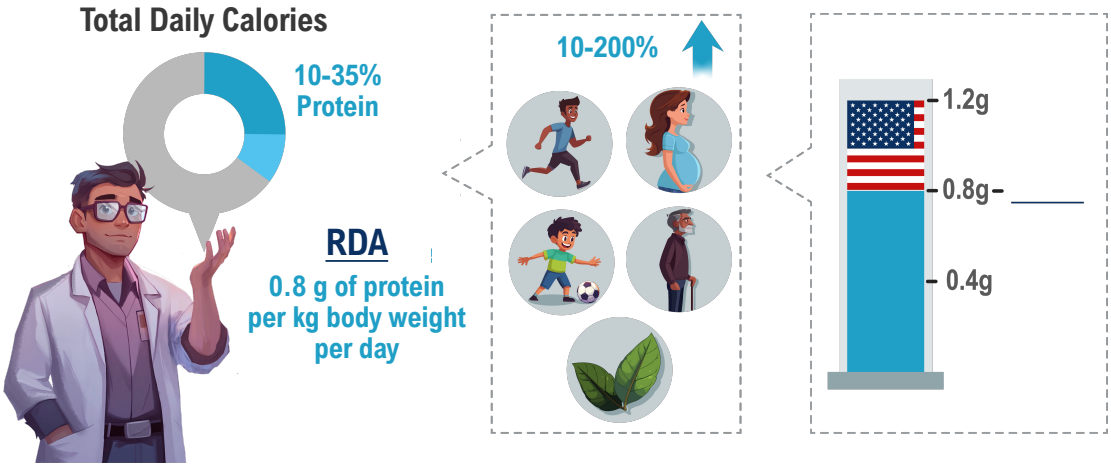
TOPIC: DIETARY GUIDELINES FOR PROTEINS

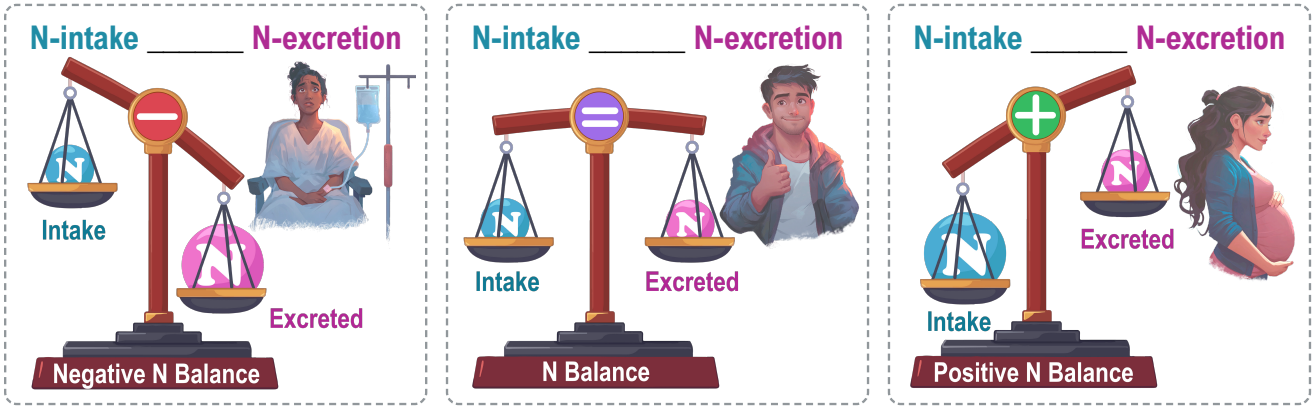
How Much Protein Do You Need?

- RDA recommends adults consume a *minimum* of _____ g of proteins *per kilogram of body weight per day*.
- AMDR recommends _____-_____% of your total daily Calories should come from protein.
  - If you are active, pregnant, a child, an older adult, or vegetarian, you likely need 10-200% _____ protein.
  - Some suggest RDA should be *increased*, but most Americans already consume much more than the RDA.



Achieving & Maintaining Nitrogen Balance

- *Protein* requirements can be estimated by the *minimum* protein needed to achieve _____ (N) *balance*.
- **Nitrogen Balance:** a state in which the body's N-*intake* is _____ to its N-*excretion*.
  - Most nitrogen is excreted in the urine as urea.
- The *difference* in **N-intake** & **N-excretion** correlates to how much _____ our body is using & losing.



NOTE: RDA is based on estimated _____ amount of protein required for most adults to *maintain* N balance.

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EXAMPLE

Andre is taking part in a scientific study where his nitrogen balance is being measured daily. The results show that he is in a state of positive nitrogen balance. Andre is a competitive athlete who is recovering from an injury. Which of the following answers correctly explains why he is in a state of positive nitrogen balance?

a) Because Andre got injured, his body is in a state of shock and is losing nitrogen.
b) Andre's body is losing nitrogen because the proteins at the site of the injury are breaking down.
c) Andre's body is gaining nitrogen because it is making new proteins to heal the injury.
d) Andre's body is gaining nitrogen because he has been eating less protein since his injury, so his body needs to store all the protein that he eats.
e) None of the above.

PRACTICE

Who is most likely to be in a state of nitrogen balance/equilibrium?

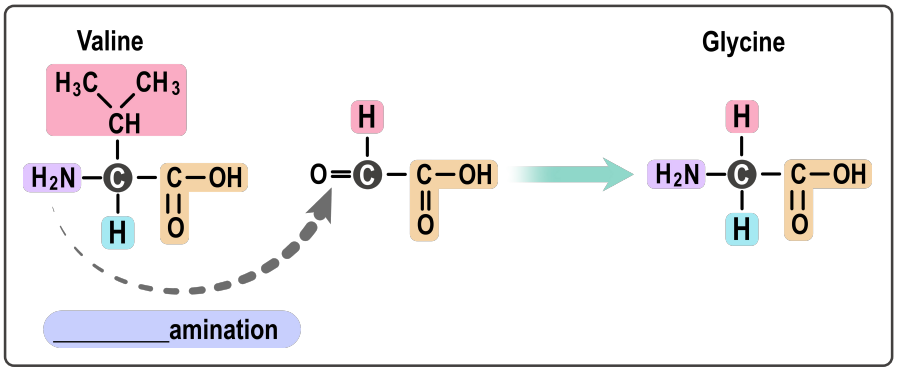
a) A 10-year-old child.
b) A 25-year-old adult.
c) A 30-year-old pregnant woman.
d) A 25-year-old adult bodybuilder currently training for competition.

TOPIC: DIETARY GUIDELINES FOR PROTEINS

Prioritize Consumption of Essential & Limiting Amino Acids

- **Essential Amino Acids** are _____ efficiently produced by our body, so must be consumed in our _____.
  - _____ out of the 20 total amino acids are *essential* in our diet.
    - **Limiting Amino Acid:** the *essential* amino acid that is *missing* or in the _____ supply.
- **Nonessential Amino Acids:** are efficiently produced by our body via *transamination* (transfer of amino group).
- **Conditionally Essential Amino Acids:** nonessential AAs that become *essential* in specific conditions (e.g. illness).

Amino Acids	
Essential	**Nonessential**
Histidine	Alanine
Isoleucine	Arginine
Leucine	Asparagine
Lysine	Aspartic acid
Methionine	Cysteine
Phenylalanine	Glutamic acid
Threonine	Glutamine
Tyrptophan	Glycine
Valine	Proline
	Serine
	Tyrosine



PRACTICE

Which process allows the body to efficiently produce nonessential amino acids by transferring an amino group from one molecule to another?

a) Hydrolysis.
b) Deamination.
c) Transamination.
d) Proteolysis.

PRACTICE

How many of the 20 amino acids used to build human proteins are considered essential in our diet?

a) 6.
b) 9.
c) 11.
d) 15.

TOPIC: DIETARY GUIDELINES FOR PROTEINS

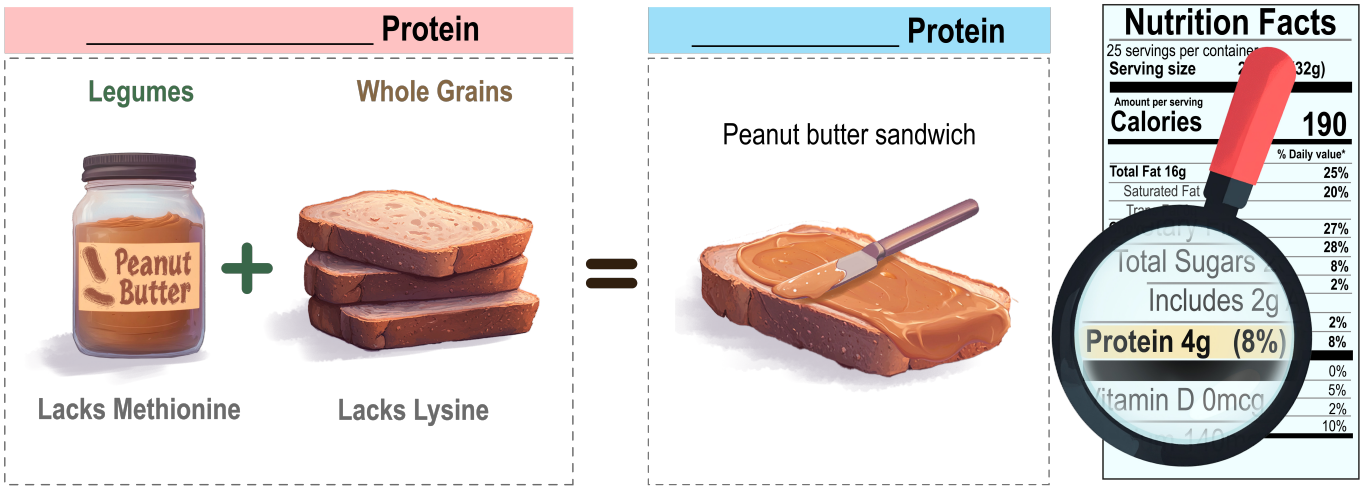
Prioritize Consumption of High-Quality Proteins

◆ NOT all protein sources are equal; *protein quality* is determined by 2 factors: (1) "*Completeness*" & (2) *Digestibility*.

(1)
- **Complete Protein:** a *high*-quality protein source *containing* _____ 9 *essential* amino acids.
- **Incomplete Protein:** a *lower*-quality protein source _____ ≥1 essential amino acids.
  - **Mutual Supplementation:** _____ ≥2 *incomplete* proteins to form a *complete* protein.

(2) **Digestibility:** more _____ digestible proteins are *higher* quality (animal proteins > plant proteins).

◆ **Protein Digestibility Corrected Amino Acid Score (PDCAAS):** "ranks" the quality of a protein (max value is 100%).



PRACTICE

Which of the following statements regarding protein-quality is true?

a) Plant-based proteins tend to be higher-quality than animal-based proteins because they're more digestible.

b) A protein that contains all 20 amino acids is always considered high-quality.

c) A protein that contains all 9 essential amino acids & is easily digestible is considered high quality.

d) A protein that is easily digestible & contains at least 9 different amino acids is considered complete.

PRACTICE

Which of the following statements about essential amino acids is true?

a) Positive nitrogen balance is when more essential amino acids are consumed than nonessential amino acids.

b) A protein that contains a high percentage of essential amino acids will be more digestible.

c) A complete protein contains at least 5 different essential amino acids.

d) A conditionally essential amino acid is not essential for most of the population but may become essential due to an individual's inability to synthesize it.

TOPIC: DIETARY GUIDELINES FOR PROTEINS

Consume Various Sources of Protein

- Protein is abundant in meat, poultry, seafood, dairy products, whole grains, legumes, soy, beans, nuts & seeds.
  - Less processed & leaner cuts of meat (_____ saturated fat) & low-fat dairy are more healthful choices.
  - Legumes, whole grains, & nuts are healthful, non-meat protein sources that Americans _____ consume.
  - Amino acid & protein *supplements* may be helpful to increase muscle mass & strength.
- Healthy Guideline: prioritize & _____ your consumption of *high* quality, *nutrient*-_____ protein sources.

PRACTICE

True or false. If false, select the answer that best corrects the statement.

Meat, poultry & seafood are the only relevant, nutrient-dense sources of proteins.

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a) True.

b) False; seafood is not as nutrient dense as meat & poultry.

c) False; other nutrient dense sources of protein include legumes, whole grains, nuts, & soy.

d) False; other nutrient dense sources of protein include legumes, nuts, seeds, fruits, & vegetables.

TOPIC: DIETARY GUIDELINES FOR PROTEINS

Vegetarian Diets

- **Vegetarianism:** any dietary practice focused on _____-based foods (*excluding* some/all animal products).
  - **Veganism:** a lifestyle or dietary practice that completely *AVOIDS* _____ *animal*-derived foods/products.
- WHY? — Common reasons include religious, ethical, & food-safety concerns and ecological & health benefits.
  - Vegetarian/vegan diets CAN be even _____ healthful than meat-based diets; but may present *challenges*.

Vegan Nutrient Challenges	Functions	Vegetarian/Vegan Alternatives
Protein	Growth, repair, structural support, biomolecules etc.	Soy products, nuts, quinoa, beans, whole-grain foods
Vitamin B_{12}	DNA synthesis, protection of nerve fibers	Fortified foods, yeast, soy products, supplements
Vitamin D & Calcium	Bone growth & strength	Fortified foods, adequate exposure to sunlight
Iron	Oxygen transport, making amino acids/hormones	Whole-grain foods, dried fruit, beans, nuts, seeds, leafy vegetables
Zinc	DNA/RNA synthesis, immune function, growth	Whole-grain foods, beans, nuts, seeds

NOTE: Foods labeled as vegetarian/vegan does _____ guarantee they are healthful.

EXAMPLE

Which of the following is a downside to a vegan diet?

a) Increased risk of type 2 diabetes.
b) Increased risk of heart disease and cancer.
c) Lower risk of a vitamin D deficiency.
d) Higher risk of iron, zinc, and protein deficiency.
e) None of the above.

PRACTICE

Which of the following foods should vegetarians prioritize to get enough protein in their diet?

a) Poultry.
b) Seafood.
c) Whole grains, nuts, seeds & beans.
d) Saturated & trans fats.