

# SECRETION

- Salivary glands
- Gastric glands
- Small glands of esophagus and intestine
- Exocrine pancreas
- Liver

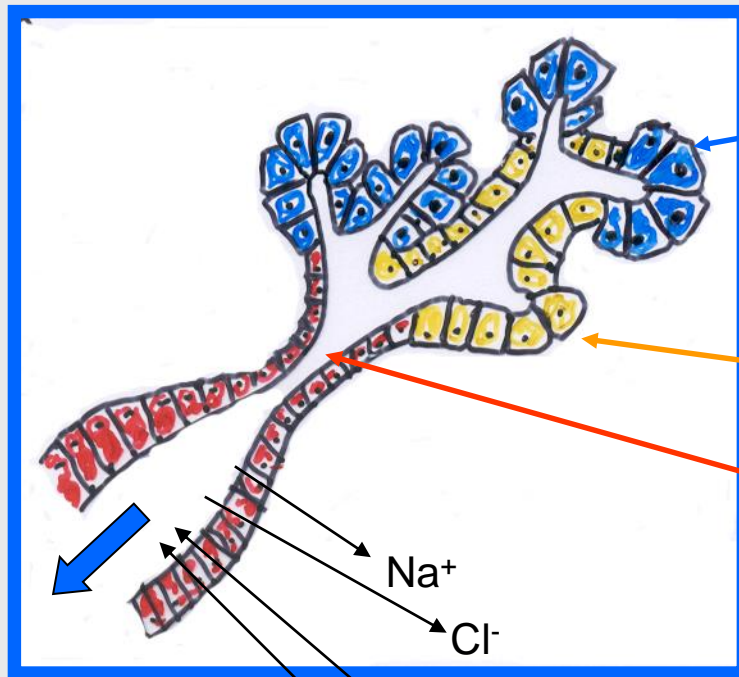
- Lubrication of food
- Swallowing
- Mechanical protection of GIT
- Chemical protection of GIT
- Enzymes
- Immune function(s)
- Articulation

## STIMULATION OF SECRETION

1. Neurocrine
2. Endocrine
3. Paracrine

# PRODUCTION OF SALIVA

- **Mucinous** vs. **serose** secretion
- Gl. parotis, gl. submaxilaris, gl. sublingualis, small salivary glands in mouth
- 1 litre / day ( 1ml/min/g )
- High resting blood flow – 10 x contracting muscle, high metabolic exchange
- pH: 7 – 8 (at rest rather acidic, increase in  $\text{HCO}_3^-$  - alkalization)
- Parasympathetic stim. – Ach, VIP, VII. a IX.n., ; vasodilatation



## PRIMARY SALIVA

### ACINES

Serose secretion ( $\text{H}_2\text{O}$ , ions; isotonic)(gl.parotis)  
Salivary amylase (zymogenic granules – exocytosis)  
Over pH 4!!!

Mucinoase secretion (glykoproteins)  
(gl.submaxilaris and sublingualis)

### DUCTUS

## SECONDARY SALIVA

pH ~ 8

(hypotonic, after stimulation – increased tonus)

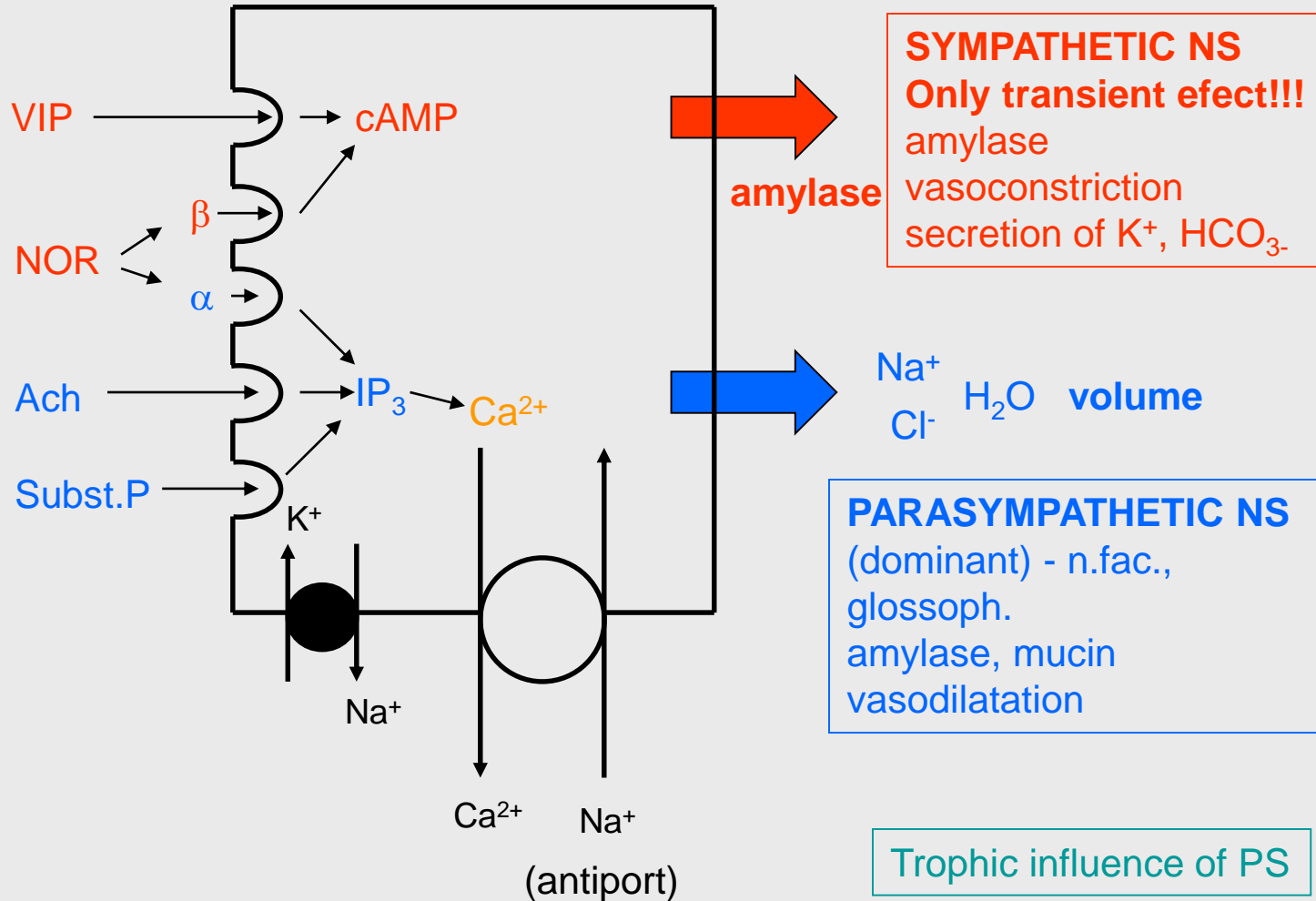
Resembles exocrine pancreas

# REGULATION OF SALIVA PRODUCTION

Transmitter

2. messenger

Secretion



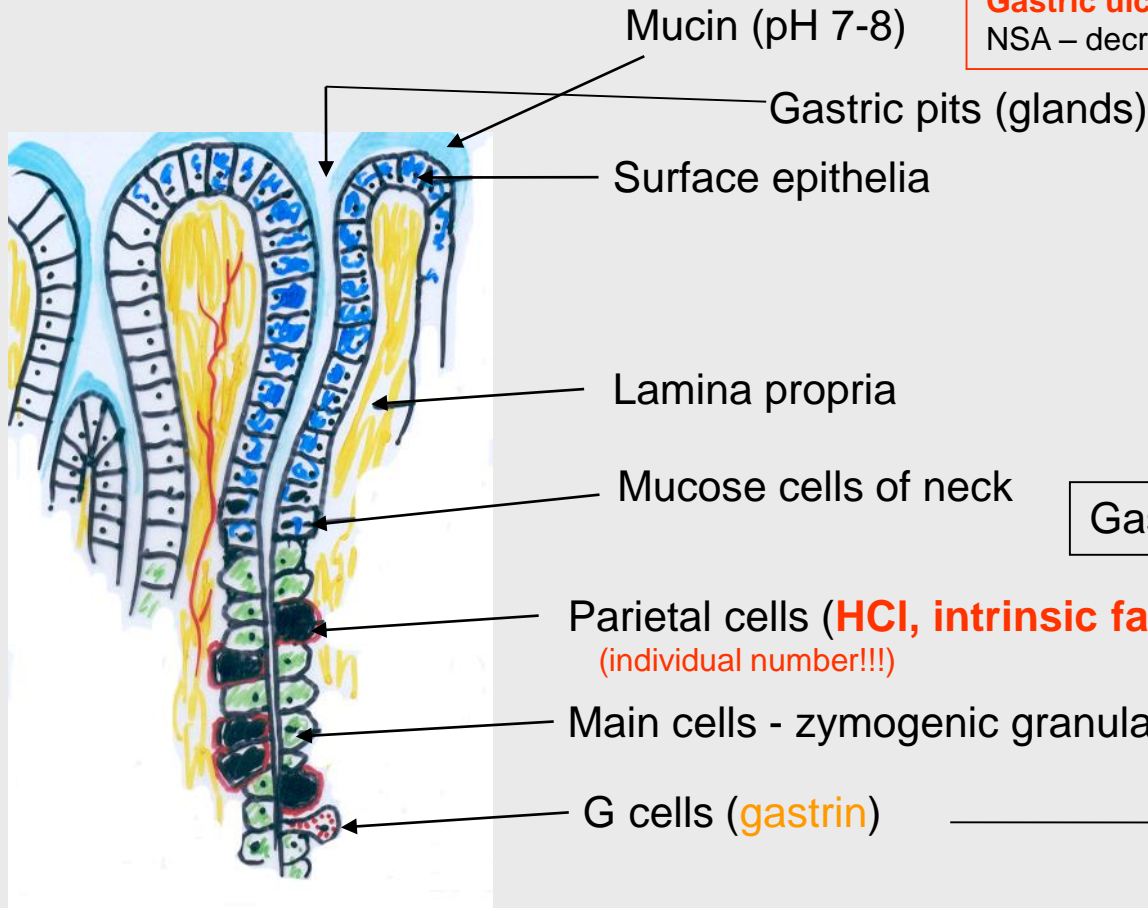
Trophic influence of PS

Xerostomia

# SECRETION OF GASTRIC JUICE

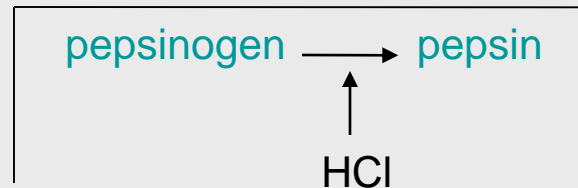
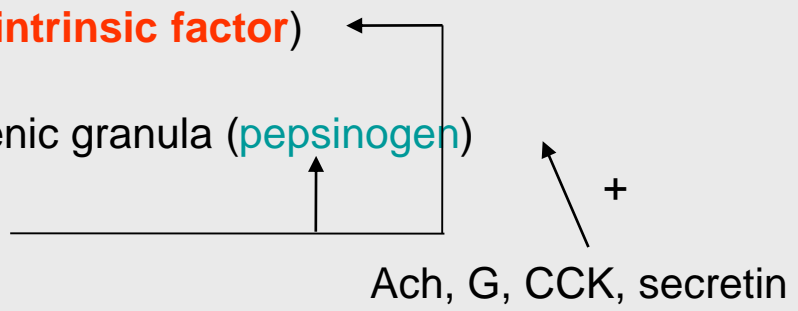
pH 2, high concentration of  $K^+$  (vomiting) a  $Cl^-$

Stimulation of  $\alpha$ -receptors – decreased secretion of  $HCO_3^-$   
**Gastric ulcers**  
 NSA – decreased secretion of  $HCO_3^-$  and mucine



- Area:
- Subcardial (mucin)
  - Fundus (HCl)
  - Pyloric (mucin, G)

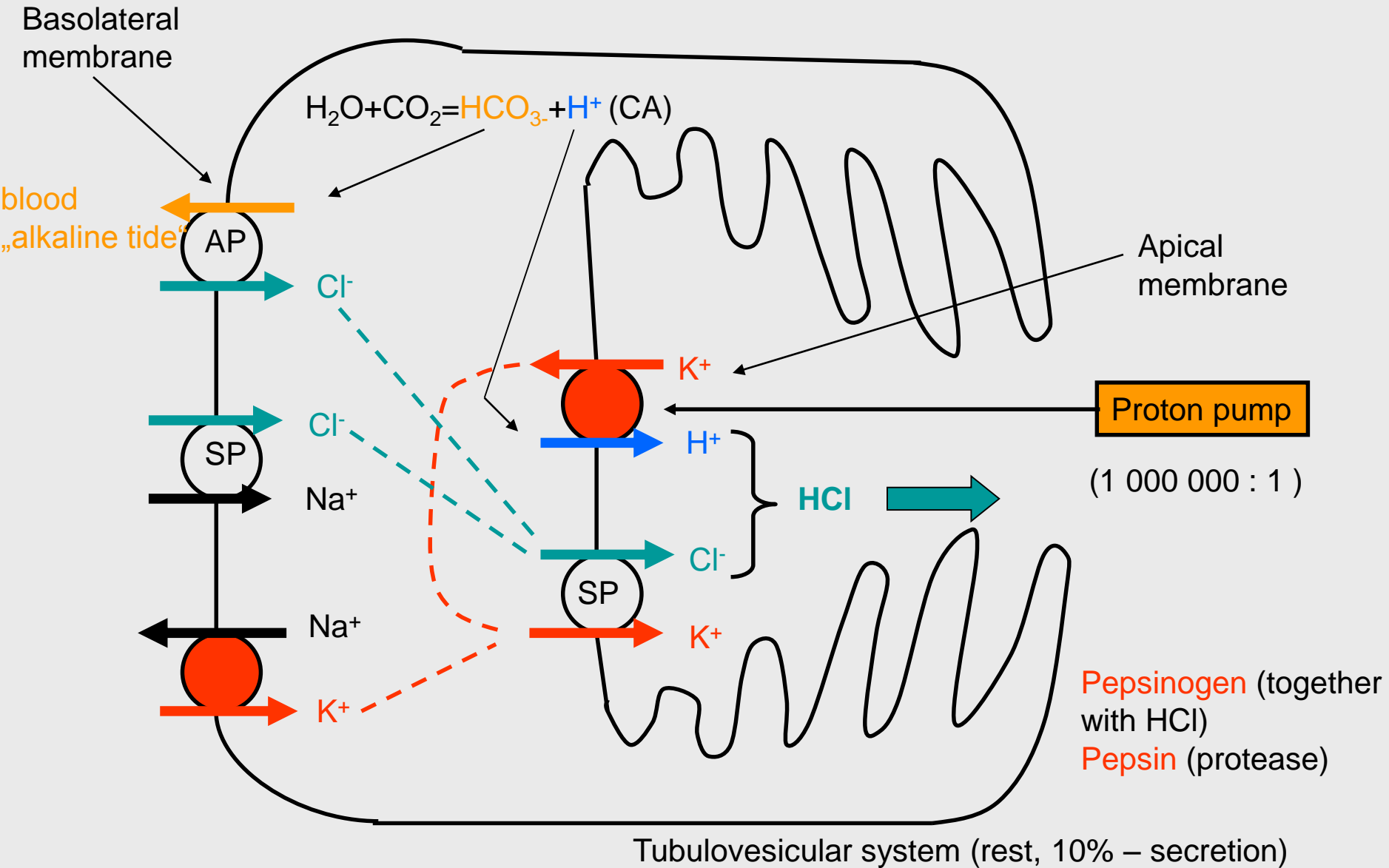
Gastric mucose barrier



**Gastric juice:** water, salts, HCl, pepsin, intrinsic factor, mucin  
 Production increases after meal

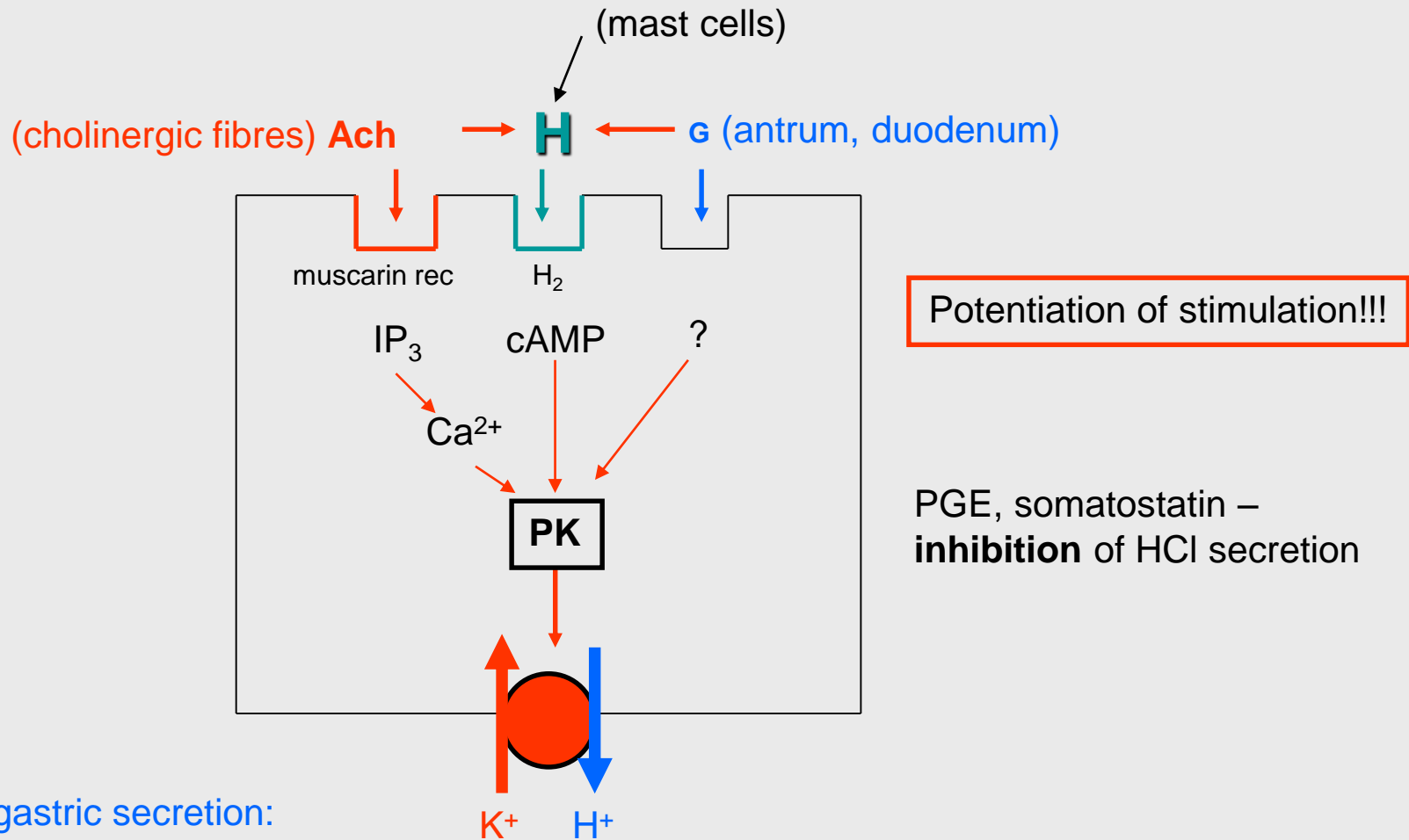
Higher secretion – lower pH, lower secretion – more  $Na^+$ , (always more  $K^+$  than in plasma)

# HCl PRODUCTION IN PARIETAL CELL



**INTRINSIC FACTOR:** binding protein (glykoprotein) for vitamin B<sub>12</sub> (pernicious anaemia)

# CONTROL OF HCl PRODUCTION IN PARIETAL CELL



## Phases of gastric secretion:

- **Cephalic** (vision, smell, taste)(X.)(directly, G, H)
- **Gastric** (distension of stomach; peptides, AA)(mechanorec.-local and centr. reflexes; trypt., fenylalanin, caffeine, alcohol – G)
- **Intestinal** (distension of duodenum, peptides, AA)(G from duodenum and jejunum)

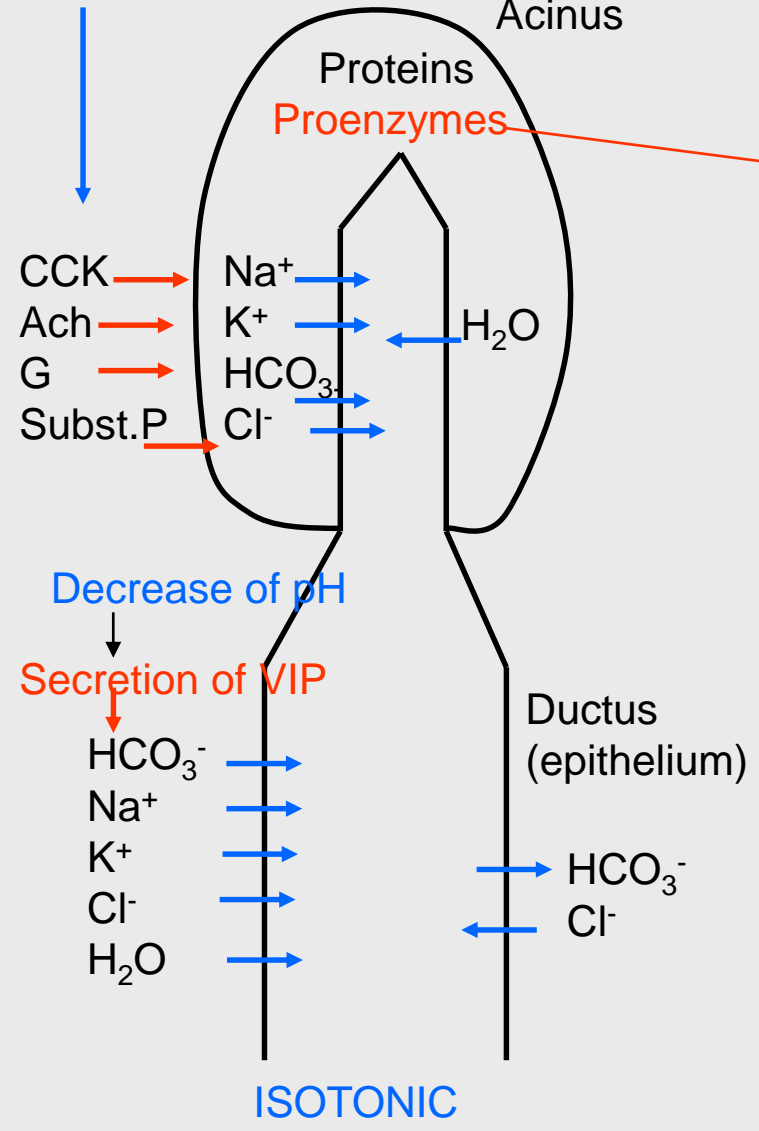
## Inhibition of gastric secretion:

Low pH, FA, hypertonia v duodenum and jejunum; secretin, bulbogastron, GIP, CCK

# CONTROL OF PANCREATIC JUICE SECRETION

100 gr  
1 l/day  
exo-endo  
n. X.

Digestion products  
(lipids, peptides)



1. Water phase ( $\text{HCO}_3^-$ ) - secretin
2. Enzymatic phase - CCK

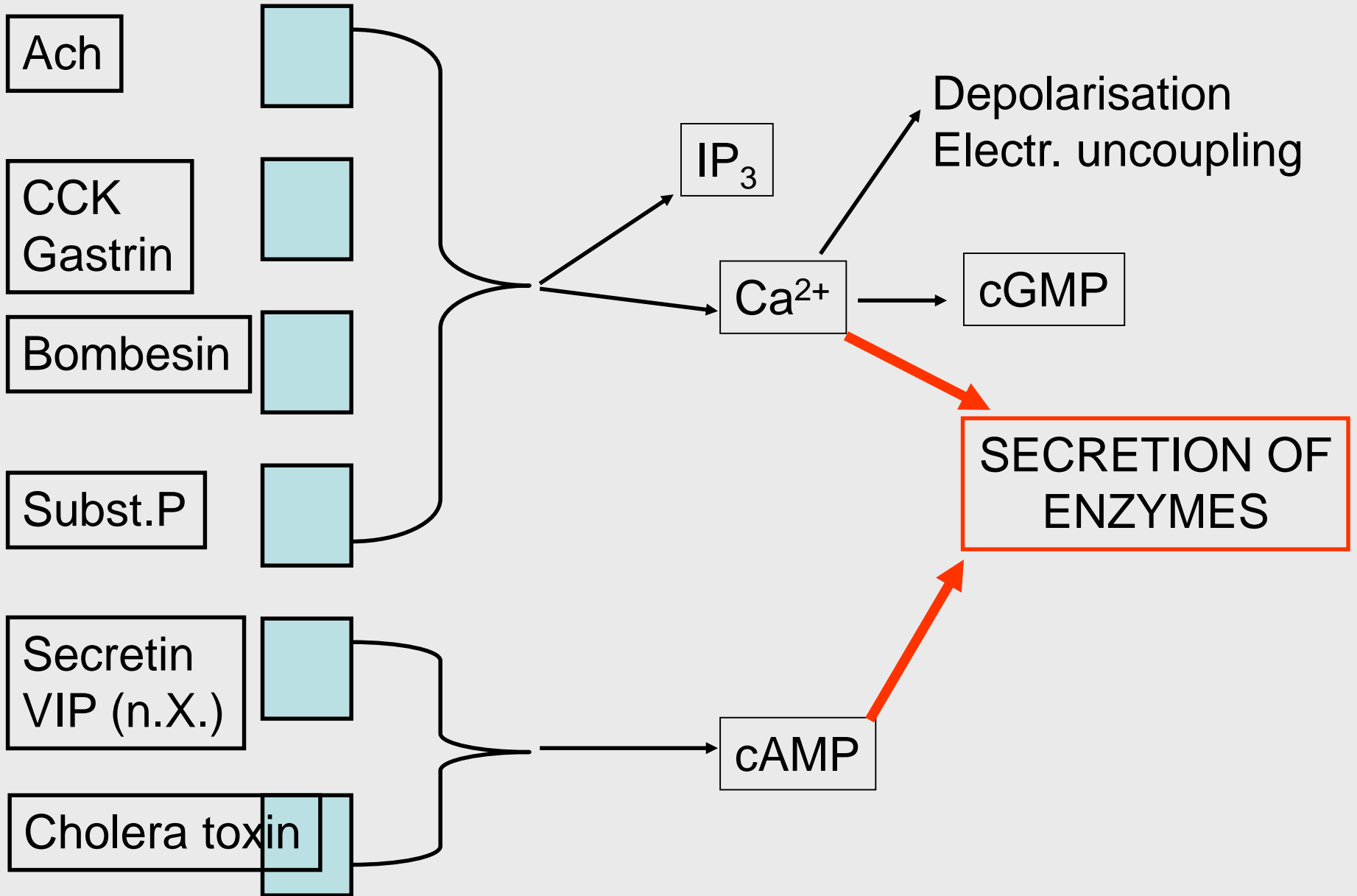
1. Trypsinogen (trypsin activates 1, 2, 3)
  2. Chymotrypsinogen
  3. Prokarboxypeptidase
  4. Trypsin-inhibitor
  5.  $\alpha$ -amylase
  6. Pancreatic lipases
- Enterokinase – activates trypsinogen

**Regulation of secretion:**

1. Phase cephalic (n.X. – gastrin)
2. Phase gastric (distension of stomach – gastrin)
3. Phase intestinal (acid in duodenum and jejunum – secretin; peptides, AA = trypt., fenylalanin, FA – CCK)

Oddi sphincter (X. rel.)  
Pancreatitis acuta

# REGULATION OF SECRETION IN ACINARY CELL

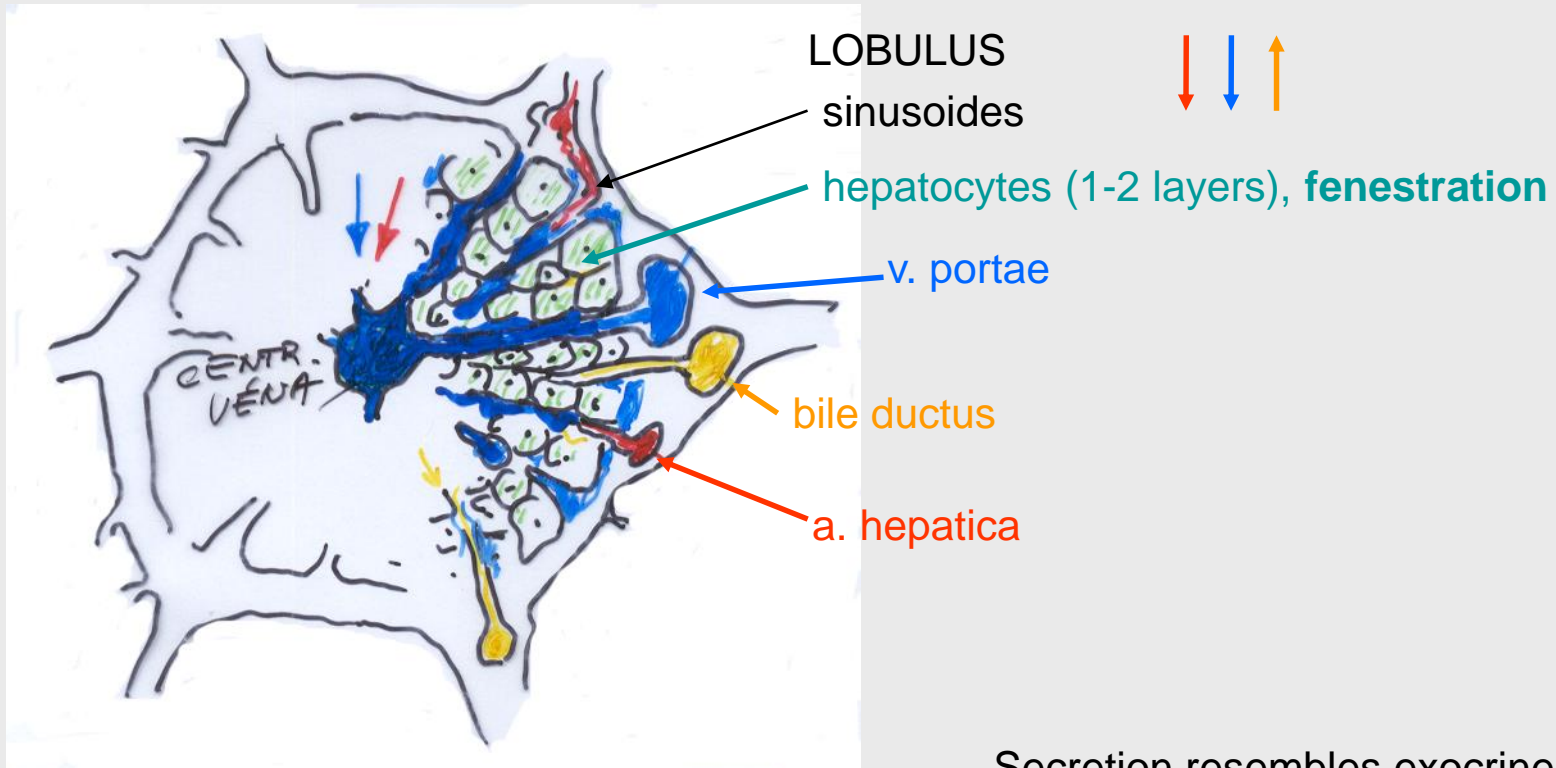




# LIVER FUNCTION

- **Regulation of metabolism** (saccharides – glycogenolysis, glukoneogenesis; lipids – chylomicrons, lipoprotein lipase, VLDL, cholesterol and triglycerides; ketone bodies; proteins – synthesis of urea)
- **Proteosynthesis** (non-essential AA, lipoproteins, albumins, globulins, fibrinogen and other proteins of blood clotting cascade)
- **Storage** (glycogen, vitamins – A, D, B<sub>12</sub>, iron)
- **Degradation** (hormones – epinephrin, norepinephrin, steroids, polypeptidic hormones)
- **Inactivation and excretion** (remedies, toxins) – detoxication by conjugation with glucuronic acid, glycine and glutathion

# BILE PRODUCTION

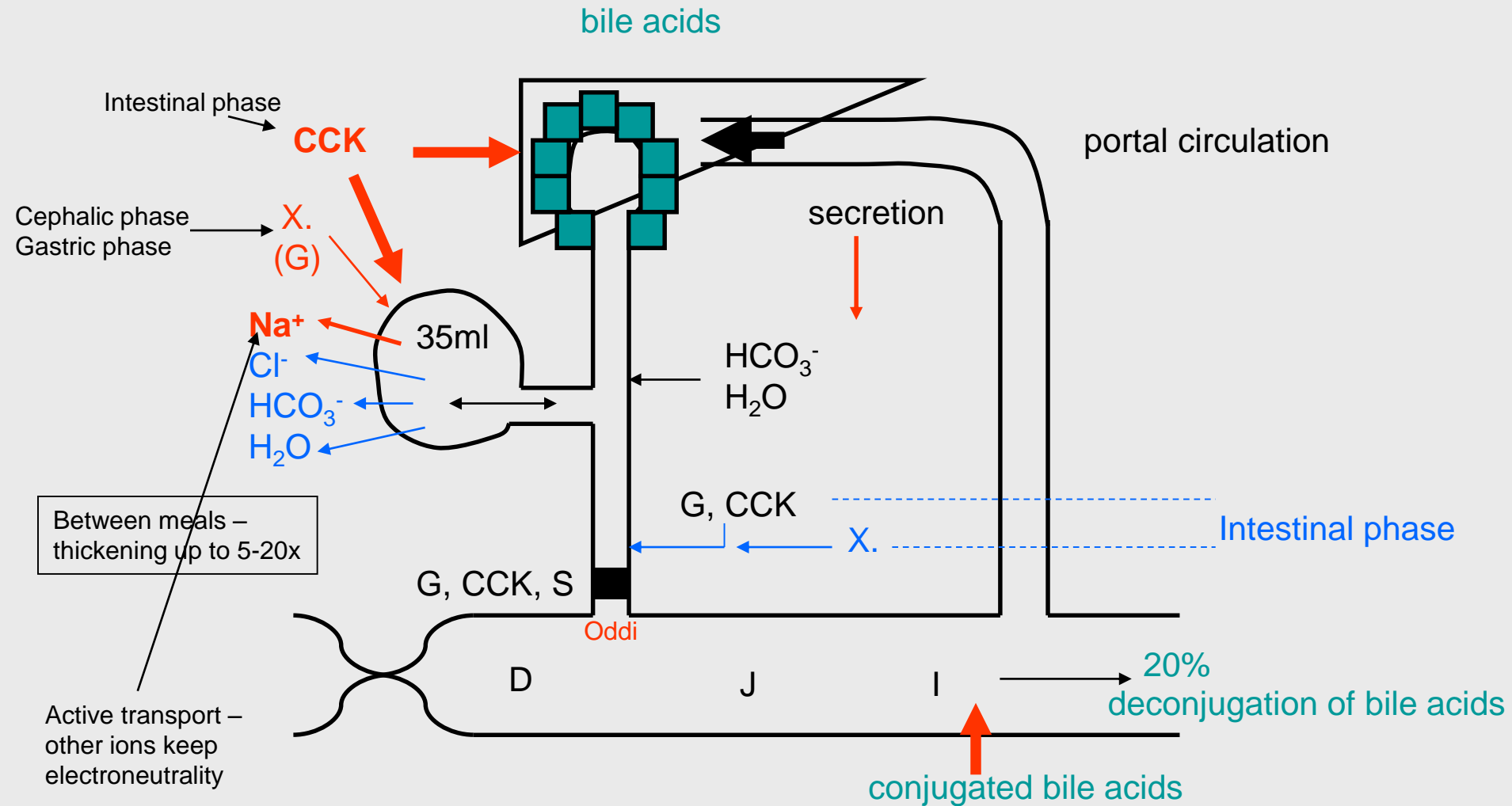


Secretion resembles exocrine pancreas

## Bile

- 250-1500ml/day, isotonic, **primary secretion** – resembles plasma, **CCK**; modification - **secretin**
- bile acids (salts –  $\text{Na}^+$ ) – conjugated (glycin, taurin) – soluble in  $\text{H}_2\text{O}$ , 50% of dry, micels
- cholesterol (crystals, lithiasis)
- lecithins
- bile pigments (bilirubin – glucuronid) – **yellow colour of bile** (lithiasis)
- $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$
- $\text{H}_2\text{O}$ ,  $\text{HCO}_3^-$  (secretin)

# ENTEROHEPATIC CIRCULATION



# SECRETION FUNCTION OF GIT AND ITS HUMORAL CONTROL

