

# Nutrition

An Applied Approach

## Chapter 1

# Nutrition: Linking Food, Function, and Health

FOURTH  
EDITION

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# What Is Nutrition?



- **Food:** The plants and animals we eat for energy
- **Nutrition:** The science that studies:
  - How food nourishes our bodies
  - How food influences our health
- **Chronic Diseases:** Diseases that come on slowly and can persist for years
  - Nutrition research focuses on supporting health and preventing and treating chronic diseases

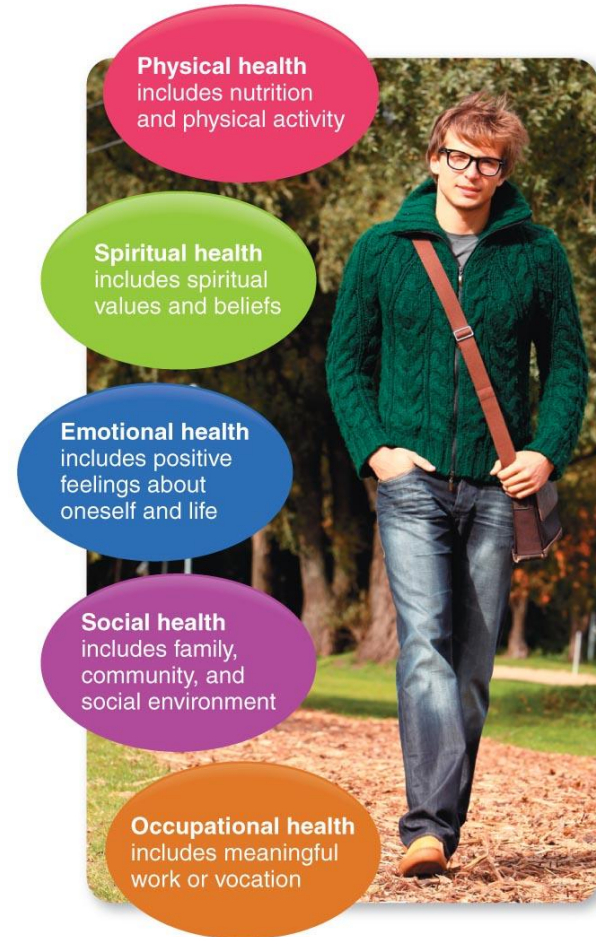
# What Is Nutrition?

- Nutrition involves study of the following:
  - Food consumption
  - Food digestion
  - Food absorption
  - Food storage
  - Factors that influence eating patterns
  - Recommended amounts of types of food
  - Food safety
  - The global food supply



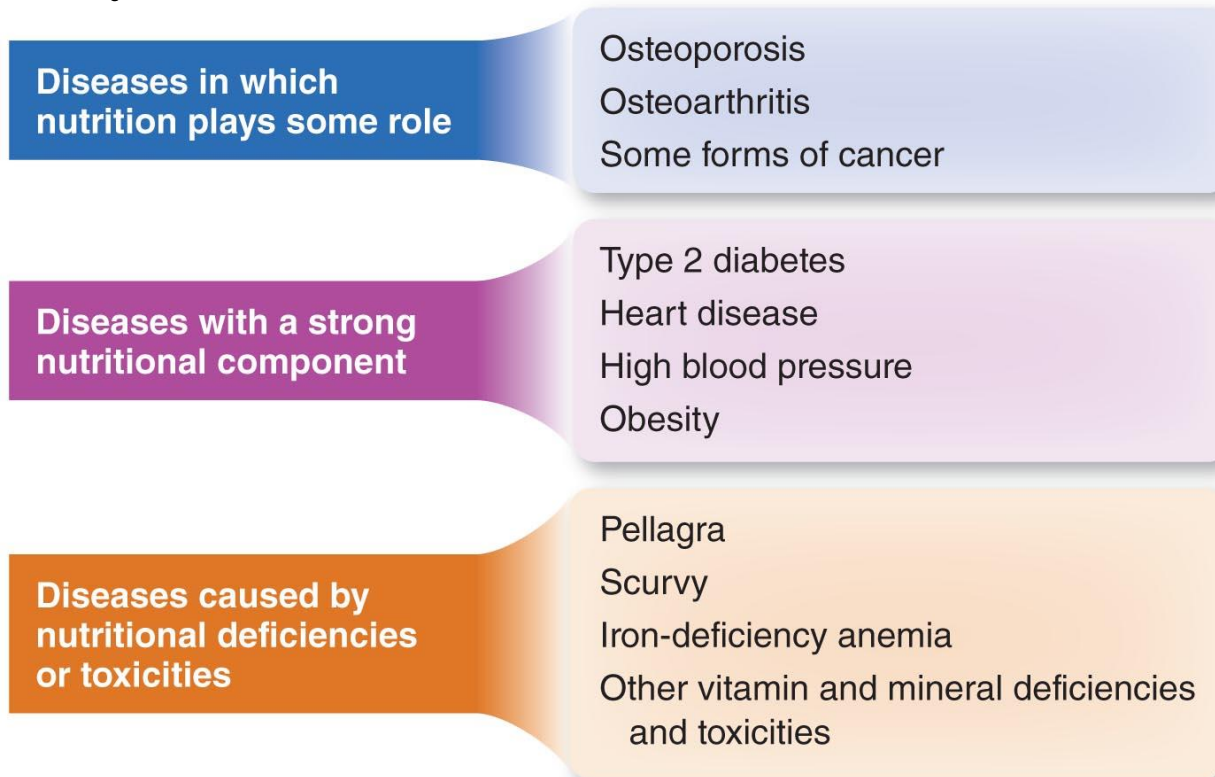
# Wellness & Health

- Nutrition and physical activity are critical components in supporting health and wellness.
- **Wellness:** Multidimensional lifelong process of health
- **Types of Health:** physical, emotional, social, occupational, and spiritual health



# Diet & Disease Prevention

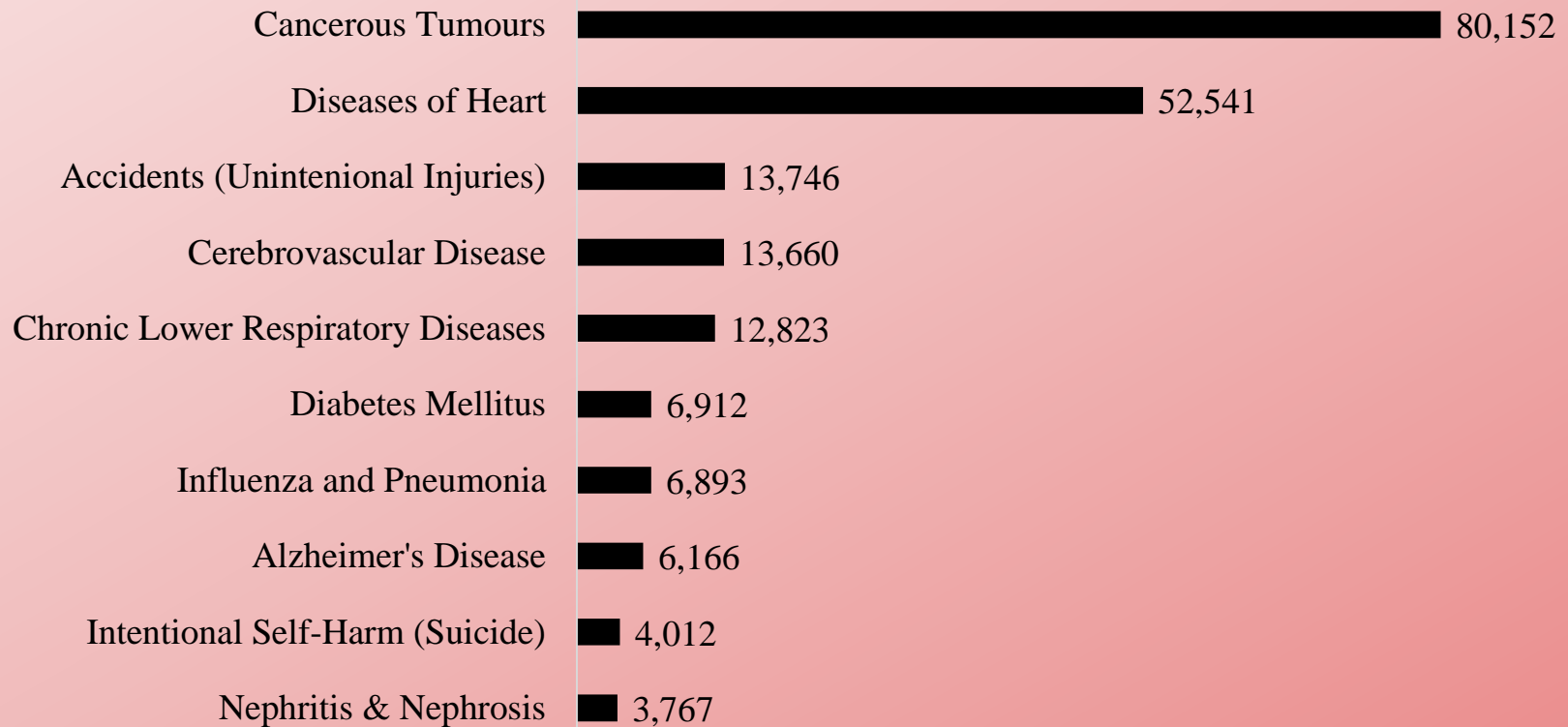
- Obesity is the primary link between poor nutrition and mortality



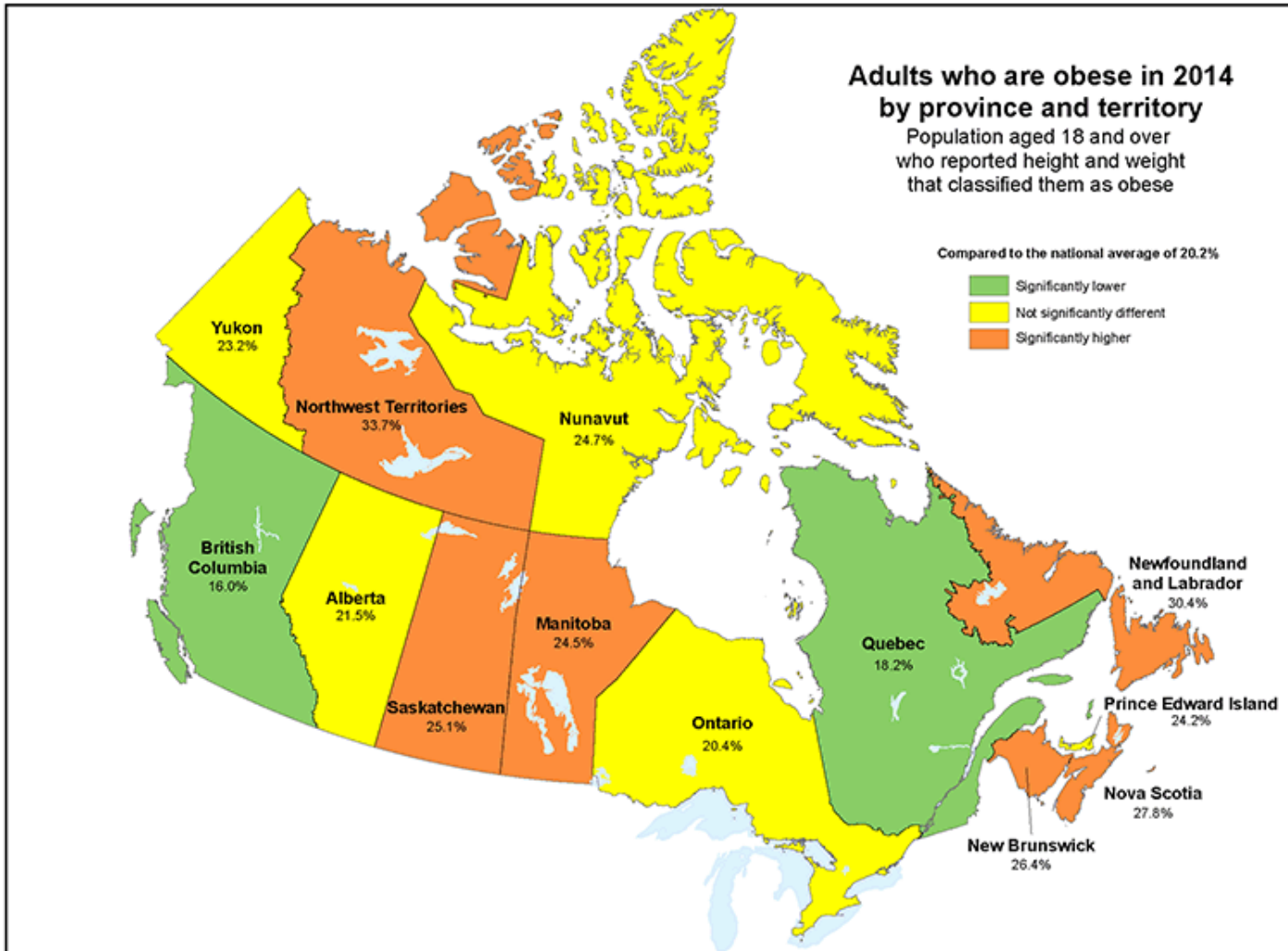


# Leading Causes of Death in Canada

## Top 10 Leading Causes of Death in Canada (2019)



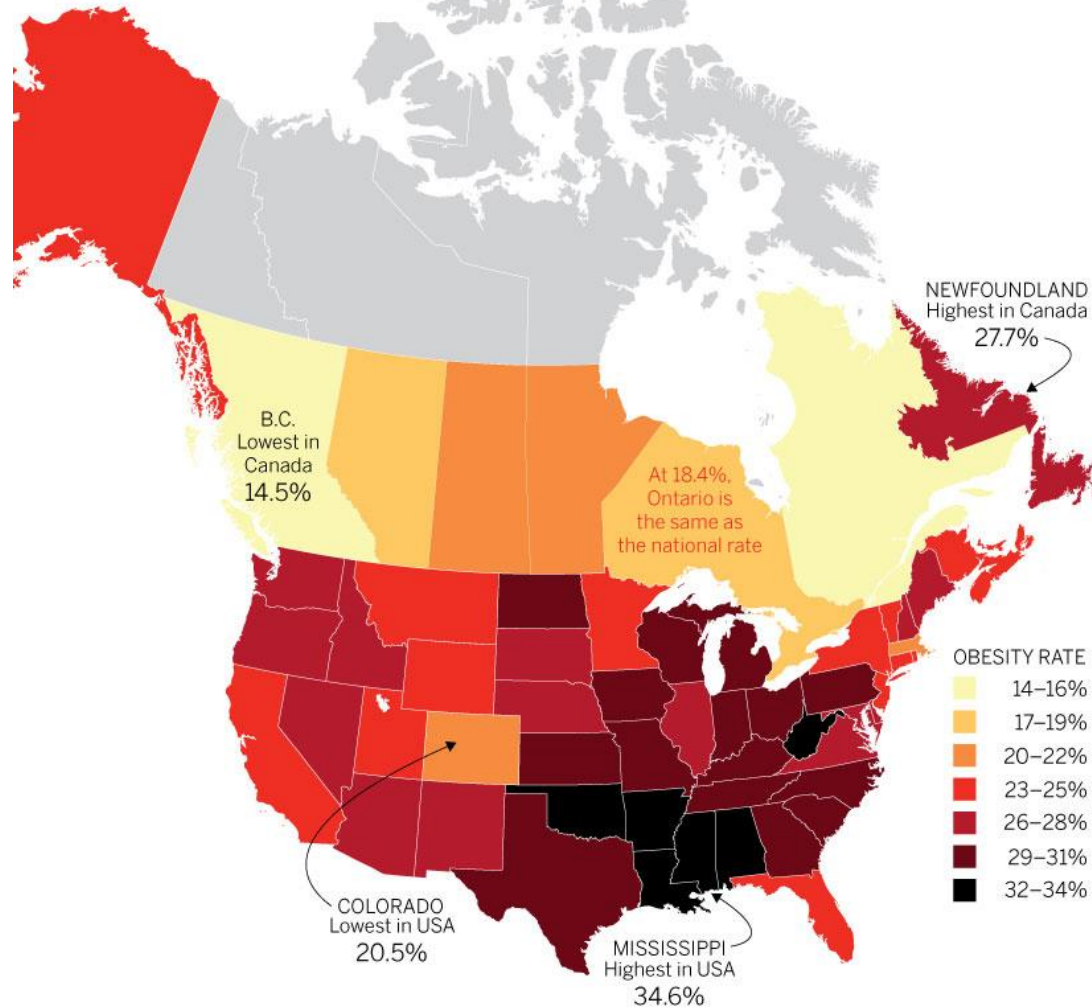
# Obesity in Canada



Source: Statistics Canada, Canadian Community Health Survey (CCHS), 2014.

# Obesity rates in North America

Percentage of the population with a Body Mass Index (BMI) of 30 or higher



\*TERRITORIES: The Canadian study did not include the territories due to insufficient data. Statistics Canada suggests the territories have high obesity rates, with Nunavut possibly as high as 28%.

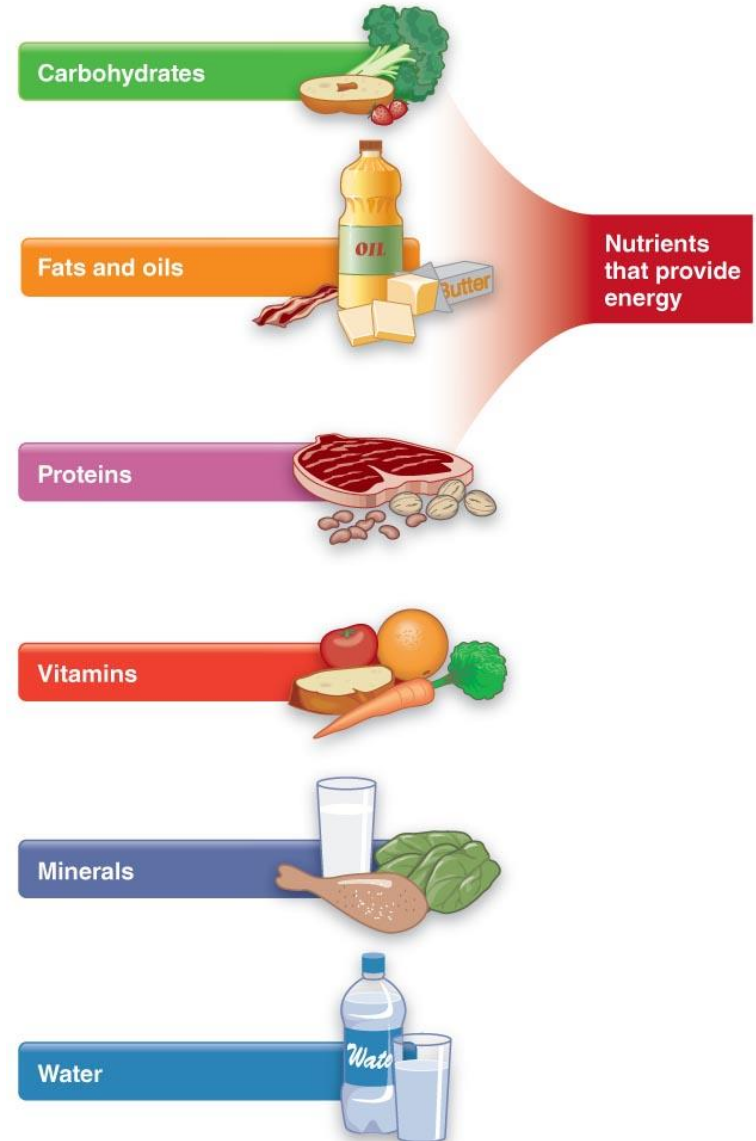
SOURCES: CDC.gov for American numbers; "Current and predicted prevalence of obesity in Canada: a trend analysis" published in CMAJ, 2014, for Canadian rates Graphic by Amanda Shendruk (aeiq.ca)



# What Are Nutrients?

- **Nutrients:** the chemicals in foods that are critical to human growth and function
- **Organic:** Foods grown with little or no synthetic chemicals
- There are six groups of essential nutrients found in foods:
  - Carbohydrates
  - Vitamins
  - Fats and oils
  - Minerals
  - Proteins
  - Water

## SIX GROUPS OF ESSENTIAL NUTRIENTS



# What Are Nutrients?

- **Macronutrients**: nutrients required in relatively large amounts
  - Provide energy
  - Carbohydrates, fats and oils, proteins
  
- **Micronutrients**: nutrients required in smaller amounts
  - Vitamins and minerals



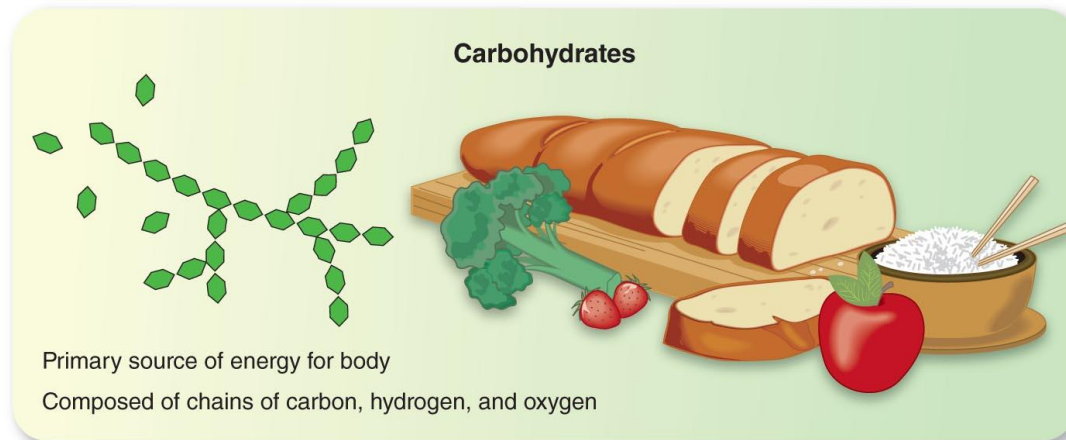
# Measuring Energy from Nutrients

- **Kilocalorie:** amount of energy required to raise the temperature of 1 kg of water by 1°C
  - We measure energy in kilocalories (kcal)
  - On food labels, "calorie" actually refers to kilocalories  
1 Calorie = 1 kilocalorie

[What is a Calorie?](#)

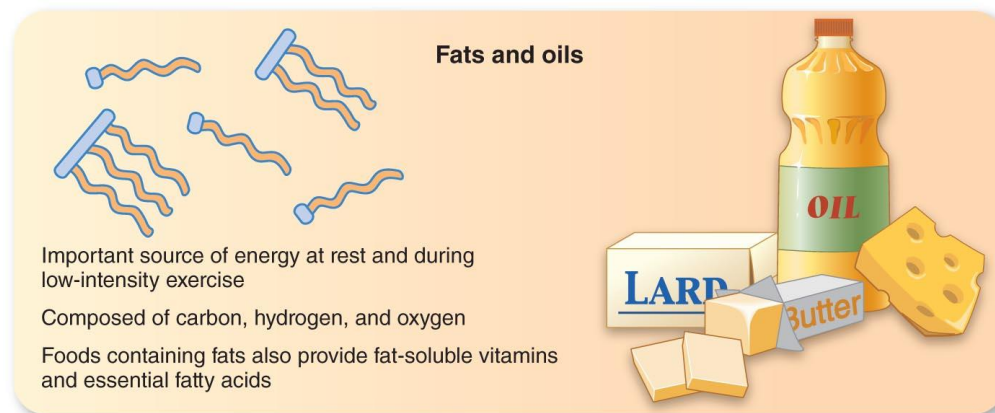
# Carbohydrates

- Carbohydrates are the primary source of fuel for the body, especially for the brain
  - Provide 4 kcal per gram
  - Found in rice, wheat, grains, vegetables, fruits, breads, pastas (and anything that contains a lot of sugar)



# Fats and Oils

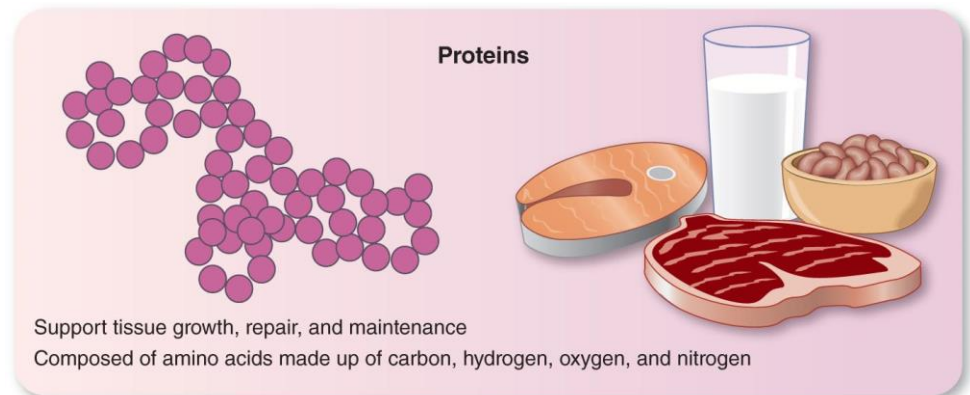
- Fats are composed of lipids, molecules that are insoluble in water
  - Provide 9 kcal per gram
  - Important energy source during rest or low-intensity exercise
  - Found in butter, margarine, vegetable oils
  - Source of fat-soluble vitamins and essential fatty acids





# Proteins

- Proteins are chains of amino acids
  - **Can supply 4 kcal of energy per gram** (Not usually a primary energy source)
  - Important source of nitrogen
  - Found in meats, dairy products, seeds, nuts, and legumes
- Proteins are important for
  - Building cells and tissues
  - Maintaining bones
  - Repairing damage
  - Regulating metabolism
  - Fluid balance



# Acceptable Macronutrient Ranges

**TABLE 1.4** Acceptable Macronutrient Distribution Ranges (AMDRs) for Healthful Diets

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

\*AMDR values are expressed as percentages of total energy or as percentage of total Calories.

Data from: *Dietary Reference Intakes for Energy Carbohydrates, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)*. National Academies Press. Reprinted by permission.

# Vitamins

- **Vitamins:** organic molecules that assist in regulating body processes
  - Vitamins are micronutrients that do not supply energy to our bodies

**TABLE 1.2** Overview of Vitamins

Type	Names	Distinguishing Features
<b>Fat-soluble</b>	A, D, E, and K	Soluble in fat Stored in the human body Toxicity can occur from consuming excess amounts, which accumulate in the body
<b>Water-soluble</b>	C, B-vitamins (thiamin, riboflavin, niacin, vitamin B <sub>6</sub> , vitamin B <sub>12</sub> , pantothenic acid, biotin, and folate)	Soluble in water Not stored to any extent in the human body Excess excreted in urine Toxicity generally only occurs as a result of vitamin supplementation

# Minerals

- **Minerals:** inorganic substances required for body processes
  - Minerals have many different functions, such as fluid regulation and energy production; are essential to bones and blood; and help eliminate harmful by-products of metabolism

**TABLE 1.3** Overview of Minerals

Type	Names	Distinguishing Features
<b>Major minerals</b>	Calcium, phosphorus, sodium, potassium, chloride, magnesium, sulfur	Needed in amounts greater than 100 mg/day in our diet Amount present in the human body is greater than 5 g (5,000 mg)
<b>Trace minerals</b>	Iron, zinc, copper, manganese, fluoride, chromium, molybdenum, selenium, iodine	Needed in amounts less than 100 mg/day in our diet Amount present in the human body is less than 5 g (5,000 mg)

# Water

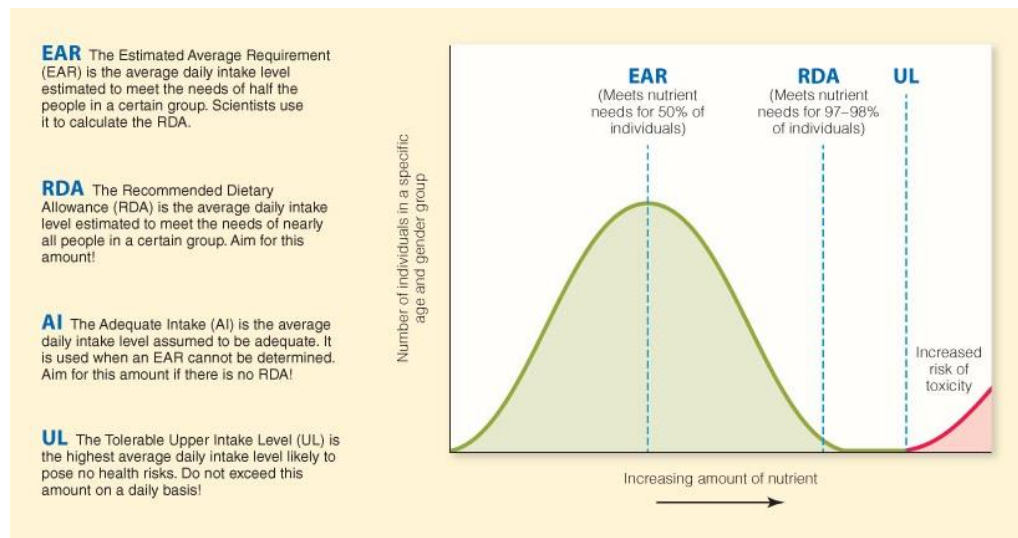
- Water supports all body functions and is a vital nutrient for health and survival
- We can intake water through any “water-based” foods such as juice, soup, fruits, vegetables, and other liquids
- Water is involved in many body processes:
  - Fluid balance
  - Nutrient transport
  - Nerve impulses
  - Body temperature
  - Removal of wastes
  - Muscle contractions





# Determining Nutrient Needs

- Dietary Reference Intakes (DRIs) identify the
  - Amount of a nutrient needed to prevent deficiency disease in healthy people
  - Amount of a nutrient that may reduce the risk of chronic disease
  - Upper level of safety for nutrient intake



# Interpreting Nutrition Research

- Research involves applying the **scientific method**
  - Observation and description of a phenomenon
  - Creation of a hypothesis
  - Design of a repeatable experiment
  - Collection, analysis, and interpretation of data
    - Formation of a conclusion, or proposal of an alternative hypothesis
  - Development of a theory based on repeated experiments

