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Food is any substance consumed to provide the body with the nutrients it needs for energy, growth, maintenance, and overall health. It can be plant-based, animal-based, or produced through other means, and it provides essential nutrients that keep our bodies functioning properly.

Components of Food

Food is made up of several key components, each with a different function in the body:

1. **Macronutrients:** These are nutrients that the body needs in larger amounts to function.
 - **Carbohydrates:** Provide energy. Found in foods like bread, rice, pasta, and fruits.
 - **Proteins:** Help build and repair tissues. Found in meat, beans, eggs, and nuts.
 - **Fats:** Provide energy, store vitamins, and protect organs. Found in oils, butter, nuts, and fatty fish.
2. **Micronutrients:** These are nutrients needed in smaller amounts but are still essential.
 - **Vitamins:** Support various body functions like immune health, vision, and bone strength (e.g., Vitamin C, Vitamin D).
 - **Minerals:** Help build bones, make hormones, and regulate heartbeat (e.g., calcium, iron, potassium).
3. **Water:** Makes up a large portion of the body and is essential for nearly all bodily functions, including digestion, temperature regulation, and nutrient transport.
4. **Fiber:** Found mainly in plant foods, fiber helps with digestion and can improve gut health. Examples include whole grains, fruits, and vegetables.

Functions of Food

1. **Energy Source:** Food fuels the body, providing the energy needed for activities, from simple breathing to intense exercise.
2. **Growth and Development:** Nutrients in food are essential for growth and the repair of tissues, especially in children, teenagers, and during recovery from injuries.
3. **Maintenance of Body Functions:** Vitamins and minerals regulate processes like metabolism, immune function, and blood clotting, which keep the body functioning optimally.
4. **Disease Prevention:** Nutrients from food help strengthen the immune system and can reduce the risk of diseases like heart disease, diabetes, and some cancers.
5. **Emotional and Social Role:** Food also has a cultural and social significance, bringing people together and providing comfort and pleasure.

Types of Food Sources

- **Plant-Based Foods:** Plant-based food refers to foods that come primarily from plants rather than animals. This includes Fruits, vegetables, grains, nuts, seeds, and legumes that provide a wide range of nutrients and are often rich in fiber, vitamins, and minerals.. Plant-based diets can vary from completely vegan (no animal products at all) to vegetarian (may include some dairy or eggs), or simply emphasize more plants while still including some animal products.
- **Animal-Based Foods:** Animal-based food refers to any food derived from animals, including meat, dairy, eggs, and seafood. These foods are typically rich in protein, essential fats, vitamins, and minerals that support various bodily functions. Animal-based foods provide complete protein sources, which means they contain all the essential amino acids the body needs.
- **Processed Foods:** These foods have been modified from their original form, often for preservation or convenience. While some processed foods are nutritious, many can be high in added sugars, salts, and fats.

Food is essential for survival and well-being. Eating a balanced diet that includes a variety of food types helps to ensure the body gets all the nutrients it needs for health, energy, and growth. Understanding what food provides can help you make better choices to support a healthy lifestyle.

Diet

A diet is the combination of foods and drinks a person regularly consumes. It refers not only to specific eating plans for health or weight management but also to everyday eating patterns and habits. Diets can vary widely depending on cultural preferences, personal choices, health needs, and lifestyle factors.

Key Aspects of a Diet

1. **Nutritional Balance:** A well-balanced diet provides the right amount of carbohydrates, proteins, fats, vitamins, minerals, and water to support bodily functions.
2. **Variety:** Including diverse foods in a diet helps ensure a range of nutrients for overall health.
3. **Portion Control:** Balancing portion sizes is essential to avoid overeating and to manage calorie intake.
4. **Meal Patterns:** Some people eat three main meals a day, while others may prefer smaller meals or snacks throughout the day.

There are various types of diets, each designed for different health goals, lifestyle preferences, and dietary needs like Balanced Diet, Plant-Based Diet, Vegetarian Diet, Vegan Diet, Ketogenic Diet, Intermittent Fasting etc.

Balanced Diet

A balanced diet provides the right proportion of nutrients the body needs to function optimally. It includes a variety of foods from all the main food groups in appropriate amounts to supply essential nutrients like carbohydrates, proteins, fats, vitamins, and minerals. The goal of a balanced diet is to promote good health, maintain energy, support growth and repair, and reduce the risk of diseases.

Components of a Balanced Diet

1. **Carbohydrates:**
 - Source of energy.
 - Found in foods like whole grains (brown rice, oats), fruits, vegetables, and legumes.
2. **Proteins:**
 - Essential for building and repairing tissues.
 - Sources include lean meats, fish, eggs, dairy, beans, and nuts.
3. **Fats:**
 - Provide long-term energy, support cell function, and help absorb vitamins.

- Healthy sources include avocados, nuts, seeds, olive oil, and fatty fish.
- 4. **Vitamins and Minerals:**
 - Vital for immune function, bone health, and overall body regulation.
 - Found in fruits, vegetables, dairy, nuts, and whole grains.
- 5. **Fiber:**
 - Aids digestion and promotes gut health.
 - Found in fruits, vegetables, whole grains, and legumes.
- 6. **Water:**
 - Essential for hydration, digestion, and nutrient transport.

Benefits of a Balanced Diet

- **Supports Growth and Repair:** Provides necessary nutrients for body maintenance and recovery.
- **Boosts Immune System:** Nutrients like vitamins A, C, and zinc help support immunity.
- **Reduces Disease Risk:** Can lower the risk of chronic diseases like heart disease, diabetes, and obesity.
- **Promotes Healthy Weight:** Helps manage calorie intake, preventing undernutrition or overnutrition.

Example of a Balanced Diet Plate

A balanced meal might include:

- Half the plate with colorful vegetables and fruits.
- A quarter with whole grains like brown rice or quinoa.
- A quarter with a protein source like chicken, beans, or tofu.
- A small amount of healthy fats, like olive oil or avocado.

In essence, a balanced diet emphasizes variety, portion control, and nutrient-rich foods to support overall health and wellness.

How balanced diet is related to health

A balanced diet is essential for good health as it provides the body with all the nutrients it needs to function properly. It includes the right proportions of carbohydrates, proteins, fats, vitamins, minerals, and fiber. Here's how it supports health:

1. **Provides Nutrients:** A balanced diet supplies essential nutrients for energy, growth, and repair.

2. **Supports Immunity:** Nutrients like Vitamin C and zinc boost the immune system, helping fight infections.
3. **Prevents Diseases:** It lowers the risk of chronic diseases like heart disease, diabetes, and obesity.
4. **Maintains Healthy Weight:** Helps manage weight by providing the right number of calories without excess.
5. **Improves Mental Health:** Nutrients in a balanced diet support brain function and mood regulation.
6. **Boosts Digestion:** Fiber-rich foods promote digestion and prevent constipation.
7. **Enhances Energy:** Provides consistent energy, reducing fatigue and improving focus.

In short, a balanced diet is crucial for overall health, supporting both physical and mental well-being, and reducing the risk of health issues.

Diseases for Nutritional Deficiency

Nutritional deficiencies can lead to a variety of health problems and diseases. Here are some common **nutritional deficiencies** and the diseases they cause:

1. Vitamin A Deficiency

- **Disease:** **Night blindness**, **Xerophthalmia** (dryness of the eyes), and **immune system weakness**.
- **Cause:** Lack of vitamin A, which is essential for vision, skin health, and immune function.
- **Sources:** Carrots, sweet potatoes, spinach, and liver.

2. Vitamin C Deficiency

- **Disease:** **Scurvy** (bleeding gums, bruising, fatigue).
- **Cause:** Inadequate vitamin C, which is needed for collagen production and immune function.
- **Sources:** Citrus fruits, strawberries, bell peppers, and broccoli.

3. Vitamin D Deficiency

- **Disease:** **Rickets** (in children) and **Osteomalacia** (in adults).
- **Cause:** Insufficient vitamin D, which is important for calcium absorption and bone health.
- **Sources:** Sunlight, fortified dairy products, and fatty fish.

4. Iron Deficiency

- **Disease:** **Iron-deficiency anemia** (fatigue, pale skin, weakness).
- **Cause:** Lack of iron, which is needed to produce hemoglobin in red blood cells.
- **Sources:** Red meat, beans, spinach, and fortified cereals.

5. Iodine Deficiency

- **Disease:** **Goiter** (enlargement of the thyroid gland) and **cretinism** (severe developmental delays in infants).
- **Cause:** Lack of iodine, which is necessary for thyroid function.
- **Sources:** Iodized salt, seafood, and dairy.

6. Vitamin B12 Deficiency

- **Disease:** **Pernicious anemia** (fatigue, weakness, nerve damage).
- **Cause:** Inadequate vitamin B12, which is important for red blood cell production and nerve function.
- **Sources:** Meat, fish, eggs, and dairy.

7. Folate (Vitamin B9) Deficiency

- **Disease:** **Megaloblastic anemia** (fatigue, weakness, pale skin) and birth defects in pregnancy (neural tube defects).
- **Cause:** Insufficient folate, which is vital for cell division and DNA synthesis.
- **Sources:** Leafy greens, legumes, and fortified grains.

8. Calcium Deficiency

- **Disease:** **Osteoporosis** (weak bones) and **rickets** (in children).
- **Cause:** Lack of calcium, which is necessary for strong bones and teeth.
- **Sources:** Dairy products, fortified plant milks, leafy greens, and tofu.

9. Zinc Deficiency

- **Disease:** **Growth retardation, delayed wound healing, and impaired immune function.**
- **Cause:** Inadequate zinc, which is important for cell growth and immune health.
- **Sources:** Meat, shellfish, legumes, and seeds.

10. Magnesium Deficiency

- **Disease:** Muscle cramps, fatigue, and irregular heart rhythms.
- **Cause:** Insufficient magnesium, which is essential for muscle and nerve function.
- **Sources:** Nuts, seeds, whole grains, and leafy greens.

A **nutritional deficiency** occurs when the body lacks essential vitamins and minerals needed for proper function. This can lead to various diseases, including anemia, weakened bones, poor immune function, and developmental delays. A balanced diet with a variety of nutrient-rich foods is the best way to prevent these deficiencies and maintain good health.

Plant Growth Regulators

Plant Growth Regulators (PGRs), also known as **phytohormones**, are chemicals that control plant growth and development. They can be natural or synthetic and affect processes like flowering, root development, and fruit ripening.

Main Types of PGRs:

1. **Auxins:** Promote cell elongation, root growth, and help plants respond to light and gravity.
2. **Cytokinins:** Stimulate cell division, promote bud growth, and delay leaf aging.
3. **Gibberellins:** Encourage stem elongation, seed germination, and fruit growth.
4. **Abscisic Acid (ABA):** Inhibits growth, helps plants cope with stress, and regulates seed dormancy.
5. **Ethylene:** A gas that controls fruit ripening and leaf shedding.

Uses:

- Improve crop yield.
- Control flowering and fruiting.
- Promote rooting in cuttings.
- Speed up fruit ripening (e.g., bananas).

In short, PGRs are essential for managing plant growth and improving agricultural productivity.

Photosynthesis

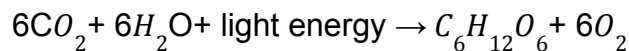
Photosynthesis is the process by which plants, algae, and some bacteria convert light energy, usually from the sun, into chemical energy stored in the form of **glucose** (a type of sugar). This process is crucial because it is how plants produce their food and release oxygen, which is vital for life on Earth.

The Basic Photosynthesis Equation:



The basic photosynthesis equation shows the overall process by which plants convert light energy into chemical energy (in the form of glucose) while producing oxygen.

The Equation:



Breakdown:

- $6CO_2$: Carbon dioxide from the air is absorbed by the plant through the leaves.
- $6H_2O$: Water absorbed by the plant's roots from the soil.
- Light energy: Energy from the sun, absorbed by chlorophyll in the plant cells.
- $C_6H_{12}O_6$: Glucose (a type of sugar), which the plant uses for energy and growth.
- $6O_2$: Oxygen is released as a byproduct and exits the plant through the leaves.

Key Points:

- Plants use sunlight to convert water and carbon dioxide into **glucose** (food) and release **oxygen**.
- It provides energy for plants and oxygen for other organisms.
- It is the foundation of the food chain.

In short, photosynthesis allows plants to produce food and release oxygen, essential for life on Earth.

Transpiration

Transpiration is the process by which **plants lose water vapor** through tiny openings in their leaves called **stomata**. It is essentially the plant's way of releasing excess water into the atmosphere.

Key Points:

- Water absorbed by roots moves through the plant to the leaves.
- Some water is used for photosynthesis, while the rest is lost through transpiration.
- It helps cool the plant and allows the flow of nutrients from roots to leaves.

In short, transpiration is how plants release water vapor, regulate water balance, and transport nutrients.