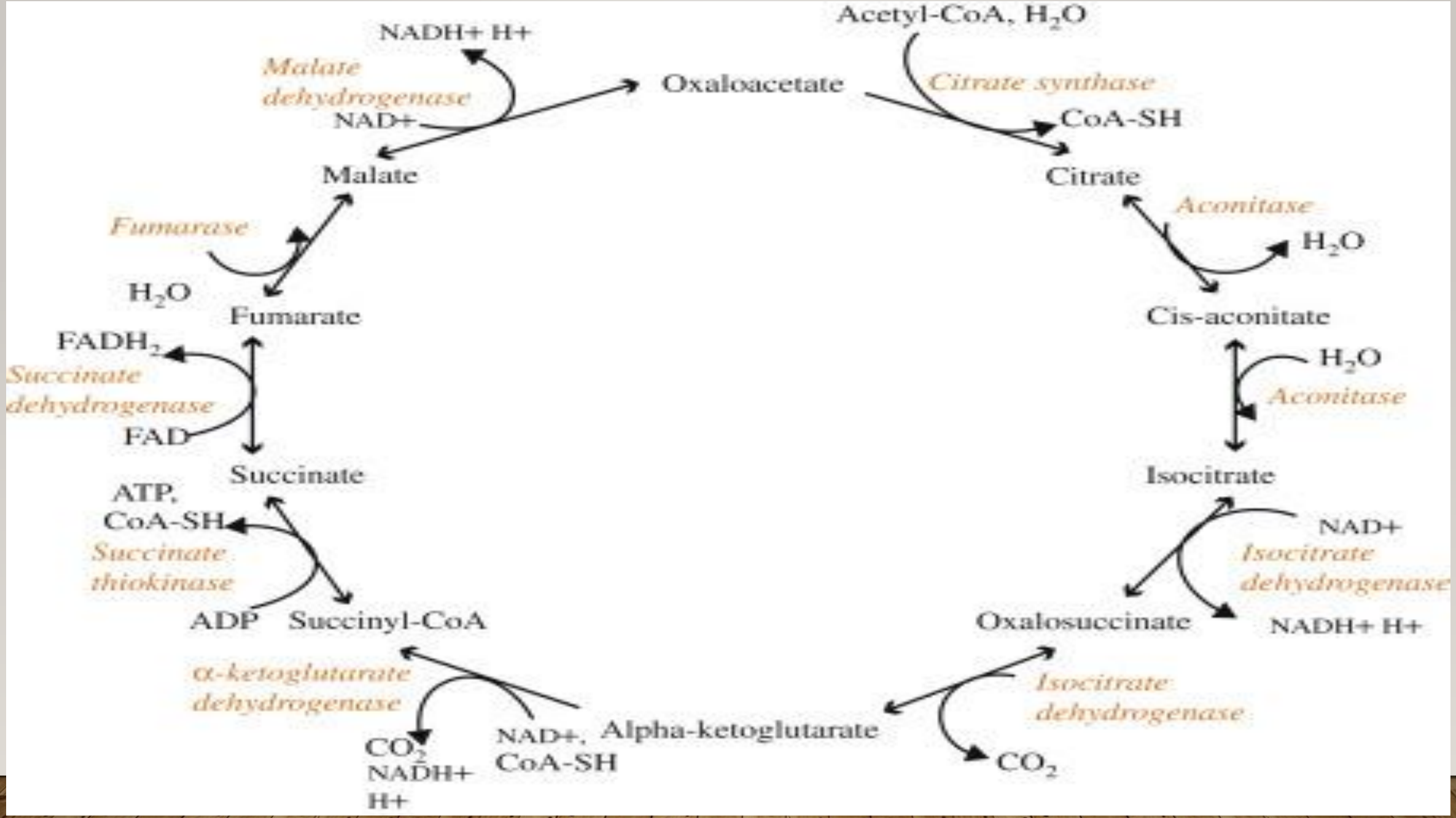


METABOLISM:

Carbohydrate metabolism is the whole of the biochemical processes responsible for the metabolic formation, breakdown, and inter conversion of carbohydrates in living organisms.

The metabolism of glucose

- Aerobic oxidation
- Glycolysis
- Gluconeogenesis
- Pentose phosphate pathway
- Glycogenesis
- Glycogenolysis
- Uronic acid pathway


NADH+ H+
Malate dehydrogenase
NAD+
Oxaloacetate
Acetyl-CoA, H_2O
Citrate synthase
CoA-SH
Malate
Citrate
Fumarase
H_2O
Fumarate
Aconitase
H_2O
Cis-aconitate
$FADH_2$
Succinate dehydrogenase
FAD
H_2O
Aconitase
Succinate
Isocitrate
ATP,
CoA-SH
Succinate thiokinase
ADP
Succinyl-CoA
NAD+
Isocitrate dehydrogenase
Oxalosuccinate
NADH+ H+
α-ketoglutarate dehydrogenase
CO_2
NADH+ H+
NAD+, CoA-SH
Alpha-ketoglutarate
Isocitrate dehydrogenase
CO_2

Carbohydrates have six major functions in the body: *

*providing energy,
* regulating blood glucose,
* sparing the use of proteins for energy,
* breaking down fatty acids,
* providing dietary fiber and
* natural sweetener for foods.

There are both healthy and unhealthy sources of carbohydrates.

- Healthy sources of carbohydrates include both food sources-animal and plant products, such as fresh fruits, vegetables, corn, potatoes, milk and milk products.

- Unhealthy sources include soda, white bread, artificial sugar, pastries, and other highly processed foods.

- Carbohydrates can be found in different forms, such as sugars, starch, and fibres.

REQUIREMENTS OF CARBOHYDRATES:

- The Dietary Guidelines for Americans recommends that carbohydrates make up 45 to 65 percent of your total daily calories. So, if you get 2,000 calories a day, between 900 and 1,300 calories should be from carbohydrates.
- That translates to between 225 and 325 grams of carbohydrates a day.

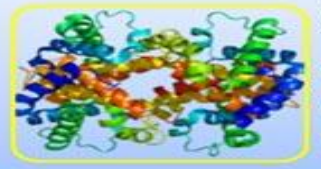
PROTEIN

PROTEIN

- Protein have been regarded as body buiding foods
- 10-15% of the total body energy is derived from protein

CLASSIFICATION

CLASSIFICATION OF PROTEINS

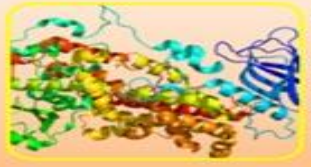


Classification Based on Structure

- *Fibrous Proteins*
- *Globular Proteins*
- *Intermediate Proteins*

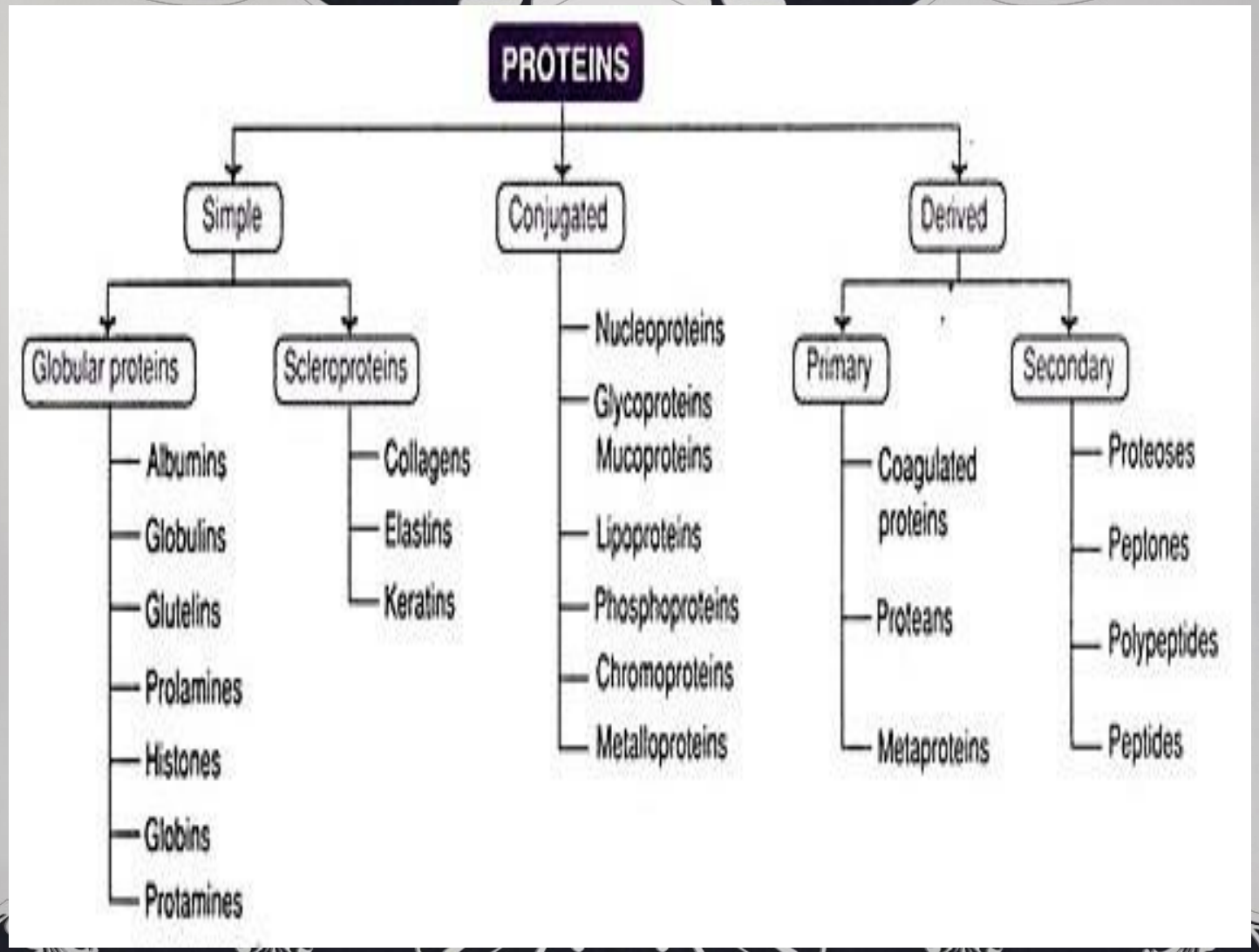
Classification Based on Composition

- *Simple Proteins*
- *Conjugated Proteins*



Classification Based on Functions

- *Structural Proteins, Enzymes, Hormones*
- *Pigments, Transport Proteins, Contractile Proteins*
- *Storage Proteins, Toxins*


PROTEINS
Simple
Conjugated
Derived
Globular proteins
Scleroproteins
Albumins
Globulins
Glutelins
Prolamines
Histones
Globins
Protamines
Collagens
Elastins
Keratins
Nucleoproteins
Glycoproteins
Mucoproteins
Lipoproteins
Phosphoproteins
Chromoproteins
Metalloproteins
Primary
Secondary
Coagulated proteins
Proteans
Metaproteins
Proteoses
Peptones
Polypeptides
Peptides

FUNCTION OF PROTEIN

- Fundamental basis of cell structure & function
- All the enzymes, several harmones, transport carriers, immunoglobulin etc., are proteins
- Involved in the maintenance os osmotic pressure, clotting of blood, muscle contraction.
- During starvation, proteins serve as the major suppliers of energy.

REQUIREMENT OF PROTEIN

- The requirement of protein is dependent on its nutritive value, caloric intake & physiological states (growth, pregnancy, lactation) of individual
- For an adukt 0.8 – 1.0 gm protein / kg body weight/ day is adequate.
- The requirement is nearly double for growing children, pregnant & lactating women.

PROTEINS CLASSIFICATION

Definition:

- Proteins are organic compounds with a high molecular weight formed of carbon, oxygen, hydrogen and nitrogen and may also contain sulfur, phosphorus and non-protein organic groups and metal ions.
- They are polymers formed of subunits

PROTEINS

- Proteins are a class of most important compounds that are found in living organisms.
- Proteins are the main constituents of our body such as

SOURCES OF PROTEINS

- Meat (all types) , milk, eggs, pulses, beans, peas, lentil, seeds, nuts, etc.

CALORIC VALUE OF

PROTEINS MAY BE CLASSIFIED ON THE BASIS OF:

- Physico-chemical properties.
- Functions.
- Nutritional value.
- Molecular Length & shape.

PHYSICO- CHEMICAL PROPERTIES

- **SIMPLE PROTEINS:**
  - On Hydrolysis yields only Amino Acids.
- **CONJUGATED PROTEINS:**
  - On hydrolysis besides Amino acids, they also yield Non-Protein substances. (Prosthetic groups).
- **DERIVED PROTEINS.**
  - They are derived from simple or conjugated proteins.

TYPES OF SIMPLE PROTEINS

- Albumins
- Globulins.
- Globins
- Protamins.
- Pritamines.
- Histones.
- Albuminoids.---

-----Collagen , ------
---Elastin &--------
-- Keratin

SIMPLE PROTEINS

- **ALBUMIN**: Water soluble
- **GLOBULINS**: Insoluble in water
- **GLOBINS** : Rich in Histidine.They unite with Heme--- Hemoglobin.
- **PROTAMINS**: Insoluble in water.Rich in Proline.

  Examples are Gliadin of wheat & Zein of maize.
- **HISTONES:** Rich in Arginine.They form nucleoproteins.
- **PROTAMINES:** Present in sperm cells.

SIMPLE PROTEINS

- **ALBUMINOIDS:** They are also called as Scleroprotein.These include Collagen ,Elastin & Keratin.
- **COLLAGEN:** Present in connective tissue

Occurs in skin,bone,tendons ,cornea & sclera of eye.

- **ELASTIN:** Occurs in tendon and arteries.
- **KERATIN:** It occurs in animal skin,hair,nails ,hoofs and feather.

COMPOUND (CONJUGATED) PROTEINS

- Upon hydrolysis besides amino acids, they also yield Non-Protein substances (**Prosthetic groups**).
- **Types of Conjugated Proteins:**
  - Nucleo- Proteins.
  - Phospho- Proteins.
  - Lipo- Proteins.
  - Carbohydrate Containing Proteins.
  - Chromo-proteins.
  - Metallo- Proteins.

NUCLEO-PROTEINS

- Histones and protamines conjugated with nucleic acids like DNA and RNA.
- Plays role in Genetic information.

PHOSPHO-PROTEINS

❖Proteins conjugated with phosphoric acid.

❖Examples:

- Casein in milk.
- Vitellin in egg yolk.

LIPO-PROTEINS

- Proteins conjugated with lipids .
- Like Fatty Acids, Lecithin, Cephalin to form VLDL, LDL and HDL

CARBOHYDRATE – CONTAINING PROTEINS

They comprise :

- Proteoglycans and
- Glycoprotein

CHROMO-PROTEINS

- Proteins conjugated with Pigments.
- Examples:
  - Haemoglobin.
  - Cytochromes
  - Rhodopsin.

METALLO-PROTEINS

- Proteins conjugated with metals.
- Examples:
  - Iron in Ferretin
  - Copper in Ceruloplasmin.

DERIVED PROTEINS

- Derived from simple or compound proteins by denaturation or some chemical reaction such as hydrolysis.
- They are subdivided into Primary & Secondary derived proteins.

PRIMARY DERIVED PROTEINS

- These are denatured or co-agulated proteins.

Example : Egg proteins

SECONDARY DERIVED PROTEINS

These are intermediates formed in protein hydrolysis.

Examples are :

- Proteoses
- Peptones
- Polypeptides
- Oligopeptides

FUNCTIONAL CLASSIFICATION

- Catalytic. (simple or con. Proteins)
- Regulatory(Insulin or GH)
- Structural(Collagen & Elastin)
- Transport(Transferrin→Fe)
- Defensive.(Ig)
- Contractile.(Actin & Myosin)
- Genetic(Histones
- Storage.(Casein in milk)

NUTRITIONAL CLASSIFICATION

- High biological value proteins:
  - Proteins which contain all the essential amino acid e.g. proteins from animal sources.
- Low biological value proteins:
  - Proteins which do not contain all the essential amino acid e.g. proteins from plant sources.

Top 10 Sources of Veggie Protein

design / layout by:
Q-Mars Imandel
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Where do you get your protein?

(brought to you by The GIVE Project)

the GIVE project
thegiveproject.org
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Spinach
49% protein

Kale
45% protein

Broccoli
45% protein

Cauliflower
40% protein

Mushrooms
38% protein

Parsley
34% protein

Cucumbers
24% protein

Green Pepper
22% protein

Cabbage
22% protein

Tomatoes
18% protein

Protein in Meat:

Beef
25.8% protein

Chicken
23% protein

Eggs
12% protein

CLASSIFICATION BASED UPON MOLECULAR LENGTH & SHAPE

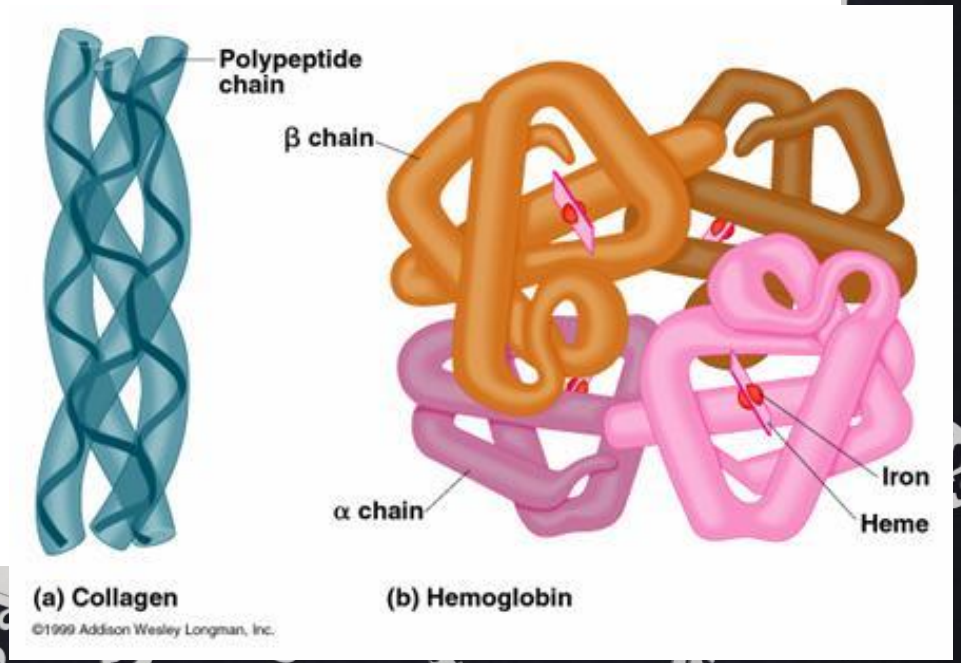
❖Structure of a protein depends on the axial ratio of the proteins i.e. length divided by width of the protein.

❖**Globular proteins:**

- Axial ratio is less than 10.

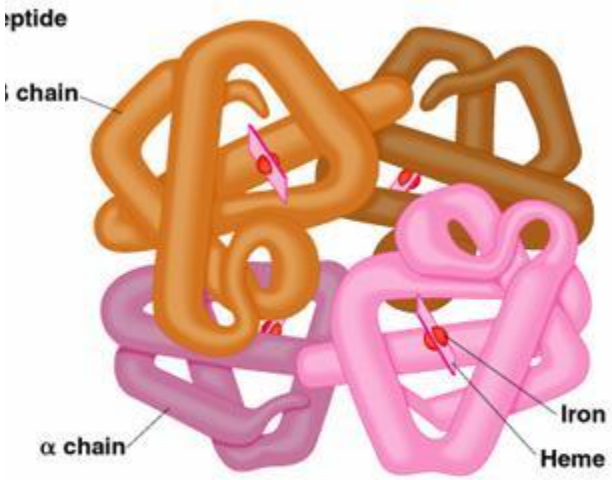
❖**Fibrous proteins:**

- Axial ratio is greater than 10.



GLOBULAR PROTEINS

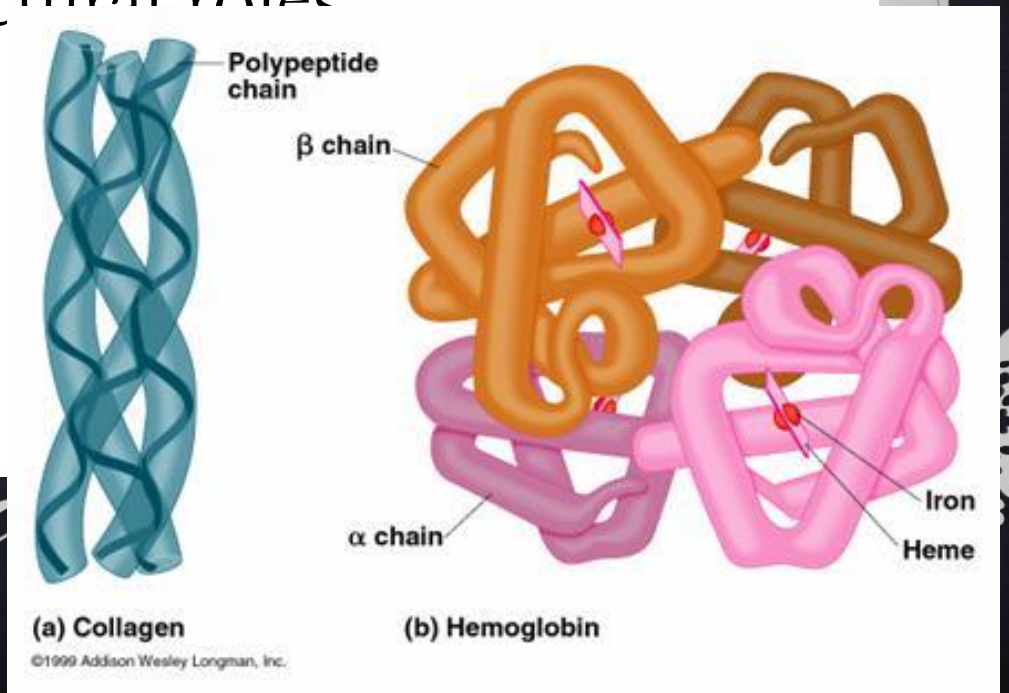
- Tightly Folded into spherical (globular) or ovoid shapes.
- Usually water soluble.
- Most of them have roles in metabolic reactions.
- **Examples:**
  - Albumin.
  - Globulin.
  - Enzymes
  - Haemoglobin.

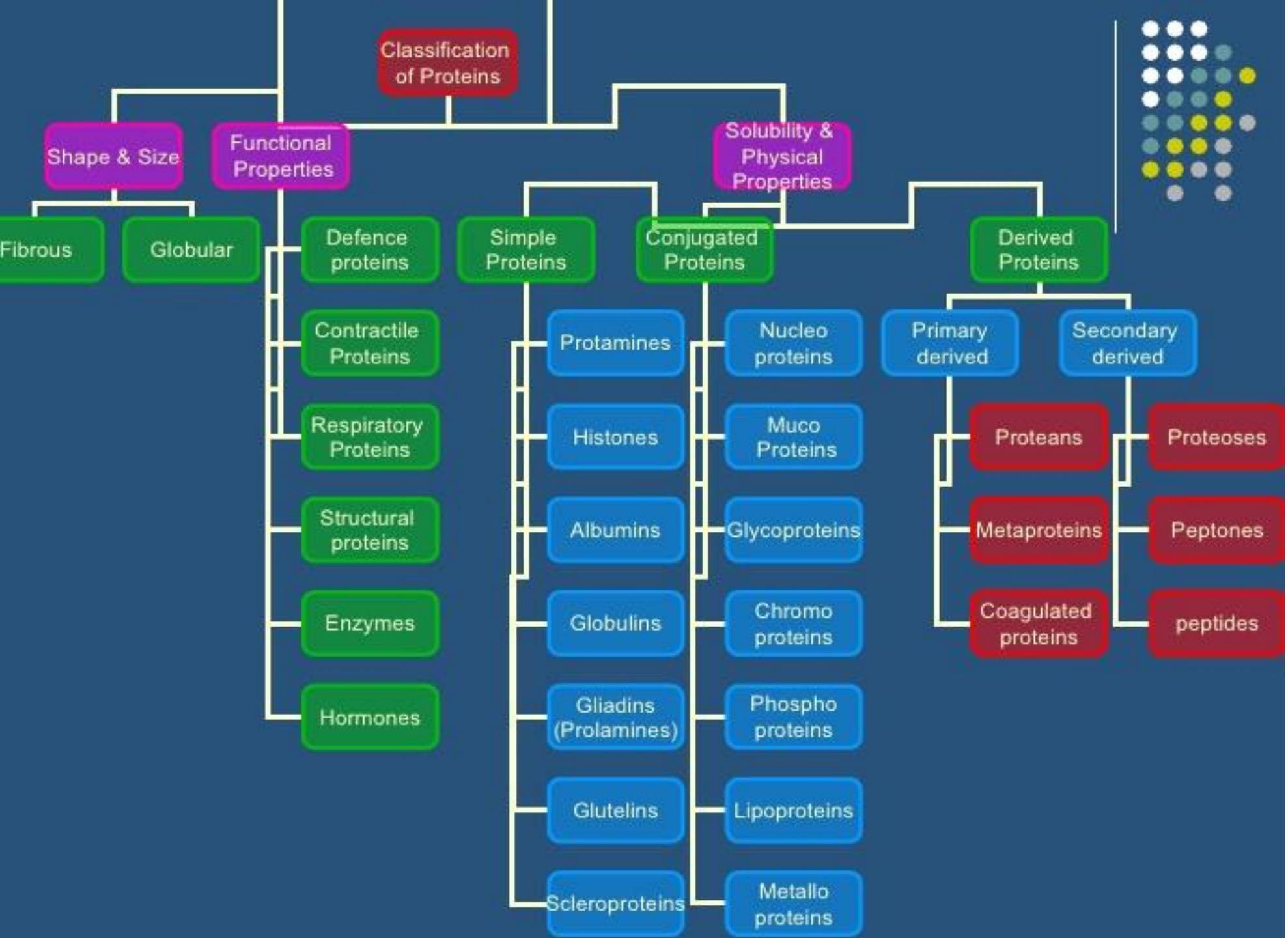


(b) Hemoglobin

FIBROUS PROTEINS

- Thread like fibrils or long fibers.
- Long parallel polypeptide chains.
- Cross linkages at intervals forming long fibres or sheets.
- Usually insoluble in water.
- Many have structural roles.
- **Examples:**
  - Collagen.
  - Elastin.
  - Keratin.




Classification of Proteins
Shape & Size
Functional Properties
Solubility & Physical Properties
Fibrous
Globular
Defence proteins
Contractile Proteins
Respiratory Proteins
Structural proteins
Enzymes
Hormones
Simple Proteins
Conjugated Proteins
Derived Proteins
Protamines
Histones
Albumins
Globulins
Gliadins (Prolamines)
Glutelins
Scleroproteins
Nucleo proteins
Muco Proteins
Glycoproteins
Chromo proteins
Phospho proteins
Lipoproteins
Metallo proteins
Primary derived
Secondary derived
Proteans
Metaproteins
Coagulated proteins
Proteoses
Peptones
peptides

PROTEIN SOURCES FUNCTIONS AND METABOLISM

PROTEIN

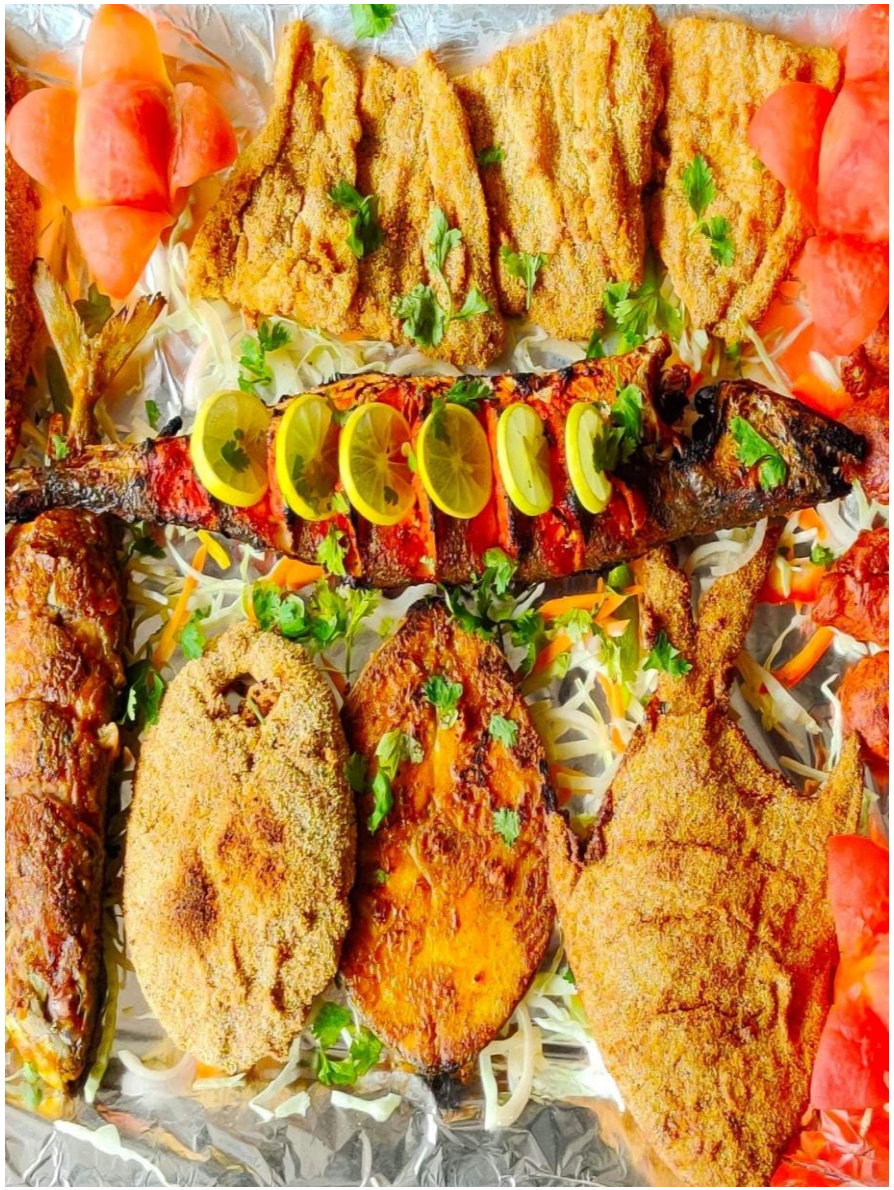
- Sources of Protein
- Good protein sources
- Function of protein
- Protein Metabolism

SOURCES OF PROTEIN

Most animal sources of protein such as meat, poultry, fish, eggs and dairy deliver all the amino acids your body needs, while plant based protein sources such as grain, beans, etc.

GOOD PROTEIN SOURCES

Protein can help you shed those unwanted pounds and keep your belly full. But it's important to eat the right amount and the right kind of protein to get it's health benefits.



SEA FOOD

- *Sea food is an excellent source of protein because it's usually low in fat.*
- *It has omega-3 fatty acids.*

WHITE-MEAT POULTRY

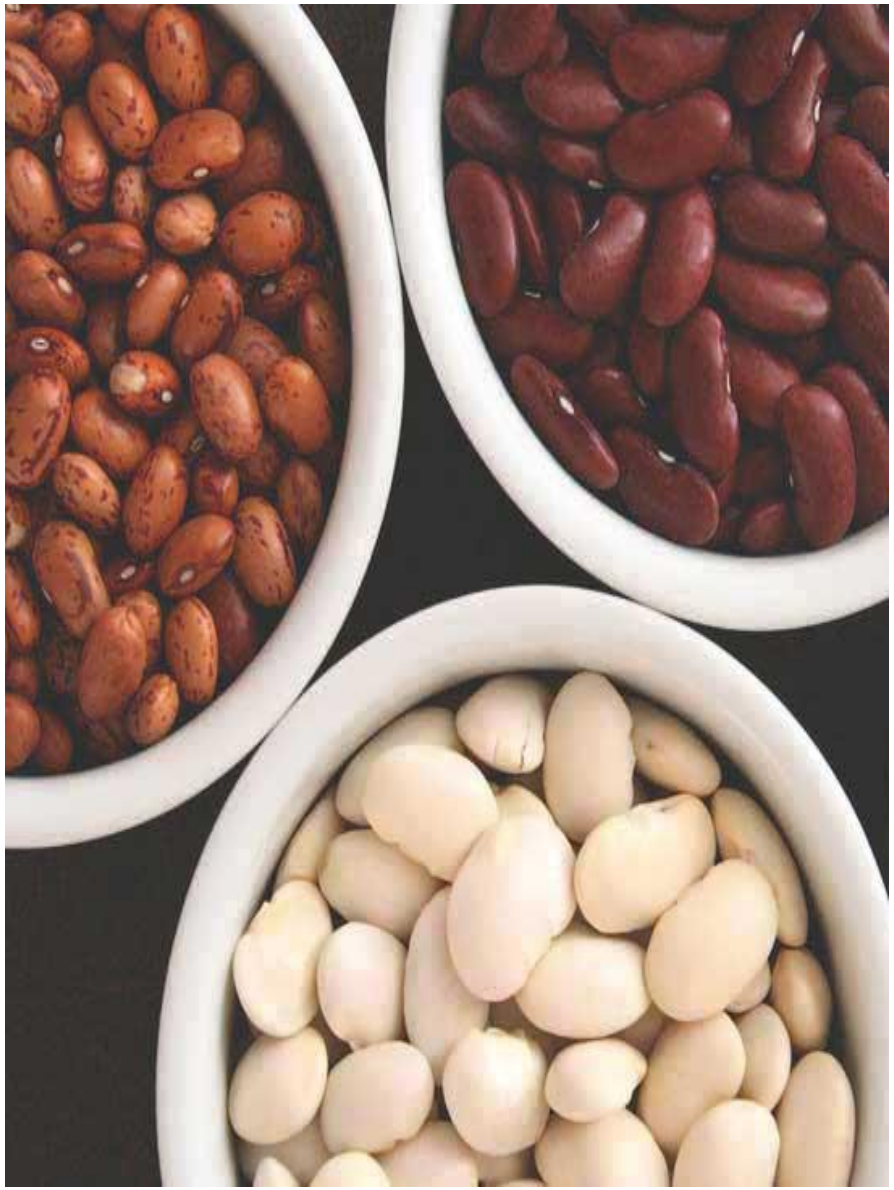
- *Stick to white meat of poultry for excellent, lean protein.*
- *Dark meat is a little higher in fat.*

MILK, CHEESE & YOGURT

Not only are dairy foods like milk, cheese and yogurt excellent sources of protein, but they also contain valuable calcium and many are fortified with Vitamin-D.

EGGS

- *Eggs are one of the least expensive forms of protein.*
- *The American Heart Association says normal healthy adults can safely enjoy an eggs a day.*



BEANS

One-half cup of beans contain as much plant based protein as an ounce of broiled steak.

PORK TENDERLOIN

This versatile white meat is 31% leaner than it was 20 years ago.

SOY

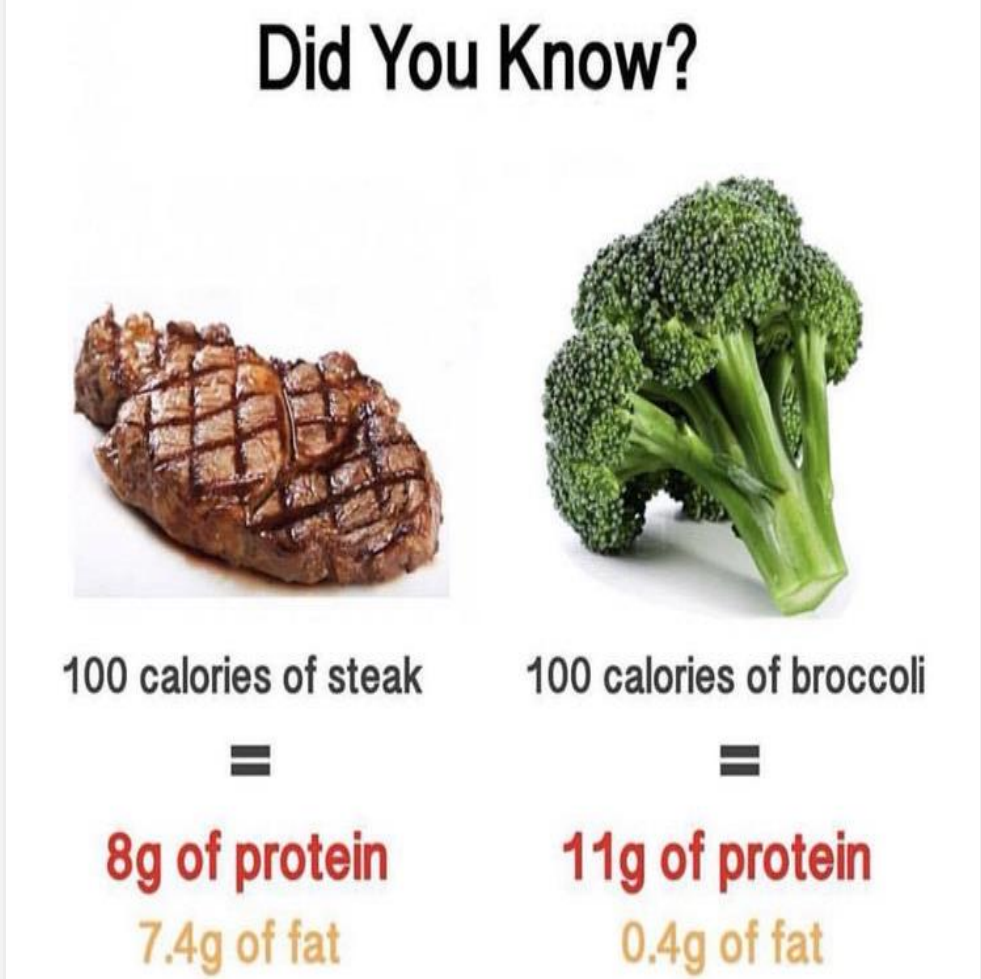
- *Fifty grams of soy protein daily can help lower cholesterol by about 3%.*
- *Eating plant based soy protein instead of sources of higher fat protein and maintaining a healthy diet can be good for your heart.*

LEAN BEEF

Lean beef has about two grams more saturated fat than a skinless chicken breast.

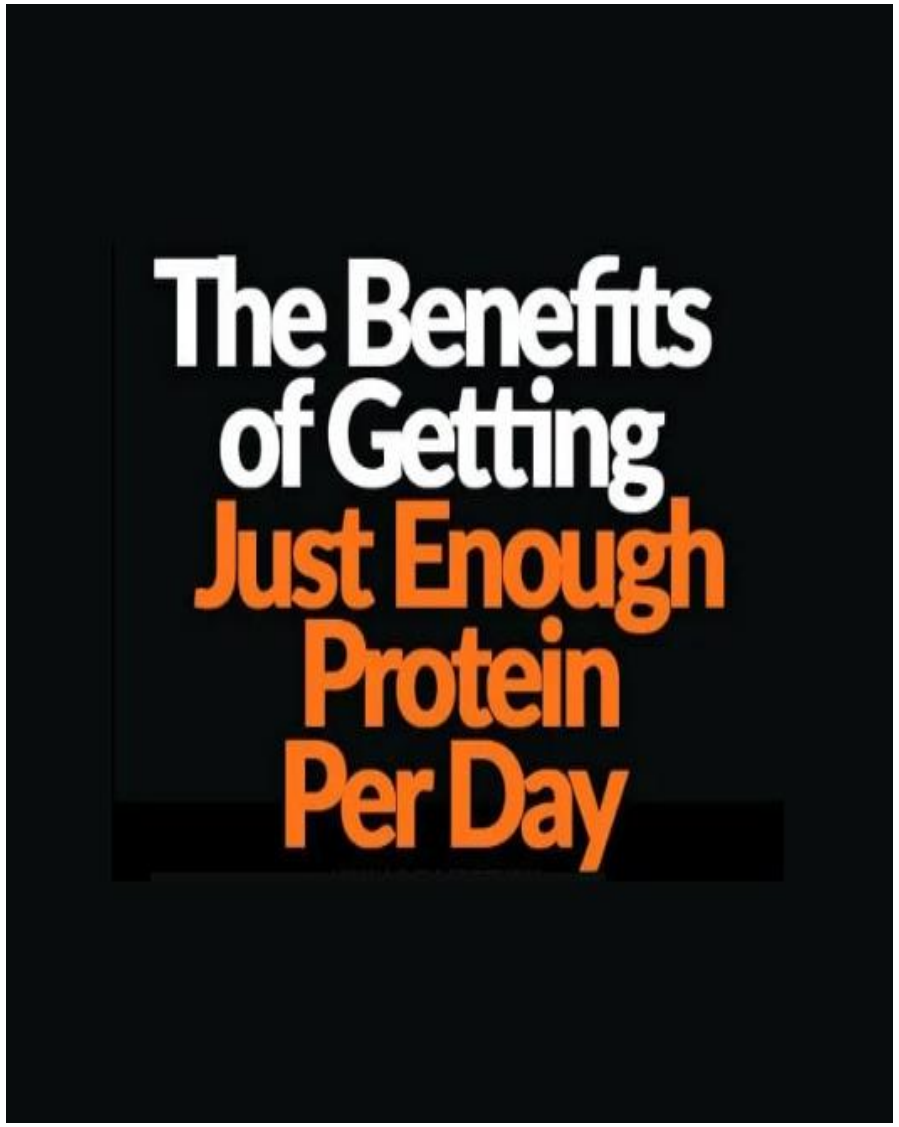
Function of Protein

- Protein is crucial to good health.
- There are 20 amino acids that help form the thousands of different protein in your body.
- Protein do most of their work in the cell and perform various jobs.
- Protein helps in growth and maintenance of our body.



Function of Protein

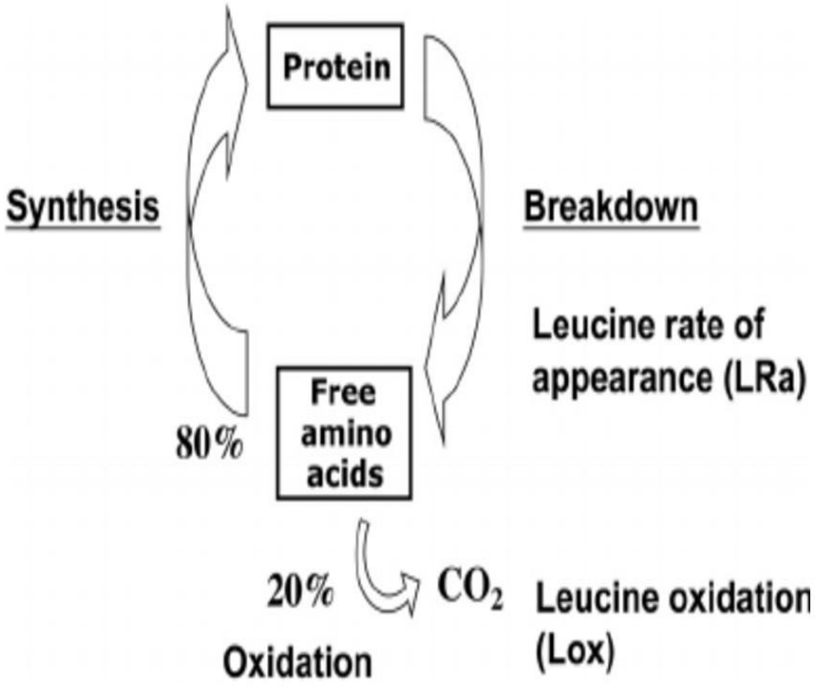
- It causes bio chemical reactions.
- Some proteins are hormones which are chemical messengers that aid communication between your cells, tissues and Organs.
- Some proteins are fibrous and provide cells and tissues with stiffness and rigidity.
- Protein provides energy and bolsters immune health and also balances fluids.



Function of Protein

- Protein maintains proper pH.
- Examples of pH value of common substances include
  - pH2: Stomach acid
  - pH4: Tomato juice
  - pH5: Black coffee
  - pH7: Human blood
  - pH10: Milk of Magnesia
  - pH12: Soapy water

PROTEIN METABOLISM



Protein metabolism denotes the various biochemical processes responsible for the synthesis of proteins and amino acids(anabolism), and the breakdown of proteins by catabolism.

PEM

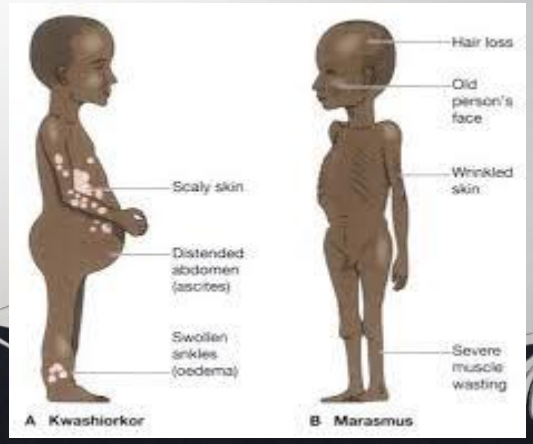
KWASHIORKOR

INTRODUCTION

- Kwashiorkor, also known as “edematous malnutrition” because of its association with edema (fluid retention), is a nutritional disorder most often seen in regions experiencing famine
- It is a form of malnutrition caused by a lack of protein in the diet. People who have kwashiorkor typically have an extremely emaciated appearance in all body parts except their ankles, feet, and belly, which swell with fluid.

- Kwashiorkor is rarely found in the United States and other countries with a generally steady food supply.

- It’s most common in sub-Saharan Africa and other countries where people routinely have a limited supply of food.



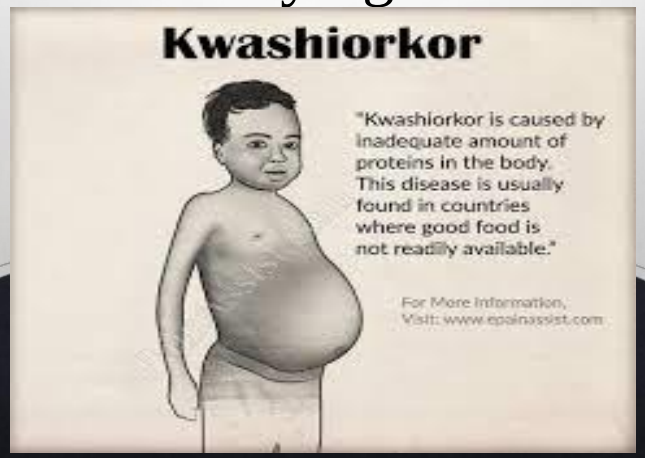
CAUSES

- Kwashiorkor is caused by a lack of protein in the diet. Every cell in your body contains protein. You need protein in your diet for your body to repair cells and make new cells. A healthy human body regenerates cells in this way constantly.

- Protein is also especially important for growth during childhood and pregnancy. If the body lacks protein, growth and normal body functions will begin to shut down, and kwashiorkor may develop.

- A limited supply or lack of food is common in these countries during times of famine caused by natural disasters such as droughts or floods or political unrest.

- If kwashiorkor does occur in the United States, it can be a sign of abuse, neglect, or fad diets, and it’s found mostly in children or older adults. It can also be a sign of an underlying condition, such as HIV.



SYMPTOMS

- Change in skin and hair color (to a rust color) and texture
- Fatigue
- Diarrhea
- Loss of muscle mass
- Failure to grow or gain weight
- Edema (swelling) of the ankles, feet, and belly
- Damaged immune system, which can lead to more frequent and severe infections
- Irritability
- Flaky rash
- Shock

DIAGNOSATION OF KWASHIORKOR

- If kwashiorkor is suspected, your doctor will first examine you to check for an enlarged liver (hepatomegaly) and swelling.
- Next, blood and urine tests may be ordered to measure the level of protein and sugar in your blood.
- Other tests may be performed on your blood and urine to measure signs of malnutrition and lack of protein. These tests may look for muscle breakdown and assess kidney function, overall health, and growth.

- Arterial Blood Gas
- Blood Urea Nitrogen (BUN)
- Blood Levels of Creatinine
- Blood Levels of Potassium
- Urinalysis
- Complete Blood Count (CBC)

TREATMENT FOR KWASHIORKOR

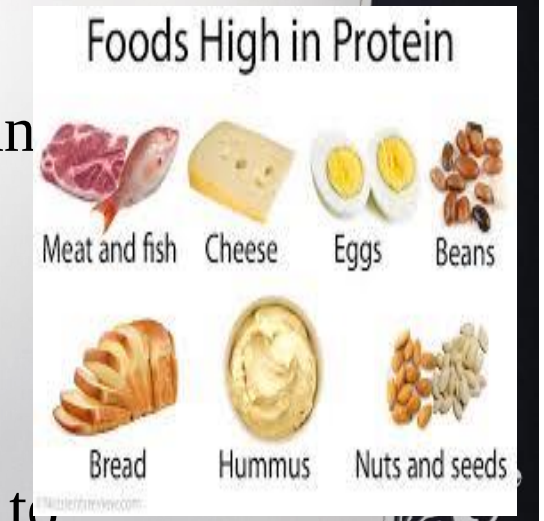
- Kwashiorkor can be corrected by eating more protein and more calories overall, especially if treatment is started early.
- You may first be given more calories in the form of carbohydrates, sugars, and fats. Once these calories provide energy, you will be given foods with proteins.
- Foods must be introduced and calories should be increased slowly because you have been without proper nutrition for a long period.
- Your doctor will also recommend long-term vitamin and mineral supplementation to your diet.

EFFECTS OF KWASHIORKOR

- Kwashiorkor is a severe form of malnutrition
- It's most common in some developing regions where babies and children do not get enough protein or other essential nutrients in their diet.
- The main sign of kwashiorkor is too much fluid in the body's tissues, which causes swelling under the skin (edema).

RIGHT FOOD

- Dietary guidelines from the Institute of Medicine Trusted Source recommend that 10 to 35 percent of adults' daily calories come from protein.
- Bananas, fruit juice, meat, eggs, vegetables, an cereals are gradually added to give a diet throughout most of the recovery period containing 5 to 7 g of protein and 130 to 150 cal.
- Penicillin is given routinely for the first eight to ten days and supplementary iron therapy is started after one week has elapsed.



COMPLICATIONS OF KWASHIORKOR

- Even with treatment, children who have had kwashiorkor may never reach their full growth and height potential.

- If treatment comes too late, a child may ha permanent physical and mental disabilities

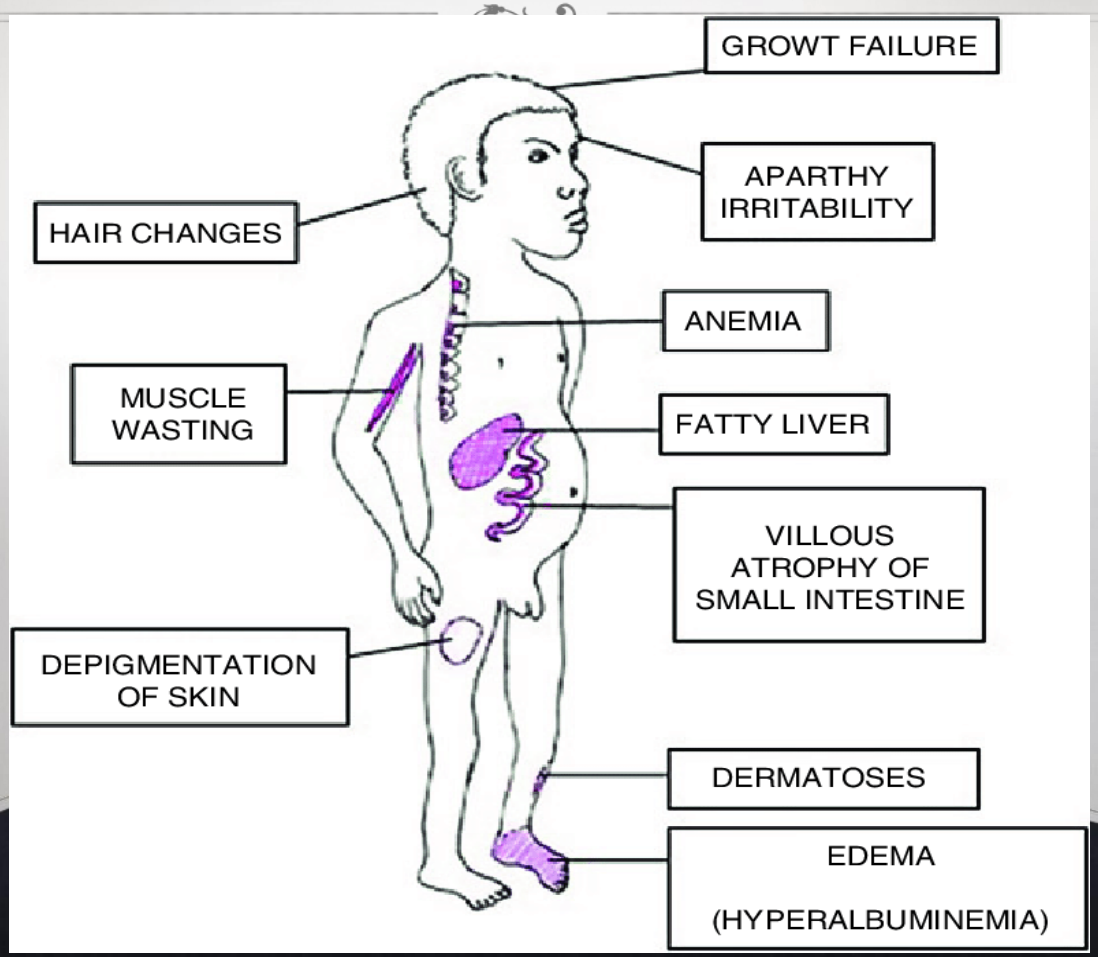
- If left untreated, the condition can lead to coma, shock, or death.

DIFFERENCE BETWEEN KWASHIORKOR &MARASUMUS

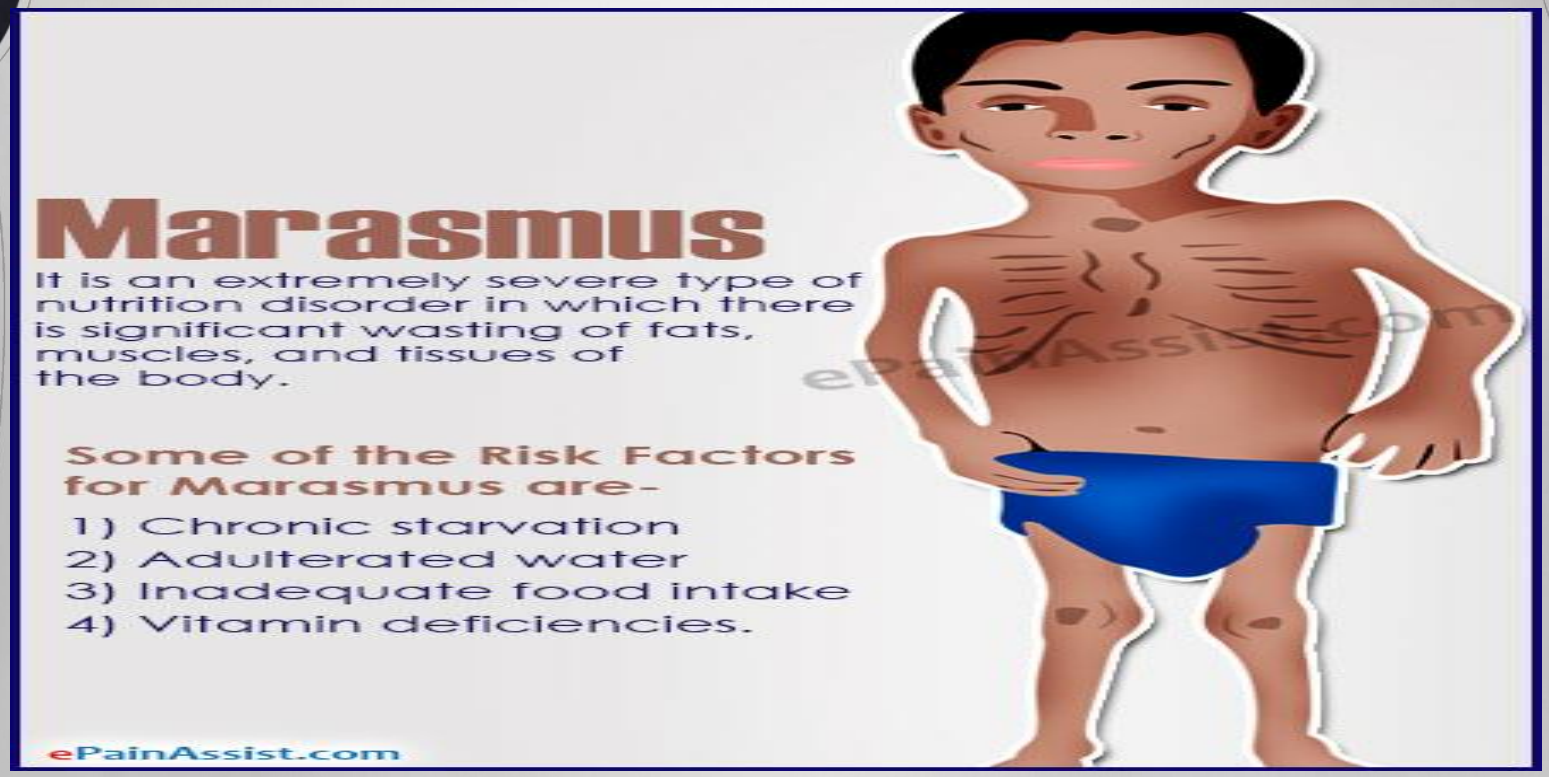
- Marasmus is a form of severe malnutrition characterized by energy deficiency.

- It can be distinguished from kwashiorkor in that kwashiorkor is protein deficiency with adequate energy intake whereas marasmus is inadequate energy intake in all forms, including protein.

KWASHIORKOR



MARASMUS


Marasmus
It is an extremely severe type of nutrition disorder in which there is significant wasting of fats, muscles, and tissues of the body.
Some of the Risk Factors for Marasmus are-
1) Chronic starvation
2) Adulterated water
3) Inadequate food intake
4) Vitamin deficiencies.
ePainAssist.com

DIETARY SOURCES

- lean meat, poultry and fish
- eggs
- dairy products like milk, yoghurt and cheese
- seeds and nuts
- beans and legumes (such as lentils and chickpeas)
- soy products like tofu
- some grain and cereal-based products are also sources of protein, but are generally not as high in protein as meat and meat alternative products

Marasmus (PEM)	Kwashiorkor
Severe deficiency of all nutrients and inadequate caloric intake	Severe protein deficiency but normal caloric intake
Peripheral edema is absent	Peripheral edema is present
Hair changes absent	Hair changes common (sparse and easily pulled out)
Skin is dry and wrinkled but no dermatosis	Dermatosis, flaky paint appearance of skin
Voracious appetite	Poor appetite
Absent subcutaneous fat	Reduced subcutaneous fat
Fatty liver uncommon	Fatty liver common
Better prognosis	Worse prognosis


Any
questions


Just Writing...
To say Thanks!