

Nutrition

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Learning Objectives

At the end of this lecture, you would be able to:

- Understand the importance of good nutrition.
- Identify food sources of nutrients.
- Describe the roles of nutrients in the body.

Good Nutrition

Consuming food and nutrients and using them to function healthily

Not the same as “food” and “nutrients”

Food = products eaten or taken into the body that contain nutrients for

- Development, growth, and maintenance of tissues and cells
- Resisting and fighting infection
- Producing energy, warmth, and movement
- Carrying out the body’s chemical functions

Essential Nutrients

Macronutrients

- Carbohydrates
- Fats (lipids)
- Proteins

Micronutrients

- Vitamins
- Minerals

Water

CARBOHYDRATES

- **The body's chief source of energy**
- **Sugar**
 - **Simple carbohydrates**
 - **Glucose:** the building unit & simplest form
 - **Fructose:** fruit
 - **Lactose:** milk
 - **Sucrose:** table sugar
- **Starches**
 - **Complex carbohydrates**
- **Fiber cellulose**

CARBOHYDRATES

- THE MOST IMPORTANT TO THE BODY IS GLUCOSE – THE FORM OF THE SUGAR THAT GOES DIRECTLY TO THE BLOODSTREAM AND PROVIDES QUICK ENERGY. ALL OTHER SUGARS MUST BE CHANGED INTO GLUCOSE BY THE BODY BEFORE THE CELLS CAN USE THEM. THE CELLS USE GLUCOSE AS THEIR PRIMARY SOURCE OF ENERGY. GLUCOSE THAT IS NOT NEEDED IMMEDIATELY IS CONVERTED BY BODY TO GLYCOGEN, A FORM OF STARCH STORED IN THE MUSCLES AND LIVER, OR IT IS CONVERTED TO AND STORED AS BODY FAT.

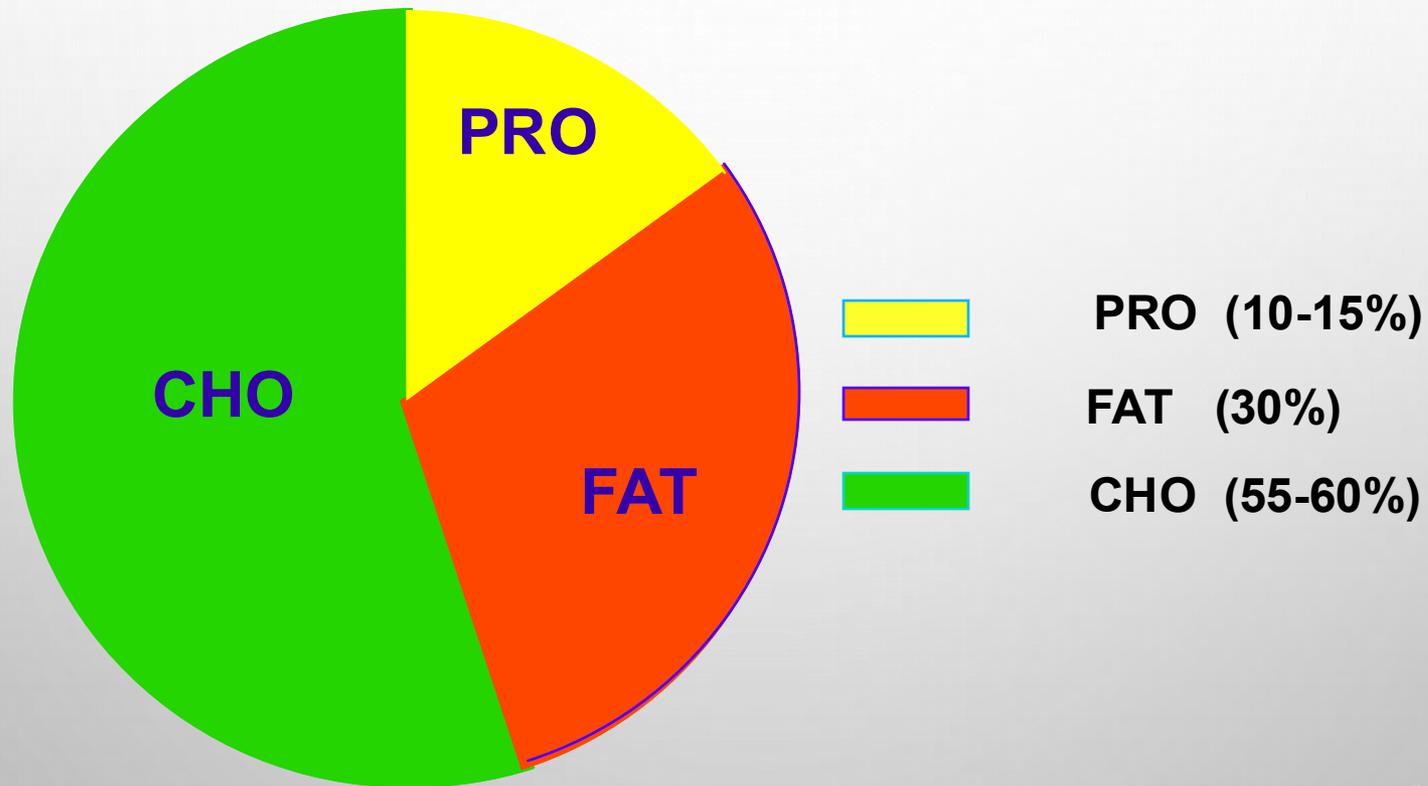
FAT

- Fat is made up of different types of fatty acids and glycerol.
- Two types of fat:
- **Saturated**
 - Animal sources
 - Solid at room temperature
- **Unsaturated**
 - Vegetable sources
 - Liquid at room temperature

PROTEIN

- PROVIDE ENERGY, ENCOURAGE GROWTH AND TISSUE REPAIR
- MADE UP OF SMALL BUILDING UNITS (**AMINO ACIDS**)
 - 20 IMPORTANT A.A. To the human body: **9** Your body can't make AND **11** It can make
- COMPLETE PROTEIN: ANIMAL FOODS
- INCOMPLETE PROTEINS: PLANT FOODS

RECOMMENDED DIETARY INTAKE



MICRONUTRIENTS

There are two types of micronutrients:

- **Vitamins**
- **Minerals**

Vitamins and minerals are needed in much smaller amounts than macronutrients.

Their amounts are measured in milligrams (mg) and micrograms (μg).

(1mg = 0.001g)

(1 μg = 0.001mg).

VITAMINS

- **Organic substances that regulate numerous and diverse physiological processes in the body**
- **Do not contain calories**
- **Two types**
 - **Fat soluble**
 - **Water soluble**

FAT-SOLUBLE VITAMINS - DISSOLVE FAT AND CAN BE STORED IN THE BODY.

Vitamin	Sources	Functions in Body	Signs of deficiency
Vitamin A	Orange, yellow, green vegetables, liver, margarine, and egg yolk	Maintains healthy eyes, skin, bone growth and tooth development, possible aid in cancer protection	Night blindness, eye-infections, rough skin, respiratory infections
Vitamin D	Milk, eggs, liver, exposure of skin to sun's ultraviolet rays	Promotes absorption of phosphorus and calcium to build and maintain bones	Rickets (poor bone development), malformation of teeth
Vitamin E	Wheat germ, whole grains, vegetable oils, legumes, nuts, dark green leafy vegetables	Protects red blood cells; stabilizes cell membranes	Rupture of red blood cells, anemia, nerve abnormalities
Vitamin K	Green leafy vegetables, liver, kale, cabbage; made in body by intestinal bacteria	Assists in normal clotting of blood	Slow clotting of blood, hemorrhage especially in newborns

WATER-SOLUBLE VITAMINS

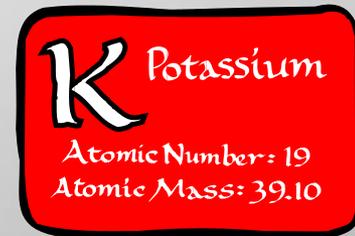
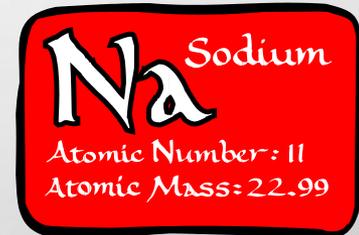
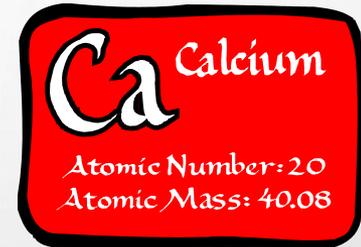
- **VITAMIN B-COMPLEX**

- **THIAMIN (VITAMIN B1)**
- **RIBOFLAVIN (VITAMIN B2)**
- **NIACIN (NICOTINAMIDE, NICOTINIC ACID)**
- **VITAMIN B6 (PYRIDOXINE, PYRIDOXAL, PYRIDOXAMINE)**
- **FOLACIN (FOLIC ACID)**
- **VITAMIN B12**

- **VITAMIN C**

MAJOR MINERALS: CALCIUM, PHOSPHORUS, MAGNESIUM, POTASSIUM, SULFUR, SODIUM, AND CHLORINE

- Calcium keeps the nervous system working well and is needed for blood clotting. Osteoporosis is disease caused by calcium deficiency.
- Sodium and potassium help regulate the passage of fluids in and out of cells. Too much sodium in the diet may aggravate high blood pressure or hypertension, increasing the risk of heart attack, stroke or kidney disease. Table salt is one source of sodium in the diet.
- Deficiency of potassium can lead to muscle weakness and abnormal heart beat.



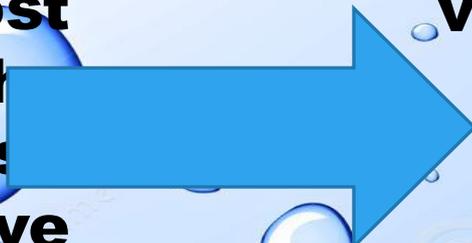
TRACE MINERALS: IRON, IODINE, MANGANESE, ZINC, COPPER, AND FLUORINE

- Iron is a vital part of hemoglobin – a substance in red blood cells that carries oxygen to all parts of the body. Insufficient iron may cause anemia, a disease in which the body has either too few red blood cells or too little hemoglobin. As result too little oxygen is carried to cells of the body.
- Iodine is needed for the thyroid gland to function properly. The thyroid gland produces hormones that control how quickly chemical reactions occur in our body. Too little iodine – thyroid gland enlarged. The primary sources are seafood and iodized table salt.

LAST BUT NOT LEAST.....

WATER!!!!!!

WATER is the most important of all the nutrients because we CANNOT survive long without it!



Water helps you:

- **Process certain vitamins (that can only dissolve in water)**
- **Hydrates you**
- **Regulates body temperature**

Food groups and Function

Foods are usually put into 3 food groups:

- 1- Body building or protein Foods: for tissue building and repair.
- 2- Energy foods: for energy production. They include carbohydrates, fats, oils and occasionally proteins.
- 3- Protective foods: for protection and vitality. They include vitamins and minerals.

ADEQUATE DIET

- This is the diet which contains a mixture of food stuffs having all the nutrition requirements of the body needed for growth (development), maintenance (repair), energy and all the vital processes of the body
- Health promoting diet.

Adequate diet should be:

Adequate: supplies all the fuel requirements, proteins, minerals, vitamins and water in optimal values.

Adequate according to age, sex, physical status, type of work and health conditions.

Palatable and satisfying the food habits of the individual.

Digestible and of sufficient size as to allay hunger till the next meal.

Variable from meal to meal.

Taken at regular times in the day.

Free from infection and poisonous chemical.

Apart from the nutrients, the diet may include some ingredients which have no nutritive value but used to improve and stimulate the appetite and digestion or simply for personal enjoyment (e.g. spices, fibers)

CONSTRUCTION OF THE DIET

- 1- Consider the age, sex, weight, developmental stage, health status and type of work of the individual
- 2- Consider everyday as a separate nutritional unit. The daily diet should provide all the essential nutrients in adequate amounts (Recommended Daily Allowance).
- 3- Number of meals: At least 3 principal meals should be served through the day

CONSTRUCTION OF THE DIET

4- Food groups: They are used for diet planning by selecting certain foods, and the number of servings from each group (3 basic food groups: energy supply foods, body building foods, and vitality foods).

Determine first the caloric requirement and use it to calculate the amount of protein, carbohydrate and fat in the planned diet

Example

The caloric requirement is 3000 cal/ day for a reference man, weighing 65 kg and doing moderately active work.

Energy

1 gram of CHO = 4 cal

1 gram of Protein = 4 cal

1 gram of fat = 9 cal

1 gram of alcohol = 7 cal

Give first the daily requirement of protein in the dose of **1 gm/kg/ day** i.e. 65 gm. This will supply $65 \times 4 = 260$ calories which are almost 10% of the caloric requirement.

Then give an equal amount of fat i.e. 65 gm (**1-1.25 gm/kg/ day**). This will supply $65 \times 9 = 585$ calories or 20% of caloric requirement.

Calculate the remaining calories and give them as carbohydrate. Thus $3000 - (260 + 585) = 3000 - 845 = 2155$. Therefore, $2155 / 4 = 538$ gm carbohydrate.

Energy Requirements and recommended intakes

Energy expenditure has 3 components:

Basal metabolism:

Physical activity:.

Specific dynamic action:

Basal metabolism

The energy required at complete rest (without any physical activity) to maintain the essential body functions (i.e. activity of internal organs and maintenance of body temperature).

It is proportional to the surface area of the body

For adult, it is about 1 calorie/kg/hour. If a normal adult male weight 65 kg, then his basal requirement will be $65 \times 1 \times 24 = 1560$ calories.

Physical activity

The energy required to perform physical work. This component is the most variable and most difficult to measure.

It is calculated according to the nature of work which is classified in grades (very light, light, moderate, heavy, very heavy)

Specific dynamic action:

the energy expended in the metabolism of food.

Sources of energy:

The share of the 3 main Macronutrients

Carbohydrate

Fat

protein

Nutrients That Have Calories:

Proteins ✓

Carbohydrates ✓

Fats ✓

Balanced Meal

It is the meal that contains the right amount of:

Body building protein

Energy giving carbohydrate, fats and oils

Protective foods and minerals.

Balanced Diet

A well balanced diet, the calorie requirements are provided by:

a- Carbohydrates provide about 60% of total calories.

b- Fats provide about 30%.

c- Proteins provide about 10%.

The factors affecting the daily energy requirements are:

1- Age

2- Sex

3- Body Size

4- Climate:

For every **10 c** rise of temperature there is a reduction in energy requirements by **5%**.

5- Pregnancy and lactating women

6- Physical activity

Thank

you

