

# Chapter 1

## An Overview of Nutrition



### What is Nutrition?

**Nutrition:** the study of food, including

- How food nourishes our bodies
- How food influences our health

“the science of food, the nutrients and the substances therein, their action, interaction, and balance in relation to health and disease, and the process by which the organism ingests, absorbs, transports, utilizes, and excretes food substances”

-The Council on Food and Nutrition of the American Medical Association

Nutrition is a relatively new discipline of science.

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### Why is Nutrition Important?

Nutrition contributes to wellness.

**Wellness:** the absence of disease

- Physical, emotional, and spiritual health

Critical components of wellness:

- Nutrition
- Physical activity

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### Why is Nutrition Important?

Nutrition can prevent disease.

- Nutrient deficiency diseases: scurvy, goiter, rickets
- Diseases influenced by nutrition: chronic diseases such as heart disease
- Diseases in which nutrition plays a role: osteoarthritis, osteoporosis

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## Why is Nutrition Important?

Obesity is a growing problem.



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## Why is Nutrition Important?

Nutrition is so important it has become a national goal.

### Goals of **Healthy People 2010**

1. Increase quality and years of healthy life
2. Eliminate health disparities

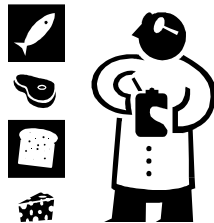
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## What Are Nutrients?

**Nutrients:** the chemicals in foods that are critical to human growth and function.

carbohydrates  
fats and oils  
proteins

vitamins  
minerals  
water



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## Functions of Nutrients

General functions of nutrients:

- Provide materials for building and maintaining the body
- Act as regulators for key metabolic reactions
- Participate in metabolic reactions that provide energy to sustain life

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## What Are Nutrients?

**Macronutrients:** nutrients required in relatively large amounts.

- Provide energy to our bodies
- Carbohydrates, fats and oils, proteins

**Micronutrients:** nutrients required in smaller amounts.

- Vitamins and minerals

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## Energy From Nutrients

We measure energy in **kilocalories (kcal)**.

**Kilocalorie:** amount of energy required to raise the temperature of 1g of water by 1°C.

On food labels, “calorie” actually refers to kilocalories.

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## Carbohydrates

Carbon, hydrogen, and oxygen  
Sugars and starches

- Basic unit is glucose
- Simple and Complex CHO



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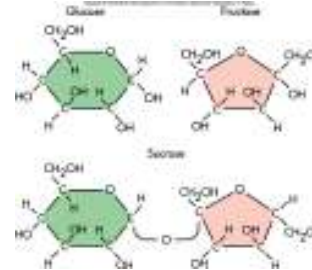
Primary source of fuel for the body, especially for the brain.

Provide 4 kcal per gram.

Carbohydrates are found in grains (wheat, rice), vegetables, fruits, legumes, and dairy products.

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## Simple Carbohydrates



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## Complex Carbohydrates



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## Fats and Oils

Fats and oils are composed of **lipids**, molecules that are insoluble in water.

- Composed of C, H and few O

Functions

- Provide 9 kcal per gram.
- Energy source, structure, regulation

An important energy source during rest or low intensity exercise.

Found in butter, margarine, vegetable oils, meat, and dairy products.



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## Proteins

Proteins are chains of **amino acids**.

- (9) Essential amino acid
- (11) Nonessential amino acid

Proteins are an important source of nitrogen

- Composed of C, O, H, N

Proteins can supply 4 kcal of energy per gram, but are not a primary energy source.



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## Proteins

Proteins are important for

- Building cells and tissues
- Maintaining bones
- Repairing damage
- Regulating metabolism

Protein sources include meats, dairy products, seeds, nuts, and legumes.

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## Vitamins

**Vitamins:** organic molecules that assist in regulating body processes. (i.e. energy production, blood clotting, and calcium balance)

Composed of various elements  
Vital to life  
Needed in tiny amounts  
Cooking loss  
Food sources: all food groups



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Vitamins are micronutrients that do not supply energy to our bodies.

1. Fat-soluble vitamins
2. Water-soluble vitamins

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## Vitamins

### Fat-soluble vitamins:

- Vitamins A, D, E and K
- Dissolve easily in fats and oils

Fat-soluble vitamins can be stored in the body.

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## Vitamins

### Water-soluble vitamins:

- Vitamin C and the B vitamins
- Remain dissolved in water

Excess water-soluble vitamins are eliminated by the kidneys and cannot be stored in our bodies.

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## Minerals

**Minerals:** inorganic substances required in tiny amounts for body processes.

Minerals include sodium, calcium, iron, potassium, and magnesium.

Minerals have many different functions such as fluid regulation, bone structure, muscle movement, and nerve functioning.

Not destroyed during cooking.



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## Minerals

Our bodies require at least 100 mg per day of the **major minerals** such as calcium, phosphorus, magnesium, sodium, potassium, and chloride.

We require less than 100 mg per day of the **trace minerals** such as iron, zinc, copper, iodine, and fluoride.

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## Water

Water is a critical nutrient for health and survival.

Body is nearly 60% water – which we get from both food and beverages

Water is involved in many body processes:

- |                     |                    |
|---------------------|--------------------|
| fluid balance       | nutrient transport |
| nerve impulses      | removal of wastes  |
| muscle contractions | chemical reactions |
| many, many more...  |                    |



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## Alcohol is NOT a nutrient



## Determining Nutrient Needs

**Dietary Reference Intakes (DRIs):** updated nutritional standards.

- Expand on the traditional RDA values
- Set standards for nutrients that do not have RDA values

Based on preventing nutrient-deficiency diseases which are rare in the U.S. ... now we are focused more on nutrition and wellness

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## Determining Nutrient Needs

DRIs consist of 4 values:

1. Estimated Average Requirement (EAR)
2. Recommended Dietary Allowances (RDA)
3. Adequate Intake (AI)
4. Tolerable Upper-Intake Level (UL)

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## Determining Nutrient Needs



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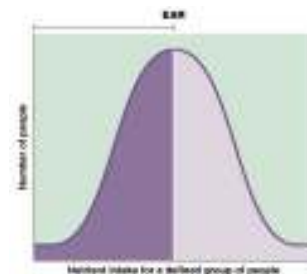
## Determining Nutrient Needs

### Estimated Average Requirement (EAR)

- The average daily intake level of a nutrient that will meet the needs of half of the people in a particular category
- Used to determine the Recommended Dietary Allowance (RDA) of a nutrient

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## Determining Nutrient Needs: EAR



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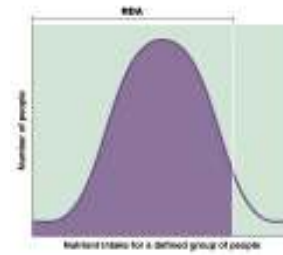
## Determining Nutrient Needs

### Recommended Dietary Allowances (RDA)

- The average daily intake level required to meet the needs of 97 – 98% of people in a particular category

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## Determining Nutrient Needs: RDA



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## Determining Nutrient Needs

### Adequate Intake (AI)

- Recommended average daily intake level for a nutrient
- Based on observations and estimates from experiments
- Used when the RDA is not yet established: calcium, vitamin D, vitamin K, fluoride

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## Determining Nutrient Needs

### Tolerable Upper Intake Level (UL)

- Highest average daily intake level that is not likely to have adverse effects on the health of most people
- Consumption of a nutrient at levels above the UL is not considered safe

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## Determining Nutrient Needs

### Estimated Energy Requirement (EER)

- Average dietary energy intake (kcal) to maintain energy balance
- Based on age, gender, weight, height, level of physical activity

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## Determining Nutrient Needs

### Acceptable Macronutrient Distribution Ranges (AMDR)

- Describes the portion of the energy intake that should come from each macronutrient

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## Determining Nutrient Needs: AMDR

Nutrient	AMDR <sup>1</sup>
Carbohydrate	45-65%
Fat	20-35%
Protein	10-35%

<sup>1</sup>AMDR values expressed as percent of total energy or as percent of total calories.  
Source: Institute of Medicine, Food and Nutrition Board, Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Protein and Amino Acids (Macromolecules) (Washington, DC: National Academies Press, 2002).

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## The Typical North American Diet

16% of kcals as proteins

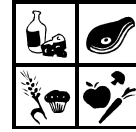
- ~66% from animal sources

50% of kcals as CHO

- ~50% from simple sugars

33% of kcals as fat

- ~60% from animal fats



## Nutrition Monitoring

Data Collection Surveys

Continuing Survey of Food Intake by Individuals (CSFII)

- <http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm>

National Health and Nutrition Examination Survey (NHANES)

- <http://www.cdc.gov/nchs/nhanes.htm>

Integrated CSFII-NHANES: What We Eat in America-NHANES

## Nutrition Survey Data

Used by many for variety of purposes:

- Nutrition monitoring and surveillance
- Relating diet to health
- Informing nutrition policies and programs

Murphy, SP. Collection and Analysis of Intake Data from the Integrated Survey. *J Nutr.* 133:885S-895S, 2003.

## Healthy People 2010



To promote healthy lifestyle and reduce preventable death and disease

Increase the number of healthy people

Reduce obesity in adults and children

Increase intake of fruits, vegetables, and whole grain products

Lower the intake of fat, saturated fats, and sodium

Increase the intake of calcium and iron

## Where to Get Reliable Nutrition Information

Registered Dietitian (RD)

Certified Nutritionist (CD)

Hospital dietetics department

Accredited University

Well known health entities

American Dietetic Association

American Heart Association



**American Dietetic Association**  
*Your link to nutrition and health™*

## General Health and Nutrition Information

[www.healthfinder.gov](http://www.healthfinder.gov) (U.S. Department of Health and Human Services)

[www.nutrition.gov](http://www.nutrition.gov) (U.S. Department of Agriculture)

<http://www.mypyramid.gov/> (U.S. Department of Agriculture)



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