

Difference Between Trypsin and Pepsin

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Key Difference – Trypsin vs Pepsin

Digestive enzymes are the enzymes that break the food we eat into small molecules which can be absorbed by our body. These enzymes help in absorption of nutrients and the maintenance of healthy gut. They are the workhorses of our digestive system and are involved throughout the digestive process. We consume various types of food which are composed of fats, proteins, and carbohydrates. Different digestive enzymes work together and break to break this food into smaller and more absorbable components. Digestive enzymes are secreted by salivary glands, secretory cells of stomach and pancreas and secretory glands of the small intestine. There are four basic categories of digestive enzymes. They are proteases, lipases, amylases, and nucleases. Proteases, also known as peptidases, break proteins into peptides or amino acids. Trypsin and pepsin are two proteases. **Pepsin is the main digestive enzyme of the stomach. Trypsin is present in pancreatic juices secreted into the small intestine.** This is the key difference between trypsin and pepsin.

What is Trypsin?

Trypsin is a protease secreted by the pancreas into the small intestine. Trypsin digests proteins into peptides and amino acids. Trypsin is formed in the inactive form known as trypsinogen. Trypsinogen is activated into trypsin by an enzyme called enteropeptidase. Activated trypsin catalyzes splitting of proteins into amino acids under basic conditions.

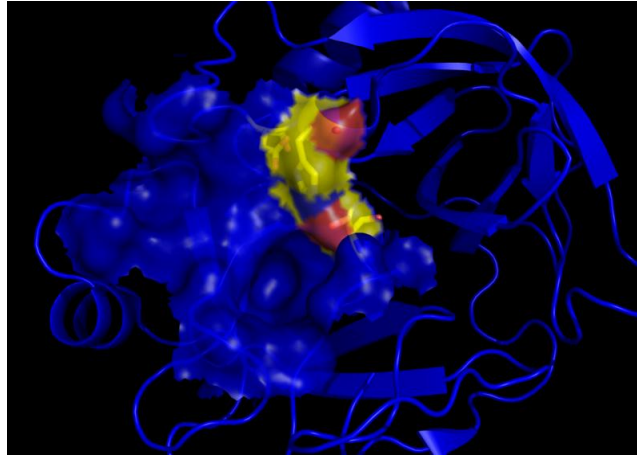


Figure 01: Trypsin

Trypsin was first discovered by Wilhelm Kuhne in 1876. Trypsin breaks peptide chains mainly at the [carboxyl](#) side of the amino acids [lysine](#) or [arginine](#). There are natural trypsin inhibitors in order to prevent the action of active trypsin in the pancreas, which can be highly damaging. They are bovine pancreas, ovomucoid, soybean, and lima bean. These inhibitors act as competitive substrate analogs and prevent the binding of the correct substrate into the active site of the trypsin. When these inhibitors bind with trypsin, it forms an inactive complex.

What is Pepsin?

Different digestive enzymes are included in the gastric juice. Pepsin is the main gastric enzyme among them. Pepsin was discovered by Theodor Schwann in 1836. Pepsin structure is three dimensional. The active site of the enzyme is formed by twisting and folding [polypeptide](#) chains and bringing several amino acids closer to each other. Pepsin is produced by gastric glands of the stomach. It is formed in the inactive form known as pepsinogen and converted into the active form, which is pepsin, by the HCl in the stomach. Pepsin is a protease. It breaks down proteins into peptides or amino acids. Stomach has acidic conditions. Pepsin catalysis occurs under this acidic environment of the stomach.

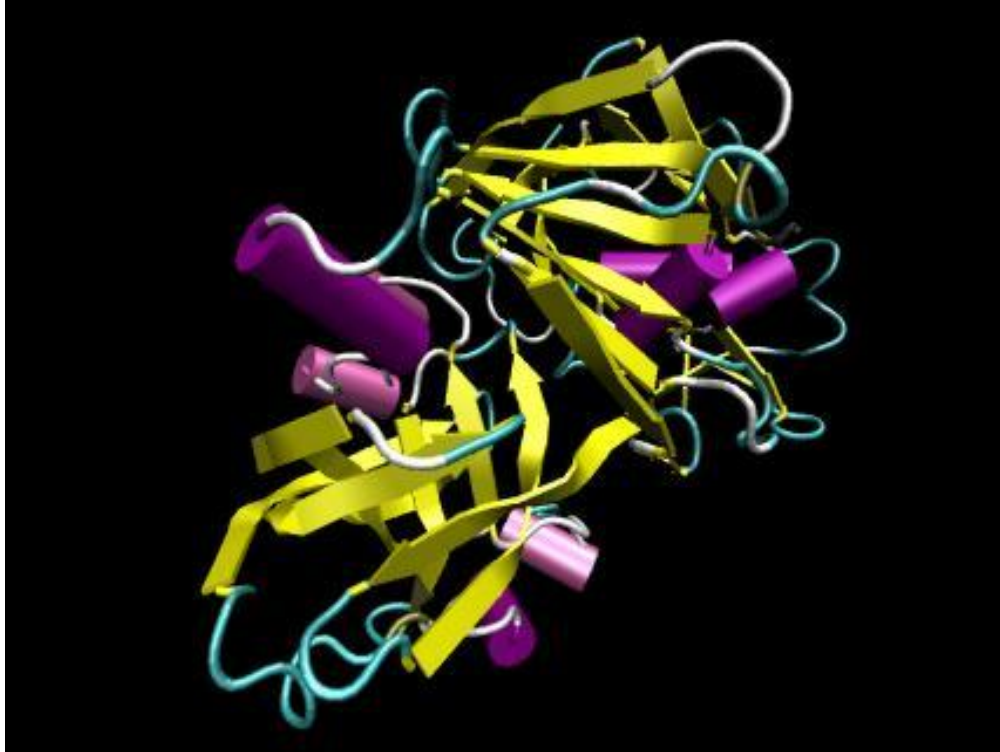


Figure 02: Pepsin

Pepsin is efficient in breaking peptide bonds between hydrophobic and aromatic amino acids such as phenylalanine, tryptophan, and tyrosine. Pepsin action can be inhibited by creating high alkaline environments and from inhibitors such as pepstatin, sucralfate, etc.

What are the similarities between Trypsin and Pepsin?

- Pepsin and trypsin break down proteins. Both are principal proteases in the human digestive system.
- Both enzymes are secreted in inactive forms such as pepsinogen and trypsinogen.

What is the difference between Trypsin and Pepsin?

Trypsin vs Pepsin

Trypsin is a protease which works in the small intestine.

Pepsin is a protease which works in the stomach.

Medium	
Trypsin acts in alkaline medium	Pepsin acts in acidic medium.
Location	
Trypsin is found in the small intestine.	Pepsin is found in the stomach.
Type of Protease	
Trypsin is a pancreatic protease.	Pepsin is a gastric protease.
Inactive Form	
Inactive form of Trypsin is trypsinogen.	Inactive form of Pepsin is pepsinogen.
Activation	
Trypsinogen is activated into trypsin by an enzyme called enteropeptidase.	Pepsinogen is activated into pepsin by HCl.
Discovery	
Trypsin was discovered by Wilhelm Kuhne in 1876	Pepsin was discovered by Theodor Schwann in 1836.

Summary – Trypsin vs Pepsin

Trypsin and pepsin are two proteases which act on proteins and break down into peptides and amino acids. Trypsin is produced by the pancreas and secreted into the small intestine. Pepsin is produced by stomach glands. It is one of the main gastric enzymes. This is the difference between trypsin and pepsin.

References:

1. Peluso, Ph.D. Michael R. "What Are the Functions of Trypsin?" LIVESTRONG.COM. Leaf Group, 18 June 2015. Web. [Available here](#). 21 July 2017.

2."Pepsin." Wikipedia. Wikimedia Foundation, 13 July 2017. Web. [Available here](#). 21 July 2017.

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