Nutrition: A Functional Approach

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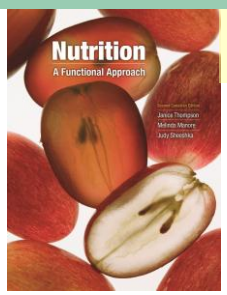


The Role of Nutrition in Our Health

What Is Nutrition?

Nutrition: the study of food, including

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

Nutrition is a relatively new discipline of science.

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

Why Is Nutrition Important?

Why Is Nutrition Important?

Nutrition can prevent disease.

a. Diseases caused by nutrient deficiency: scurvy, goiter, rickets
b. Diseases influenced by nutrition: chronic diseases such as heart disease
c. Diseases in which nutrition plays a role: osteoarthritis, osteoporosis

Why Is Nutrition Important?

Obesity is a growing problem in Canada.

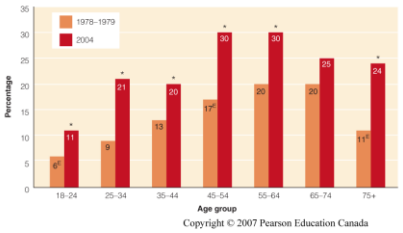
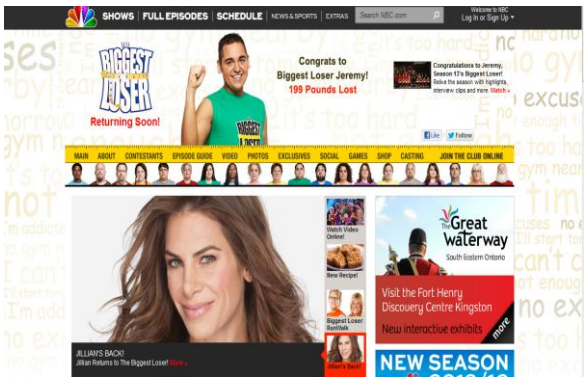


Figure 1.2 Obesity rates among Canadian adults, by age group, 1978–79 versus 2004.
* significantly higher than estimate for 1978–79 ($p<0.05$).
[E] Coefficient of variation 16.6% to 33.3% (interpret with caution).
(From the Statistics Canada publication *Measured obesity, Adult obesity in Canada: Measured height and weight*, 2004, no. 1, Catalogue 82-620, July 6, 2005, page 19, available at: www.statcan.ca/english/research/82-620-MIE/2005001/articles/adults/aobesity.htm, accessed January 2006.)



What Are Nutrients?

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

There are six classes of nutrients:

carbohydrates	vitamins
fats and oils	minerals (inorganic)
proteins	water (inorganic)

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

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.

Energy From Nutrients

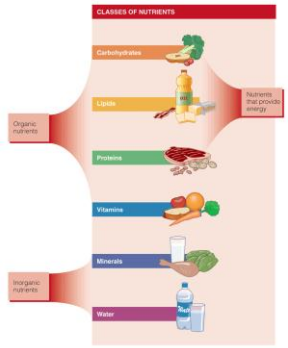


Figure 1.6 The six classes of nutrients found in the foods we consume.

Carbohydrates

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, milk, and legumes.

Composed of C, H, and O^2.

Fats and Oils

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

Provide 9 kcal per gram.

An important energy source during rest or low intensity exercise.

Found in butter, margarine, vegetable oils.

Fats and Oils

Foods containing lipids provide fat soluble vitamins and essential fatty acids.

Composed of C, H, and $O^{2.}$

Contain less O^2 and H_20 than carbohydrates.

Why is this important?

Proteins

Proteins are chains of amino acids.

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

Composed of C, H, O^2 and nitrogen.

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.

Vitamins

Vitamins: organic molecules that assist in regulating body processes.

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

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

Vitamins

Fat-soluble vitamins

- Vitamins A, D, E and K
- Dissolve easily in fats and oils
- Can be stored in the body
- Deficiencies can be serious
- Found in fat-containing foods such as meats, dairy, vegetable oils, nuts, seeds, fatty fish.

Vitamins

Water-soluble vitamins

- Vitamin C and the B vitamins
- Remain dissolved in water
- Excess eliminated by the kidneys
- Not stored in our bodies
- Abundant in many foods i.e. whole grains, vegetables, meat, and dairy products, but sensitive to cooking and storage practices.

Minerals

Minerals: inorganic substances required for body processes.

- Include sodium, calcium, iron, potassium, and magnesium.
- Many different functions such as fluid regulation, bone structure, muscle movement, and nerve functioning.

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.

Water

Water is a critical nutrient for health and survival.

Water is involved in many body processes:

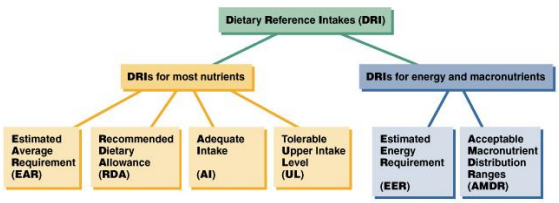
- fluid balance
- nerve impulses
- muscle contractions
- many, many more…
- nutrient transport
- removal of wastes
- chemical reactions

Determining Nutrient Needs

Dietary Reference Intakes (DRIs) are updated nutritional standards for Canada and USA.

- Expand on the traditional recommended values of each country
- Set standards for nutrients that did not previously have recommended values

Determining Nutrient Needs



Determining Nutrient Needs

DRIs consist of 4 values:

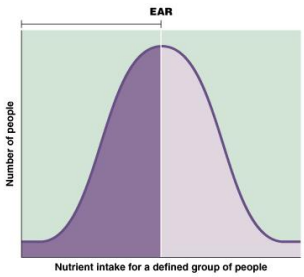
1. Estimated Average Requirement (EAR)
2. Recommended Dietary Allowances (RDA)
3. Adequate Intake (AI)
4. Tolerable Upper Intake Level (UL)

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

Determining Nutrient Needs: EAR

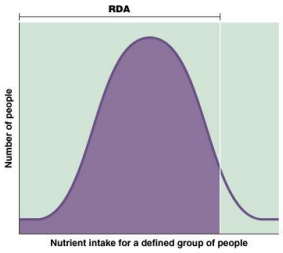


Determining Nutrient Needs

Recommended Dietary Allowances (RDA)

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

Determining Nutrient Needs: RDA



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: e.g., calcium, vitamin D, vitamin K, fluoride

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

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

Determining Nutrient Needs

Acceptable Macronutrient Distribution Ranges (AMDR)

- Describes the portion of the energy intake that should come from each macronutrient
- Expressed as ranges (percentage of total energy) with upper and lower boundary.

Determining Nutrient Needs: AMDR

Nutrient	AMDR*
Carbohydrate	45–65%
Fat	20–35%
Protein	10–35%

* 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, Carbohydrates, Fiber, Fat, Protein and Amino Acids (Macronutrients)* (Washington, DC: National Academies Press, 2002).

Nutrition Advice

Who can you trust?

- Trustworthy experts are educated and credentialed
- Government sources of information are trustworthy
- Professional organizations provide reliable nutrition information.