

Protein digestion

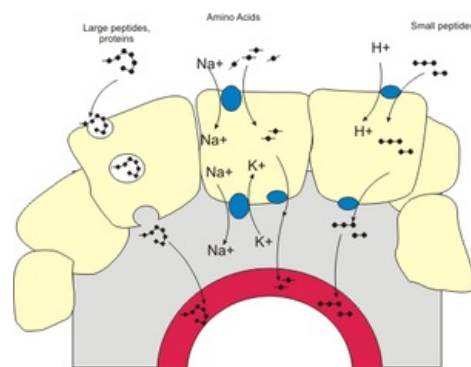
Protein digestion begins in the stomach by the action of the endopeptidase pepsin. **Pepsin** is secreted by the main cells of the fundus and body of the stomach in the form of inactive proenzymes. The precursor is **pepsinogen**, which is converted into pepsin using hydrochloric acid. The acidic stomach environment in the pH range of 1.8–4 creates an optimal environment for its activity, which ceases in the small intestine once the stomach contents mix with the alkaline pancreatic juice. In the pancreatic juice, other proteolytic enzymes reach the duodenum, which are responsible for the breakdown of polypeptides produced by digestion in the stomach. These are endopeptidases (**trypsin, chymotrypsin and elastase**) which cleave internal peptide bonds and carboxypeptidases (procarboxypeptidases A,B and inactive forms of enzymes) which cleave individual amino acids at the carboxyl end of the peptide chain. The breakdown into final products (**amino acids**) takes place either in the intestinal lumen, in the brush border of enterocytes, or even in the cytoplasm of mucous cells.

Protein absorption

The amino acids released by digestion have **specialized transport systems** on both the luminal and basolateral sides of the membrane, from where they are transported into the interstitium and then into the bloodstream. On the luminal side, resorption takes place using specialized carriers for individual types of amino acids. On the basolateral membrane, resorption takes place by diffusion.

Neutral and acidic amino acids are transported into mucosal cells by secondarily active Na^+ symporters and then pass into the blood passively or on a carrier.

Basic amino acids (arginine, lysine, ornithine) have their own transport systems. Part of the amino acids is absorbed in the form of dipeptides or tripeptides by secondary active transport using cotransport with sodium. Resorption of di- and tripeptides is faster. In enterocytes, dipeptides and tripeptides are cleaved by cytoplasmic enzymes into individual amino acids.



Protein absorption

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