

## Overview of Nutrition

The subject of nutrition is both exciting and confusing to the beginning student. Nutrition has become a major topic of conversation at places of work, at social gatherings, and in the media. We are living at a time when the focus is on prevention of disease and responsibility for one's own health. The newest trends in health care emphasize the importance of nutrition education. Throughout history, food and its effects on the body have been studied and written about, but most of the information gathered was based on trial and error. Many superstitions regarding the magical powers and healing capabilities of food also evolved. The study of nutrition as a science is relatively new, developing only after chemistry and physiology became established disciplines. Its growth begins with the end of World War II. Nutrition science is now a highly regarded discipline. The progressive advances in the science and technology of this discipline offer us hope in controlling our destiny by preventing or delaying the onset of a number of chronic diseases related to nutrition, food, and lifestyle. Every specialized field has its own language. A beginning student in nutrition needs to comprehend the language used in this discipline and to understand some basic concepts upon which the science is based to understand the science of nutrition. Nutrition builds on two areas of science. The life sciences of biochemistry and physiology tell us how nutrition relates to our physical health and body function. **Nutrition science** comprises the body of scientific knowledge that governs nutrient requirements for all aspects of life for body maintenance such as growth, activity, reproduction, and maintenance.

## **Basic Concepts of Nutrition**

**Nutrition:** is the result of the processes whereby the body takes in and uses food for growth, development, and the maintenance of health. These processes include digestion, absorption, and metabolism.

**Nutrient:** a chemical substance obtained from food and needed by the body for growth, maintenance, or repair of tissues. Many nutrients are considered essential, the body cannot make them and they must be obtained from food.

**Food:** any substance taken into the body that will help to meet the body's needs for energy, maintenance, and growth.

**Diet:** refers to whatever you eat and drink each day. Thus it includes the normal diet you consume and the diet people consume in groups. Diet may also be modified and used for ill persons as part of their therapy (therapeutic diets).

**Optimum nutrition:** the state of receiving and utilizing essential nutrients to maintain health and well-being at the highest possible level. It provides a reserve for the body.

**Malnutrition:** means an undesirable kind of nutrition leading to ill-health. It results from a lack, excess or imbalance of nutrients in the diet. It includes undernutrition and overnutrition.

**Overnutrition:** an excessive intake of one or more nutrients, frequently referring to nutrients providing energy (kcalories).

**Undernutrition:** is a state of an insufficient supply of essential nutrients or a deficiency of one or more nutrients, including nutrients providing energy (calories).

**Health:** the state of complete physical, mental, and social well-being; not merely the absence of disease and infirmity.

**Wellness:** that integrates body, mind, and spirit should be the main goal in life.

**Nutritional status:** One's physical condition as determined by the diet or condition of the body as it relates to the consumption and utilization of food.

**Good nutritional status:** the intake of a balanced diet containing all the essential nutrients to meet the body's requirements for energy, maintenance, and growth.

**Poor nutritional status:** an inadequate intake (or utilization) of nutrients to meet the body's requirements for energy, maintenance, and growth.

**Kilocalorie (kcalorie, kcal):** technically correct term for unit of energy in nutrition, equal to the amount of heat required to raise the temperature of 1 kg of water 1°C.

### **Assessment of Nutritional Status**

**Assessment:** gathering of data about a person in order to logically identify his or her physical, psychological, social, and economic assets and liabilities. There are four major techniques to assess nutritional status:

#### **1- Physical Findings**

There are many clinical signs of good and poor nutrition. Although some of these signs are not related to a person's nutritional status, they serve as a general indicator of health. Data from a physical assessment are considered objective data and helpful to the health practitioner. Table (1) summarizes these findings.

#### **2- Anthropometric Measurements**

Assessment of growth and development by studying anthropometric measurements (physical measurements of the human body) provides important information about the nutritional status of infants, children, adolescents, and pregnant women. Standard measurements include weight, height, head circumference, midarm circumference, chest circumference, and skin-fold thickness.

**Table (1) Characteristics of Nutritional Status**

<b>Good nutritional status</b>	<b>Poor nutritional status</b>
Alert expresion	Apathy
Shiny hair	Dull, lifeless hair
Clear complexion with good color	Greasy, blemished complexion with poor color
Bright, clear eyes	Dull, red-rimmed eyes
Pink, firm gums and well-developed teeth	Red, puffy, receding gums and missing or cavity-prone teeth
Firm abdomen	Swollen abdomen
Firm well-developed muscles	Underdeveloped, flabby muscles
Well-developed bone structure	Bowed legs, “ pigeon” breast
Normal weight for height	Overweight or underweight
Erect posture	Slumped posture
Emotional stability	Easily irritated, depressed, poor attention span
Good stamina, seldom ill	Easily fatigued, frequently ill
Healthy appetite	Excessive or poor appetite
Healthy, normal sleep habits	Insomnia at night, fatigued during day
Normal elimination	Constipation or diarrhea

#### **4- Diet History and Methods of Evaluating Data**

The type of data needed for health and diet history is subjective and involves interviews and food records. The accuracy of both approaches depends on the skill of the interviewer and the client’s memory, perception, and cooperation. From an interview, information can be obtained on the client’s food intake history, presence of disorder, and drug usage. It is important that the interviewer learn something about the client’s life and the factors that influence his or her eating habits (such as money, storage facilities, transportation, ethnicity). Once the data are collected, we can determine the nutrient content of the diet and evaluate the person’s dietary intake using available references such the Dietary Guidelines. At present this is easily done with computer software designed for that purpose.

## **Nutrients & their Functions**

To maintain health and function properly, the body must be provided with nutrients. Nutrients are chemical substances that are necessary for life. They are divided into six classes:

- 1- Carbohydrates (CHO) – provide energy (4 kcal)
- 2- Fats (lipids) – provide energy (9 kcal)
- 3- Proteins – build and repair body tissues; provide energy (4 kcal)
- 4- Vitamins – regulate body processes
- 5- Minerals – regulate body processes
- 6- Water – regulate body processes

The body can make small amounts of some nutrients, but most must be obtained from food in order to meet the body's needs. Those available only in food are called essential nutrients. There are about 40 of them, and they are found in all six nutrient classes. The six nutrient classes are chemically divided into two categories: organic and inorganic. Organic nutrients contain hydrogen, oxygen, and carbon. (Carbon is an element found in all living things.) Before the body can use organic nutrients, it must break them down into their smallest components. Inorganic nutrients are already in their simplest forms when the body ingests them, except for water.

## **What Is an Essential Nutrient?**

The body can synthesize (make) many nutrients, such as the lipids cholesterol and fat, but about 50 nutrients are dietary essentials. An essential nutrient must be supplied by food, because the body does not synthesize the nutrient or make enough to meet its needs. Water is the most essential nutrient. **There are three key features that help identify an essential nutrient:**

- If the nutrient is missing from the diet, a deficiency disease occurs as a result.
- The deficiency disease is a state of health characterized by certain abnormal

physiological changes. Changes that affect body functions are referred to as signs of disease. Disease signs include rashes, failure to grow properly, and elevated blood pressure. Symptoms are subjective complaints of ill health that are difficult to observe and measure, such as dizziness, fatigue, and headache.

- When the missing nutrient is added to the diet, the abnormal physiological changes are corrected. As a result, signs and symptoms of the deficiency disorder resolve as normal functioning is restored and the condition is cured.
- After scientists identify the nutrient's specific roles in the body, they can explain why the abnormalities occurred when the substance was missing from the diet.

If you wanted to test your body's need for vitamin C, for example, you could avoid consuming foods or vitamin supplements that contain the vitamin. When the amount of vitamin C in your cells became too low for them to function normally, you would develop physical signs of scurvy, the vitamin C deficiency disease. Early in the course of the deficiency, tiny red spots that are actually signs of bleeding under the skin (bruises) would appear where the elastic bands of your clothing applied pressure. When you brushed your teeth, your gums would bleed from the pressure of the toothbrush. If you cut yourself, the wound would heal slowly or not at all. If you started consuming vitamin C containing foods again, the deficiency signs and symptoms would disappear within a few days as your body recovered. One of the physiological roles of vitamin C is maintaining a substance in your body that literally holds cells together. This substance is also needed to produce scar tissue for wound healing. When the vitamin is lacking, the tiniest blood vessels in your skin begin to leak blood where the skin is compressed, and even minor cuts have difficult healing. Thus, vitamin C meets all the required features of an essential nutrient.

## **What Are Phytochemicals?**

Some foods, particularly those from plants, contain substances that are not nutrients, yet they have healthful benefits. Plants make hundreds of phytochemicals (phyto=plant). Caffeine, for example, is a phytochemical naturally made by coffee plants that has a stimulating effect on the body. Many phytochemicals are antioxidants that may reduce risks of heart disease and certain cancers. An antioxidant protects cells and their components from being damaged or destroyed by exposure to certain environmental and internal factors. Not all phytochemicals, however, have beneficial effects on the body; some are toxic (poisonous) or can interfere with the absorption of nutrients.

## **Dietary Supplements**

Many Americans purchase dietary supplements such as vitamin pills and herbal extracts to improve their health. The Dietary Supplement and Health Education Act of 1994 (DSHEA) allows manufacturers to classify nutrient supplements and certain herbal products as foods. According to the DSHEA, a dietary supplement is a product (excluding tobacco) that contains a vitamin, a mineral, an herb or other plant product, an amino acid, or a dietary substance that supplements the diet by increasing total intake. According to scientific evidence, some dietary supplements, such as vitamins and certain herbs, can have beneficial effects on health. However, results of scientific testing also indicate that many popular dietary supplements are not helpful and may even be harmful.

## **Major Food Groups**

### **1- Grains**

The grains group includes all foods made from wheat, rice, oats, cornmeal, barley, such as bread, pasta, oatmeal, breakfast cereals, tortillas, and grits. In general, 1 slice of bread, 1 c of ready-to-eat cereal, or 1/2 c of cooked rice, pasta, or cooked cereal can be considered as 1 ounce equivalent from the grains group.

At least half of all grains consumed should be whole grains. Consume 3 or more ounce equivalents of whole-grain products per day. Since the recommended 3 ounce equivalents may be difficult for young children to achieve, they should gradually increase the amount of whole grains in their diets. An ounce-equivalent of grains is about 1 slice of bread, 1 c of ready-to-eat cereal flakes, or 1/2 c of cooked pasta or rice, or cooked cereal. Refined grain products can also be good sources of several vitamins and minerals, when they have undergone enrichment or fortification.

**Enrichment** is the addition of iron and certain B vitamins to cereal grain products such as flour and rice. In general, enrichment replaces some of the nutrients that were lost during processing.

**Fortification** is the addition of nutrients to food, such as adding calcium to orange juice, vitamins A and D to milk, and numerous vitamins and minerals to ready-to-eat breakfast cereals.

## **2- Vegetables**

The vegetable group includes all fresh, frozen, canned, and dried vegetables and vegetable juices. In general, 1 c of raw or cooked vegetables or vegetable juice, or 2 c of raw leafy greens can be considered as 1 c from the vegetable group. Eat the recommended amounts of vegetables, and choose a variety of vegetables each day. For example, those needing 2000 calories per day need about 2-1/2 c of vegetables per day.

## **3- Fruits**

The fruit group includes all fresh, frozen, canned, and dried fruits and fruit juices. In general, 1 c of fruit or 100% fruit juice, or 1/2 c of dried fruit, can be considered as 1 c from the fruit group. Eat recommended amounts of fruit, and choose a variety of fruits each day. For example, people who need 2000 calories per day need 2 c of fruit per day.



#### **4- Milk and milk products**

The milk group includes all fluid milk products and foods made from milk that retain their calcium content, such as yogurt and cheese. Foods made from milk that have little to no calcium, such as cream cheese, cream, and butter, are not part of the group. Most milk group choices should be fat free or low fat. In general, 1 c of milk or yogurt, 1-1/2 ounces of natural cheese, or 2 ounces of processed cheese can be considered as 1 c from the milk group. Consume 3 c of fat-free or low-fat (1%) milk, or an equivalent amount of yogurt or cheese, per day. Children 2 to 8 years old should consume 2 c of fat-free or low-fat milk, or an equivalent amount of yogurt or cheese, per day. Consume other calcium-rich foods if milk and milk products are not consumed.

#### **5- Meat and meat substitutes**

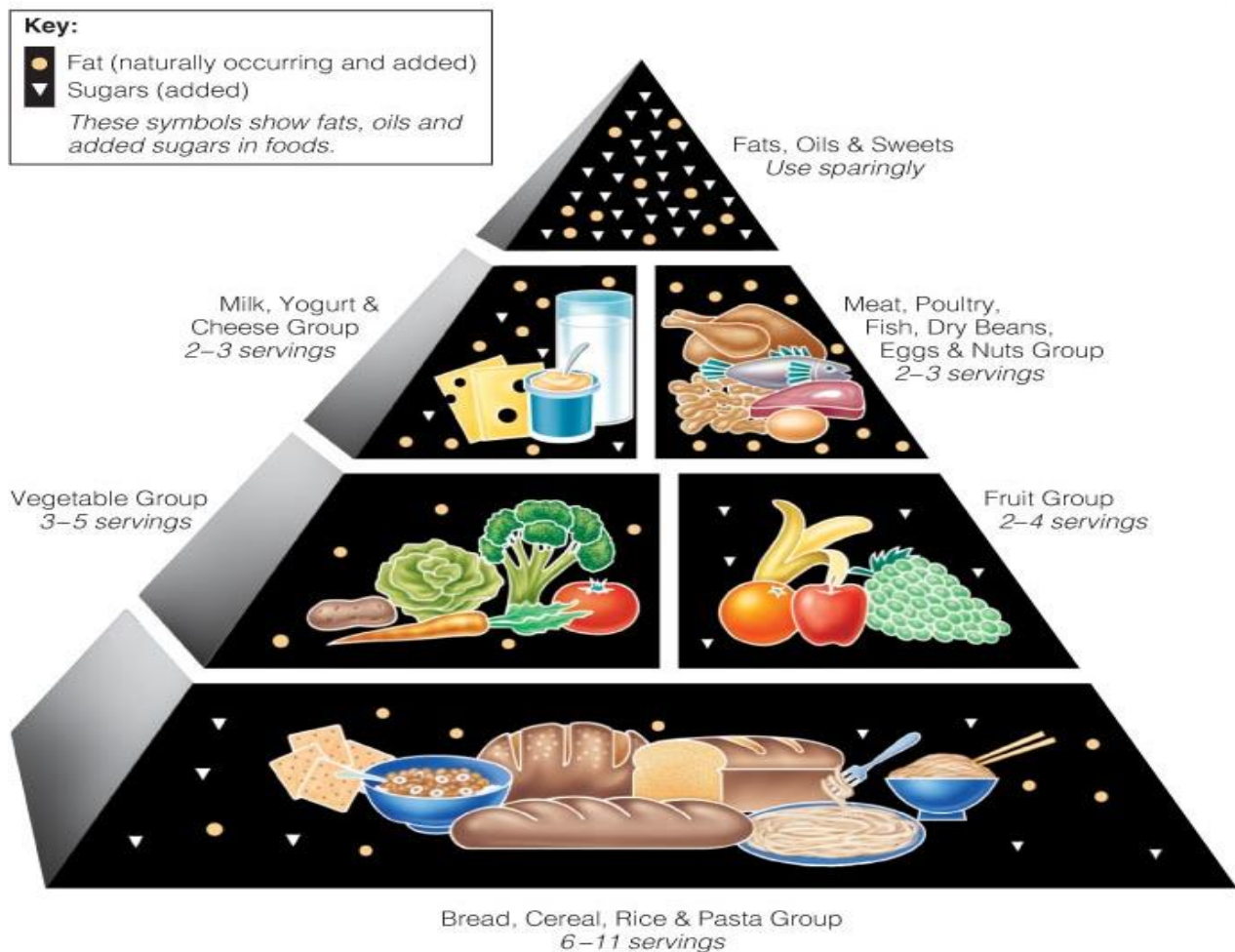
For the meat and beans group in general, 1 ounce of lean meat, poultry, or fish, 1 egg, 1 tbsp peanut butter, 1/4 c cooked dry beans, or 1/2 ounce of nuts or seeds can be considered as 1 ounce-equivalent from the meat and beans group. One should make choices that are low fat or lean when selecting meats and poultry. Choose a variety of different types of foods from this group each week. Include fish, dry beans, peas, nuts, and seeds, as well as meats, poultry, and eggs. Consider dry beans and peas as an alternative to meat or poultry as well as a vegetable choice. Keep the overall amounts of foods eaten from this group within the amount needed each day. For example, people who need 2000 calories per day need 5-1/2 ounce-equivalents per day.

#### **6- Fats and Oils**

Oils and fats were obtained from many different plants and from fish such as canola, corn, olive, soybean, and sunflower. Some foods are naturally high in oils such as nuts, olives, some fish, and avocados. Foods that are mainly oil include mayonnaise, certain salad dressings, and soft margarine. Choose most fats from sources of monounsaturated and polyunsaturated fatty acids, such as fish, nuts,

seeds, and vegetable oils. Keep the amount of oils consumed within the total allowed for caloric needs. For example, people who need 2000 calories per day can consume 27 grams of oils (about 7 tsp). Choose fat-free, low-fat, or lean meat, poultry, dry beans, milk, and milk products. Choose grain products and prepared foods that are low in saturated and trans fat.

## Food Guide Pyramid



## References

- Schiff, W., J. The Nutrition for Healthy Living. 2<sup>nd</sup> ed., 2011. The McGraw-Hill Companies, Inc.
- Roth, R., A. Nutrition and Diet Therapy. 10<sup>th</sup> ed., 2011. Cengage Learning com.