

# Gastric juice

Gastric juice is produced in the tubular glands of the gastric mucosa. The juice production is **2 to 3 liters** per day. Its pH is acidic and reaches values of **1.8 to 4**.

## On the production participate:

### Mucinous cells (Goblet cell)

They produce mucin. The mucin forms 0.6 mm thick layer above the mucosa and protects it from chemical and mechanical effects. Mucus is extremely important part of the stomach's defense mechanisms against mucosal digestion. It is characterized by mechanical resistance and low friction which simplifies the smooth passage of food particles. Its production is highly dependant on the proper blood supply of the stomach wall.

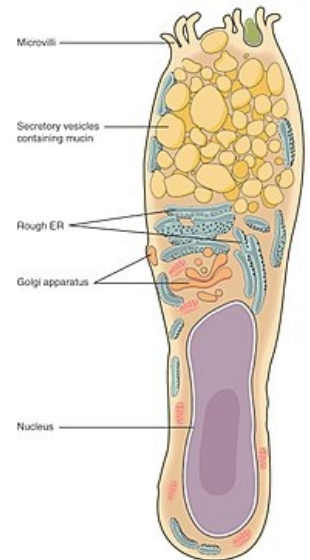
### Main cells

They form pepsinogens which are inactive precursors of proteolytic enzymes of gastric juice. After getting into contact with acidic juice, they are converted to pepsins. Pepsins are endoproteases that break down proteins. Optimal pH for their function is between 1.8 - 3.5. If the pH rises above 5, their proteolytic activity decreases rapidly and part of their molecule, that split off during the activation, is able to reversibly inactivate pepsinogen. The pH 7 to 8 leads to irreversible inactivation.

### Parietal (covering) cells

They secrete HCl and intrinsic factor (a glycoprotein necessary for absorption of vitamin B12). Hydrochloric acid is responsible for the acidic pH and therefore has many functions:

- activates inactive pepsinogen to pepsin;
- keeps acidic pH at which pepsin has the greatest effect;
- coagulates proteins that leads to faster enzymatic degradation;
- reduces iron to an absorbable form of divalent ion;
- maintaining acidic environment which protects some vitamins (eg. C).



Goblet cell

## The secretion can be divided into few phases:

### Cephalic phase

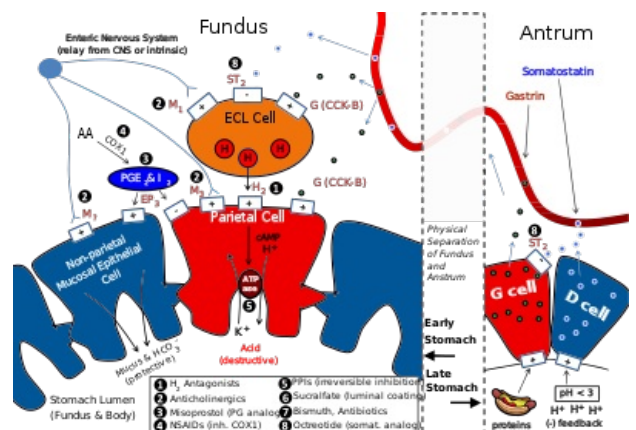
Increasing and suppressing secretion is an active mechanisms influenced by CNS which is triggered by capturing signal of food, taste or smell. The fibers of the vagus nerve stimulate parental cells. Parasympathetic activity increases juice production that can be blocked by cutting off the vagus nerve.

### Gastric phase

The gastric phase starts in the moment the food is swallowed. The entry of the bite causes an increase in the volume of the stomach. This change is captured by mechanoreceptors in the stomach wall. The irritation leads to increasing the activity of the intestinal nervous system which directly or indirectly stimulates parental cells through gastrin and histamine. The effect of the food component increases the pH. This releases gastrin that stimulates parental cells and therefore increase in HCl secretion.

### Intestinal phase

Last phase occurs when the chyme leaves the stomach. At the beginning the secretion is increased due to the release of gastrin. Later when the chyme goes into the duodenum, the suppressing hormones are released - secretin, gastric inhibitory polypeptide, cholecystokinin. These hormones suppress gastric production and thus HCl secretion.



HCl Secretion

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## References

- KITTNAR, Otomar. *Lékařská fyziologie*. 1. edition. Praha : Grada, 2011. pp. 790. ISBN 978-80-247-3068-4.
- LÜLLMANN-RAUCH, Renate. *Histologie*. 3. edition. Praha : Grada, 2012. pp. 576. ISBN 978-80-247-3729-4.

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