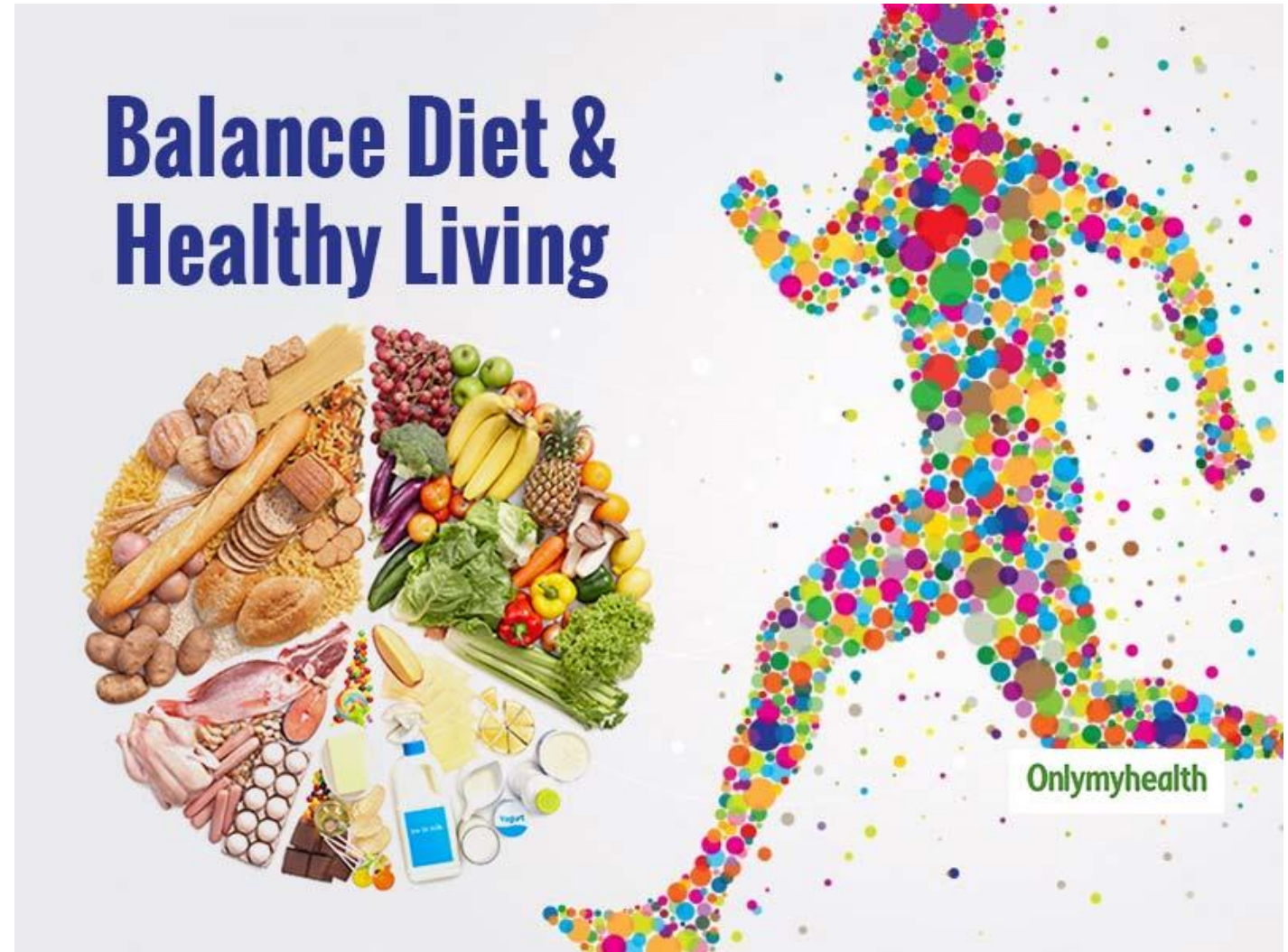


Concept of Balanced Diet

Dr. Rupesh B. Yadav

Asst. Prof.
TCSC, Mumbai.



What is balance diet



- A **balanced diet** is one that **includes foods from all groups during the day meal.** The quantities & proportions of these foods need to be such that, they fulfil our daily requirements for all nutrients.



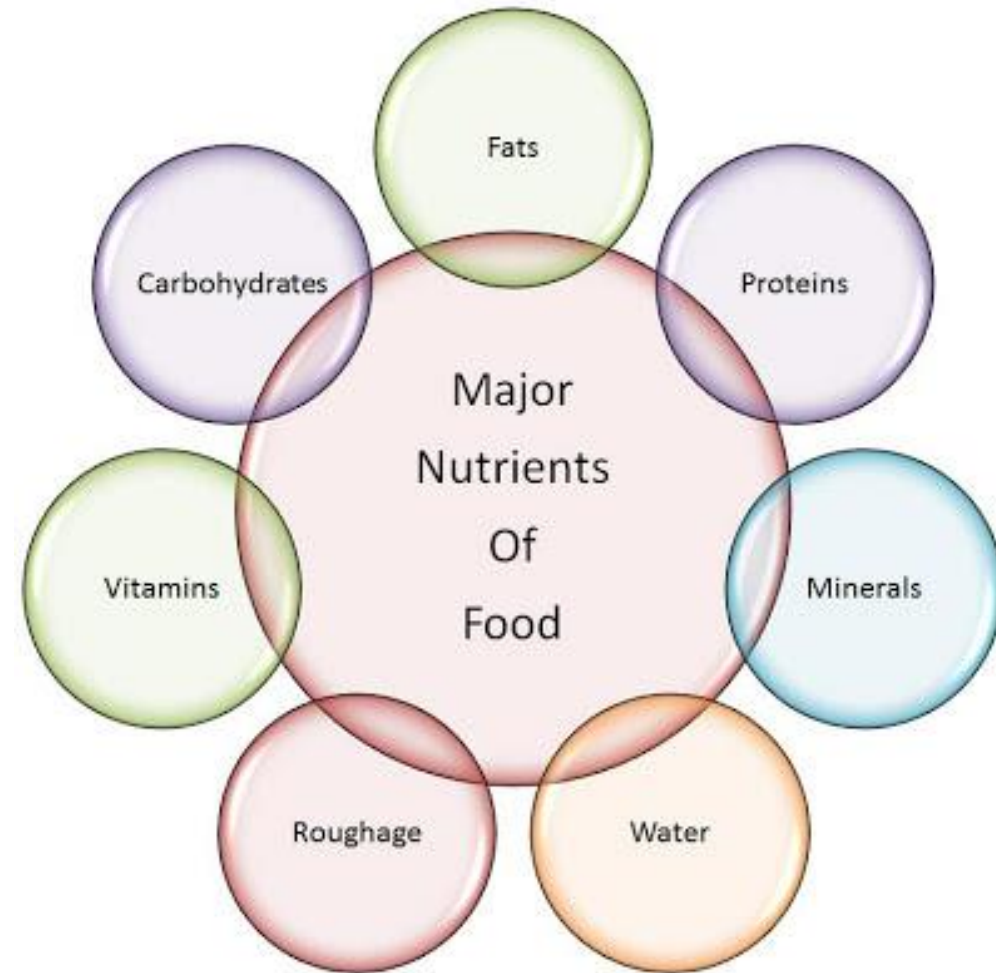
Diet & dietary recommendations

- The food is eaten because all the nutrients required by the body are present in different kinds of food.
- A nutrient is generally defined as “any substance that provides nourishment, and which is essential for growth and maintenance of life”.



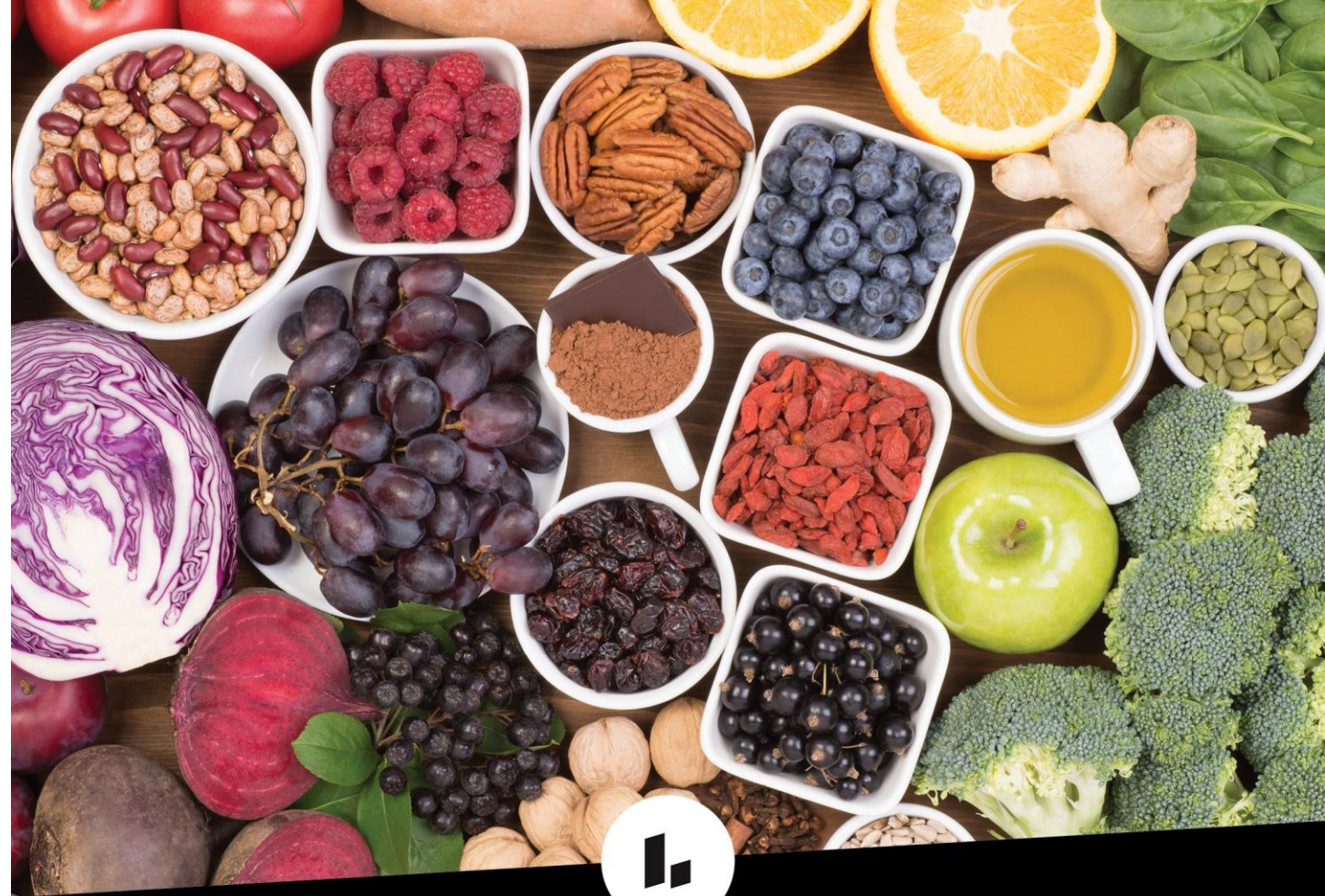
Diet & dietary recommendations

- The **major nutrients** are **proteins, carbohydrates, and fats** which form the bulk of the diet.
- **Proteins** are made up of **amino acids**, which are building **blocks for body** tissues as they **help to create, maintain and renew tissues** in the body.
- A **very large portion carbohydrate** diet is **converted to glucose** which is used for **energy**.



Diet & dietary recommendations

- Besides these macronutrients, body also requires small quantities of a number of other nutrients called micronutrients. These include minerals such as iron, zinc, calcium etc. and vitamins - organic substances necessary for normal functioning of the body.



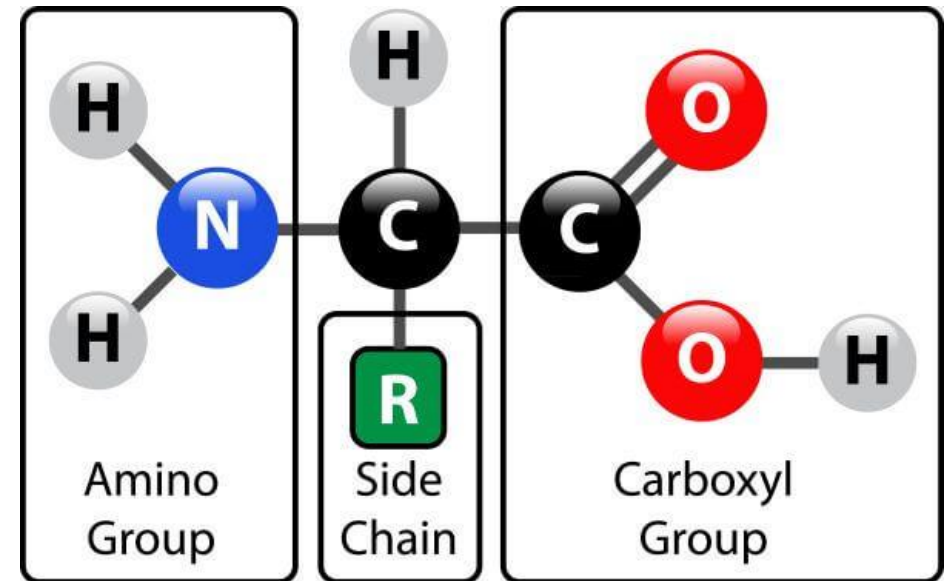
THE ULTIMATE GUIDE TO

Micronutrients

Nutrients & their functions

Proteins

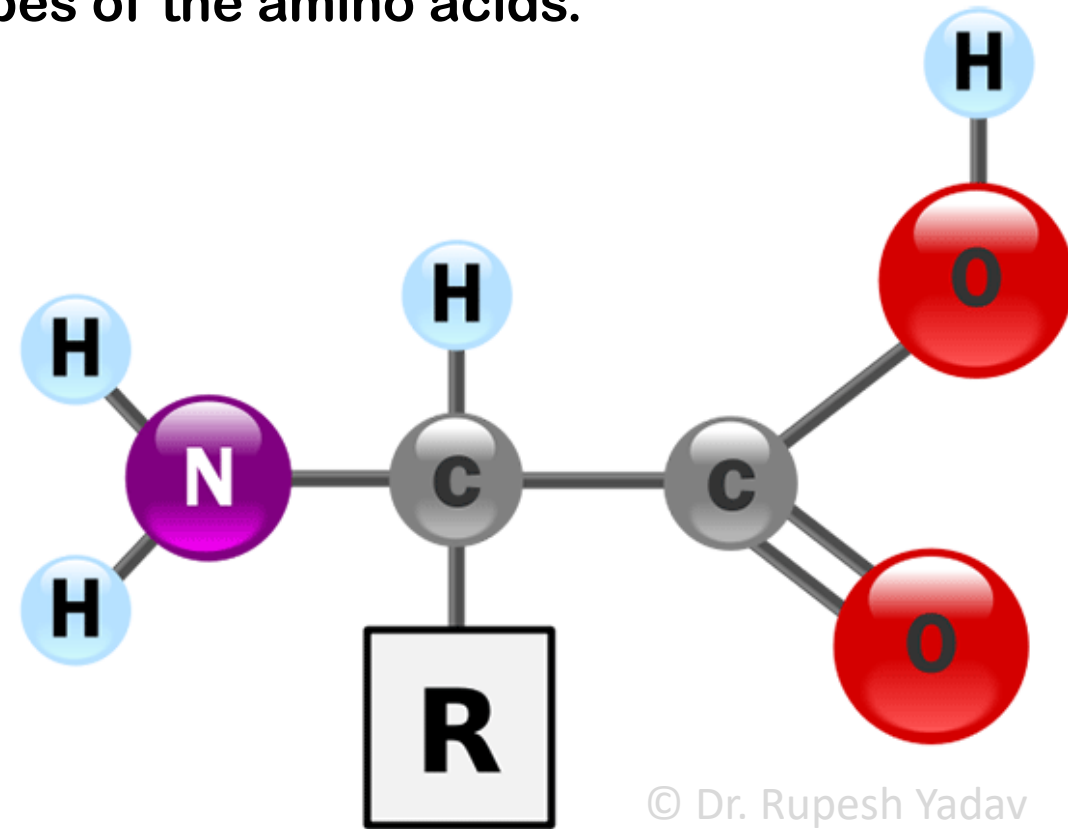
- Proteins are composed of carbon, hydrogen, oxygen and also nitrogen and often Sulphur.
- Proteins are organic substances of high molecular weight formed by a number of amino acids which are the structural elements or building blocks of protein (fig.1.1)



Nutrients & their functions

Proteins

- A protein molecule is **made from a long chain** of amino acids. Thus, complete **hydrolysis of protein yield some 20 different** types of the amino acids.
- Of these 20 amino acids, there are **12 amino acids which are made by the body**. These are called **non-essential amino acids** which means these amino acids are non-essential in our food.



Nutrients & their functions

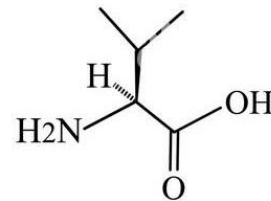
Proteins

- But there are **8 amino acids** which are not **made by our body** and they **must be taken along with our food**. These amino acids are called **essential amino acids**.

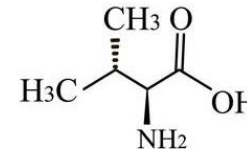
- These are lysine, tryptophan, phenylalanine, threonine, valine, methionine, leucine, and isoleucine

ESSENTIAL AMINO ACIDS

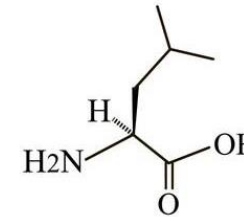
Valine



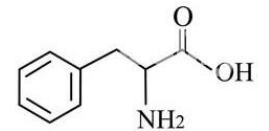
Isoleucine



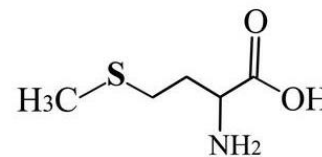
Leucine



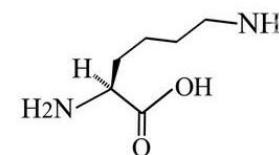
Phenylalanine



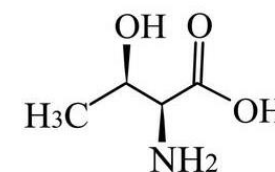
Methionine



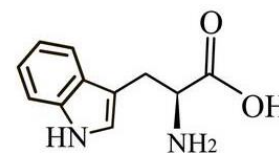
Lysine



Threonine



Tryptophan



Nutrients & their functions

Proteins

Table B.1. pK_{aR} and pI values for the 20 common amino acids. The amino acids in bold type are ionisable.

Amino Acid	Abbreviation	Single letter abbreviation	Linear formula of R-group	pK_{aR} values	pI
Alanine	Ala	A	CH ₃		6.01
Arginine	Arg	R	HN=C(NH₂)-NH-(CH₂)₃	12.48	10.76
Asparagine	Asn	N	H ₂ N-CO-CH ₂		5.41
Aspartic acid	Asp	D	HOOC-CH₂	3.65	2.77
Cysteine	Cys	C	HS-CH₂	8.18	5.07
Glutamine	Gln	Q	H ₂ N-CO-(CH ₂) ₂		5.65
Glutamic acid	Glu	E	HOOC-(CH₂)₂	4.25	3.22
Glycine	Gly	G	H		5.97
Histidine	His	H	NH-CH=N-CH=C-CH₂	6.00	7.59
Isoleucine	Ile	I	CH ₃ -CH ₂ -CH(CH ₃)		6.02
Leucine	Leu	L	(CH ₃) ₂ -CH-CH ₂		5.98
Lysine	Lys	K	HN₂-(CH₂)₄	10.53	9.74
Methionine	Met	M	CH ₃ -S-(CH ₂) ₂		5.74
Phenylalanine	Phe	F	Ph-CH ₂		5.48
Proline	Pro	P	(CH ₂) ₃		6.48
Serine	Ser	S	HO-CH ₂		5.68
Threonine	Thr	T	CH ₃ -CH(OH)		5.87
Tryptophan	Trp	W	Ph-NH-CH=C-CH ₂		5.89
Tyrosine	Tyr	Y	HO-Ph-CH ₂		5.66
Valine	Val	V	(CH ₃) ₂ -CH		5.97

Nutrients & their functions

Proteins

- All the essential amino acids are present in egg, meat, fish, chicken, cheese and all the different dairy foods.
- They are also present in plants but proteins of some plants may not contain one or more essential amino acids. For example, there is very little methionine in beans. Similarly, corn contains not adequate amount of lysine.



Nutrients & their functions

Proteins

- Therefore, those who are vegetarians should select their food carefully so that they get proper supply of all the essential amino acids.



Nutrients & their functions

Proteins

- The **pregnant woman** must be given **adequate quantity of all the essential amino acids** because presence of even little less amount of protein can retard a child's mental and physical development.
- Even after birth, **child should be supplied with adequate** quantity of essential amino acid for the same reason.



Nutrients & their functions

Proteins

- There are a number of **vegetables and vegetable products** Such as **legume, lentils**, split pe etc., nuts and seeds, whole grains, and soy products including tofu which contain complete proteins.
- Proteins are very **important in building, maintaining and renewing body cells.**



Nutrients & their functions

Carbohydrates

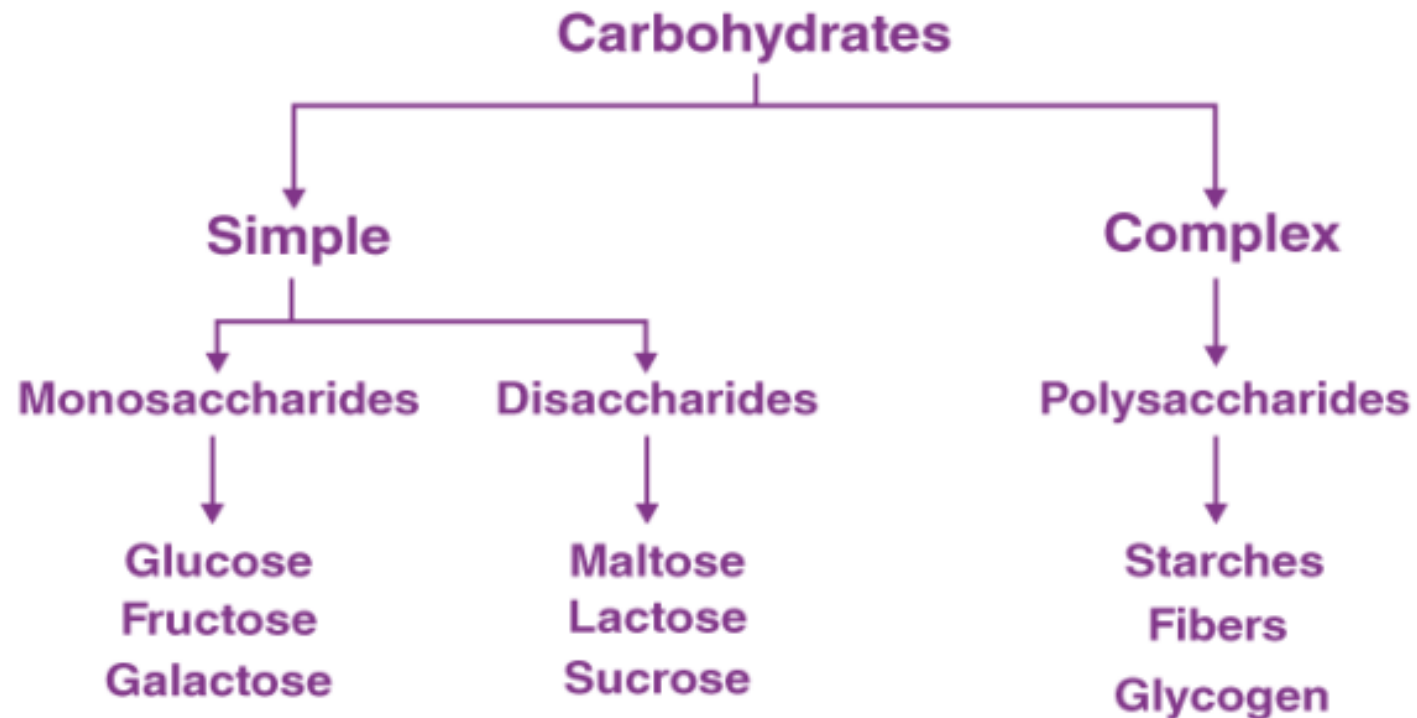
- Carbohydrates are made up of atoms of carbon, oxygen and hydrogen, with the ratio of hydrogen to oxygen being 2:1, and can be represented by the empirical formula $C_n H_{2O)n}$ making them as hydrates of carbon.



Nutrients & their functions

Carbohydrates

- The **carbohydrates** are broadly **classified into** monosaccharide, oligosaccharides & polysaccharides.



Nutrients & their functions

Carbohydrates

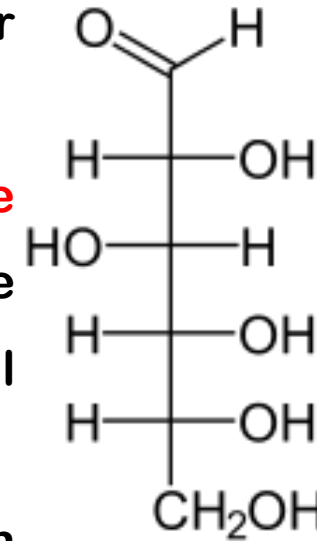
➤ **Monosaccharides:** are the **simple sugars**.

➤ **A most common monosaccharide** is glucose(D-glucose or Dextrose).

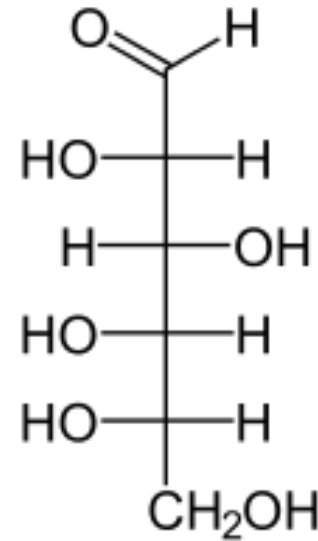
➤ It is biologically most important sugar The **carbohydrates are digested to form glucose before they can be absorbed** into the **blood stream and get transported to the** cells and tissues of all the organs.

➤ During **cellular respiration, cells extract the energy stored** in glucose molecules and utilize this energy for various activities.

➤ **Vitamin C** (Ascorbic acid) which prevents scurvy (degeneration of skin, teeth, blood vessels) is synthesized from D-glucose.



D-Glucose

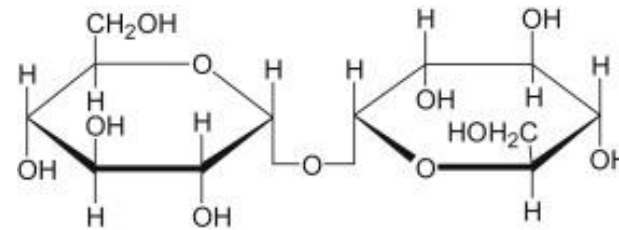


L-Glucose

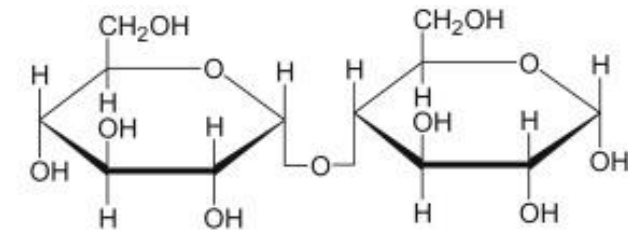
Nutrients & their functions

Carbohydrates

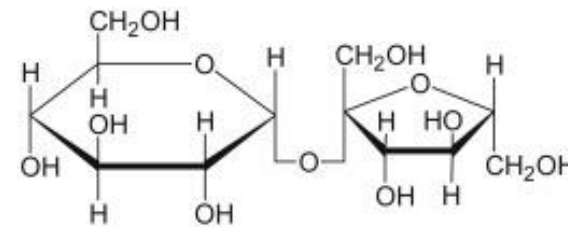
- **Oligosaccharides:** are **polymers of monosaccharides** containing **two to ten residues**. The sugars formed by two units of monosaccharides are called **disaccharides**. The common disaccharides are **sucrose, maltose and lactose**.



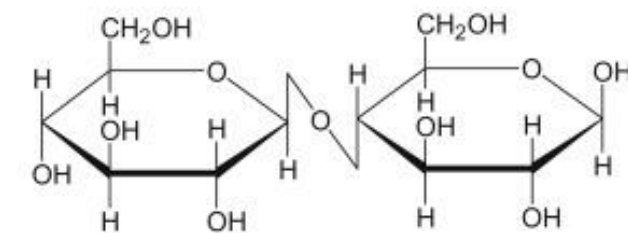
Trehalose
 $\alpha(1-1)$



Maltose
 $\alpha(1-4)$



Sucrose
 $\alpha1-\beta2$

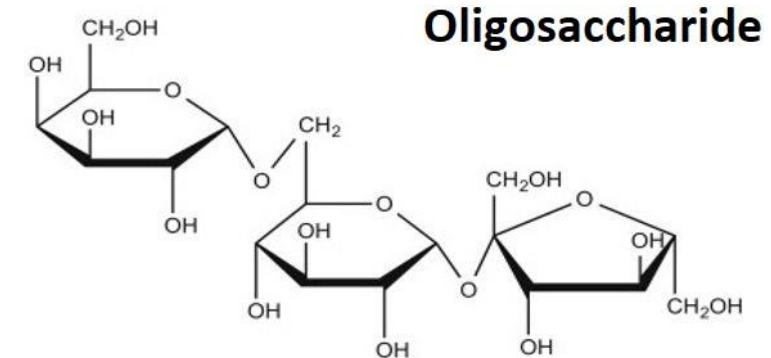


Cellobiose
 $\beta(1-4)$

Nutrients & their functions

Carbohydrates

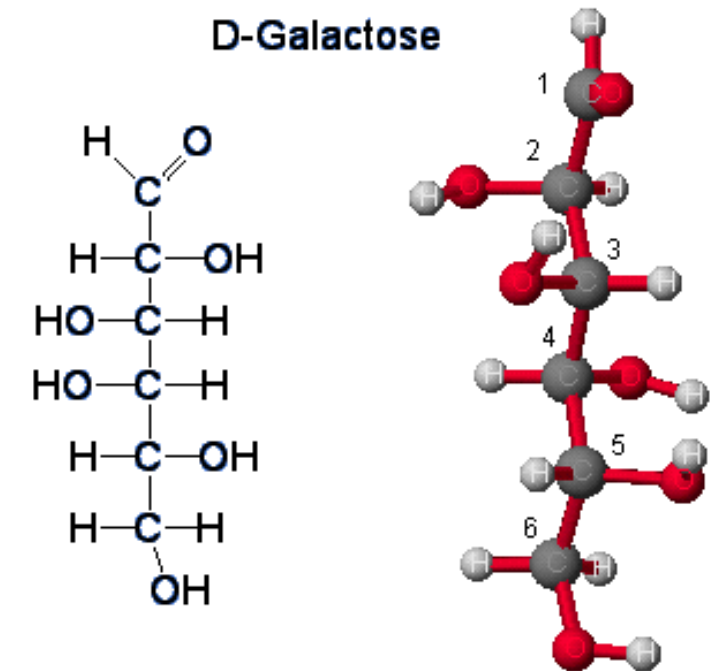
- Oligosaccharides are one of the **most commonly used food components**, main sucrose.
- They have **unique chemical structures** that are not digested by humans.
- The main **function** of oligosaccharides is to **increase the growth of bifidobacterial** in the colon. These bacteria destroy the undesirable bacteria in the colon.
- The **other functions are reduction of blood cholesterol**, blood lipids, blood pressure as well as reduction of constipation.



Nutrients & their functions

Carbohydrates

- It is suggested that **a daily dose of 2.5 - 3.0 gm of pure fructo-oligosaccharides or galactose** - oligosaccharides can be considered as **an effective daily dose**.
- Oligosaccharides are **found mainly in cereal grains and products prepared from them**, such as bread, breakfast cereal, and also vegetables such as legumes (beans, lentils and peas), as well as fruits.
- Actually, **wholegrain breads and cereals are very important** in a balanced diet or an important functional ingredient in a healthy diet.

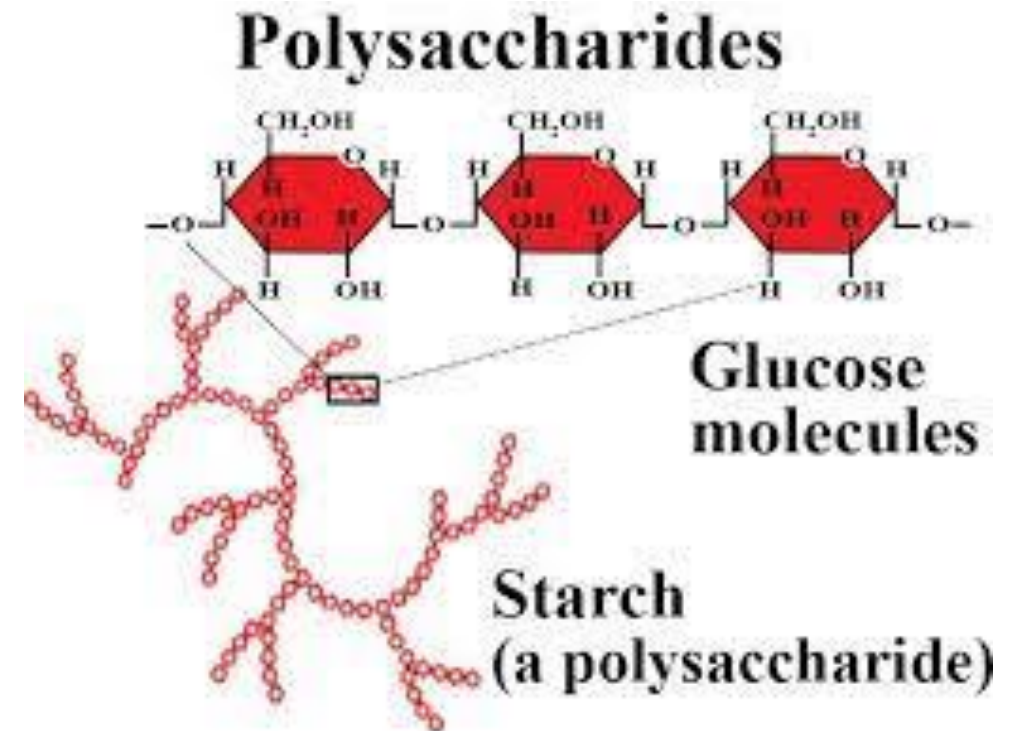


C. Ophardt, c. 2003

Nutrients & their functions

Carbohydrates

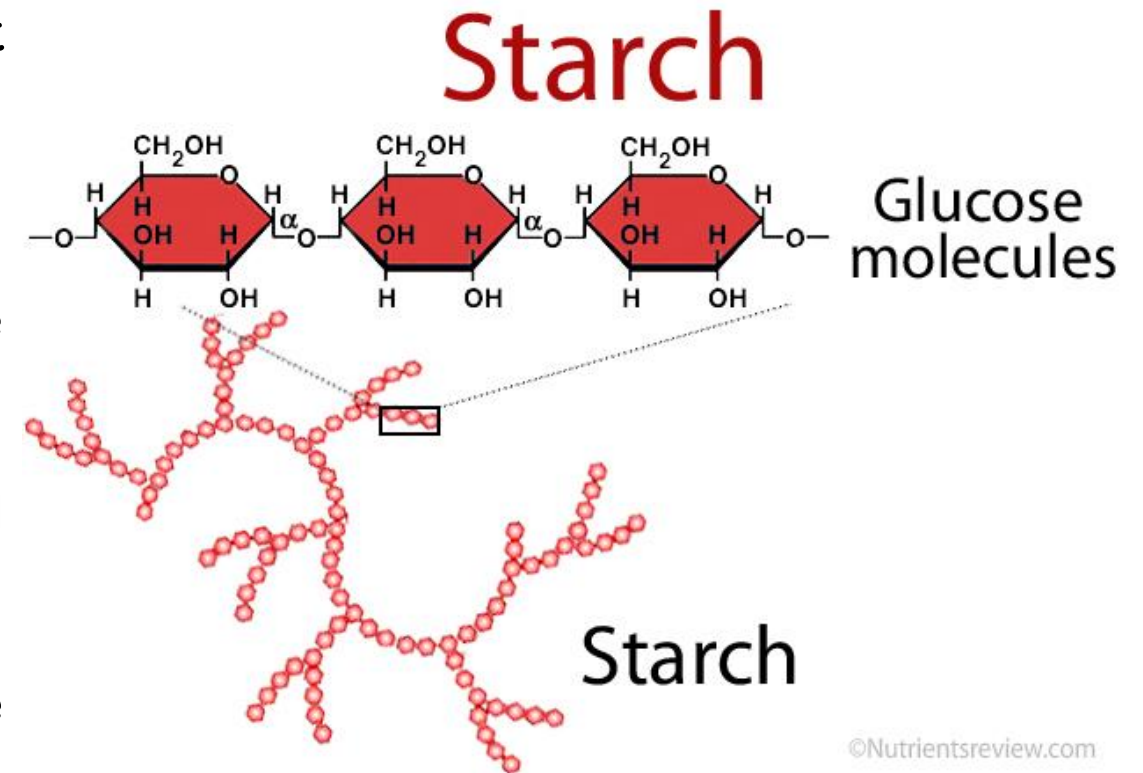
- **Polysaccharides:** are **polymers** of a few **hundred to a few thousand monosaccharides** linked together.
- Polysaccharides may be structural polysaccharides like **cellulose and chitin** or nutrient polysaccharides such as **starch and glycogen**.
- The starch granule consists of a mixture of two different polysaccharides amylose and amylopectin



Nutrients & their functions

Carbohydrates

- **Starch is the main storage molecule** in plant cells, and glycogen is the main storage of polysaccharide of animal tissues.
- Plant **starch is hydrolyzed** to release glucose as a nutrient for cells.
- Glycogen is **mostly stored in liver** and muscle cells.
- This **glycogen is hydrolyzed** to release glucose whenever required.



Nutrients & their functions

Carbohydrates

- It is usually suggested by nutritionists or dietitian that **plenty of vegetables and fruits must be taken every day.**
- The diet should include about 300 g of fruits and about **375 g of vegetables every day for an adult.**
- Fruits and vegetables are extremely useful since they are **rich in fiber, low in fat,** an important source of several nutrients including vitamin C, folic acid and many protective antioxidants.



Nutrients & their functions

Fats

- Fats or triacylglycerols are composed of three fatty acids joined to a glycerol molecule.
- A fatty acid has a long carbon skeleton having 4 to 24 carbon atoms (usually 16 or 18),
- At one end of fatty acid is a 'head' consisting of a carboxyl group (-COOH) and the long hydrocarbon tail is attached to the carboxyl group.

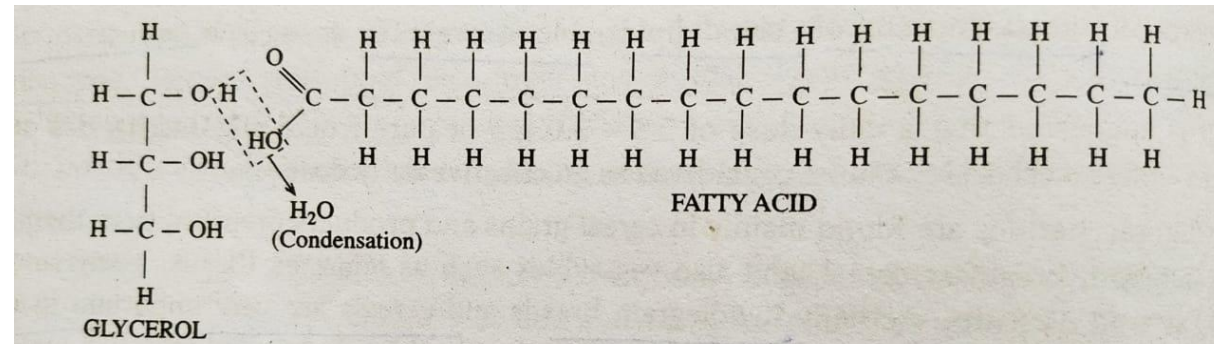


Fig. 1.5 : Figure showing the molecular building blocks of a fat

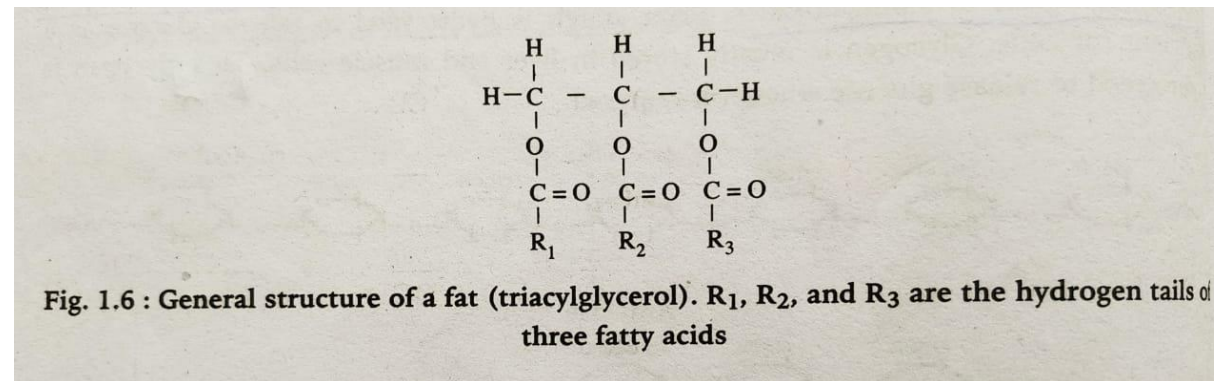


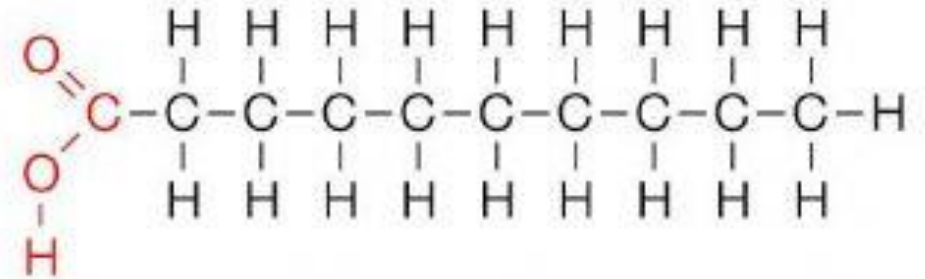
Fig. 1.6 : General structure of a fat (triacylglycerol). R₁, R₂, and R₃ are the hydrogen tails of three fatty acids

Nutrients & their functions

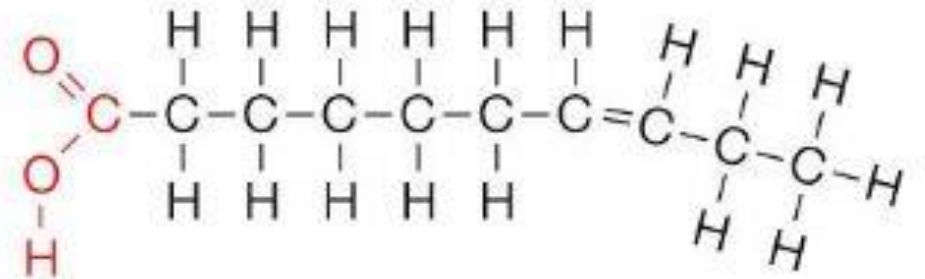
Fats

- Two very important and essential unsaturated fatty acids are **omega 3 fatty acid** and **omega 6 fatty acid**.
- Fatty acids are straight chain hydrocarbons with a **carboxyl group at one end**.
- The **carbon placed next** to the carboxyl group is **known as alpha**, the next one as beta and so on.
- The **last position** is called as **omega**, the last letter in Greek alphabet (omega).

Saturated



Unsaturated



Nutrients & their functions

Fats

- **Omega fatty acids** are actually **poly unsaturated** fatty acids (PUFA), they have **more than one double bond**.
- It is important to know that the **physiological properties** of **unsaturated fatty acids** mainly **depend on the position of the double bond** with respect to the omega carbon.
- Therefore, fatty acids named according to the unsaturation with respect to the omega carbon. Thus, in **omega 3 fatty acid**, the **first double bond** is present as the **third C - C bond** from the methyl (CH₃) terminal.
- For example, **Linolenic Acid** is an omega 3 fatty acid having double bonds at C, C12 and C15 positions

Nutrients & their functions

Fats

- Similarly, in **omega 6 fatty acid**, the **double bonds** present at **c9, and c12** position as **in linoleic acid**.
- **Both**, omega 3 and omega 6 fatty acids **can not be synthesized in human body**, and therefore, they are **essential fatty acids** and should be **obtained from various foods**.
- **Linoleic Acid** (omega 6 fatty acid) is present in **vegetable oils** such as sunflower, safflower, and soyabean) and also in **animal meats; nuts and seeds**.
- Alpha Linoleic Acid (ALA) which is **omega 3 fatty acid** is available from strains of **flaxseed oils, canola oil, walnuts, eggs and fish**.

Nutrients & their functions

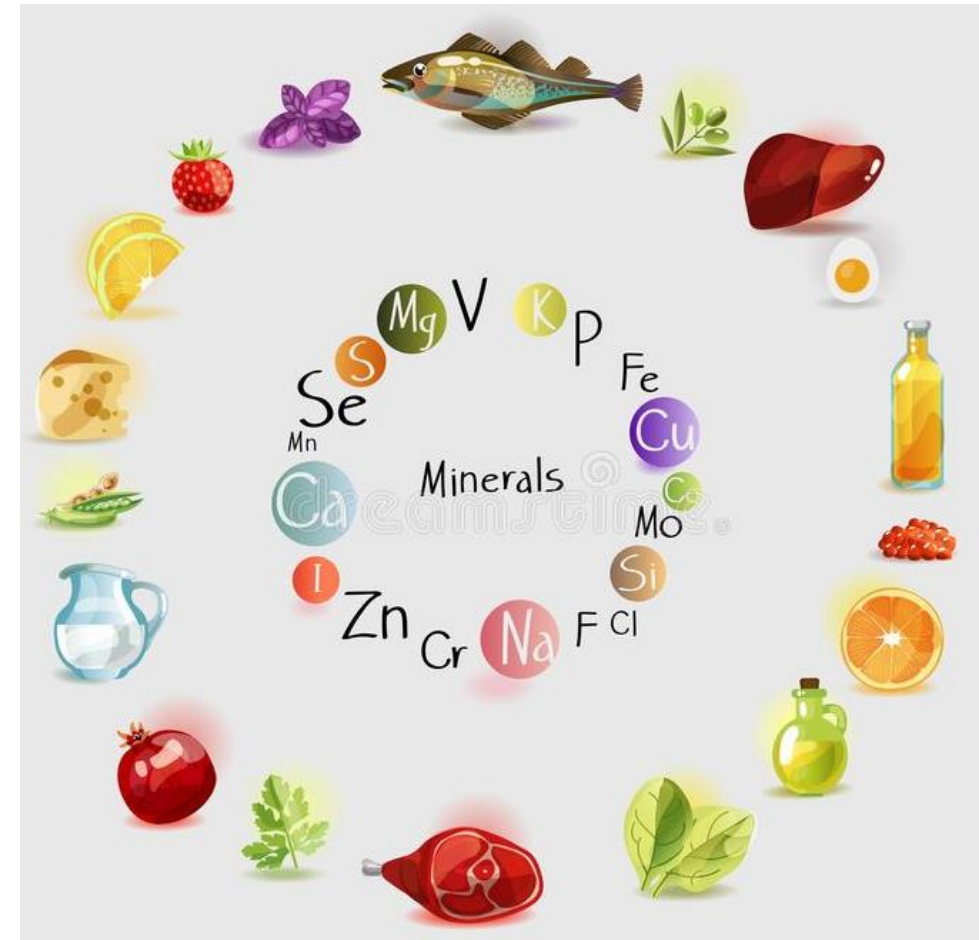
Fats

- It has been observed recently that an **appropriate balance** must be maintained **between omega 3 and omega 6 fatty acids** since both these fatty acids **work together to maintain good health**.
- For example, **omega 3 fatty acids** help in **reducing inflammation** and on the other hand, **omega 6 fatty acids** help in **promoting inflammation**.
- The **ideal ratio** of omega 3 to omega 6 has been observed to be **1 : 1**.
- According to **some experts** it should be **1:2**.
- The other main **functions of omega 3 fatty acid** are **prevention of the heart attack, atherosclerosis, depression & cancer**.

Nutrients & their functions

Minerals

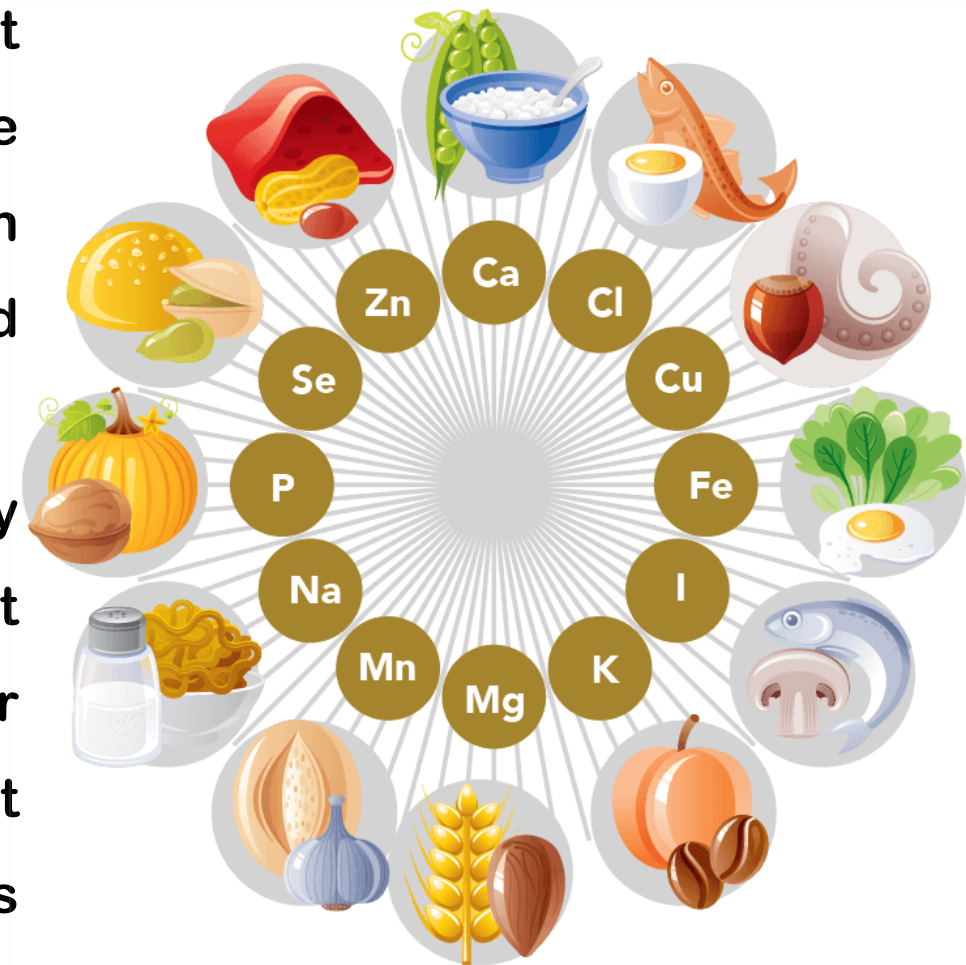
- Minerals are the **substances** obtained by **mining**. A number of minerals such as iron, calcium, zinc, copper, iodine, magnesium, manganese, phosphorous, sodium molybdenum and some other elements are present throughout the body in bone muscles, blood, cartilage and body fluids.
- They are **constituents of many enzymes**. All of these minerals are needed by the body either in large quantities or some in very small quantities.



Nutrients & their functions

Iron (Fe)

- **Iron (Fe):** Women require much more iron than men at the time of pregnancy and menstruation. The requirement of iron is about thrice than that of men during pregnancy for the development of baby, and during menstruation for the blood loss.
- **According to some nutritionists**, the average daily **requirement of iron** is about **15 mg a day**, but according to some others, it is 18-20 mg per day for men and about 18 for women. During **pregnancy** it should be about 20 mg. For children, the amount is about 8-12 mg depending on the age.



Nutrients & their functions

Iron (Fe)

- There are **two types of iron**, **haem iron** present in animals and **non-haem** iron present in plants. The haem iron can be absorbed easily in human body than the non-haem iron.
- The **good source of haem iron is chicken**, lean red meat, fish and many sea foods Iron is present in large quantity in liver, kidney and heart. **The non-haem iron is available in legumes** such as beans, chickpeas, lentils etc. cereal grains and wholegrain, dark green leafy vegetables including cabbage and broccoli, nuts and seeds.



Nutrients & their functions

Calcium

- Calcium is the **major component of the bones, teeth and nails**. It is **also required for muscle contraction and regulation of the heart beat and blood clotting**.
- If there is **lack of calcium** in the diet, the **body** will immediately start **withdrawing calcium from bones**.
- This happens **because** bone is easily **broken down** to release calcium into blood stream so that the heart muscles continue to beat. If this continues, the bone density will ultimately become less and that will create many problems.



Nutrients & their functions

Calcium

- Calcium can be **obtained from diet either from animal sources or plant sources**. The animal sources are fish, prawns, milk and milk products such as cheese, yoghurt, ice cream etc. The plant sources are legumes, spinach, broccoli, nuts, whole grain cereals and breads, sesame seeds etc.
- It is **important to note** that the absorption of calcium into the body from different foods are not the same. Calcium from dairy foods is absorbed much more compare nuts or other kinds of food.



Nutrients & their functions

Calcium

- The **requirement** of calcium, that is, daily intake **depends on age, sex (male or female)**, pregnant woman, nursing mother or menopausal woman. Usually for a normal adult male and female, daily 800 mg of calcium is recommended. For the pregnant women, 1100 to 1300 mg has been recommended by different nutritionists.



Nutrients & their functions

Zinc

- Zinc is the **component of several enzymes** (more than 200) in the body.
- Thus zinc **helps in maintaining enzyme system and cells in the body**. It helps in the formation of insulin, contractibility of muscles, synthesis of DNA and protein, repair of muscle and tissue, and functioning of the brain.
- Zinc is a **strong antioxidant**. It helps in healing cuts and wounds. It is important for the development of reproductive organs.

ZINC-RICH FOODS



Nutrients & their functions

Zinc

- **According to WHO** (World Health Organization), the adult intake of zinc should be **15 mg per day**.
- But this may vary between 5-15 mg per day depending upon the age and sex of the individual.
- **Men require zinc more than women**, because semen contains 100times more zinc than is found in the blood.
- The **animal sources of zinc are fish** and sea food (oysters are the richest source of zinc, much more than red meat), chicken, lean red meat, eggs and dairy foods. **The plant sources are mushroom**, nuts, cereals, seeds (especially pumpkin seeds) legumes and whole grains

13 ZINC RICH FOODS



Cereals



Wheat germ



Sesame seeds



Pumpkin Seeds



Meats



Shellfish



Squash Seeds



Fruits



Vegetables



Spinach



Mushroom



Dark Chocolate

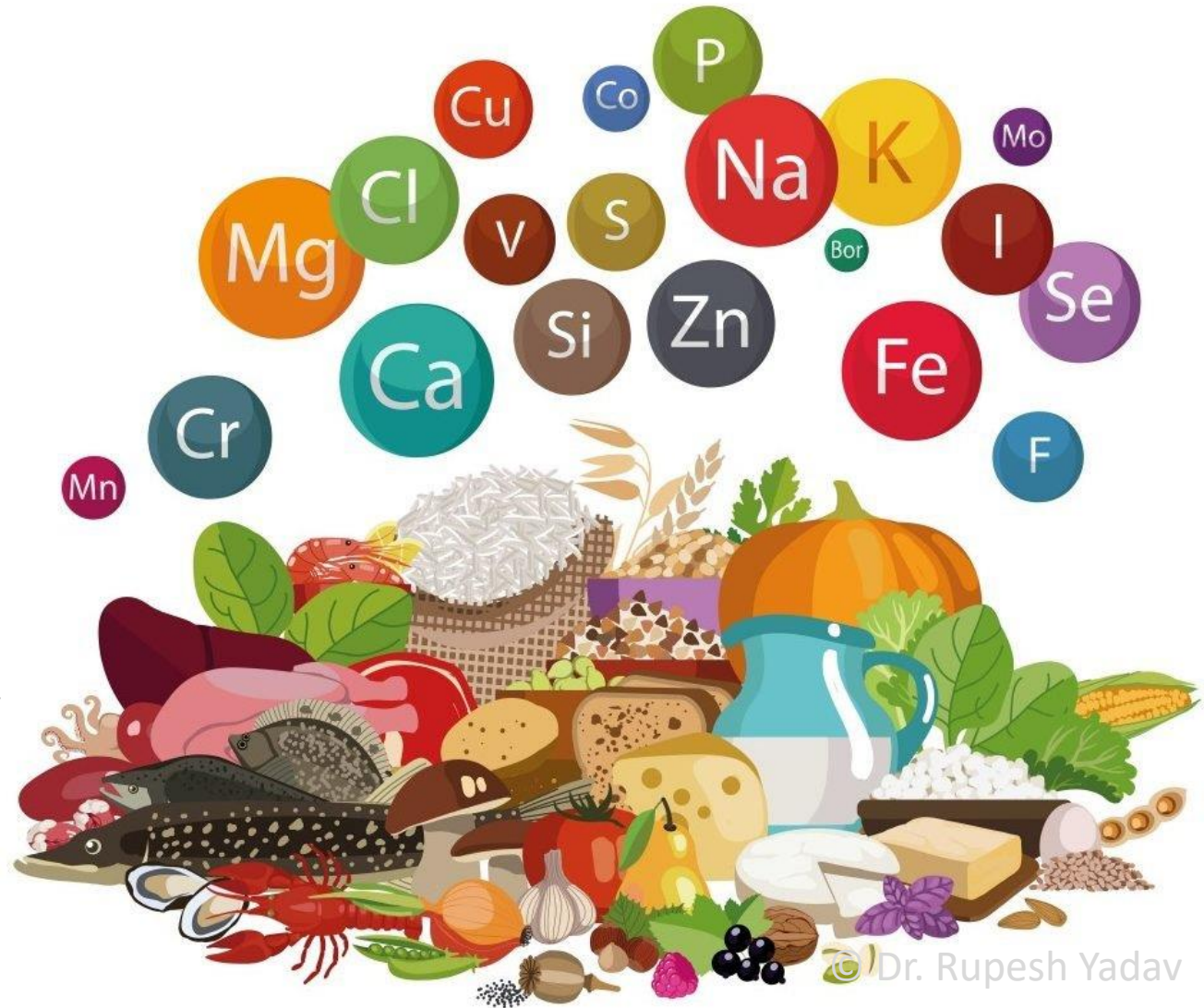


Nuts

Nutrients & their functions

Other Minerals

- There are **several other minerals** such as **copper**, cobalt, iodine, magnesium, manganese, molybdenum, potassium, phosphorous, selenium, sodium, Sulphur, and a few more which are also required for proper functioning of different parts of the body.



Nutrients & their functions

Vitamins

- Vitamins are **organic substances** necessary for life.
- They are essential for the normal functioning of the body.
- They are **required for growth and vitality**.
- Vitamins regulate metabolism through enzyme systems.
- Vitamins can be described as any of a group of organic compounds **essential in small amounts to maintain normal healthy** and development.



Nutrients & their functions

Vitamins

- **Human beings require 13 known vitamins** in their diet. All these vitamins are essential, because absence of even one vitamin may cause serious effects or absence of one vitamin may affect function of others.



Nutrients & their functions

Different vitamins & their functions, sources & effect of deficiency

Vitamins	Sources	Functions	Deficiency diseases
1. Vitamin A	Milk products, eggs, fish, carrots, etc.	It helps in improving eyesight and provides immunity.	Night blindness.
2. Vitamin B	Chicken, red meat, tuna, cheese, milk, etc.	It helps to in the formation of RBC and supports proper growth and metabolism.	Skin disease, beriberi, etc.
3. Vitamin C	Broccoli, sprouts, spinach, tomatoes, oranges, etc.	It helps in growth and repairing of the tissues.	Scurvy.
4. Vitamin D	Exposure to sunlight, tuna, fish liver oil, etc.	It helps in the absorption of calcium and is required for healthy bones.	Rickets.
5. Vitamin E	Sunflower oil, soya bean, peanuts, hazelnuts, etc.	It provides antioxidants in the body.	Damage to nerves and muscles.
6. Vitamin K	Spinach, turnip, parsley, etc.	Helps in regulating the process of blood clotting.	Defective coagulation of blood leading to death.

Nutrients & their functions

Different vitamins & their functions, sources & effect of deficiency

Name	Chemical Name	Function	Deficiency & Source	Excess
B Complex: Vitamin B₁ <i>Requirement:</i> 1.4 mg	Thiamine	Convert sugar into energy; promotes appetite, digestion; strong heart muscle, nerves, growth; prevents fatigue, fat deposit in arteries.	Beriberi, Wernicke-Korsakoff syndrome (mental confusion, muscle weakness). <i>Sources:</i> Wheat, yeast, oatmeal, peanuts, pork, bran, sunflower seeds, soybean sprouts.	Rarely hypersensitive reactions (anaphylactic shock and drowsiness).
Vitamin B₂ <i>Requirement:</i> 1.6 mg/day.	Riboflavin.	Help in releasing energy; utilization of fats, proteins, sugars; and healthy vision.	Mouth lesions, seborrhea, corneal vascularization; insufficient intake result dermatitis. <i>Sources:</i> Dairy products, liver, kidney, yeast, leafy vegetables, fish, eggs.	No complications; higher than 200 mg may cause urine colour alteration.
Vitamin B₃ <i>Requirement:</i> 18 mg/day.	Niacin	Help in healthy skin, nerves, GI tract; converting carbohydrates into energy.	Pellagra; mental confusion, muscle weakness. <i>Sources:</i> Liver, lean meat, wheat, brewer's yeast, fish, eggs, poultry, nuts, sesame seed.	Above 150 mg cause facial flushing, liver damage, skin, gastrointestinal and other problems.
Vitamin B₅ <i>Requirement:</i> 6 mg/day.	Pantothenic acid	Crucial in energy and hormone production.	Paresthesia; insufficient intake cause fatigue, nausea, abdominal cramping. <i>Sources:</i> Eggs, fish, dairy products, whole-grain cereals, legumes, yeast, broccoli, cabbage, potatoes	None reported, however, 1200 mg cause nausea and heartburn.

Nutrients & their functions

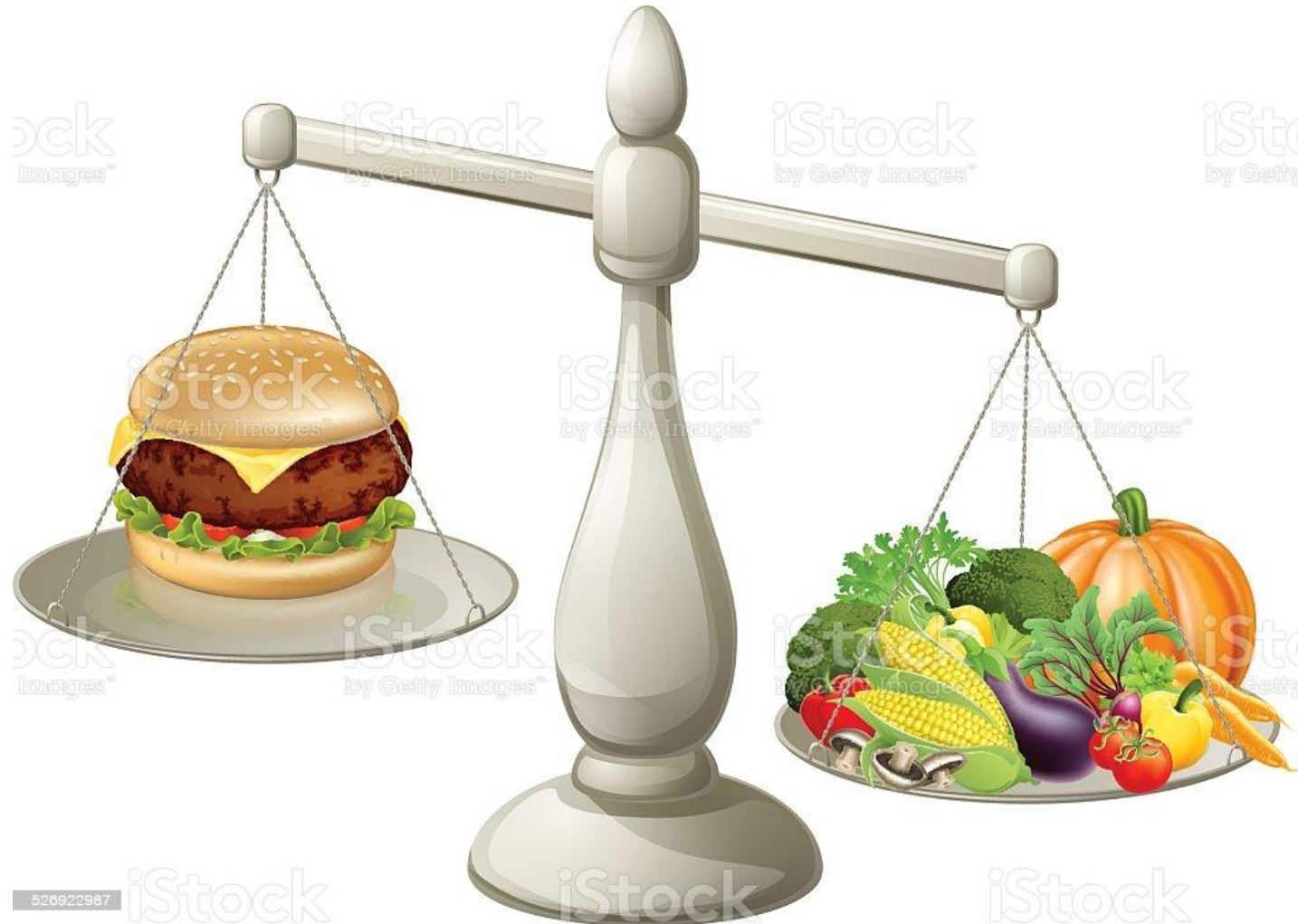
Different vitamins & their functions, sources & effect of deficiency

Name	Chemical Name	Function	Deficiency & Source	Excess
Vitamin B₆ <i>Requirement:</i> 2 mg	Pyridoxamine, Pyridoxal	Metabolism of protein, fat, carbohydrate; RBC formation, control cholesterol; prevents water retention; builds hemoglobin.	Anemia, peripheral neuropathy; Insufficient intake result dermatitis. <i>Sources:</i> Brewer's yeast, wheat germ, meats, milk, eggs, avocados, bananas.	Above 100 mg cause numbness and tingling in hands and feet, nerve damage, impaired ability to sense stimuli
Vitamin B₇ <i>Requirement:</i> 30 µg	Biotin	Release energy from carbohydrates, and to synthesize fat.	Dermatitis, enteritis; anemia; insufficient intake cause fatigue, nausea, abdominal cramping. <i>Sources:</i> Eggs, Fish, Whole-cereals, Legumes, vegetables of cabbage family.	None reported.
Vitamin B₉ <i>Requirement:</i> 400 µg	Folic acid	Essential for A, D, E, K functions; RBC and nucleic acid formation; protein digestion. Prevent neural tube defects. Reduces homocystein level.	Neural tube defect; cause anemia. <i>Natural Sources:</i> Dark-green leafy vegetables, carrots, liver, eggs, soybeans, oranges, beans, whole wheat.	Seizure threshold diminished; Above 400 µg cause anemia, mask vitamin B ₁₂ deficiency.
Vitamin B₁₂ <i>Requirement:</i> 6 µg.	Cyanocobalamin, hydroxy or methyl cobalamin	Use of protein, fats, carbohydrates; RBC formation; healthy nerves, nucleic acid; prevent pernicious anemia	Megaloblastic anemia . <i>Sources:</i> Liver, beef, pork, eggs, dairy products, shellfish, fortified cereals.	Above 3000 µg cause eye problems.

Nutrients & their functions

Balanced Diet

- A diet is considered a "balanced diet" when the diet, that is, the food that a person takes contains in **correct proportion** all the **macronutrients** and **micronutrients** so that proper nourishment is provided and the person maintains a healthy life.



Nutrients & their functions

Balanced Diet

- But the problem is that every individual has **"unique biochemistries"** and, therefore, a particular "balanced diet" would not fit all individuals.
- The **nutritional needs of each individual are different** depending on **"lifestyle and medical history"**.
- Diet also is different **according to sex, age,** and some other conditions.

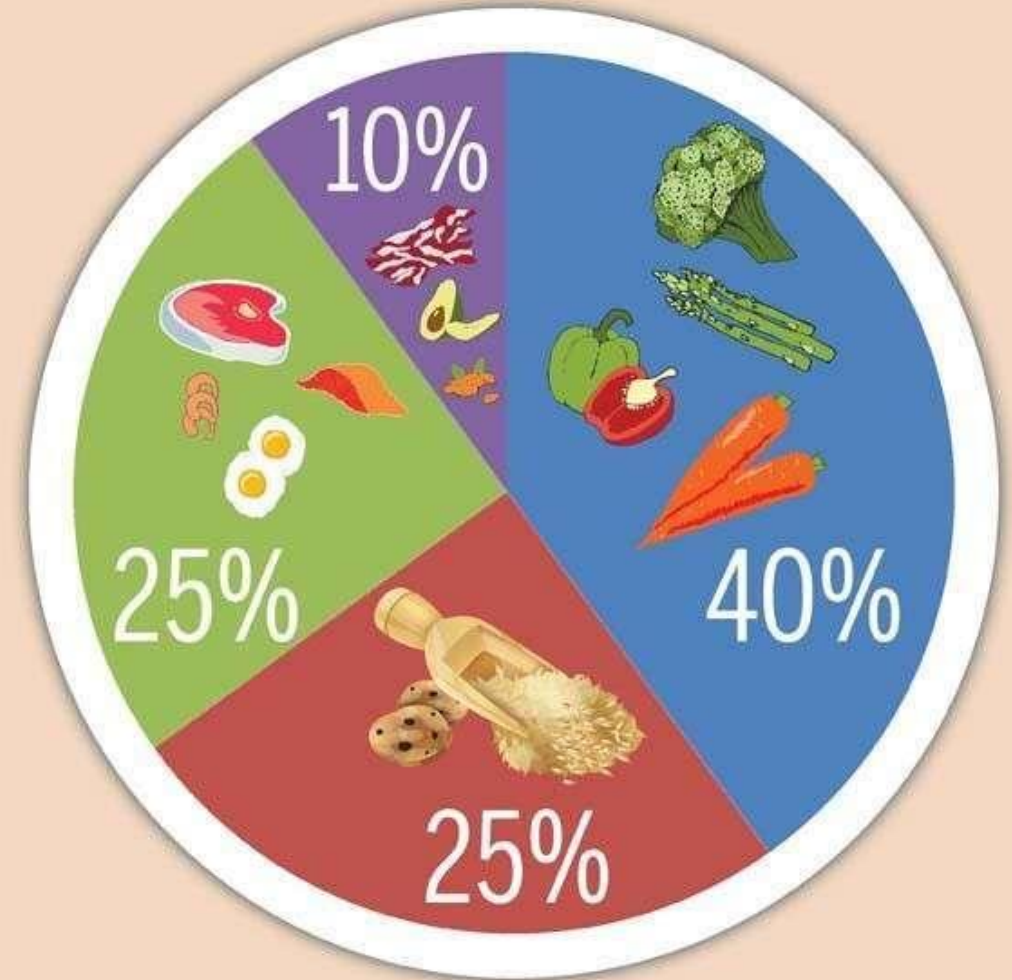


Nutrients & their functions

Balanced Diet

- They play very important roles at cellular and molecular level. Similarly, fatty acids have been found to act as modulators of gene function and they can stimulate or inhibit DNA transcription in a cell.
- Therefore, in short, it is now known that nutrients in the diet play a much bigger role in human physiology than previously thought, and all these aspects also should be considered for a balanced diet.

Balanced diet



- Fruits and vegetables
- Protein
- Fibre-rich carbohydrates
- Fats

Nutrients & their functions

Balanced Diet

- Now-a-days, a new term "functional foods" is used to describe natural foods that enhance human health. The "functional foods" have been defined in different ways. According one definition, **"functional food is any food that has positive impact on an individual's health, physical performance or state of mind, in addition to its nutritive value"**.



Balanced Diet

➤ Considering all these aspects and on the basis of suggestions of a number of authors, physicians, nutritionists or dieticians, a chart or table has been presented here indicating daily required allowances of some of the nutrients for a normal male, female, pregnant woman, menstrual woman, boys, girls and children

	AGE	DIET									
	Age (Years)	Macronutrient Protein (g)	Minerals		Vitamins						
			Iron (mg)	Calcium (mg)	A (IU)	B ₁ (mg)	B ₂ (mg)	B ₃ (mg)	B ₁₂ (mcg)	C (mg)	D (IU)
Men											
Adult	19-64+	47-70	10-18	300	5000-10,000	1.2-1.4	1.2-1.6	12-16	3	45-78	400
Women	19-54	47-58	15-18	800	5000-10,000	1.2-1.4	1.2-1.6	12-16	3	45-70	400
	55-75	47-58	15-18	800	5000-10,000	1.2-1.4	1.2-1.6	12-18	3	45-70	400
	Pregnant	67-78	18-20	1100-1300	6000-10,000	1.4	Little higher	18	Little more	35-70	400
	Nursing	87-98	18-20	1200-1300	8000-10,000	1.4	Little higher	18	Little more	75-100	400
Boys	8-11	52-72	15	800	4000	1.0	1.0	16	2	70	400
	12-15	75	15	1000	5000	1.2	1.2	20	2	80	400
	16-18	85	15	800	5000	1.4	1.4	22	2	80	400
Girls	8-11	55	15	900	4500	0.9	0.9	15	2	80	400
	12-15	62	15	1000	5000	1.0	1.0	17	2	80	400
	16-18	58	15	800	5000	0.9	0.9	15	2	70	400
Children											
Infants	0-1	30-32	About 8	300-550	2000	0.5	0.5-0.8	9	2	40	400
Children	1-7	32-52	8-12	700-800	2500	0.6-0.8	0.6-0.8	9-14	2	50-60	400

Note : IU = International Unit. mg = milligram. mcg = microgram

References : The Vitamin Bible. Earl Mindell. Guild Publishing, London 1988. The Family Medical Reference Book. Consulting Editor P. Evans; Macdonald & Co. (Publishers) Ltd. London 1987. The CSIRO Total Wellbeing Diet. Dr. Manny Noakes with Dr. Peter Clifton. Penguin Books. Penguin Group (Australia) 2005.



*Thank
You*

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