

Role of Elastases in Human Body

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DESCRIPTION

Elastases are the only proteases that have the ability to hydrolyze the scleroprotein elastin. Elastin, along with collagen, is a crucial protein that helps connective tissue maintain its mechanical qualities. Elastase is a hydrolase that breaks down peptide bonds. It belongs to the serine proteases family. It's a glycoprotein with 218 amino acids in its polypeptide chain. Elastase is a pancreatic enzyme produced by the pancreas' acinar cells that is resistant to intestinal breakdown. Pancreatic elastases 1 (Protease E) and 2, as well as neutrophil elastase, are among the enzymes. These three elastases can also work as an esterase and amidase on synthetic substrates like succinyl-trialanine-p-nitroanilide. Although the three enzymes have similar enzyme activities, their immunoactivity is vastly different. Trypsin activates proelastase from the mammalian pancreas, resulting in pancreatic elastase. It is kept in the zymogen granules after processing to proelastase, and then activated to elastase in the duodenum by tryptic cleavage of a peptide link in the inactive form of the precursor molecule. During inflammation, neutrophils release elastase, which kills germs and host tissue. Because of its strong affinity for DNA, it also localises to Neutrophil Extracellular Traps (NETs), which is a rare characteristic for serine proteases. Neutrophil elastase inhibitors are few. Serpins are one type of inhibitor (Serine Protease Inhibitors). Alpha 2-antiplasmin, a member of the Serpin family of proteins, has been demonstrated to interact with neutrophil elastase. Elastases are recognised to play a role in the pathophysiology of pulmonary emphysema, cystic fibrosis, infections, inflammation, and atherosclerosis. They play a physiological role in processes such as neutrophil migration, phagocytosis, and tissue remodelling.

Elastase from humans

Elastase from human leukocytes: Human leukocyte elastase

(HLE) is a serine proteinase that plays a role in tissue breakdown and inflammation. Appropriate HLE inhibitors are thought to be effective in the treatment of a variety of diseases, including emphysema and cystic fibrosis.

Human neutrophil elastase: Neutrophil elastase is a protease enzyme that can produce emphysema or emphysematous alterations if it is overexpressed. The lungs' structure is broken down, and airspaces are expanded. Cyclic and severe congenital neutropenia, or the failure of neutrophils to mature, is caused by mutations in the ELANE gene.

The role of human elastase in disease

A1AT: Elastase is blocked by the acute-phase protein 1-antitrypsin (A1AT), which binds to the active site of elastase and trypsin nearly irreversibly.

Cyclic neutropenia: It is a rare hereditary condition characterised by variable neutrophil granulocyte numbers over 21-day periods.

Other diseases: In the presence of antibodies, neutrophil elastase causes blistering in bullous pemphigoid, as a skin disorder.

Elastase test

Elastase aids in the digestion of lipids, proteins, and carbohydrates after a meal. It's an important element of the digestive system. Elastase is passed in the stool by a healthy pancreas. The elastase test determines how much elastase is present in the stool. If there is little or no elastase in the stool, it could indicate that the enzyme isn't acting properly. Pancreatic insufficiency is the medical term for this condition. Pancreatic insufficiency can result in malabsorption and malnutrition, among other issues. Pancreatic insufficiency in children can be a symptom of Cystic fibrosis or Shwachman-Diamond syndrome.

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Received: 22-Apr-2022, Manuscript No. EEG-22-17919; **Editor assigned:** 25-Apr-2022, PreQC No. EEG-22-17919 (PQ); **Reviewed:** 13-May-2022, QC No. EEG-22-17919; **Revised:** 17-May-2022, Manuscript No. EEG-22-17919 (R); **Published:** 24-May-2022, DOI: 10.35841/2165-8056.22.11.185

Citation: Brilan S (2022) Role of Elastases in Human Body. *Enz Eng*. 11: 185.

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