Gastric juice

Secretion, determination of secretion capacity
Functions of gastrointestinal tract

- Digestion of food components
- Absorption of nutrients
Functions of stomach

- Digestion of proteins
- Digestion of lipids
Gastric juice

- Daily production of gastric juice is approximately 2000-3000 ml
- pH 1,0 - 1,5
Composition of gastric juice

- Hydrochloric acid
- Pepsin
- Gastric lipase
- Gastricksin
- Intrinsic factor
- Mucus
Gastric mucosa - schématicky
Cells of gastric mucosa

- **Chief cells** – pepsinogen
- **Parietal cells** – hydrochloric acid and intrinsic factor
- **Mucous cells** – mucus
- **G-cells** – gastrin
- **D-cells** – somatostatin
- **Enterochromaffin cells** – atrial natriuretic peptide
- **ECL-cells** – histamine
Gastric mucosa
Chief and parietal cells
Parietal cell

• Hydrochloric acid

• Intrinsic factor
Blood

**carboxydrase**

$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$

PARIetal CELL

Gastric lumen

**CO**

**K**

**H**

**K**

**Cl**

**K**

**Na**

**Na**

**K**

**H**

**K**

**Cl**

**Cl**

**HCO**

**HCO**

**Cl**

**Cl**

**Na**

**Na**

**Na**

**Na**

**Cl**

**Cl**

**CO**
**PARIENTAL CELL**
(resting)

\[
\text{CO}_2 + \text{H}_2\text{O} = \text{H}_2\text{CO}_3
\]

**Carboanhydrase**

**Blood**
- \(\text{CO}_2\)
- \(\text{HCO}_3^-\)
- \(\text{Cl}^-\)
- \(\text{H}^+\)
- \(\text{Na}^+\)
- \(\text{K}^+\)

**Gastric Lumen**
- \(\text{Cl}^-\)
- \(\text{K}^+\)
- \(\text{Na}^+\)
- \(\text{H}^+\)
- \(\text{HCO}_3^-\)

**Parietal Cell** (resting)
- \(\text{H}^+\)
- \(\text{Na}^+\)
- \(\text{K}^+\)
Control mechanisms of gastric acid secretion on level of parietal cell
Nervous, paracrine and endocrine control of gastric acid production
Determination of gastric acid secretion

- Pentagastrin test – stimulatory test
Preparation of patient

- 12 hours of starvation
- 24 hours without drugs influencing secretion of gastric juice
- The patient is not permitted to smoke the morning of, or during the test and should avoid any form of exercise
Protocol of gastric stimulation test

- Collect residual gastric fluid from a fasting patient by suction on a nasogastric tube
- Collect basal secretions for four 15-minutes periods
- Administer pentagastrin i.m. in a dose of 6 μg/kg of body weight
- Collect further stomach secretions for four consecutive 15-minute time periods
- Measure the volume of each fraction of gastric fluid
- Determination of gastric acid concentration: a known volume of gastric fluid is titrated with 0.1 mol/l NaOH until phenolphthalein takes on red color
Reference values

• Basal acid output – BAO
  1 – 5 mmol/hour

• Maximal acid output – MAO
  10 – 23 mmol/hour
Increased BAO
• Zollinger-Ellison syndrome
  = tumor of G-cells
Increased MAO
• Zollinger-Ellison syndrome
• Peptic ulcers
Decreased MAO
• Chronic atrophic gastritis
• Gastric cancer