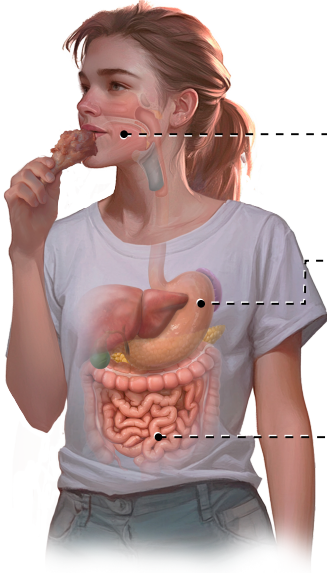


## TOPIC: PROTEIN DIGESTION

### Protein Digestion

- ◆ Most protein digestion occurs in the \_\_\_\_\_ & \_\_\_\_\_ intestine.
- **Stomach:** \_\_\_\_\_ denatures proteins & activates the protein-digesting enzyme/protease called “*pepsin*.”
- **Small Intestine:** pancreatic & intestinal proteases continue digesting peptides into single \_\_\_\_\_ acids.



Step #	Location	Enzyme/Agent	Product
1	Mouth	N/A	Mechanically digested proteins (chewing)
2	Stomach	Stomach HCl ( <i>acidic pH</i> ), Pepsinogen → _____	_____ Proteins + Peptide fragments
3	Small Intestine	<i>Pancreatic</i> & Intestinal Proteases	Dipeptides + Tripeptides + Some Amino Acids
	Small Intestine Enterocytes	Dipeptidases & Tripeptidases	Single amino acids

### EXAMPLE

Which of the following statements regarding protein digestion is true?

- a) Proteases break polypeptides down into shorter peptide chains in the mouth.
- b) Most protein digestion occurs in the mouth, where it is mechanically denatured & broken down by acid.
- c) Chemical digestion of proteins occurs in the acidic environment of the stomach, which denatures proteins.
- d) Large proteins and long polypeptides can be easily absorbed in the small intestine.

### PRACTICE

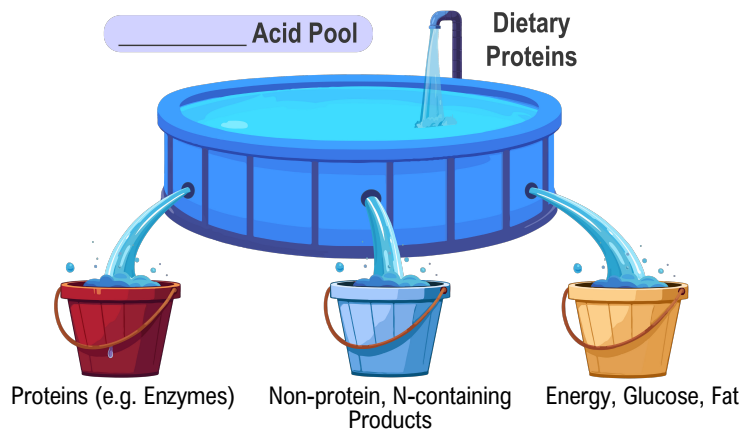
Which of the following statements correctly describes the role of pepsin in protein digestion?

- a) Pepsin is an enzyme that breaks proteins down into short peptides in the stomach.
- b) Pepsin begins breaking down proteins in the mouth, as it is released from salivary glands.
- c) Pepsin is a protein itself and therefore is denatured in the stomach due to the acidic environment.
- d) Pepsin's primary function is to denature proteins (causing them to lose their quaternary, tertiary, & secondary structure) but does not cleave (split) them.

## TOPIC: PROTEIN DIGESTION

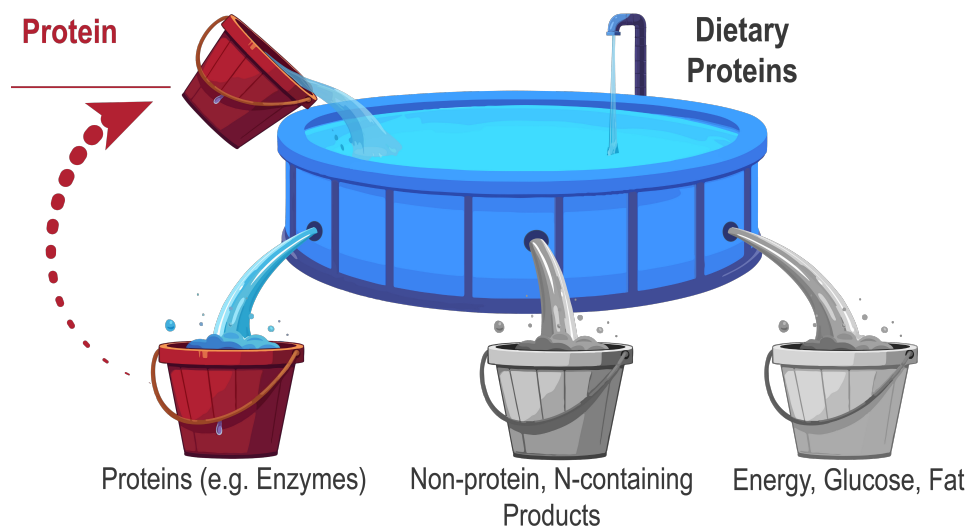
### The 3 Primary Fates of Absorbed Amino Acids

- ◆ Amino acids absorbed in the small intestine enter the *blood*, becoming part of the body's *amino acid* \_\_\_\_\_.
- **Amino Acid Pool:** all the body's amino acids available for \_\_\_\_\_ (most circulate in blood).
- ◆ Amino acids in the blood travel to the \_\_\_\_\_ & have 3 primary fates:
  - 1) Used to build new proteins.
  - 2) Used to build non-protein, nitrogen-containing products.
  - 3) Deaminated (removes N) then used as a “last resort” \_\_\_\_\_ source or converted to glucose or fat.



### What is Protein Turnover?

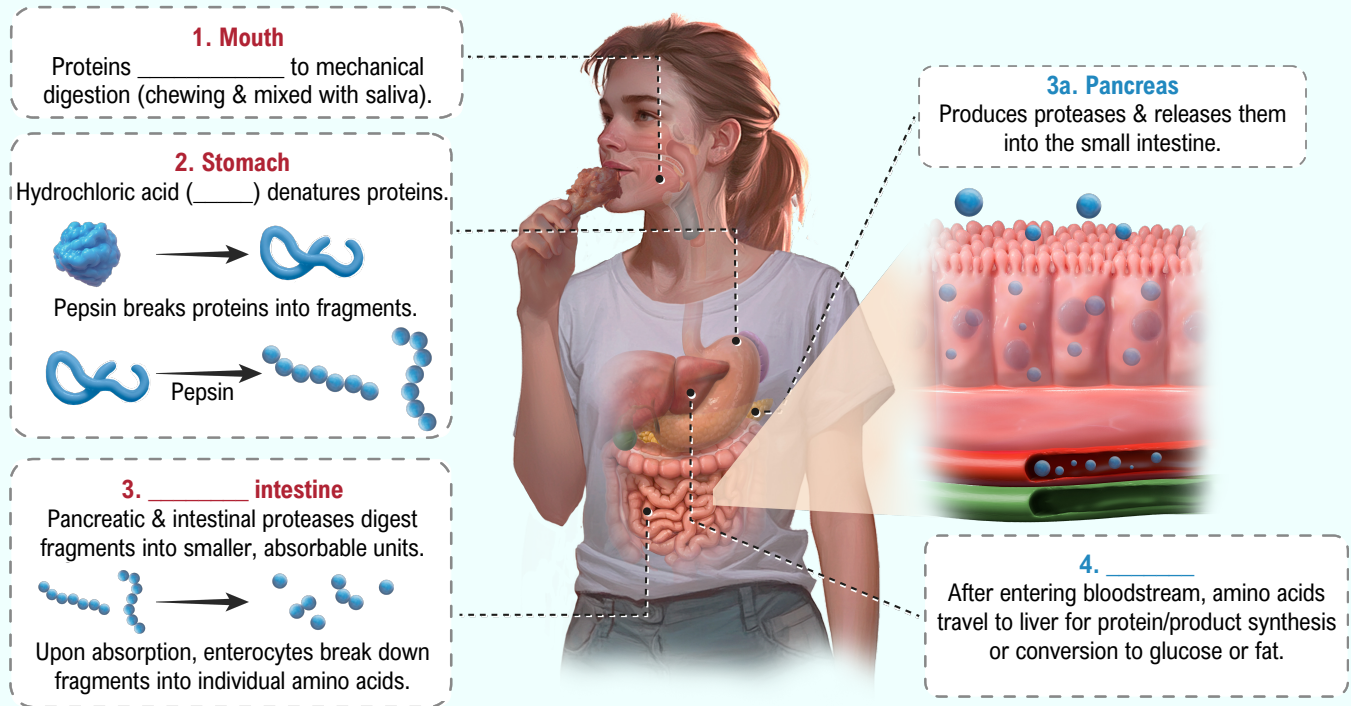
- ◆ Our bodies rely on our *diet* & *protein* \_\_\_\_\_ to replenish the amino acid pool & maintain critical functions.
- ◆ **Protein Turnover:** the ongoing process of *breaking down* & *rebuilding* proteins in the body.
  - Allows old, damaged, non-functional proteins to be *degraded* & \_\_\_\_\_ with newly built proteins.
  - Also allows cells to \_\_\_\_\_ to current conditions, producing the proteins required in any given moment.
- ◆ ~250g of protein is “turned over” per day, which \_\_\_\_\_ how much dietary protein intake we need!



## TOPIC: PROTEIN DIGESTION

### EXAMPLE

Fill in all the blanks throughout the image below to review protein digestion and absorption.



### PRACTICE

Which of the following is NOT a potential fate of amino acids from dietary proteins?

- a) Used to build non-protein, nitrogen-containing products.
- b) Deaminated and converted to glucose or fat for energy.
- c) Stored in the liver for later use.
- d) All of the above are potential fates of absorbed dietary proteins.

### PRACTICE

Why is it so important to maintain an adequate number of amino acids in your body's amino acid pool?

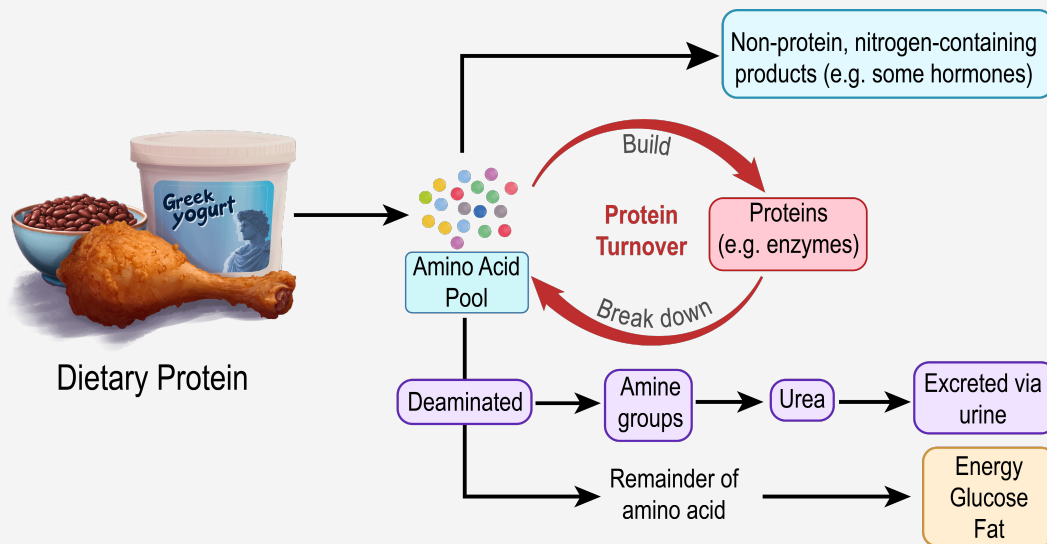
- a) Your body loses ~250g of protein per day so it's important to intake approximately 250g/day to replace it.
- b) Your body is constantly degrading & synthesizing proteins (protein turnover), so it needs an adequate number of amino acids available to use for new proteins.
- c) Your body always needs to have enough amino acids available to be deaminated & used for energy.
- d) All of the above.

## TOPIC: PROTEIN DIGESTION

### PRACTICE

Based on the diagram below, which of the following statements is correct?

- a) Once amino acids are absorbed, they are first built up into proteins, then relocated throughout the body.
- b) Amino acids are absorbed by the small intestine, then deaminated before entering the amino acid pool.
- c) All protein that is deaminated will be excreted in urine.
- d) While most of the amino acids absorbed by the body are used to make protein, some are used to make non-protein products such as glucose, fat, & some nitrogen-containing molecules.



### PRACTICE

Which of the following answer options describes an instance where protein turnover is a useful process?

- a) Storage of amino acids in the amino acid pool, so they can be quickly used for energy at any time.
- b) The breakdown of DNA to form new proteins.
- c) The breakdown of insulin when blood glucose levels drop & the use of its amino acids to make new proteins.
- d) All of the above.