Editorial

iMedPub Journals
www.imedpub.com

Journal of Clinical Gastroenterology and Hepatology
ISSN 2575-7733

2021
Vol.5 No.1:e005

Activation of Human Pancreatic Proteolytic Enzymes

Song Tsuyochi*

Department of Medical and Health Sciences, University of Milan, Milan, Italy

***Corresponding author:** Song Tsuyochi, Department of Medical and Health Sciences, University of Milan, Milan, Italy, E-mail: tsuyochi.song@umi.it

Received date: September 02, 2021; **Accepted date:** September 16, 2021**; Published date:** September 23, 2021

Citation: Tsuyochi S (2021) Activation of Human Pancreatic Proteolytic Enzymes. J Clin Gastroenterol Hepatol. Vol.5 No.1:e005.

Description

Hepatocellular Enteropeptidase (formerly enterokinase) the enzyme of enzymes (E.C. 3.4 21.9), discovered at the beginning of the last century by Schepowalnikov is located in the brush border membrane of duodenal and upper small intestinal enterocytes. In the duodenal fluid, it is present in a soluble form or attached to small fragments of brush border membrane released from intestinal epitelial cells. This localization of the enzyme is found in many animal species and in man enteropeptidase is a serine proteinase. It is produced as a single chain precursor (Proenteropeptidase), sorted to the apical membrane of cells and activated by duodenase or trypsin. In the mature form it consists of a heavy chain of 82-140 kDa that ancors the enzyme in the intestinal brush border membrane and a light chain of 35-62 kDa that contains the catalytic subunit. The two chains are linked together by disulphate bridges. Enteropeptidase is responsible for the activation of trypsinogen to trypsin. The mechanisms of this activation process and its kinetics have been studied using purified zymogens of animal origin. Similar studies have also be performed using samples of normal human duodenal or pancreatic fluid as the source of enzymes or zymogens.

The enteropeptidase catalysed activation process is highly specific. In this process an octapeptide with the structure N-Ala-Pro-Phe-Asp-Asp-Asp-Asp-Lys is released from trypsinogen: trypsinogen activation peptide and by a conformational change, trypsinogen is converted into the active enzyme .The Tetra-aspartate motif in trypsinogen has been shown to be important for control of the autocatalytic activation of trypsinogen. This is in agreement with an earlier study which has shown that the polyaspartyl sequence of this domain in trypsinogen is an obstacle for the autocatalytic process, because trypsin does not attack model peptides containing this sequence. In recent studies, doubts have been raised as to whether the polyaspartate structure is the only domain necessary for recognition of the trypsinogen activation peptide by enteropeptidase. Other structures interacting with the heavy chain of enteropeptidase might be involved.in this recognition process.

The autocatalytic activation of trypsinogen by trypsin can occur under certain conditions *in vitro* and *in vivo* and does play an important role for the pathogenesis of pancreatitis. Duodenal fluid collected from patients with enteropeptidase deficiency containing zymogens prior to activation offers the possibility to study the activation process of proteolytic zymogens under conditions which come near to the physiological situation *in vivo*. If human pancreatic fluid prior to activation is available, this is another possibility for investigating the activation of trypsinogen and the role of trypsin and enteropeptidase in this process.

The activation of trypsinogen by trypsin added to the duodenal fluid of a patient with enteropeptidase deficiency did not occur. Only after adding enteropeptidase to the sample of duodenal fluid, active trypsin was formed. Auto activation of trypsinogen had not occurred because the sample had no tryptic activity prior to activation by exogenous enteropeptidase. If bovine trypsin was added to a sample of pure human pancreatic secretions collected from the main pancreatic duct, the result was similar: No activation by trypsin, prompt activation with enteropeptidase. The key role of enteropeptidase in the cascade process leading to the presence of active proteolytic pancreatic enzymes in the human small intestine. Autocatalytic activation of human trypsinogens did not occur in the environment of duodenal contents collected from patients with deficiency of enteropeptidase. Trypsinogen and chymotrypsinogen in duodenal fluid of these patients were rapidly activated after addition of purified enteropeptidase.