Chapter 01: Food Groups

1. Definitions

Food

A food is a substance consumed by humans to satisfy their energy, functional, and structural needs.

In the context of food sciences, a food can be considered either a raw material or a processed product intended for human consumption. It provides not only energy but also essential compounds for growth and maintenance of the body.

Nutrients

Nutrients are substances derived from foods, either directly absorbable or obtained after digestion, essential for the normal functioning of the body. They ensure energy production, tissue construction and renewal, as well as regulation of metabolic and physiological functions.

Several categories of nutrients are distinguished: proteins, carbohydrates, lipids, vitamins, minerals, water, and dietary fibers. Each category plays a specific and complementary role.

2. Major Food Constituents

2.1 Proteins

Proteins are organic compounds composed of amino acids, some of which are essential because the body cannot synthesize them. They come from both animal sources (meat, fish, eggs, dairy products) and plant sources (legumes, cereals, nuts).

Role in the body:

- Construction and renewal of muscles, tissues, and organs.
- Synthesis of enzymes, hormones, and antibodies.

Impact on foods:

- Affect texture and coagulation capacity (e.g., cheese, yogurt).
- Contribute to the overall nutritional value of foods.

2.2 Carbohydrates

Carbohydrates are the main sources of dietary energy. They are classified as simple carbohydrates (sugars) and complex carbohydrates (starch), found in cereals, legumes, and fruits.

Energy role:

- Provide energy required for cells and vital functions.
- Complex carbohydrates are converted into glucose and stored as glycogen in the liver and muscles.

Examples:

- Cereals, potatoes, rice, pasta.

2.3 Lipids

Lipids are a concentrated source of energy and play a structural role in cell membranes. They consist of saturated, monounsaturated, and polyunsaturated fatty acids, some of which are essential (omega-3 and omega-6).

Roles:

- **Energy:** 1 g of lipids provides approximately 38 kJ.
- **Structural:** contribute to cell membrane formation and transport fat-soluble vitamins.
- **Sensory:** influence food texture and flavor.

Examples: Olive oil, butter, fatty fish, nuts.

2.4 Vitamins and Minerals

Vitamins and minerals are required in small amounts for proper body function.

Functional roles:

- Facilitate enzymatic and metabolic reactions.
- Contribute to growth, blood clotting, immune defense, and regulation of water and electrolytes.

Examples:

- Fat-soluble vitamins A, D, E, K → fatty foods, oils, fish.
- Water-soluble vitamins B, C → fruits, vegetables, whole grains.

2.5 Water and Dietary Fibers

Water:

- Represents approximately 70% of body weight and is essential for nutrient transport and waste elimination.

- Maintains body temperature and fluid balance.

Dietary fibers:

- Indigestible carbohydrates that facilitate intestinal transit and regulate blood glucose.
- Promote gut microbiota health and provide a feeling of satiety.

Sources: fruits, vegetables, whole grains, legumes.

3. Food Classification

3.1 By Origin

- **Plant:** cereals, legumes, fruits, vegetables, algae.
- **Animal:** meat, fish, eggs, milk.
- **Mineral or synthetic:** water, salt, food additives.

3.2 By Degree of Processing

- **Fresh:** unprocessed, consumed as is.
- **Processed:** canned, frozen, sterilized.
- **Highly processed:** ready-to-eat meals, industrial products.

3.3 By Nutritional Role

Foods are classified according to their main function in the body:

1. **Functional foods:** rich in fibers, vitamins, and minerals, promote health (e.g., fruits, vegetables).
2. **Building foods:** provide proteins and essential minerals for growth and tissue renewal (e.g., meat, eggs, dairy).
3. **Energy foods:** provide energy and reserves, rich in carbohydrates and lipids (e.g., starches, oils, fats).
4. **Water:** vital element, participates in all physiological functions.

4. Food Groups and Their Relation to Raw Materials

After studying nutrients and their physiological roles, it is necessary to address the broader concept of food groups.

Nutrients are not consumed in isolation but through a variety of foods derived from agricultural or animal raw materials.

Thus, food groups form a fundamental link between the raw material and the final food product.

4.1 Cereals and Their Derivatives

This group includes cereals such as wheat, barley, rice, and corn, as well as derivatives like flour, semolina, and bread.

Cereals represent a major plant-based raw material in the food industry.

After harvest, they undergo simple operations such as cleaning, drying, and milling to obtain semi-processed products.

Nutritionally, this group is the main source of complex carbohydrates and therefore energy for the body.

4.2 Fruits and Vegetables

Fruits and vegetables are plant-based foods rich in vitamins, minerals, fibers, and bioactive compounds.

They are highly perishable due to their high water content and biological activity after harvest.

They can be consumed fresh or subjected to processing such as freezing, canning, or juicing.

4.3 Milk and Dairy Products

Milk is an animal-derived raw material with a complex nutritional composition.

It is rich in proteins, lipids, calcium, and vitamins, explaining its importance in human nutrition.

Due to its high microbiological sensitivity, milk requires rigorous technological treatments before consumption or processing.

4.4 Meats, Fish, and Eggs

This group provides high biological value proteins as well as essential vitamins and minerals.

Meats, fish, and eggs are highly perishable animal raw materials.

They must undergo processes such as cooling, freezing, or transformation to ensure their safety.

4.5 Fats and Oils

Fats include vegetable oils and animal fats.

Vegetable oils are obtained from raw materials such as olives, soybeans, or sunflower.

These raw materials undergo extraction and refining processes to improve quality and stability.

4.6 Sugars and Sweet Products

Sugars are mainly derived from plant raw materials such as sugar cane and sugar beet.

These raw materials are processed industrially to obtain refined sugar.

4.7 Water as an Essential Food Component

Water is an indispensable constituent of all foods, whether naturally present or added during processing.

It plays a fundamental role in biochemical reactions and food technological processes.

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