

Chapter 30



N  **U**  **T**  **R** **I**  **T** **I**  **O** **N**

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

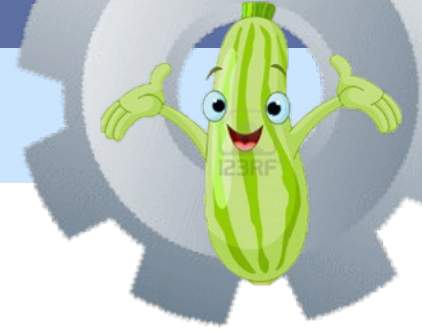
🌶️ Physical, emotional, and spiritual health

Critical components of wellness:

🌶️ Nutrition

🌶️ Physical activity

Why is Nutrition Important?



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



Nutrition is the science that studies food and how food nourishes our body and influences health.

True

False



Nutrition is the science that studies food and how food nourishes our body and influences health.

True

False



What Are Nutrients?



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

carbohydrates

fats and oils

proteins

vitamins

minerals

water

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.

from

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, and legumes.

carb.

Carbohydrates



How does the body process dietary carbohydrates?

Carbohydrates must be breakdown from di-, oligo-,and polysaccharides into monosaccharide.

Only monosaccharide can pass into the blood stream.

Carb.

Carbohydrates



Hydrolysis is aided by a number of enzymes:

H-Amylase – attacks all three storage polysaccharide at random, hydrolyzing the α -1,4-glycosidic bonds.

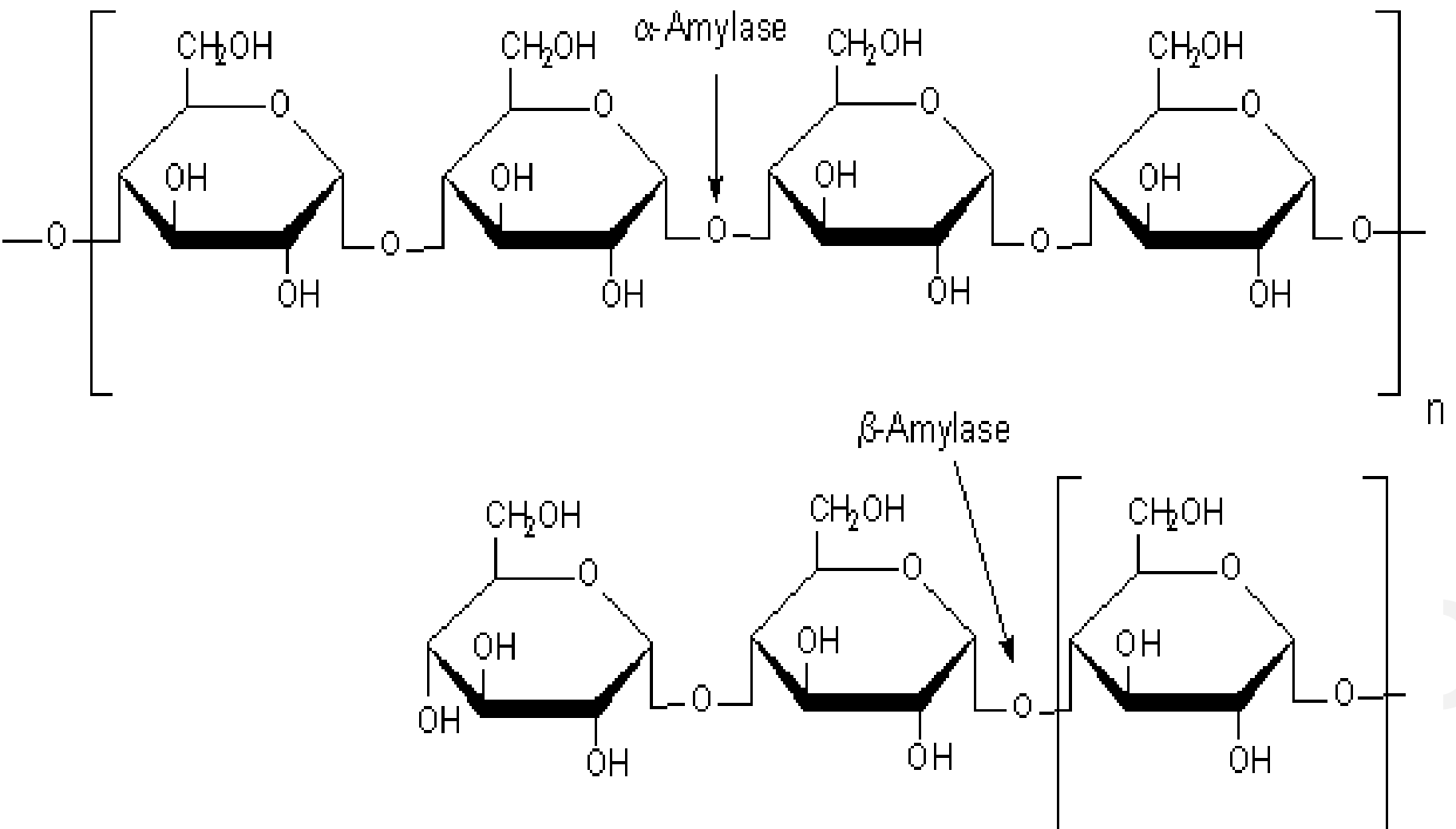
-Amylase – hydrolyzes the α -1,4-glycosidic bonds but in an orderly fashion cutting disaccharides maltose units one by one from the non-reducing end of a chain.

Debranching enzyme – hydrolyzes the α -1,6-glycosidic bonds.

Carbohydrates



Amylase Specificity



Fats and Oils



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

Provide **7 kcal** per gram.

An important energy source during rest or low intensity exercise.

Found in butter, margarine, vegetable oils.

Fats and Oils



How does the body process dietary fats?

Lipids in foods must be hydrolyzed into smaller components before they can be absorbed into the blood or lymph system.

Lipase - enzymes that promote hydrolysis.



Proteins



Proteins are chains of **amino acids**.

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

Proteins are an important source of 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.

Proteins







Digestion of dietary proteins begins with cooking which denatures proteins.

Denatured proteins are hydrolyzed by hydrochloric acid and digestive enzymes in the stomach.

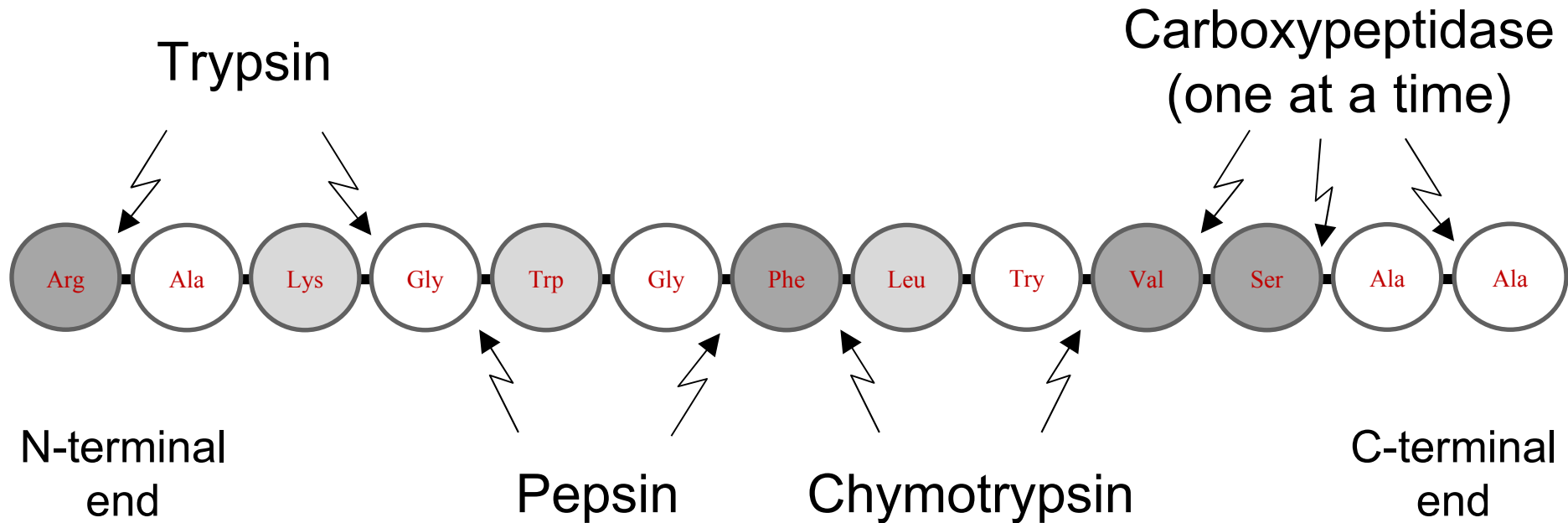
Proteins



HCL denatures protein and hydrolyzes peptide bonds.

-  **Pepsin** – hydrolyzes peptide bonds of amino side of the aromatic amino acids (tryptophan, phenylalanine, and tyrosine).
-  **Chymotrypsin** – hydrolyzes internal peptide bonds at the same amino acids as does pepsin.
-  **Trypsin** – hydrolyzes the carboxyl side of arginine and lysine.
-  **Carboxypeptidase** – hydrolyzes amino acids one by one from the c-terminal end of the protein.

Enzymes Hydrolyze Peptide Chains In Specific Ways





Proteins are a primary energy source for our bodies

True

False



Proteins are a primary energy source for our bodies

True

False



Vitamins



Vitamins: organic molecules that assist in regulating body processes.

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

- 🌶️ Fat-soluble vitamins
- 🌶️ Water-soluble vitamins

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.

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.




All vitamins must be consumed daily to support optimal health.

True

False





All vitamins must be consumed daily to support optimal health.

True

False



Minerals



Minerals: inorganic substances required 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.

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

nutrient transport

nerve impulses

removal of wastes

muscle contractions

chemical reactions

many, many more...

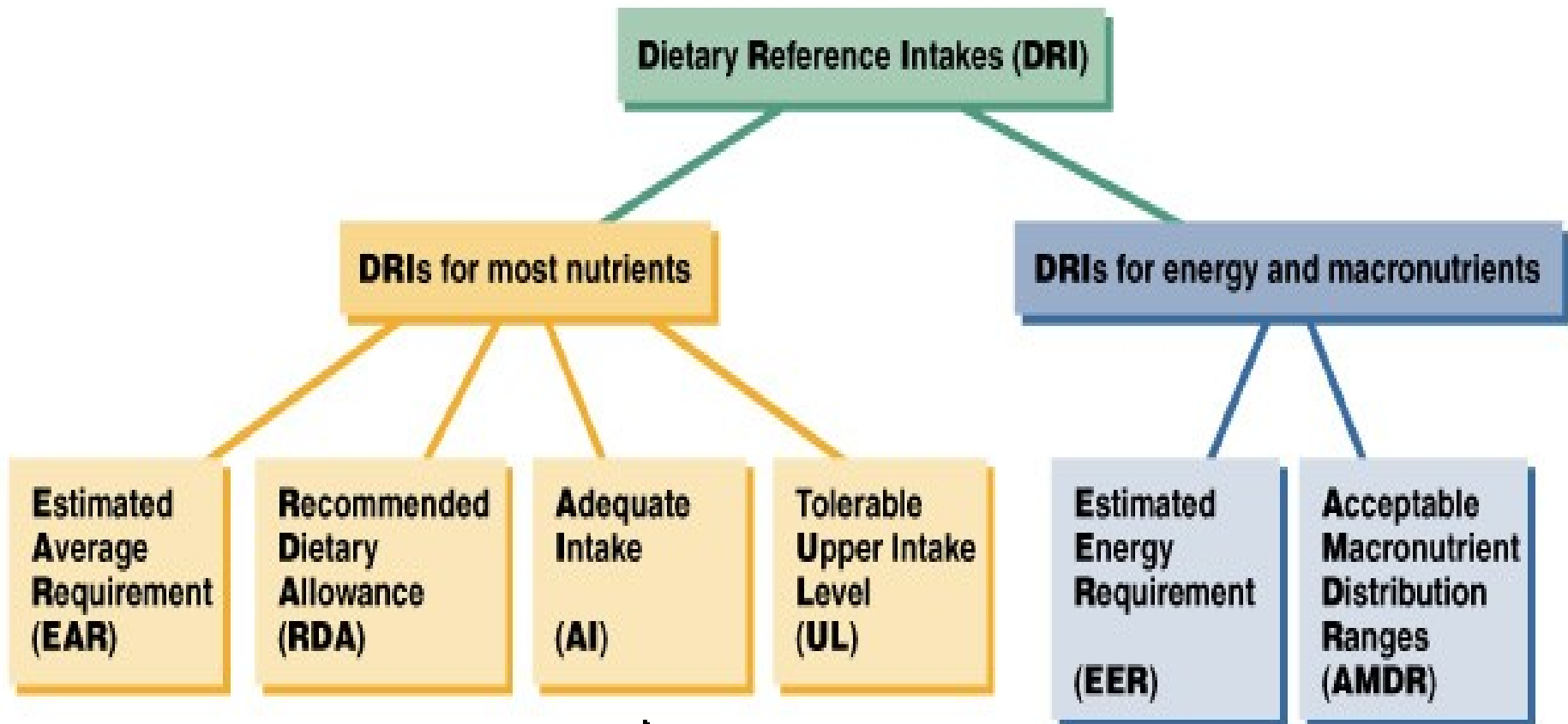
Determining Nutrient Needs

Dietary Reference Intakes (DRIs): updated nutritional standards.

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



Determining Nutrient Needs



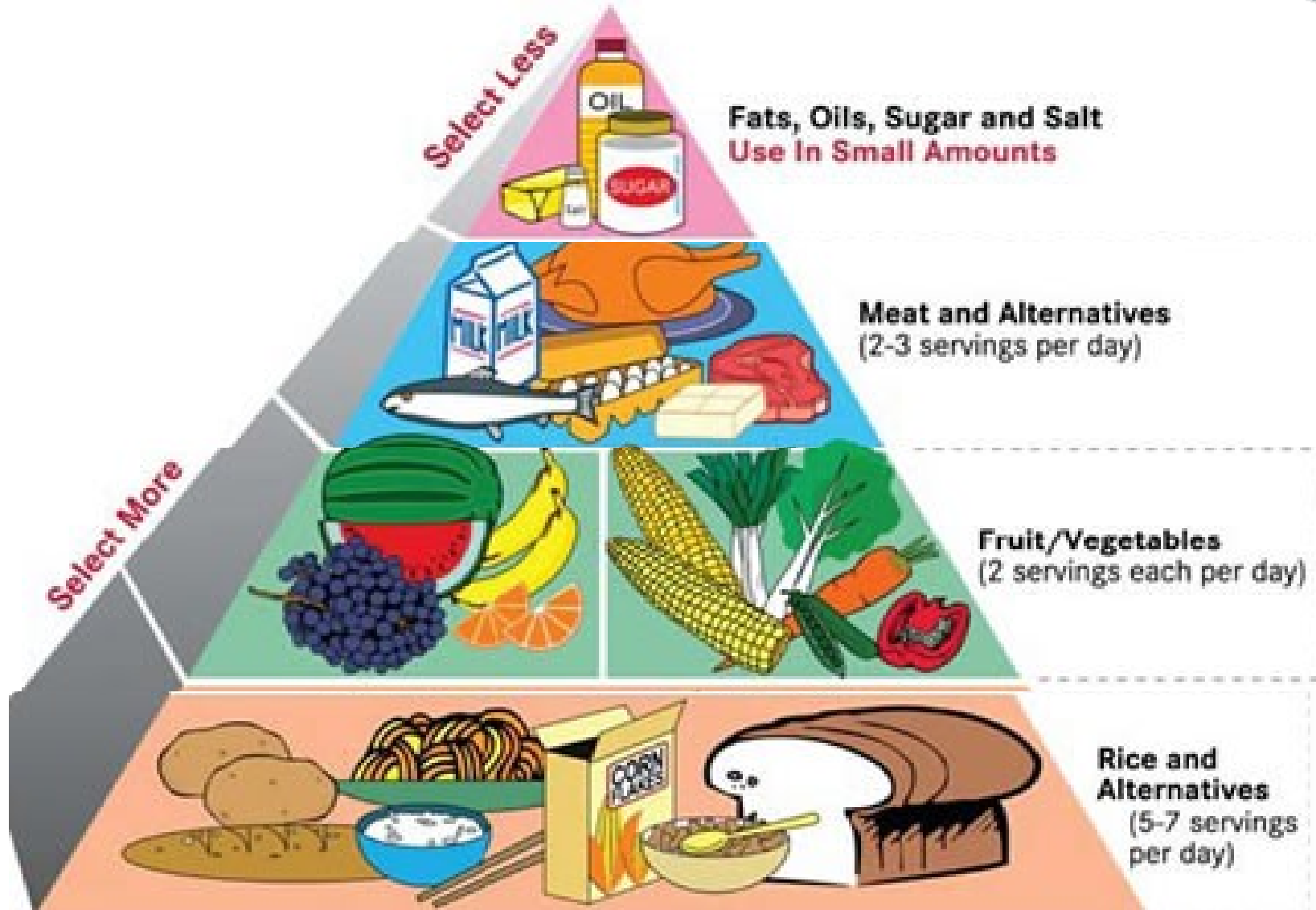
Determining Nutrient Needs



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)

Food Guide Pyramid



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

A decorative graphic at the top left of the slide features a grey gear partially overlapping a horizontal bar with segments of red, orange, yellow, green, and blue. The main title is centered on a light blue background strip.

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

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



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



Amount Per Serving

Calories 634.9 Calories from fat 308

% Daily Value*

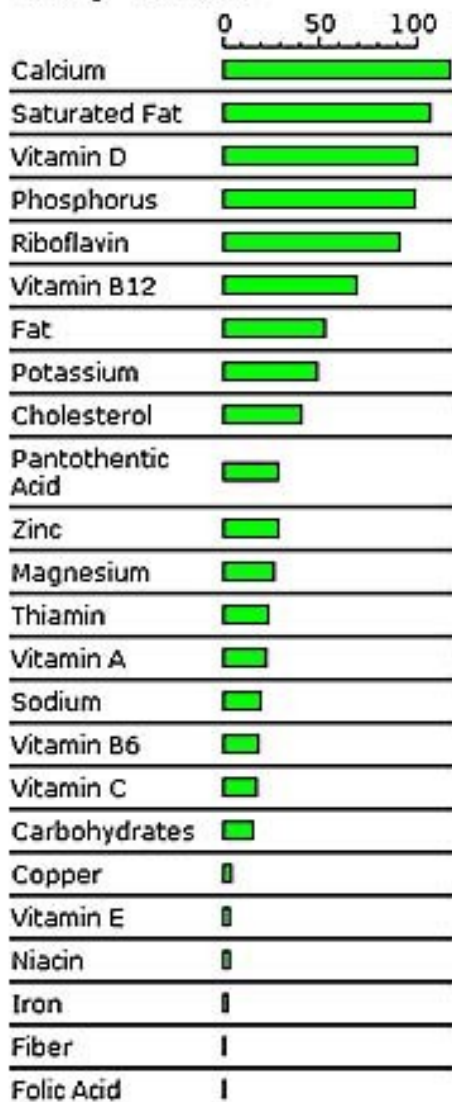
Total Fat	34.2g	53%
Saturated Fat	21.4g	107%
Cholesterol	124.2mg	41%
Sodium	474.9mg	20%
Potassium	1702.4mg	49%
Total Carbohydrate	49.2g	16%
Dietary Fiber	0g	0%
Sugars	49.2g	
Protein	33.7g	

Vitamin A	23%	Vitamin C	18%
Thiamin	24%	Riboflavin	91%
Niacin	4%	Calcium	117%
Iron	3%	Vitamin D	100%
Vitamin E	4%	Vitamin B6	19%
Folic Acid	0%	Vitamin B12	69%
Phosphorus	99%	Magnesium	27%
Zinc	29%	Copper	5%
Pantothenic Acid	29%		

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

** Due to rounding, percentages may not total to 100%.

Source of nutrient information: USDA SR20

Daily Values

Milk, dry, whole (1 cup)

image generated using wootus.com



Amount Per Serving

Calories 634.9

Calories from fat 308

% Daily Value*

Total Fat 34.2g 53%

Saturated Fat 21.4g 107%

Cholesterol 124.2mg 41%

Sodium 474.9mg 20%

Potassium 1702.4mg 49%

Total Carbohydrate 49.2g 16%

Dietary Fiber 0g 0%

Sugars 49.2g

Protein 33.7g



Vitamin A	23%	Vitamin C	18%
Thiamin	24%	Riboflavin	91%
Niacin	4%	Calcium	117%
Iron	3%	Vitamin D	100%
Vitamin E	4%	Vitamin B6	19%
Folic Acid	0%	Vitamin B12	69%
Phosphorus	99%	Magnesium	27%
Zinc	29%	Copper	5%
Pantothenic Acid	29%		

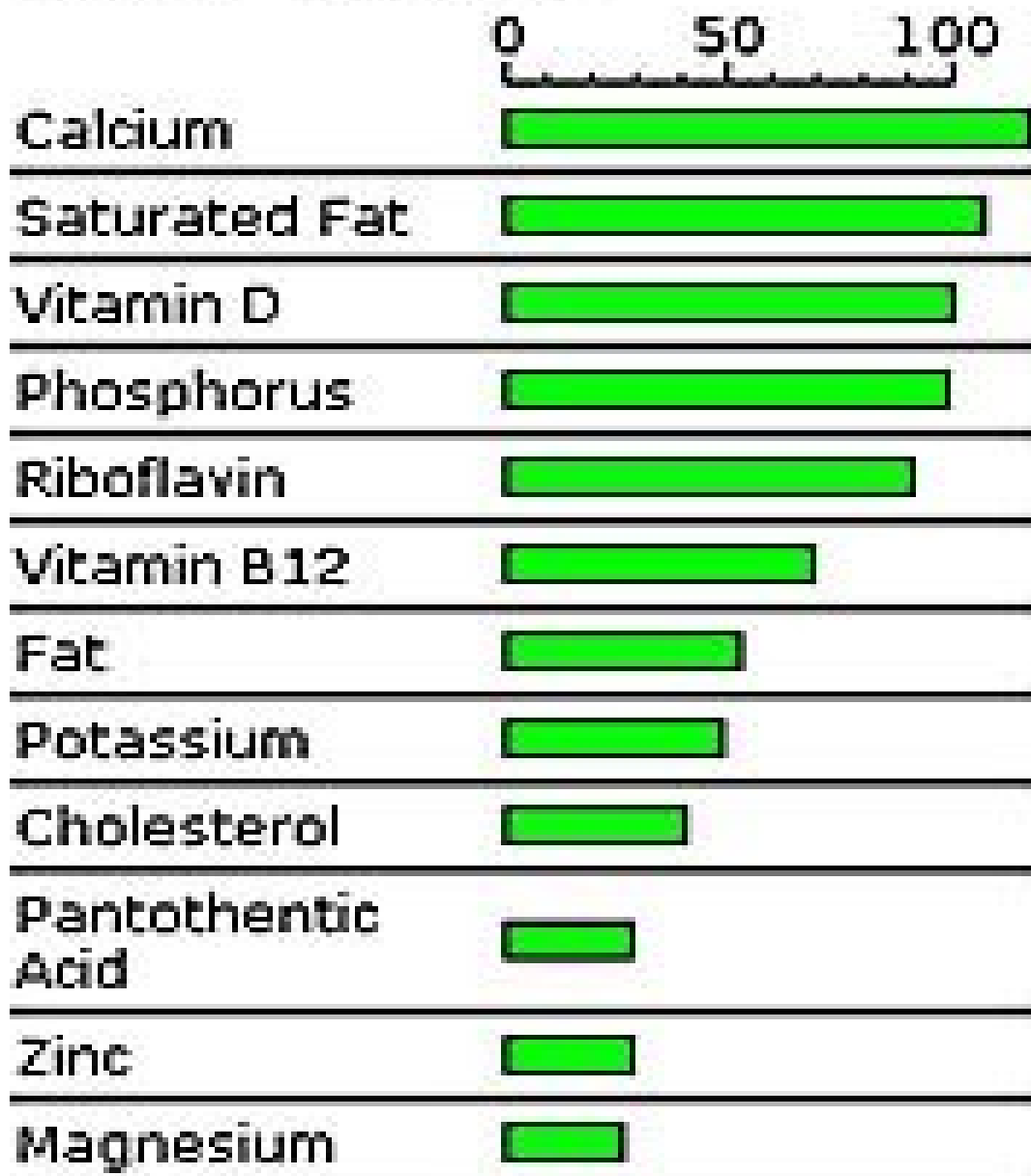
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Source of nutrient information: USDA SR20



Daily Values





Thiamin	
Vitamin A	
Sodium	
Vitamin B6	
Vitamin C	
Carbohydrates	
Copper	
Vitamin E	
Niacin	
Iron	
Fiber	
Folic Acid	

Milk, dry, whole (1 cup)





The Recommended Daily Allowance is the maximum amount of nutrient that people should consume to support normal body functions.

True

False



The Recommended Daily Allowance is the maximum amount of nutrient that people should consume to support normal body functions.



True

False



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)



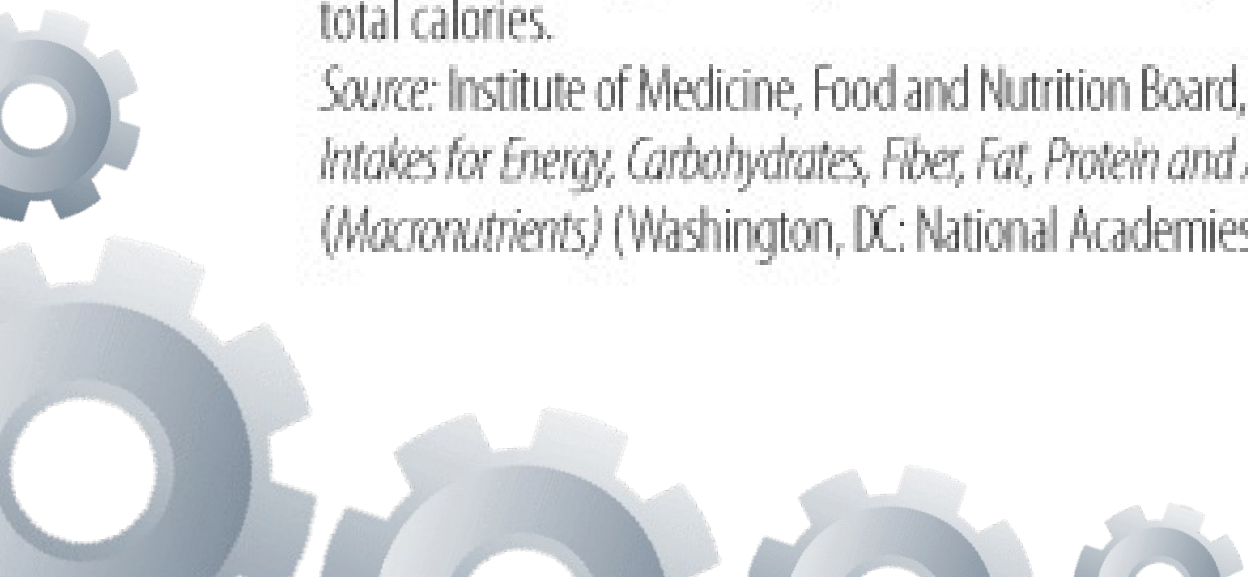
Describes the portion of the energy intake that should come from each macronutrient

Determining Nutrient Needs: AMDR

<i>Nutrient</i>	<i>AMDR*</i>
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).



A green apple is the central focus, featuring a large white question mark and a bite taken out of its lower right side. To its left, an orange apple is visible but out of focus. The background is a solid, light brown color.

QUESTIONS



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