

# Pepsin

## Pepsin

Pepsin is a general name for a number of proteinases (pepsin A, B, C - EC 3.4.23.1,2,3) and pepsinogens are their **precursors** (proenzymes). Activation of **pepsinogen A** to **pepsin A** takes place in an acidic environment, the resulting **pepsin A** is capable of further activation of pepsinogen via autocatalysis. 8 gastric mucosal proteases can be separated electrophoretically in agar gel: pepsinogens PG1 – PG5 form a group of immunologically identical proteins (pepsinogen I, PG-I, PGA), pepsinogens PG6 and PG7 form the group of pepsinogen II (PG-II, PGC), the last protein is cathepsin E (SMP, *slow moving proteinase*). Molecular weight of pepsinogen I is 42,500.

Pepsin is an **endopeptidase**, so it hydrolyzes peptide bonds within the molecule, breaking it down into smaller fragments. In gastric juice, it hydrolyzes bonds near amino acids that have large side chains (amino acids with aromatic residues, branched chains, and methionine).<sup>[1]</sup>

## The clinical significance

The determination of pepsin in the insulin test and the serum level of pepsinogens A and C are of clinical importance. The RIA methodology with <sup>125</sup>I-pepsinogen in a competitive setting is used for the determination. Pepsinogen A is a marker of mucosal atrophy and is used in genetic studies as a subclinical marker of duodenal ulcer disease. Pepsinogen C is used as a marker of gastric mucosal status (possibly the PG-A / PG-C ratio is useful) and also as a marker of infection with *Helicobacter pylori* as well as its eradication. There is a decreased level of pepsinogen A in patients with achlorhydria, e.g., in pernicious anemia. Recent studies have shown a significant reduction in pepsinogen-I and at the same time an increase in the level of IgA antibodies to *Helicobacter pylori* in gastric cancer.

**Determining the ratio of the levels of** both pepsinogens (PG-I : PG-II) is today considered the most advantageous serological marker related to pepsin. The ratio of PG-I to PG-II decreases significantly depending on the histological risk or the presence of vacA + positivity of *Helicobacter pylori* infection. The combination of determination of pepsinogen-I, gastrin-17, and antibodies to *Helicobacter pylori* is tested as a so-called serological biopsy, GastroPanel, in the differential diagnosis of gastritis. The risk of gastric cancer, combined with *Helicobacter pylori* positivity, is another area of interest in gastrointestinal tumor screening.

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