

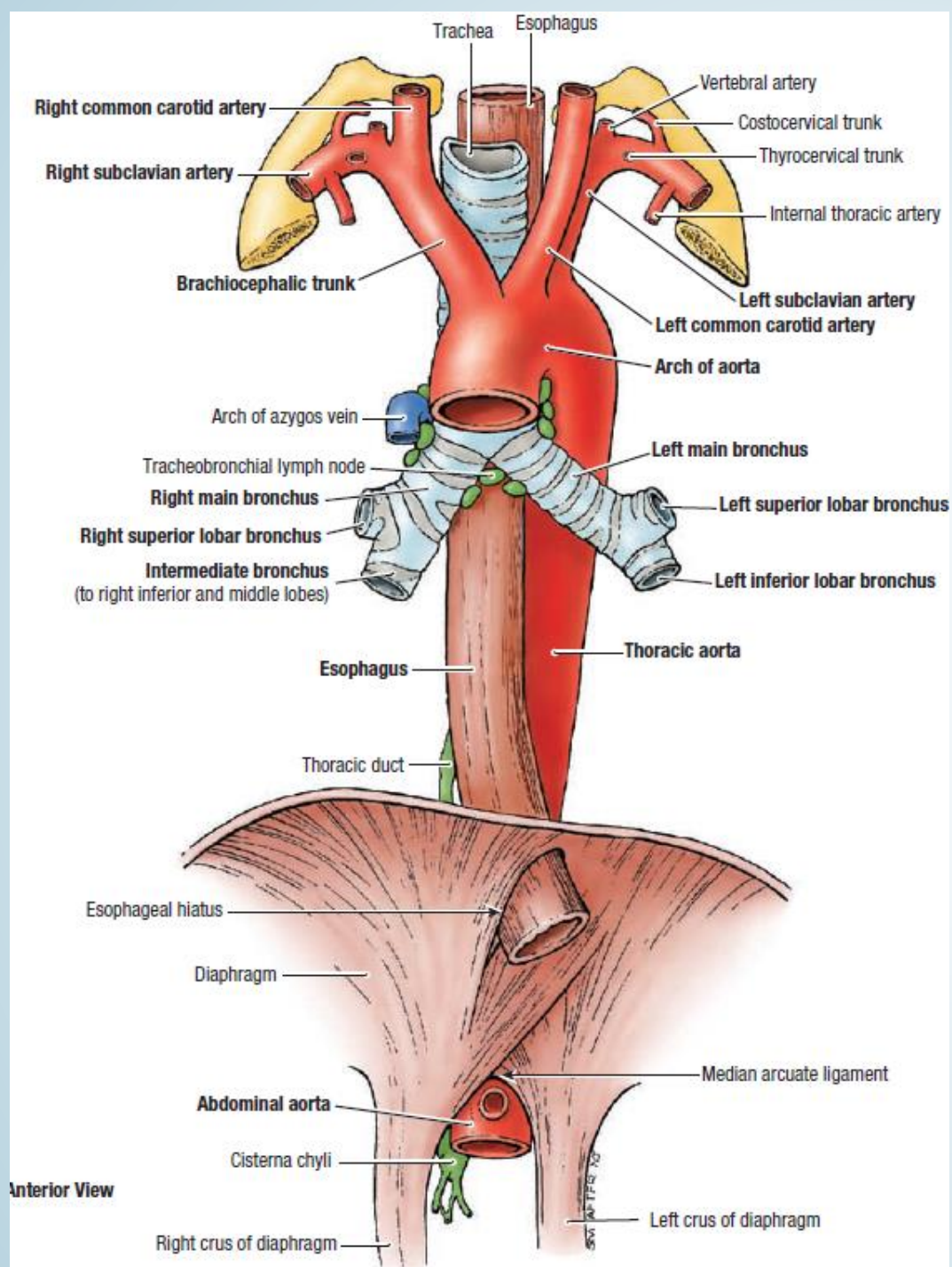
Morphology and histology of the esophagus and the stomach



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Anatomy, Histology and Embryology Institute
2019.

ESOPHAGUS



Esophagus

cervical part
 thoracic part
 abdominal part

C6 - Th11 left side

„upper esophagus sphincter“
 (m. cricopharyngeus)
 „lower esophagus sphincter“ (cardia)

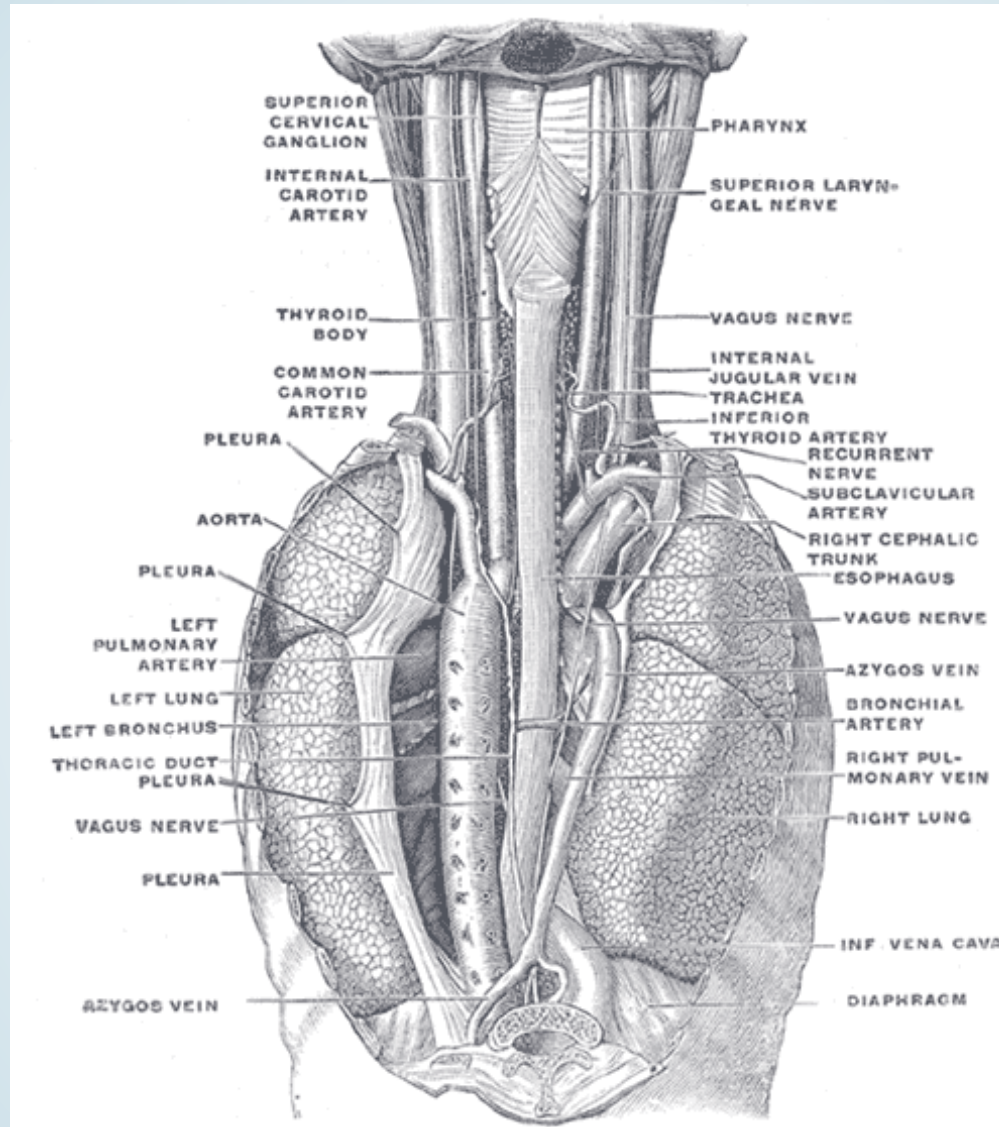
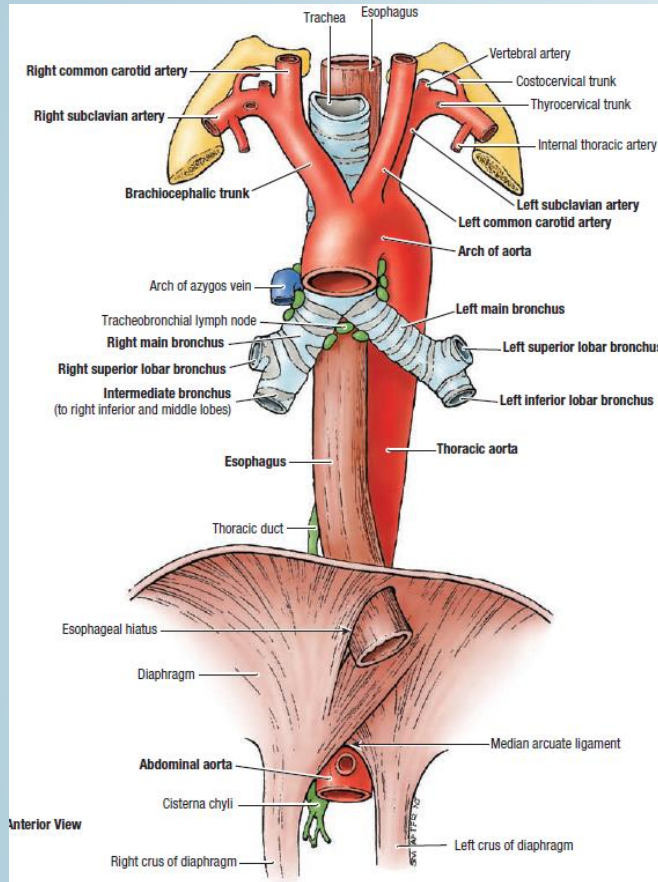
narrowings:

- cricoid cartilage
- aortis arch
- left principal bronchus
- diaphragm, esophageal hiatus

narrowings from the incisors:

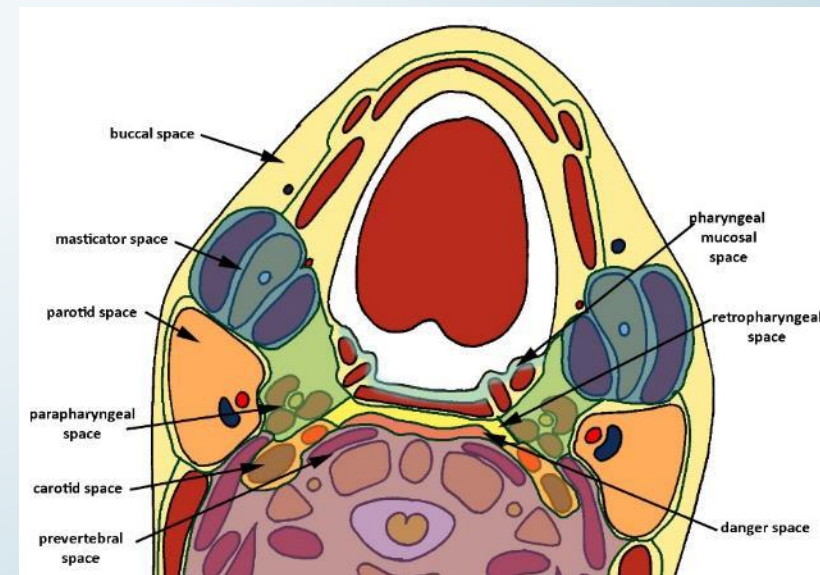
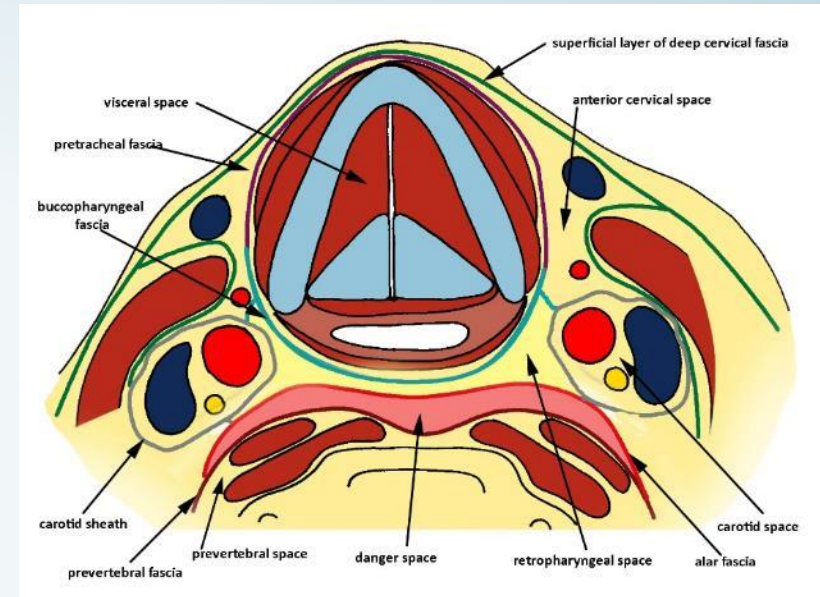
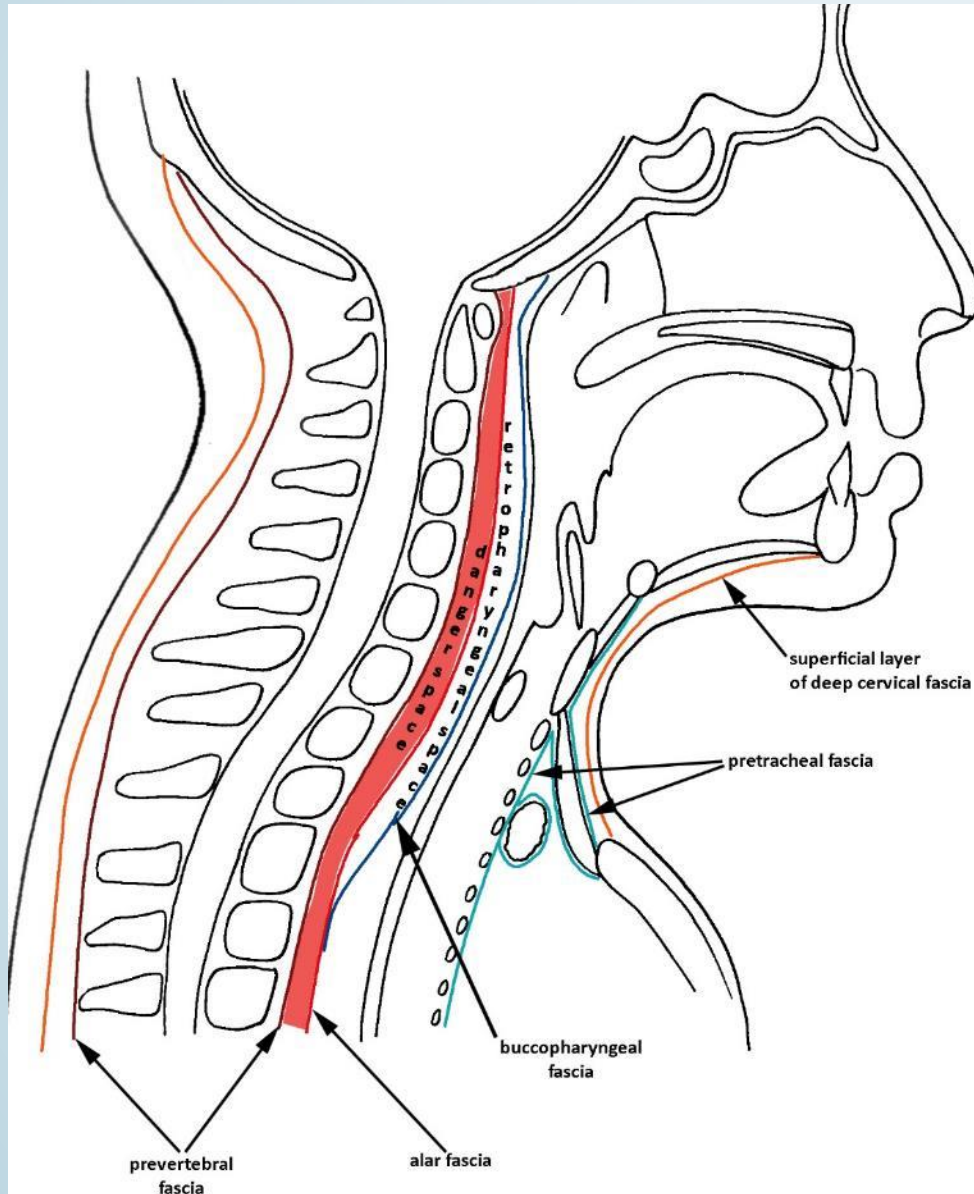
- 15 cm
- 23 cm
- 24 cm
- 40 cm

Esophagus



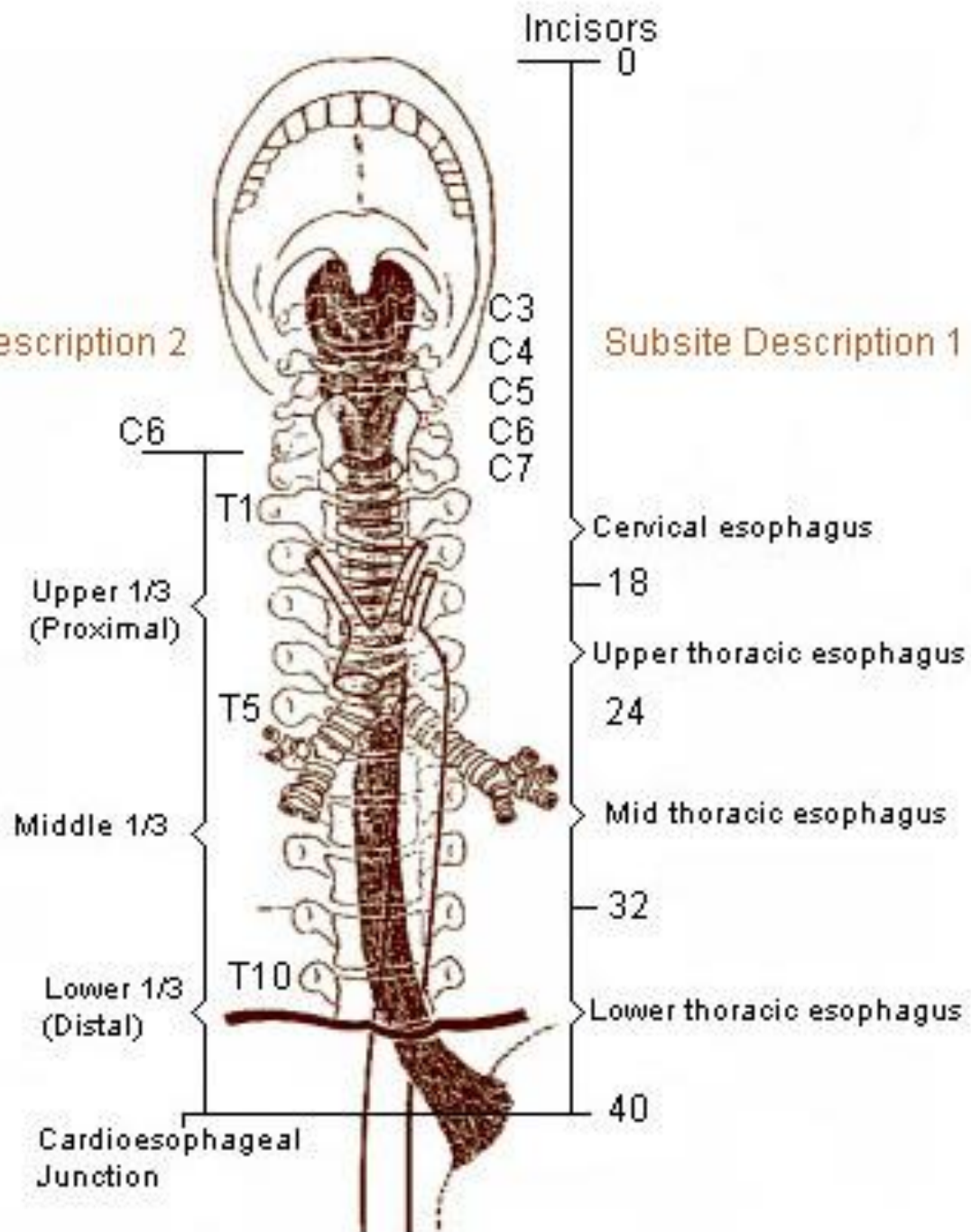
- anterior to prevertebral (alar) fascia & buccopharyngeal fascia
- behind trachea
- right to aortic arch
- medial to right lung
- behind left atrium
- anterior and right to descending aorta
- diaphragm, esophageal hiatus
- recurrent laryngeal n.
vagus n. (left ant., right post.)

Esophagus, cervical spaces

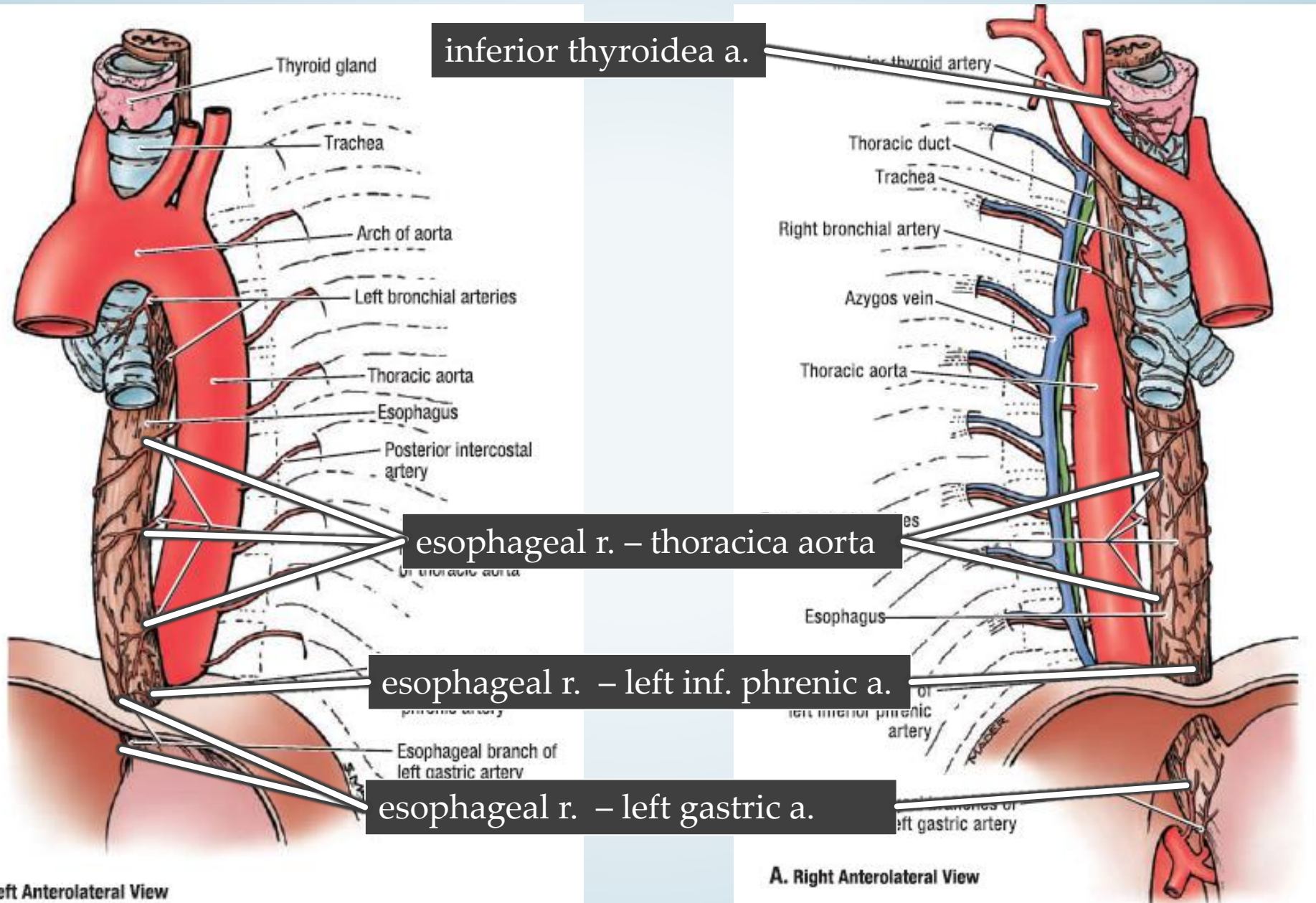


Subsite Description 2

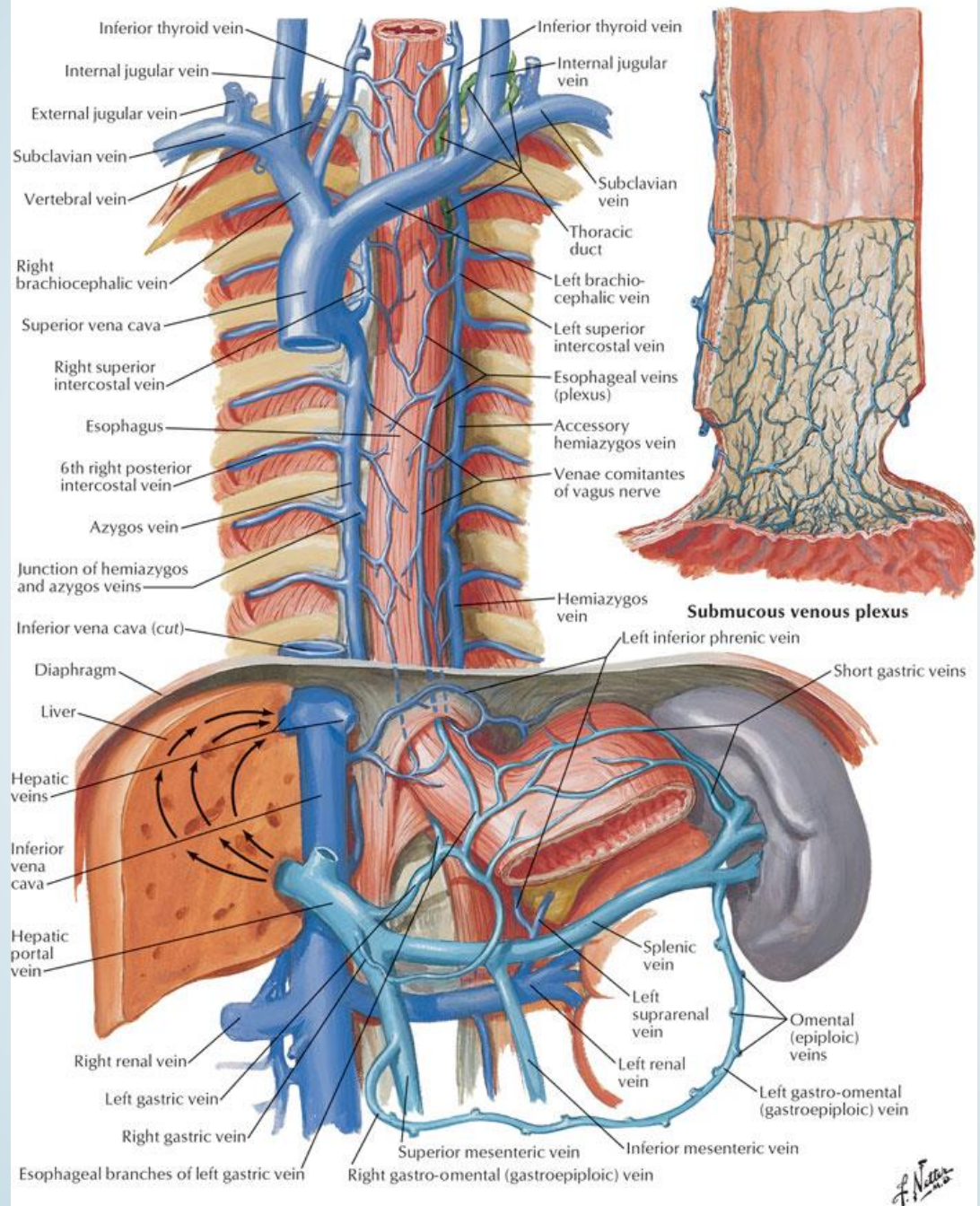
Subsite Description 1

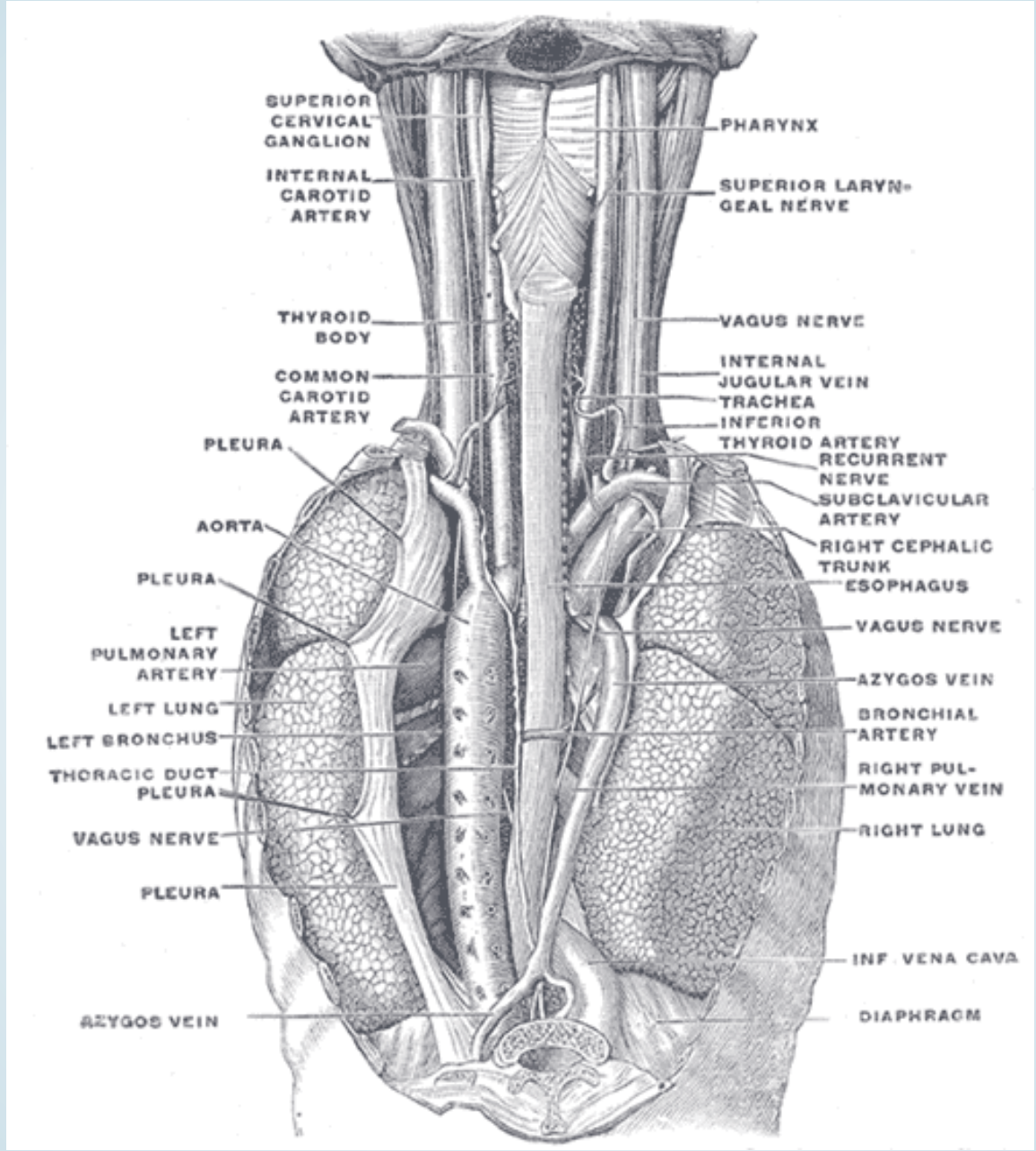


Esophagus blood supply



Veins of Esophagus





Esophagus – veins

Esophageal varix

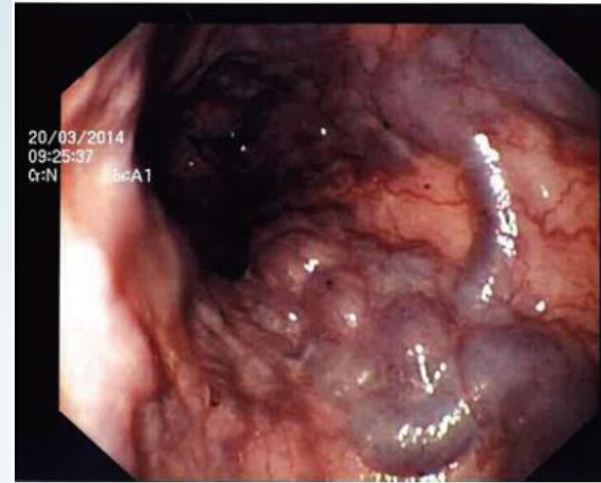
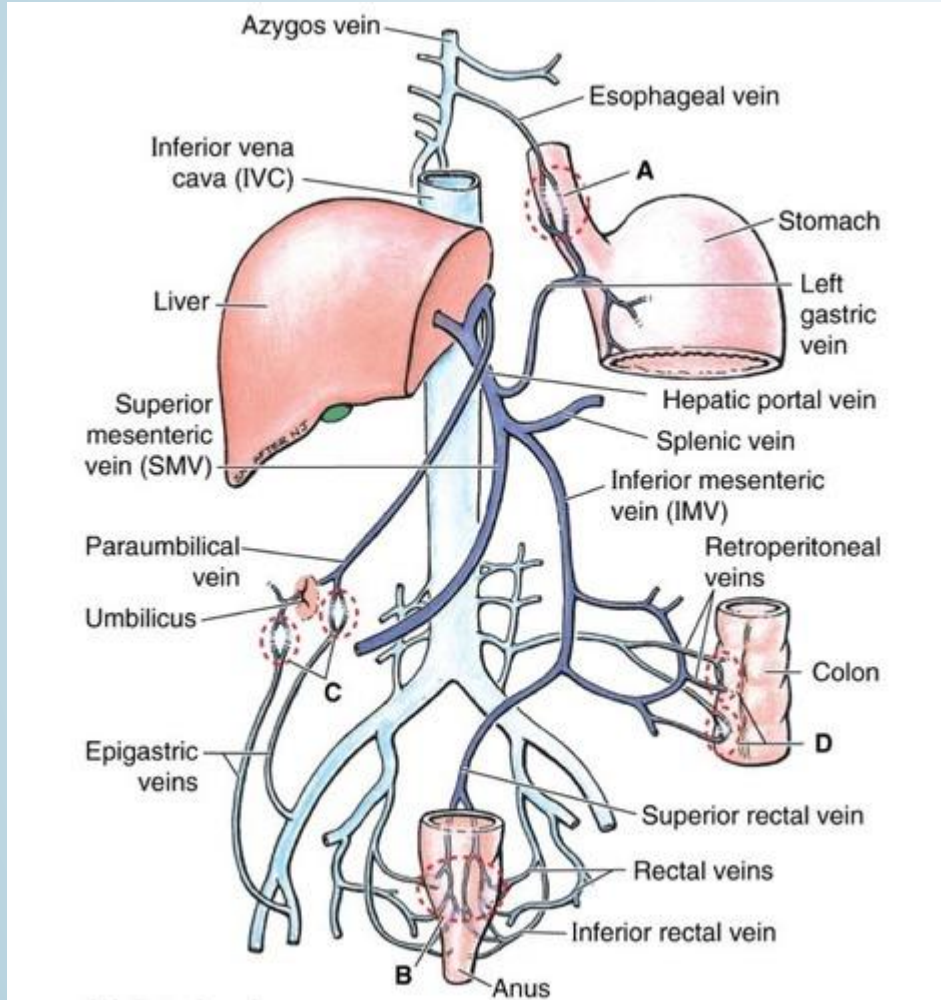
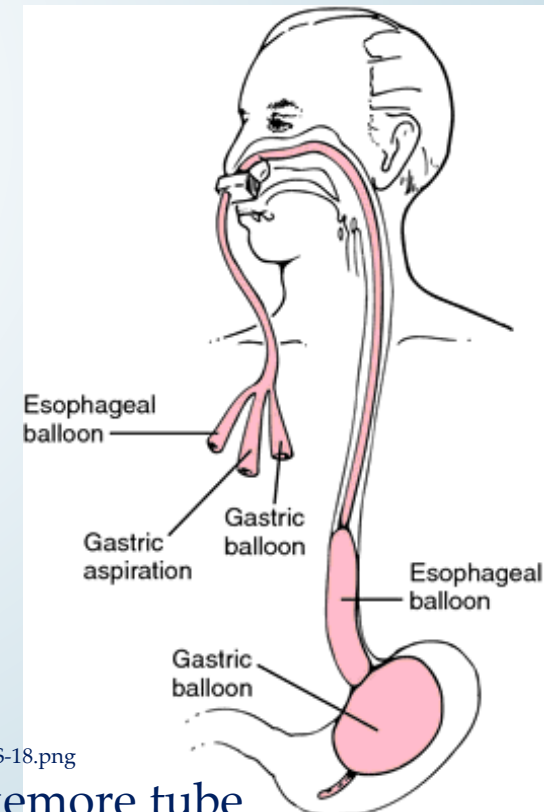
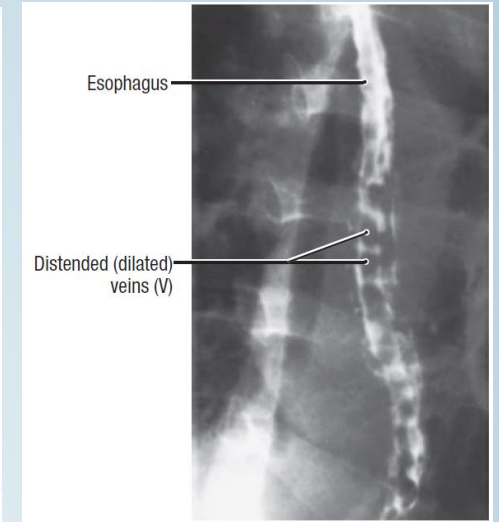


Figure 1 Large esophageal varices at EGD.



<http://img.tfd.com/mk/S/X2604-S-18.png>
 Sengstaken-Blakemore tube

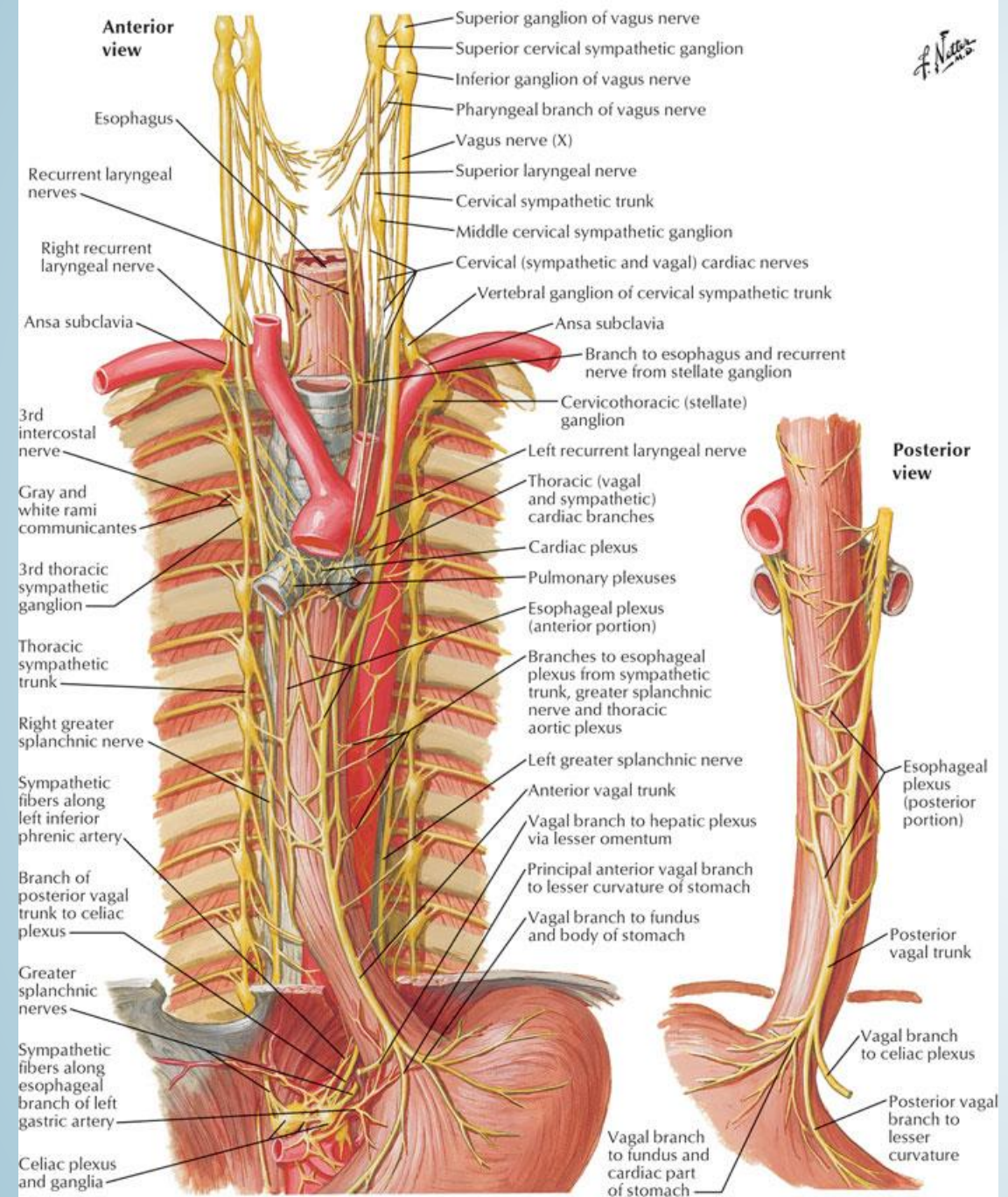
Nerves of Esophagus

F. Netter

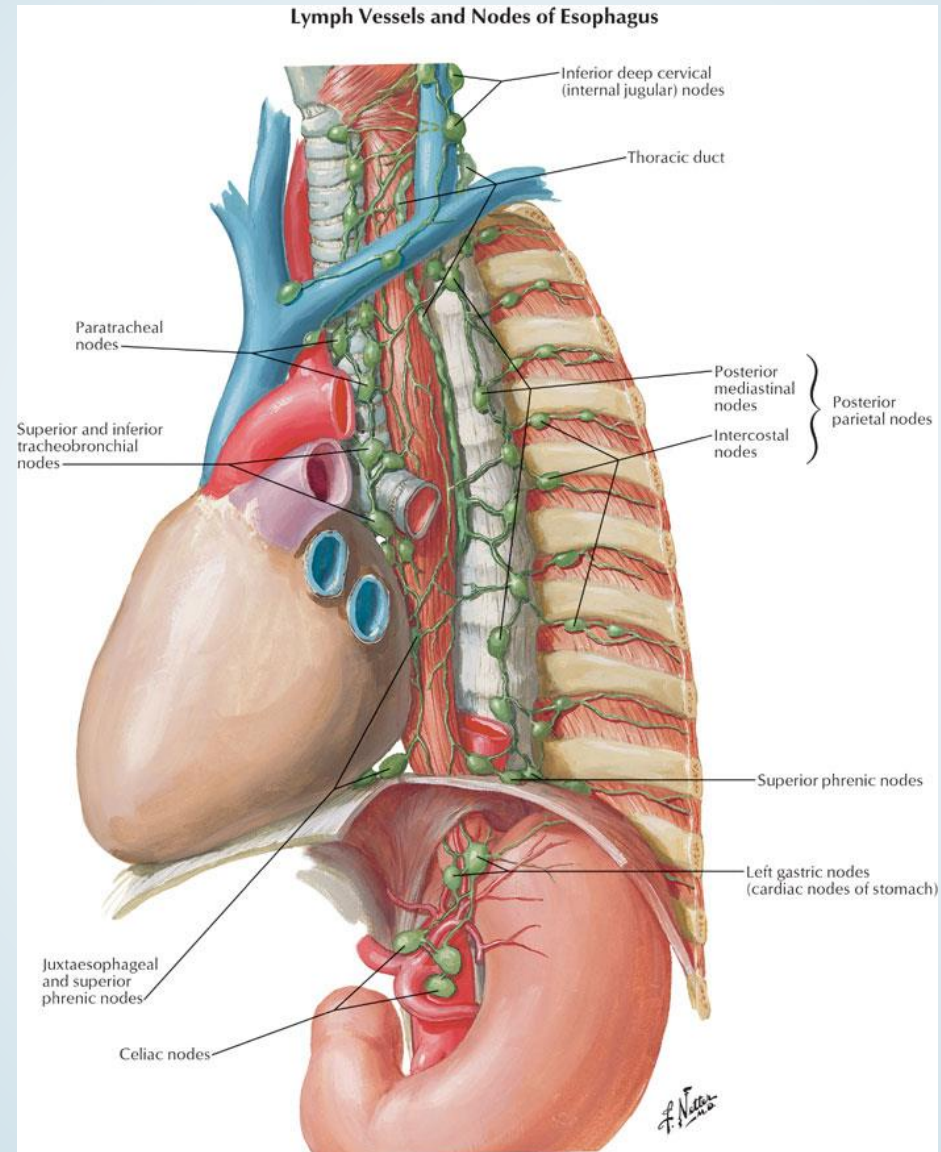
Esophagus innervation

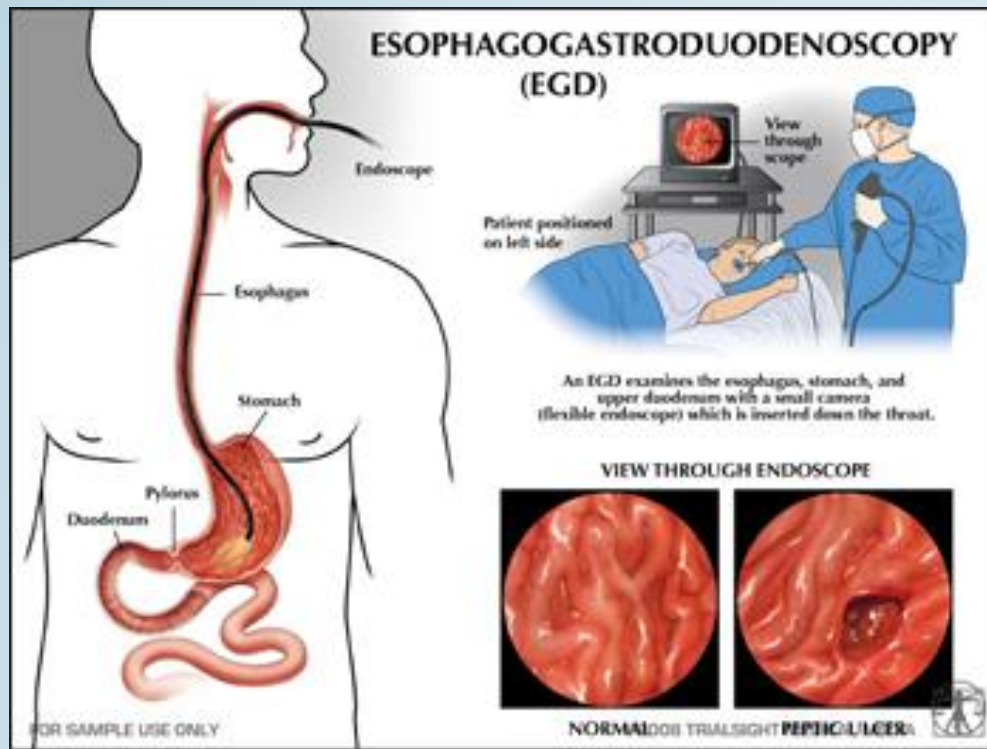
vagus n.
sympathetic trunc

plexus esophagei



Lymphatic drainage of esophagus





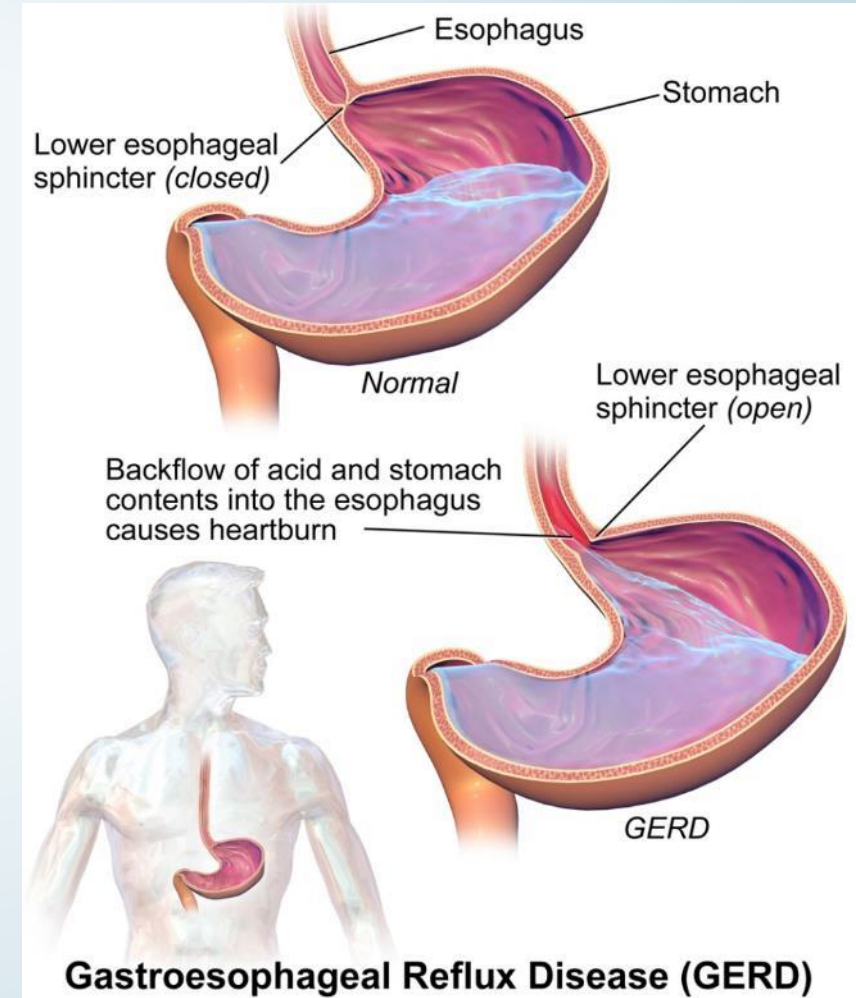
<http://www.summitgastro.com/Media/Default/endoscopic-procedures/egd.png>



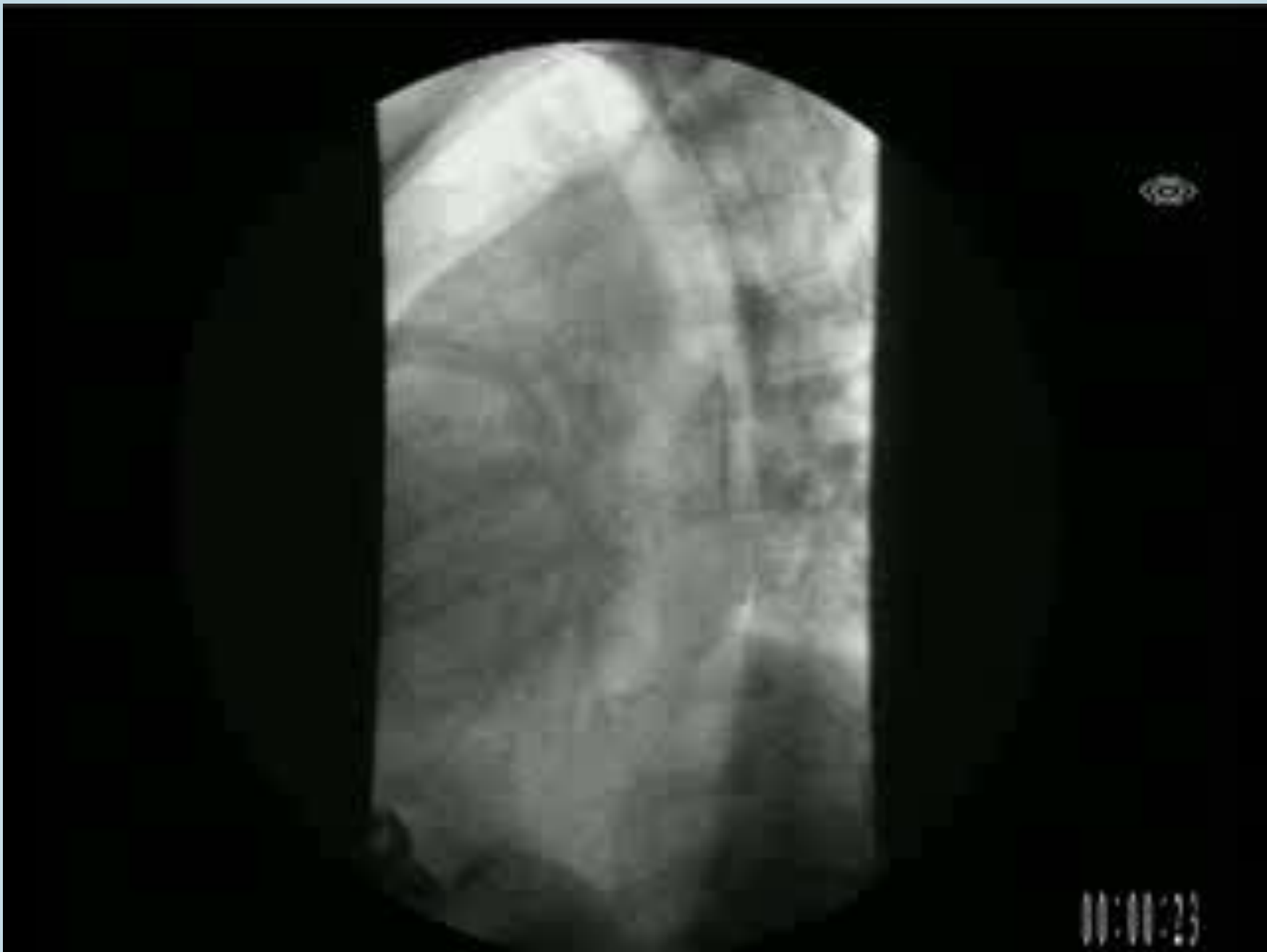
https://commons.wikimedia.org/wiki/File%3ABarretts_esophagus.jpg

Gastroscopy

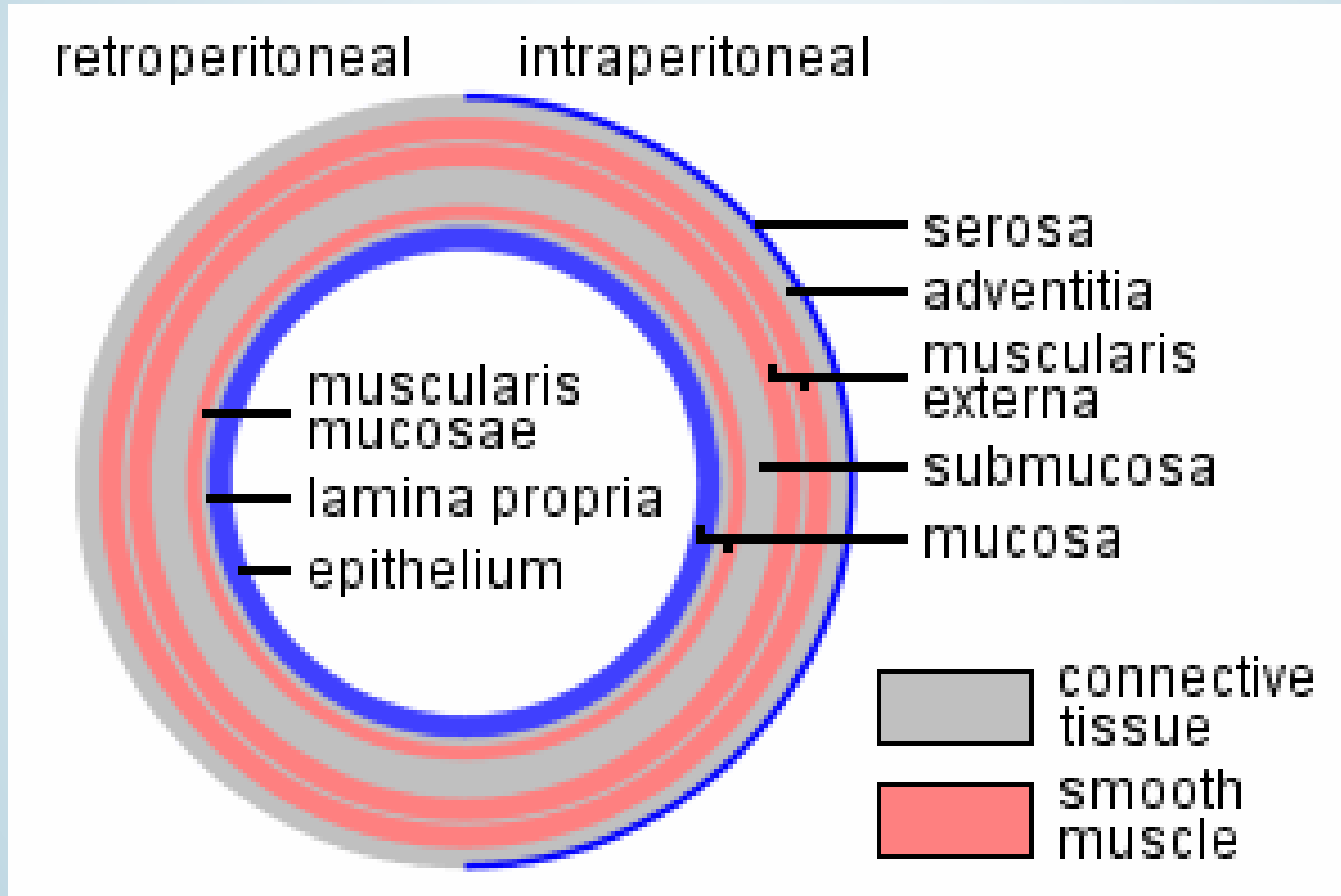
Gastro-esophageal reflux



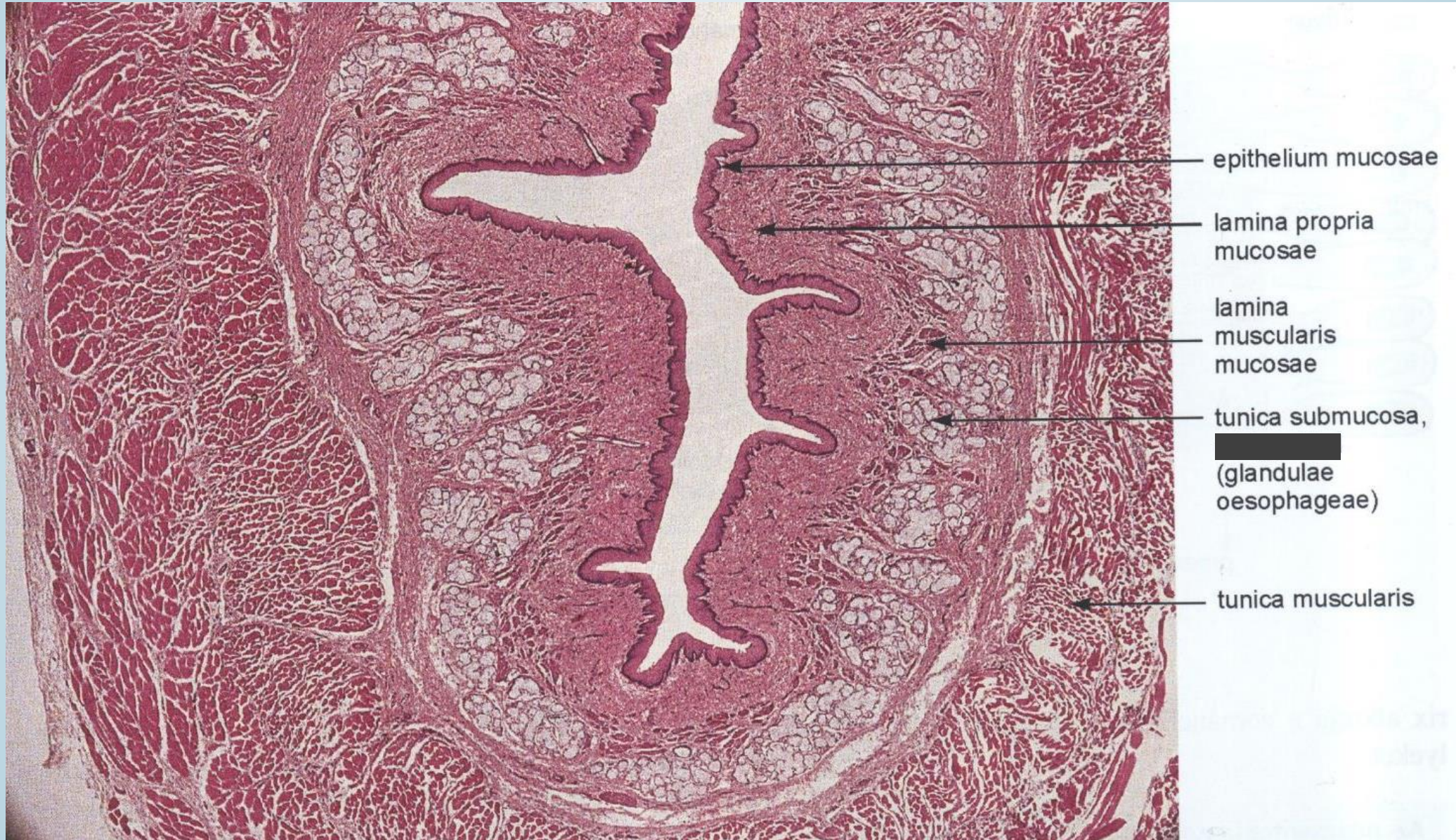
https://en.wikipedia.org/wiki/Gastroesophageal_reflux_disease#/media/File:GERD.png

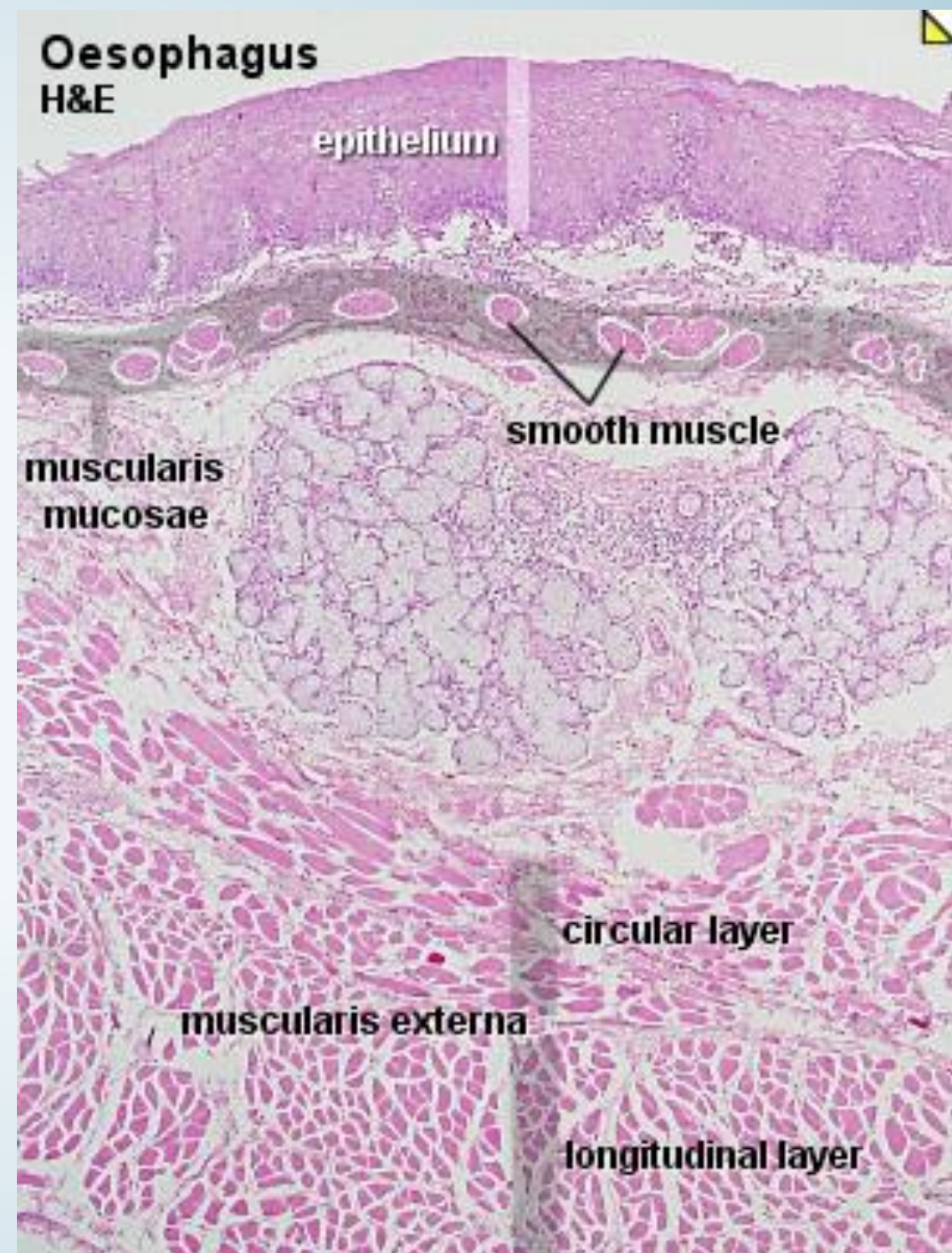
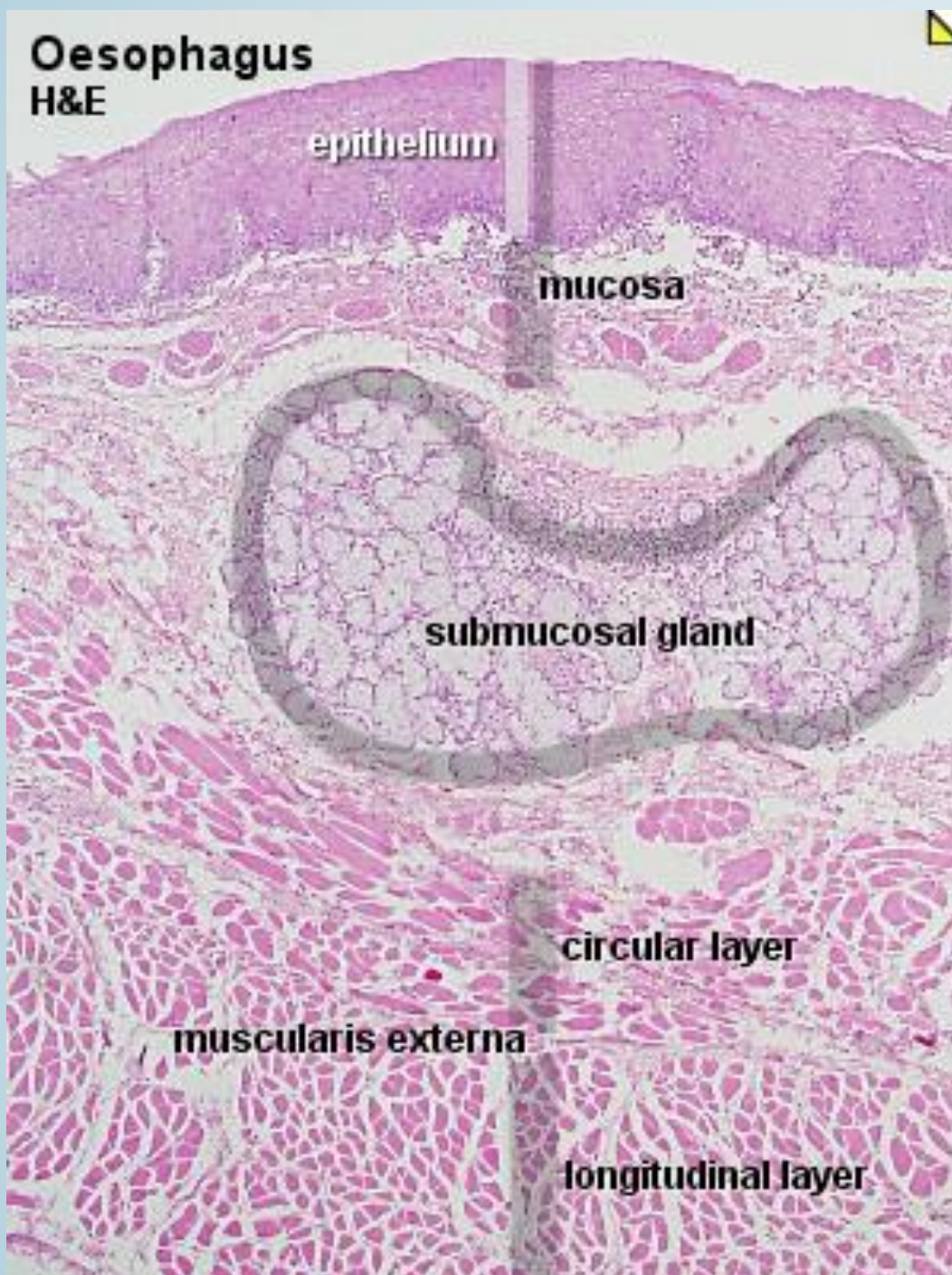


Throughout the remainder of the digestive system, the histological composition of the alimentary canal can be described by the following blue-print:

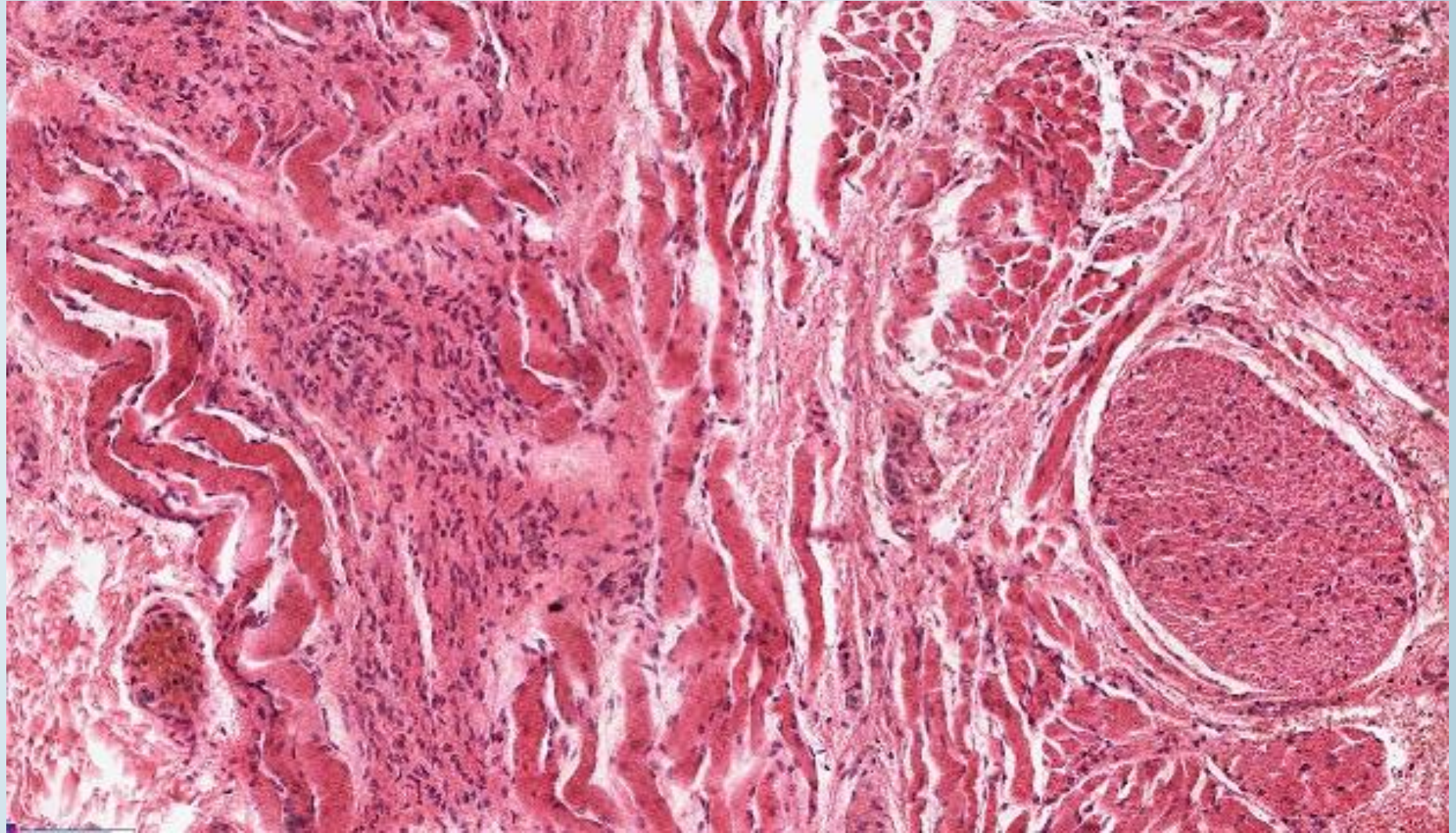


Histology of esophagus





Esophagus histology



ESOPHAGUS HISTOLOGY

*Tunica mucosa, epithelium:
stratified non-keratinized
squamous epithelium (1)*

*Longitudinal folds by mucosa and
submucosa*

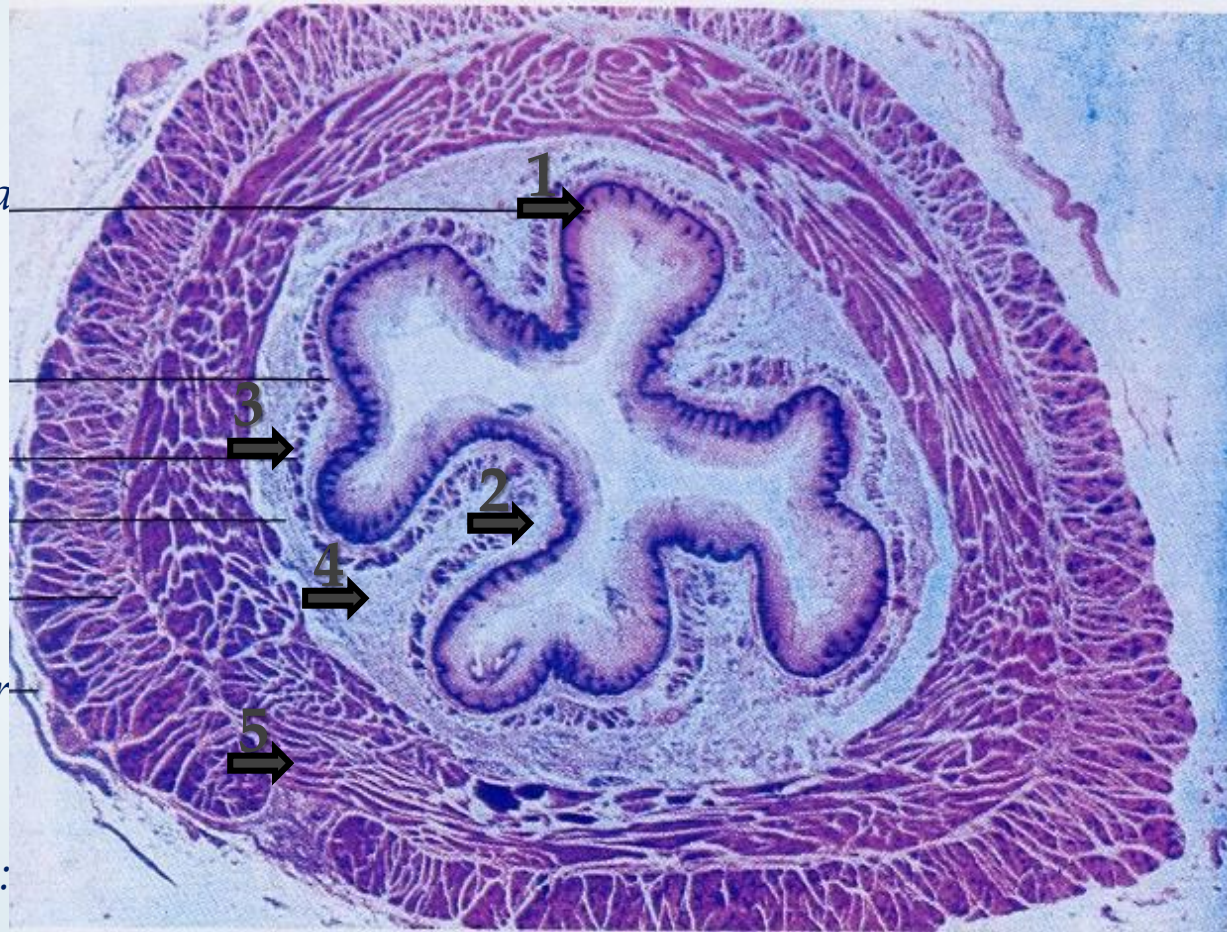
*Lamina propria mucosae (2) cardia
glands in the distal part of
esophagus.*

*Lamina muscularis mucosae (3)
longitudinal smooth muscle*

*Tunica submucosa (4): mixed or
mucous small salivary glands*

*Tunica muscularis (5): inner
circular, outer longitudinal. Upper
part: striated muscle, middle:
mixed, lower part: smooth muscle*

*Tunica adventitia (abdominal part:
tunica serosa)*



Stomach (ventriculus, gaster, stomachus)



www.chewitwell.hu



www.daganatok.hu



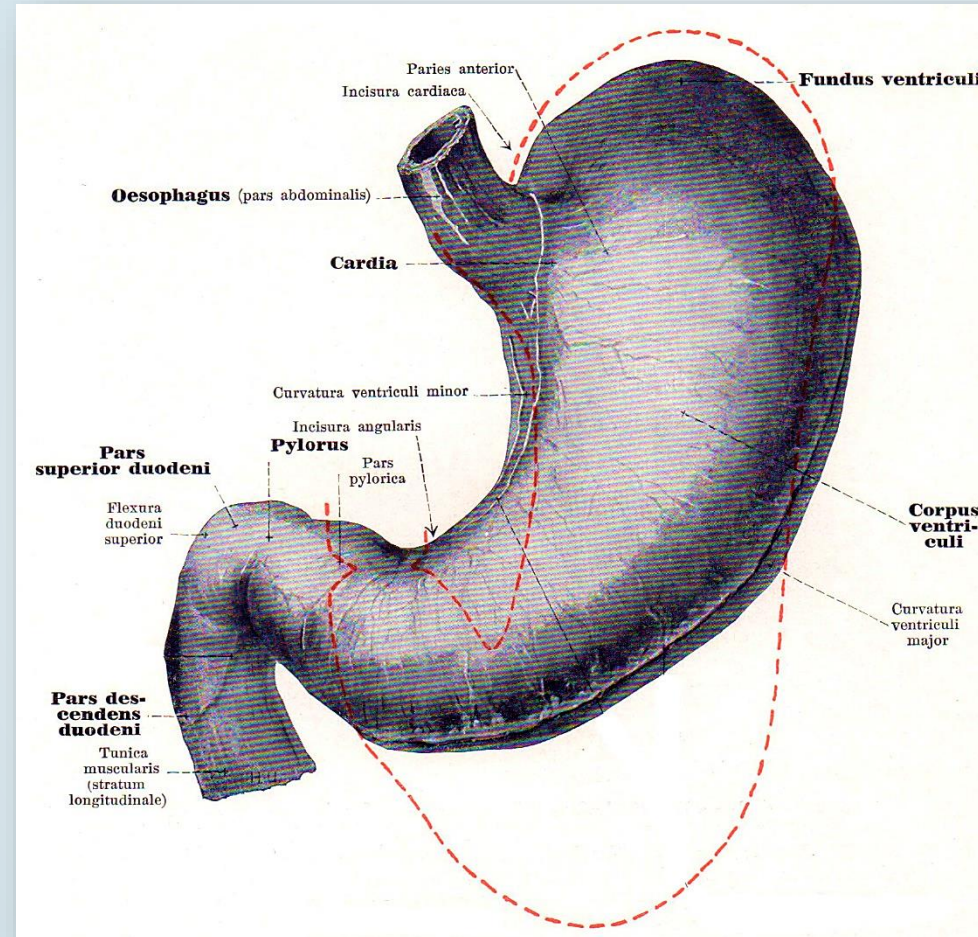
www.szimpatika.hu

Parts

Cardiac notch of stomach
(incisure, Angle of His)

Angular incisure

Angulus gastricus



Surfaces (walls):

paries anterior

paries posterior

Margins:

curvatura minor (minor curvature)

curvatura major (major curvature)

Parts

Cardia (3):

transition into the esophagus (2)

Fundus (I): contains air

(visible only in standing position on X-rays)

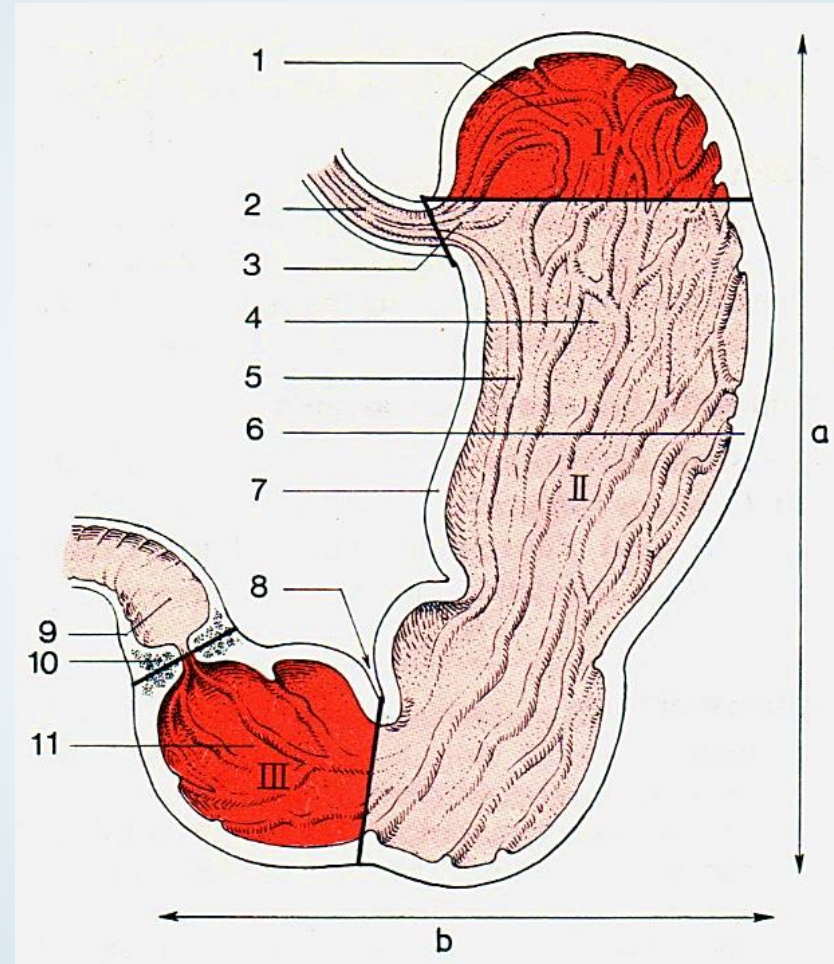
Corpus (Body) (II)

Antrum pyloricum (III):

Transition into the duodenum

Pyloric canal

(bulb of the duodenum) (9)



Faller

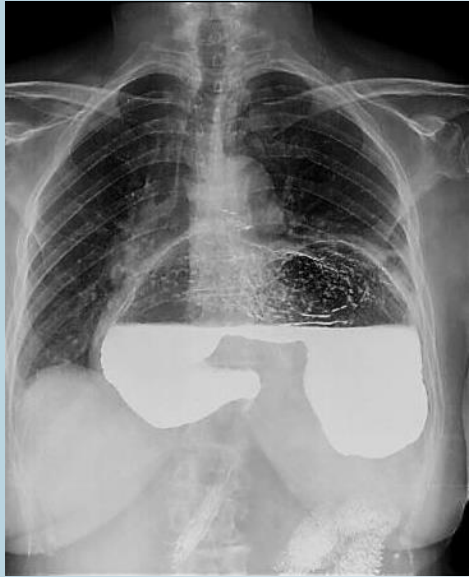
*a) digestoric part
(Xray: vertical part)
digestoric part*

*b) egestoric part
(Xray: horizontal part)
transmitting part*

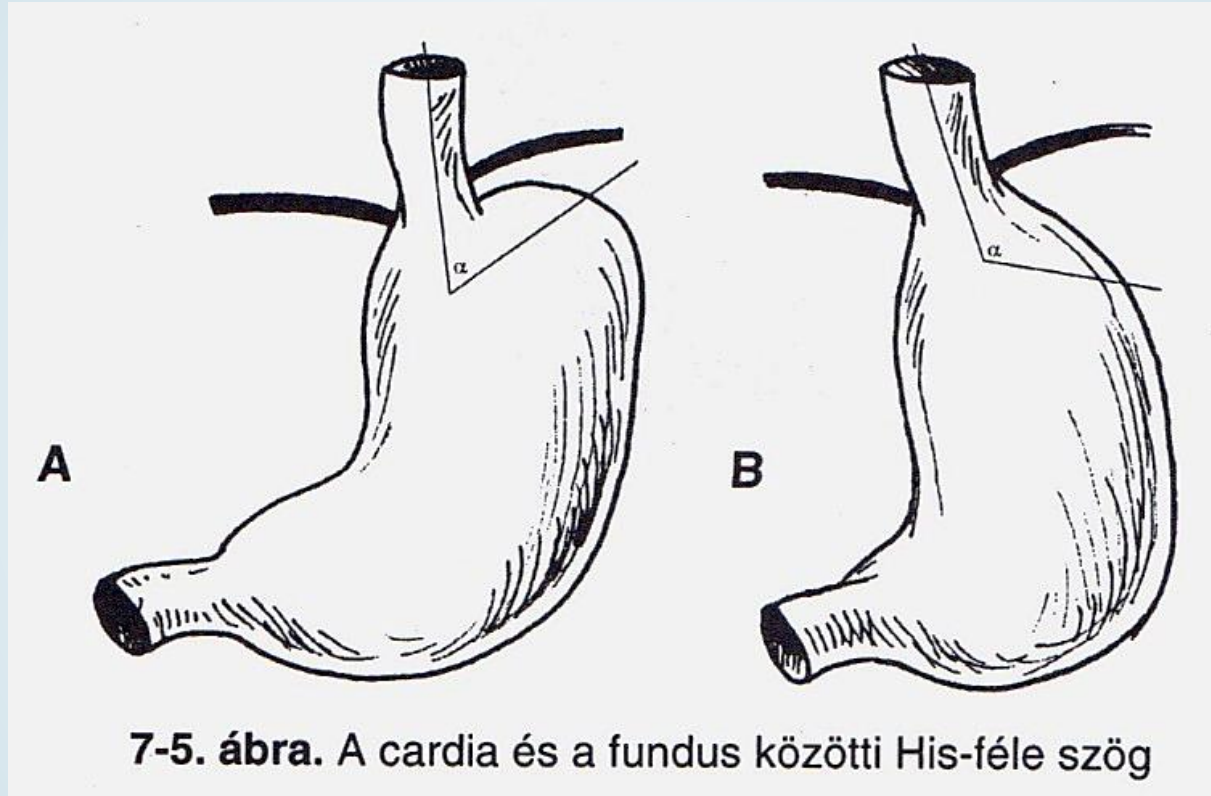
there is an overlap between the two

the approximate limit is on the lesser curvature, called:
Angularis incisura (8)

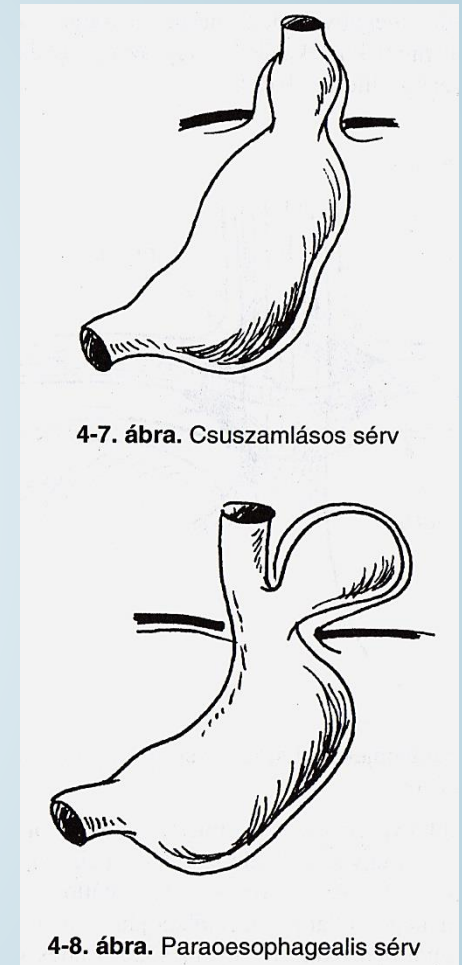
Cardiac notch of stomach or the angle of His



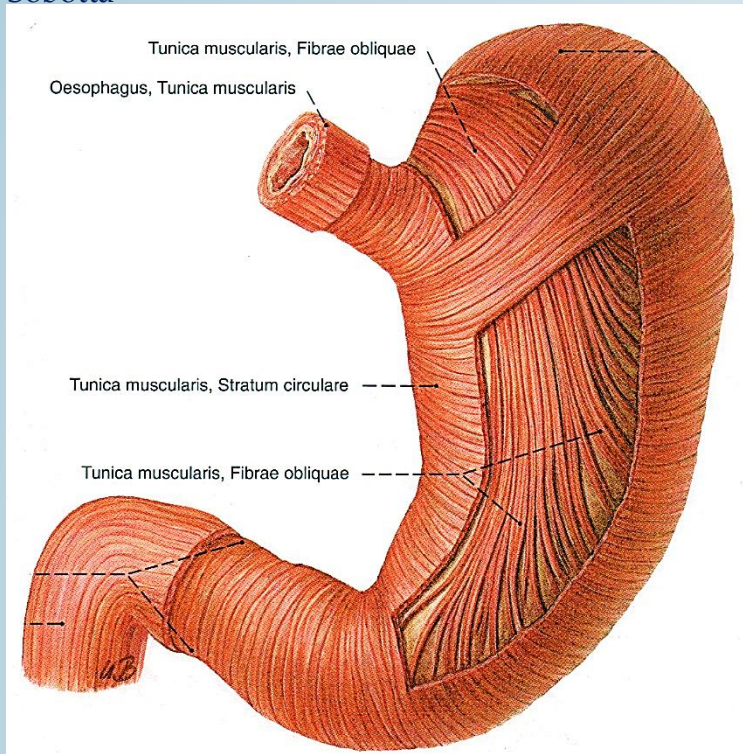
www.scielo.isciii.es



Szél



Szél



Stomach - musculature

Typically to hollow organs into *muscular tunica organised* histology: from smooth muscle – autonomous innervation

3 layers:

(a) Longitudinal stratum – outer, longitudinal

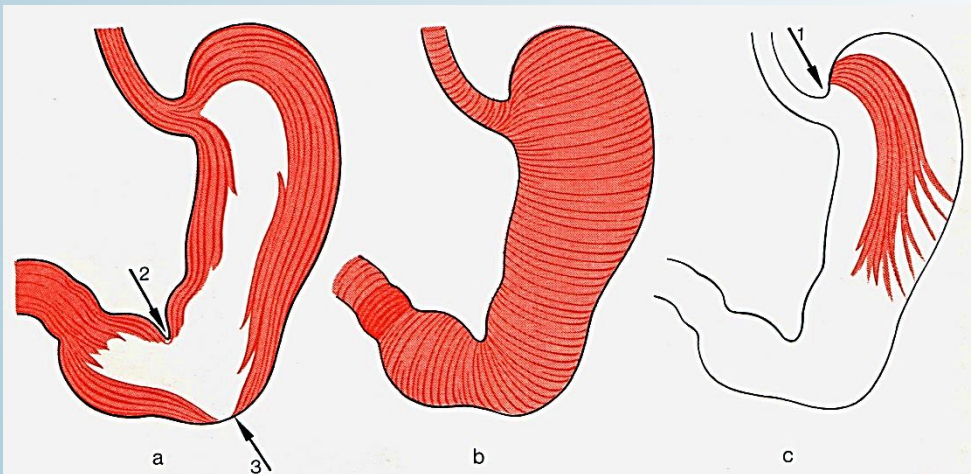
Strongest at the *lesser curvature*, missing at the *cardiac notch* (3)

(b) Circular stratum – middle, circular continuous, closed layer

Strengthening: *sphincter pyloric muscle*

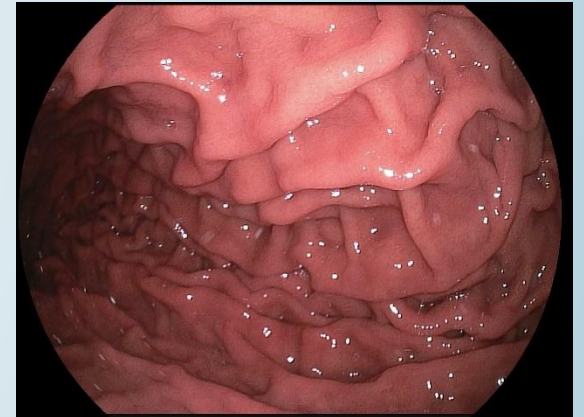
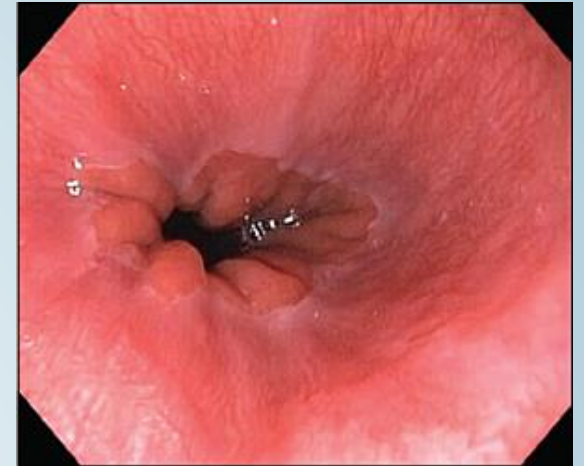
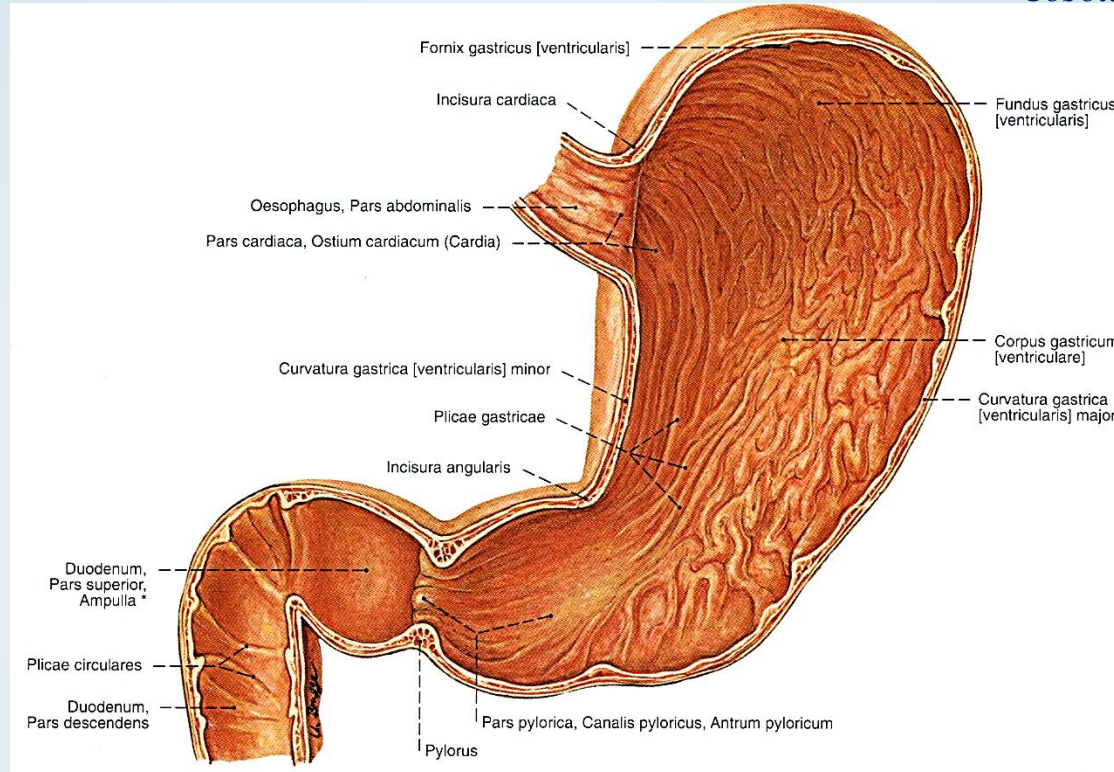
(c) Oblique fibres – innermost „layer”

Typically from the the *cardiac notch* (His) to the *greater curvature*



Stomach – inner surface

Sobotta



At the cardia

Sharp esophageal-stomach transition

(endoscopy called „Z-line“)

Epithelium exchange zone!

(tumors)

By the lesser curvature longitudinal corrugations

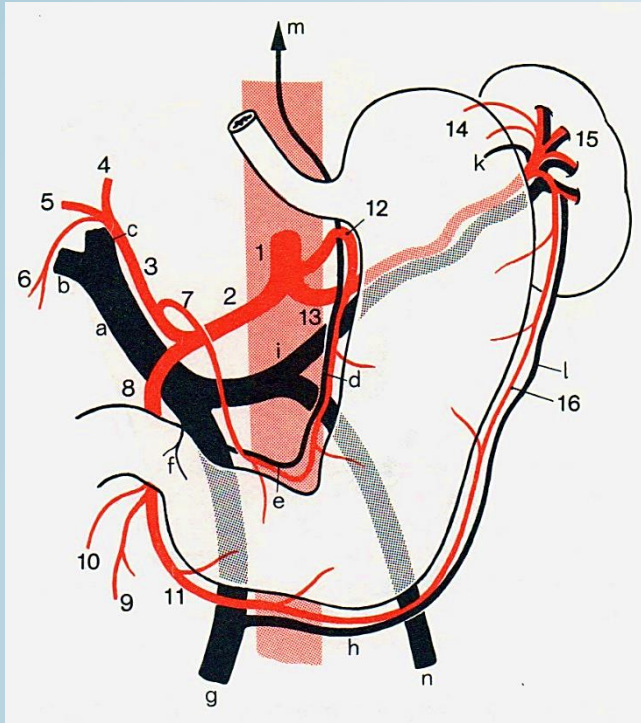
(longitudinal folds)

To help the fast transition of liquids into the duodenum

Between folds:

areae gastricae

Stomach – blood supply



The stomach develops from the foregut

blood supply: from the abdominal arteries of the foregut, called celiac trunk (or *Haller's tripod*)

Anastomosing branches from left and right along the lesser and greater curvature, or to the fundus; direct or indirect supply from the celiac trunk

(12) **left gastric a.:** directly from the celiac trunk, „left up”

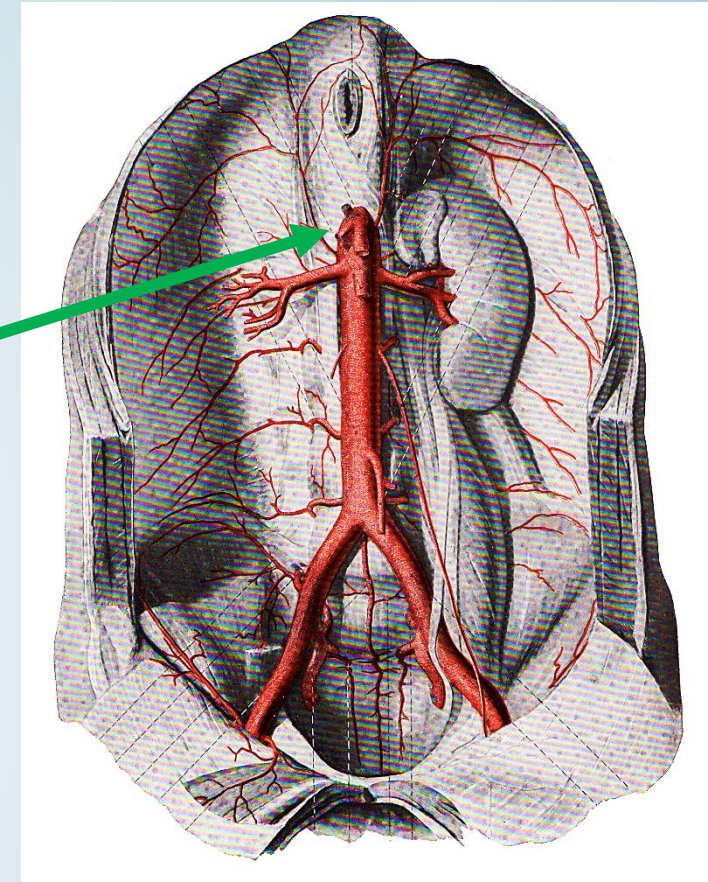
(7) **right gastric a.:** from the proper hepatic a.

(11) **Right gastroepiploic a.** (seu gastrointestinal) from the gastroduodenalis a.

(16) **Left gastroepiploic a.** (seu gastrointestinal) from the splenic a.

(14) **Short gastric aa.** from the splenic a., to the fundus

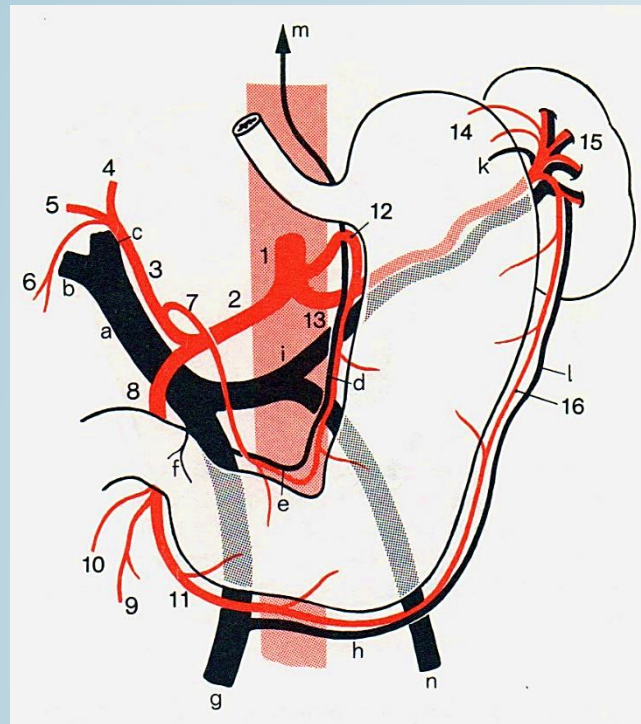
12 and 7 along the lesser curvature, 11 and 16 along the greater curvature forms an arched anastomosis



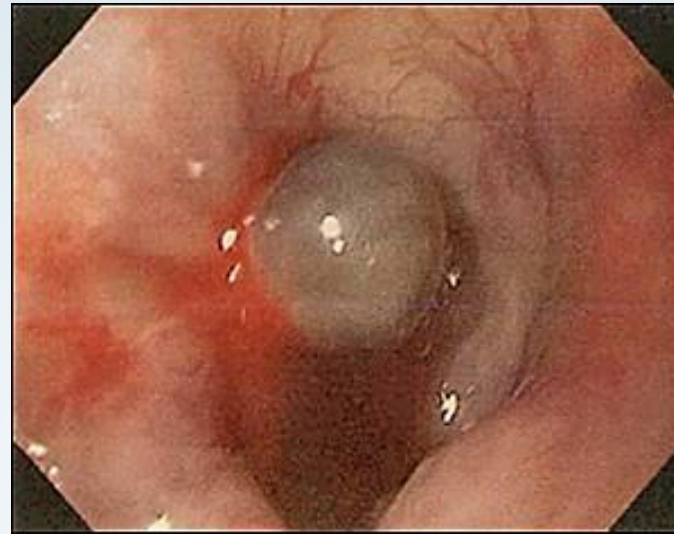
Spalteholz

A rich blood supply for reserve in shape and size changes of the stomach, or isolated surgery

Faller



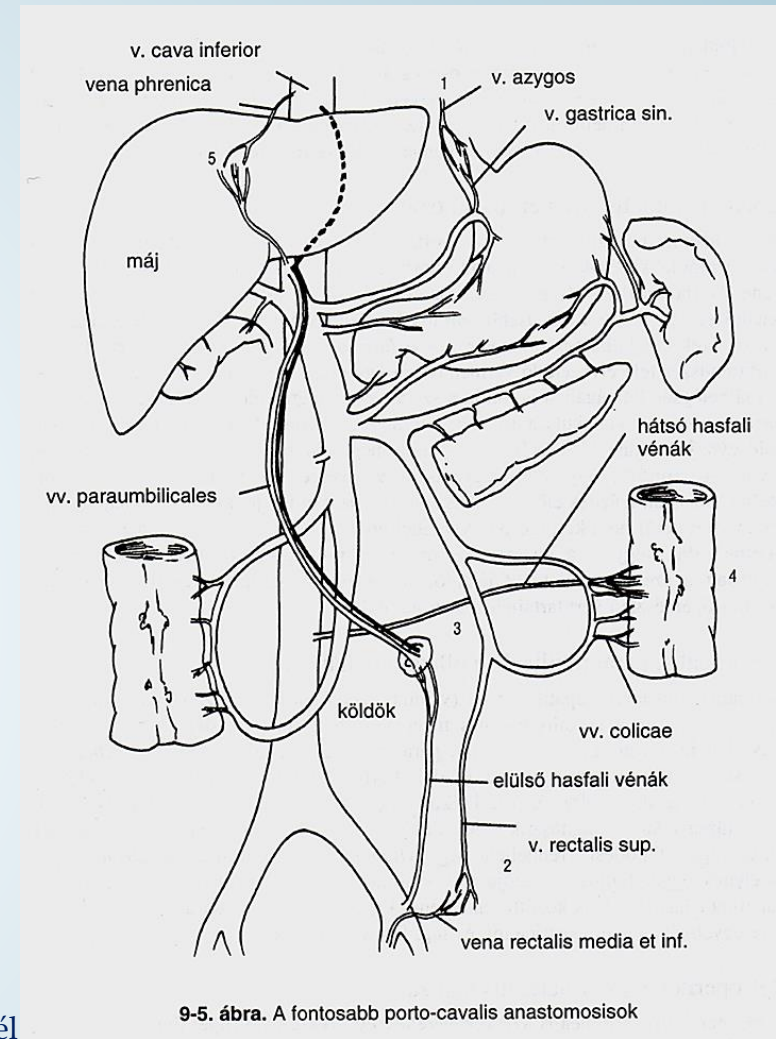
Stomach – venous drainage



www.aafp.org

As from all the unpaired abdominal organs, the blood flows into the liver via the portal vein

Fundus veins are also called coronal vv.



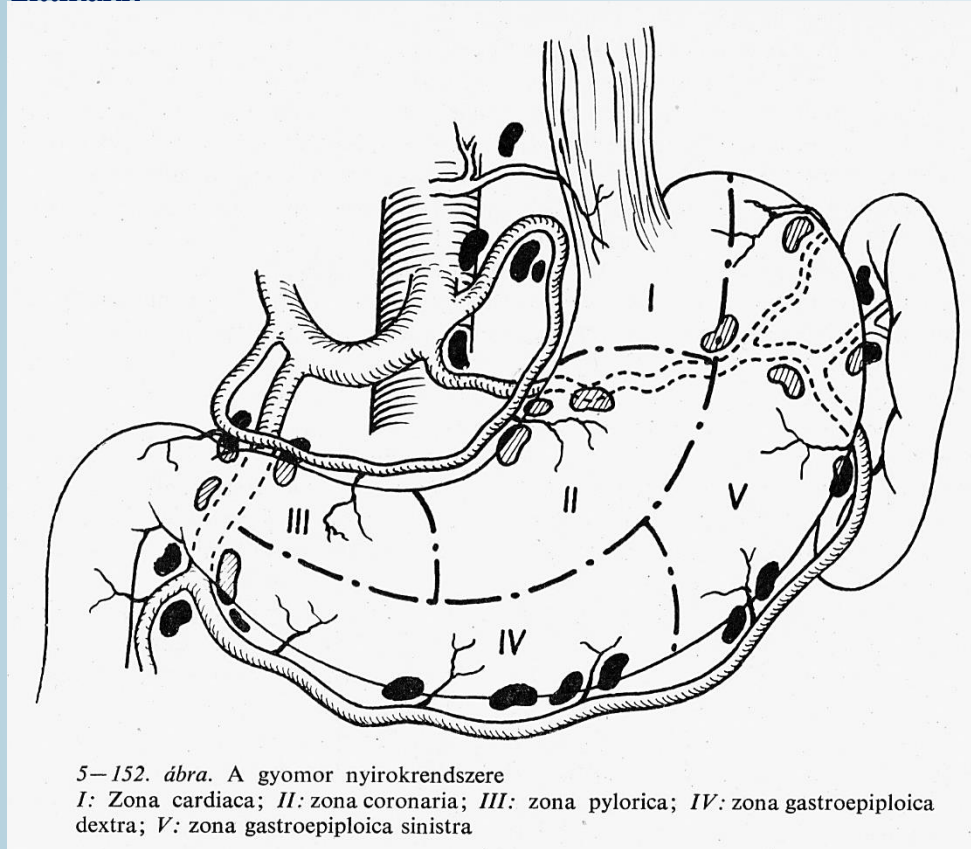
Szél

9-5. ábra. A fontosabb porto-cavalis anastomosisok

Porto-caval anastomosis between the portal v. and the superior v. cava is the left gastric v., by the abdominal oesophageal and the azygos/hemiazygos vv.: stagnancy of the blood in these submucosal veins, can cause dilations (varicosis). It can lead to dangerous bleedings (rupture)!!!

Stomach – lymphatic drainage

Littmann



Other lymphatic drainage:

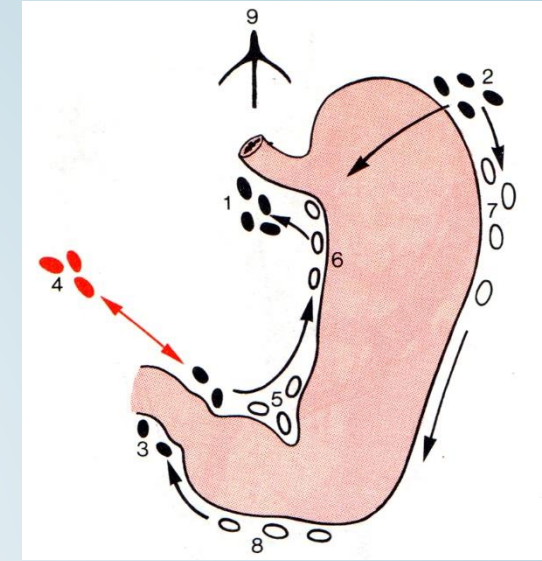
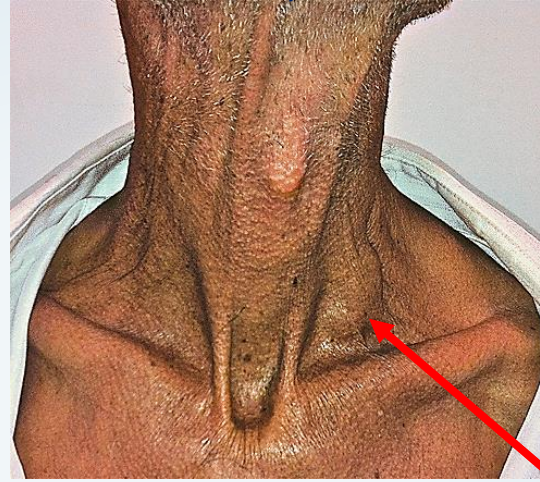
nodi lymph. pancreaticolienales

nodi lymph. lienales

nodi lymph. hepatici

nodi lymph. coeliaci

DOI: 10.1056/NEJMicm1204740



Lymphatic drainage sectors, characteristic lymphatic flow:

(6) nodi lymph. gastrici sinistri (two-way lymphatic flow!!!):
 chisterna chyli or left supraclavium (Virchow-lymph node)

(5) nodi lymph. gastrici dextri (it can flow in the opposite:
 gastric cancer -> liver metastasis)

(7) nodi lymph. gastroepiploici sinistri

(8) nodi lymph. gastroepiploici dextri

(3) nodi lymph. pylorici

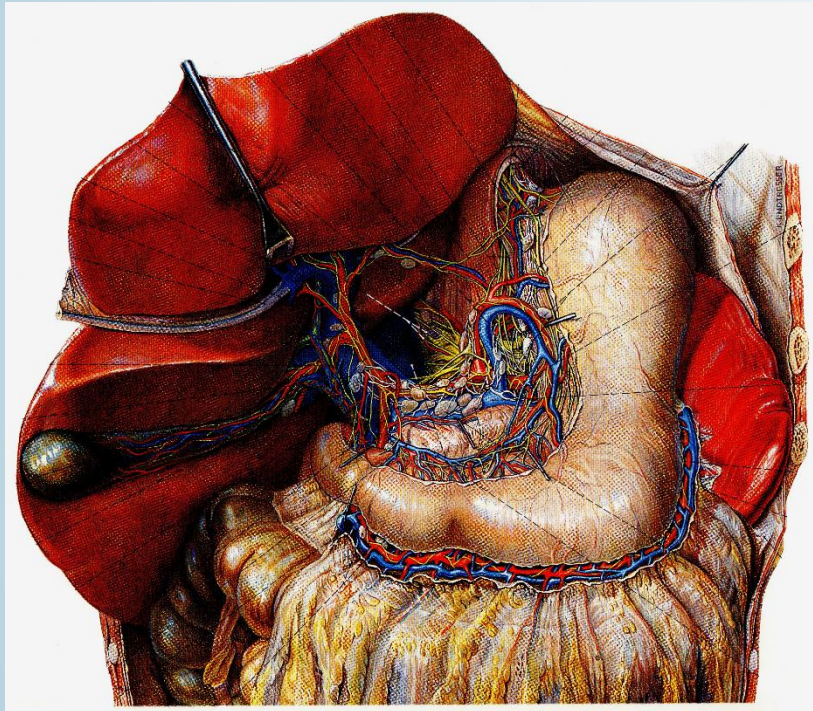
Earlier ulcers were cured by different vagotomy

Stomach - innervation

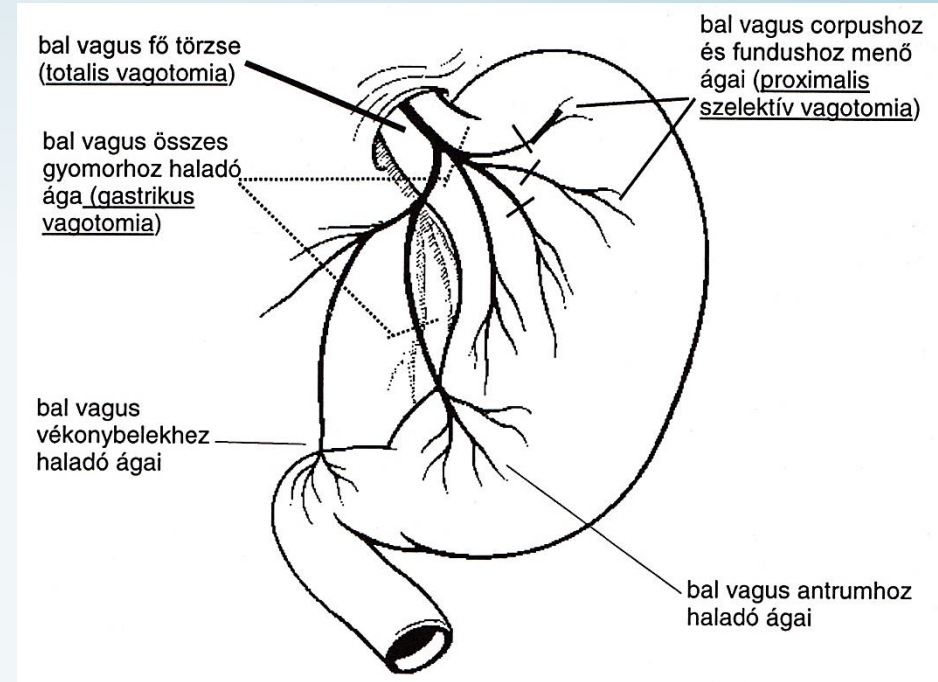
Autonomic innervation

SY: *celiac ggl.*

Decrease the acid secretion and the peristaltik motility



Pernkopf



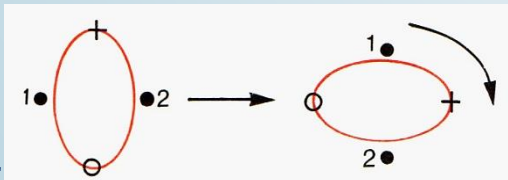
PSY: *vagus n. dexter et sinister*

(Abdo part of X. cranial nerve)

Increase the acid secretion and the peristaltik motility

The most important coordinator of the gastric movements (motility) but *myenteric plexus of Auerbach* is the autonomic rhythm-generator

The final positions of the two vagus nn., can be explained by the development of the stomach gyomor (rotation to the right)



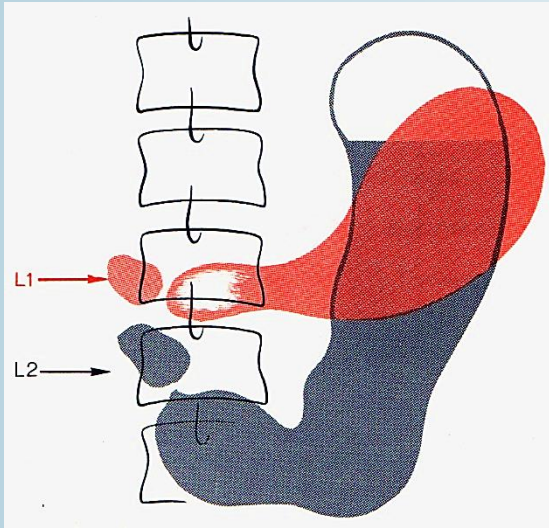
Faller

Szél

stomach – shape, position

Depending on: load, position, muscle tone, temper, ageing

Faller



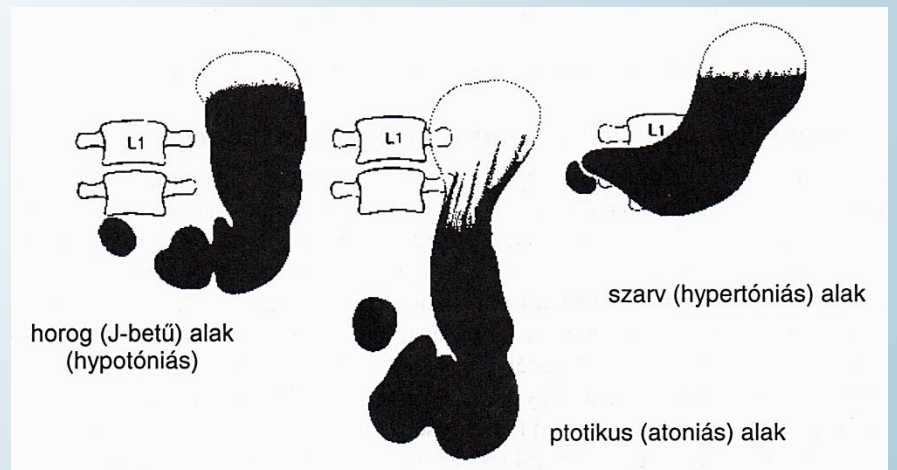
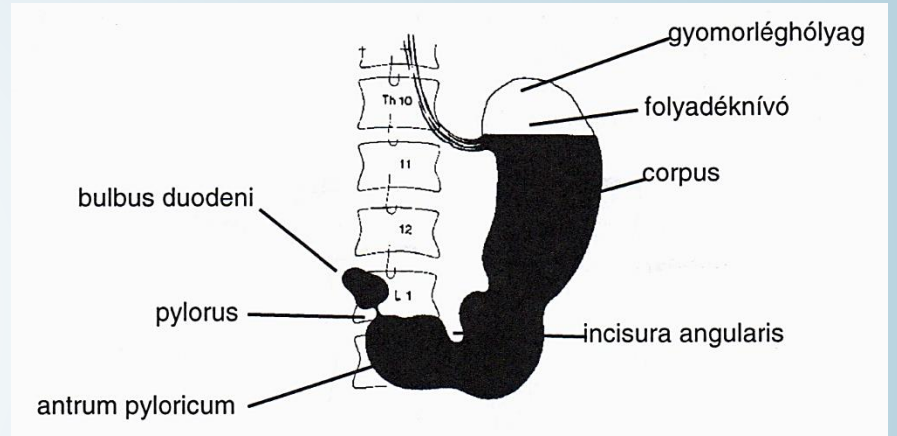
lying

standing

- The situation of the fundus is Relatively fixed below the left dome of the diaphragm
- The cardia is fixed at level Th11/12 or Th10/11 on the left side of the vertebral column

- The situation of the pylorus is: lying position at L1, standing position at L2 on the right side of the vertebral column (transpyloric plain)

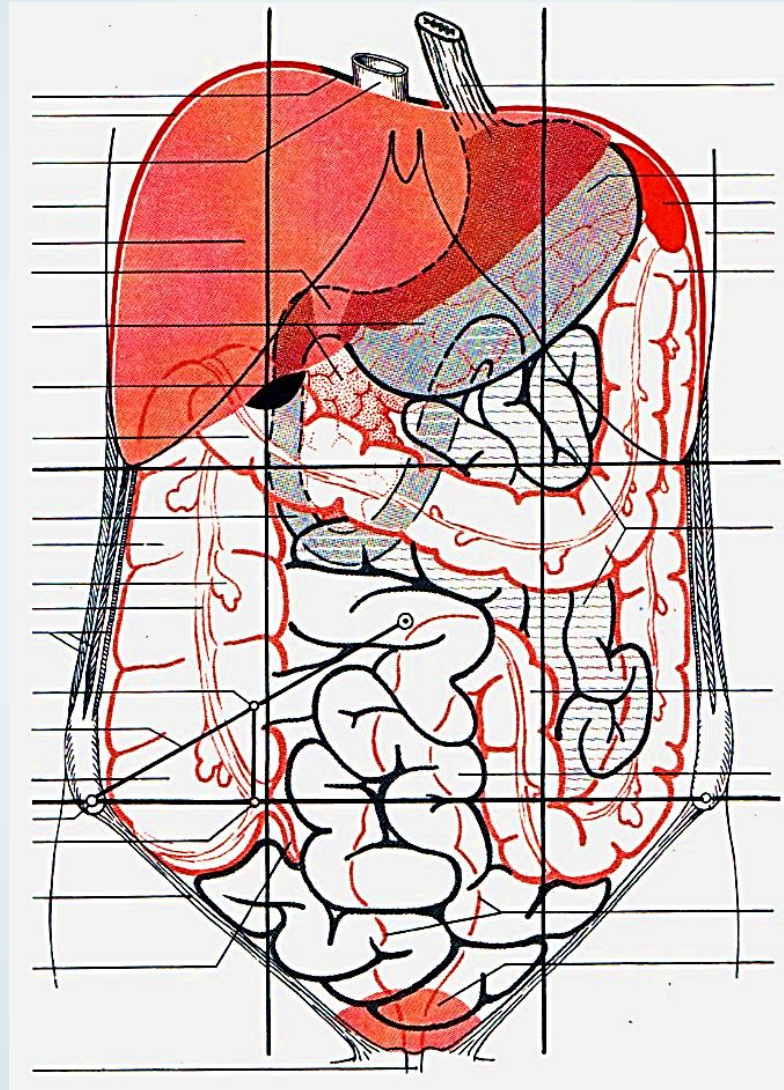
Radiological changes of the stomach
(In a standing position, there is air in the fundus)



Stomach - topography

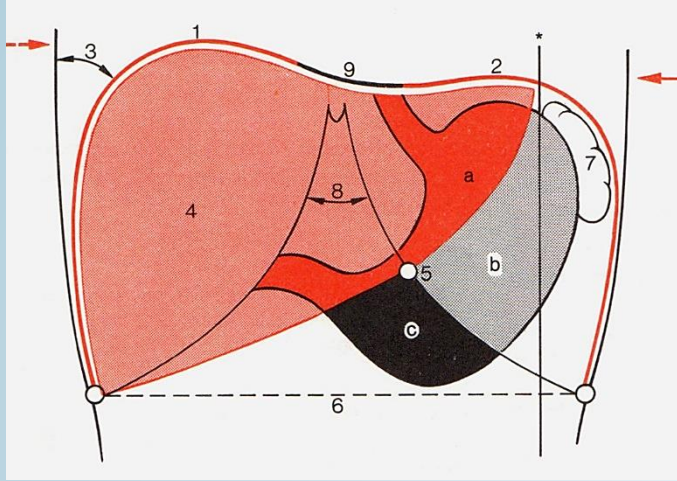
left hypochondrium
epigastrium

Loaded condition or in ptosis:
In the umbilical region



Stomach - topography

Faller



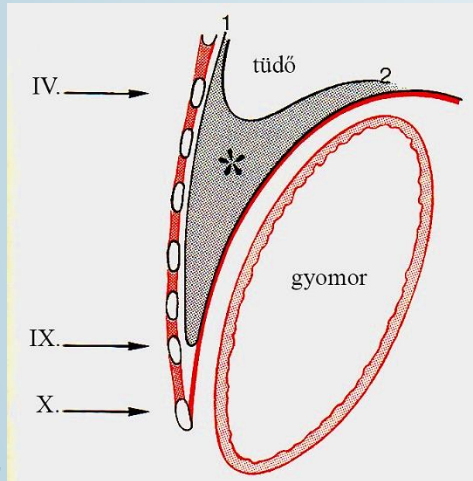
Partially covered, limited physical examination:

a) hepatic surface (totally covered by the liver)

b) diaphragmatic surface (Traube-space)

c) free surface or triangle of Labbe (here can be touched via the abdominal wall)

Borders: left lobe of the liver, greater curvature, left arch of the rib cage

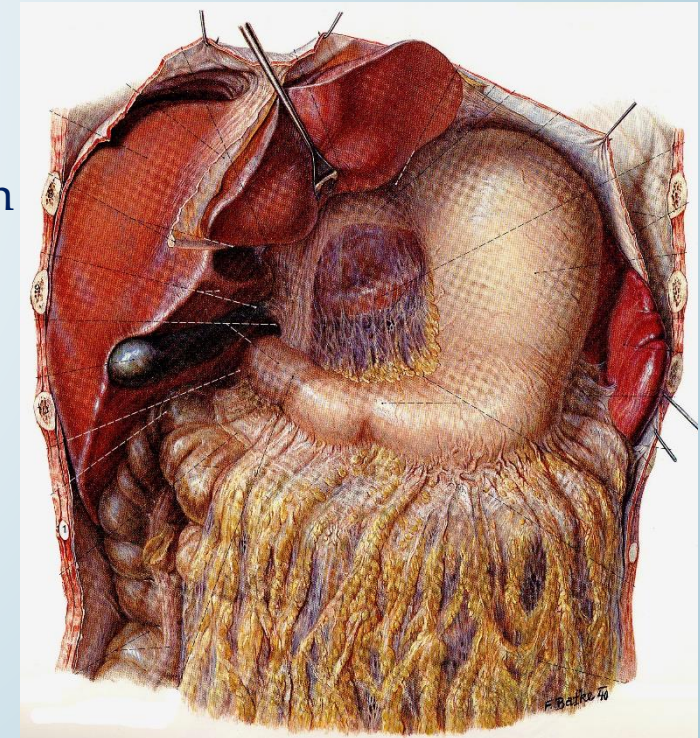


Faller

Traube-space: physical examination of the thorax

Diagnostic importance percussion of pleural effusion
(percussion sound dims in the presence of liquid)

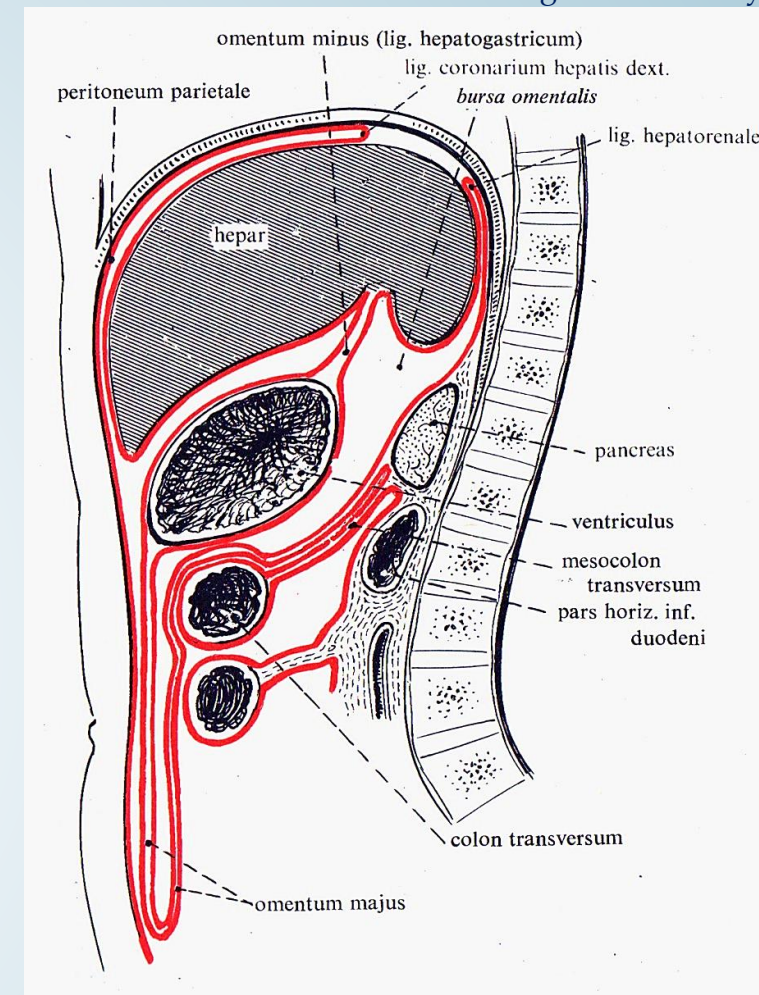
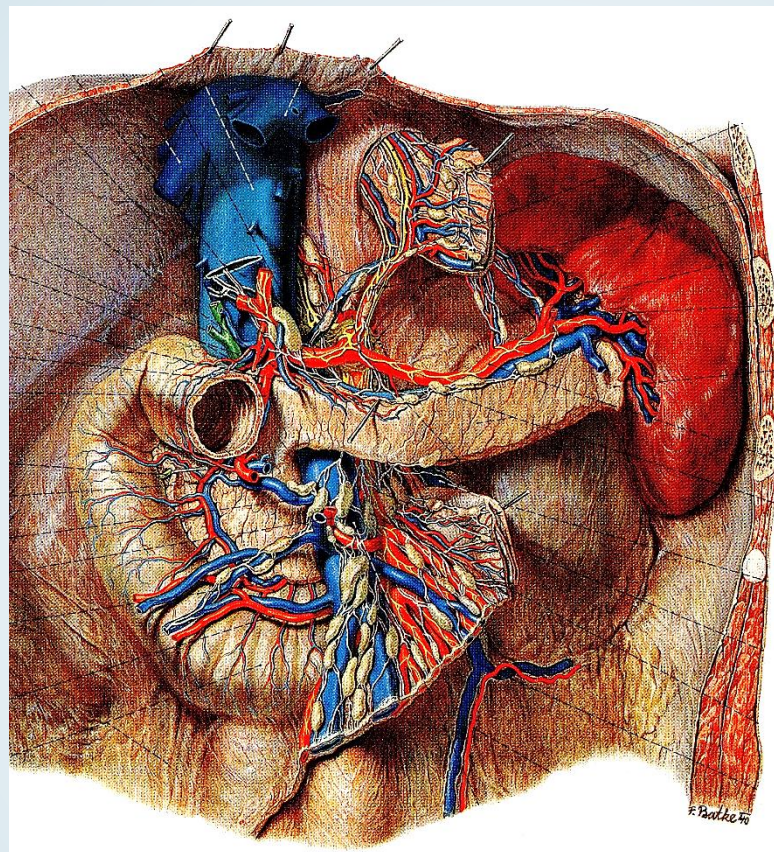
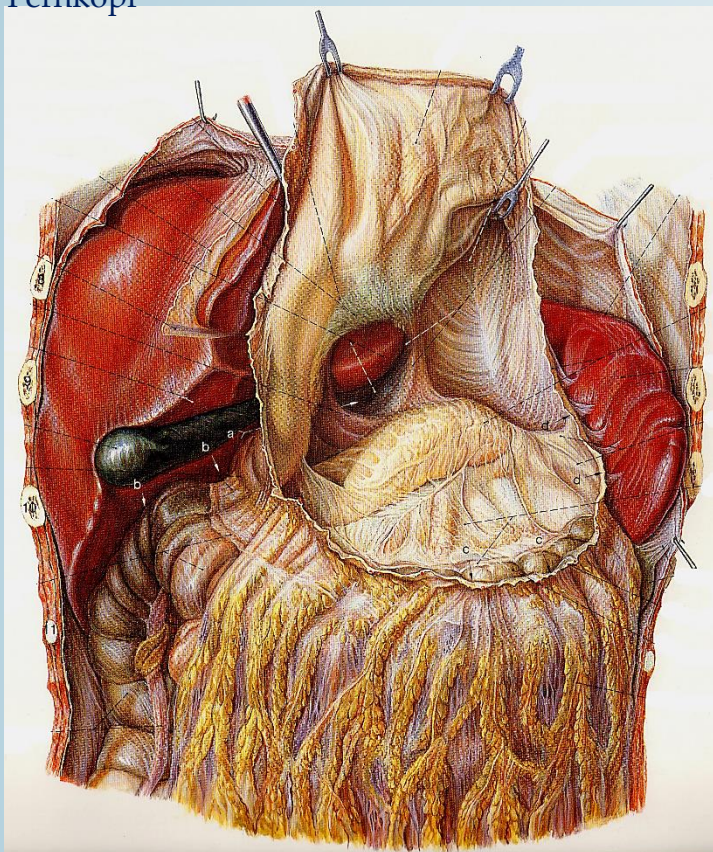
Downwards facing the transversal colon, to the left
spleen and diaphragm



Pernkopf

Stomach - topography

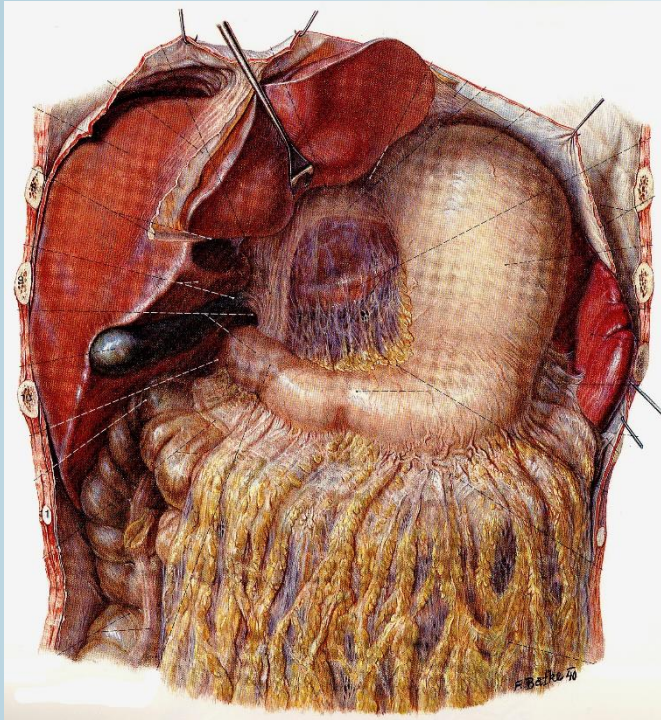
Pernkopf



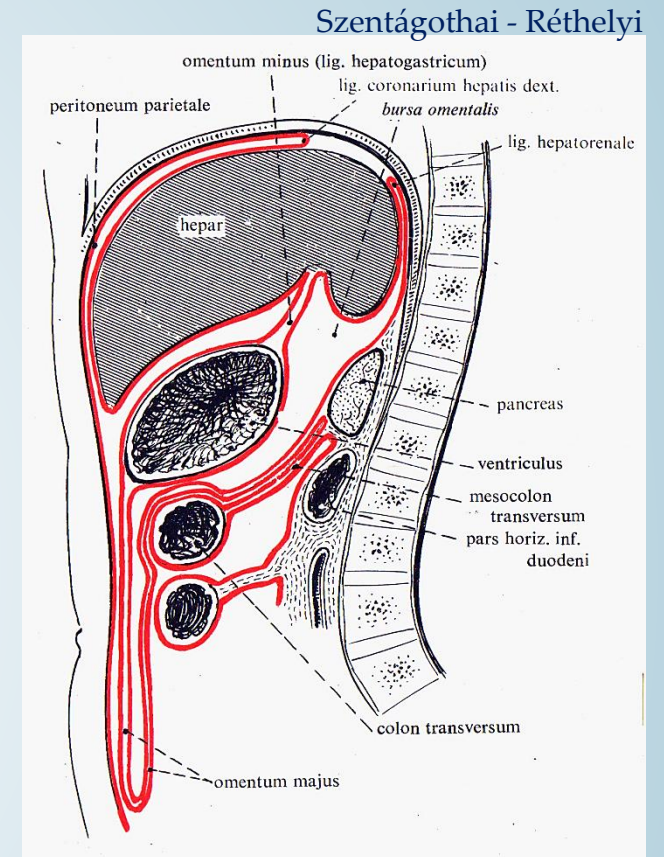
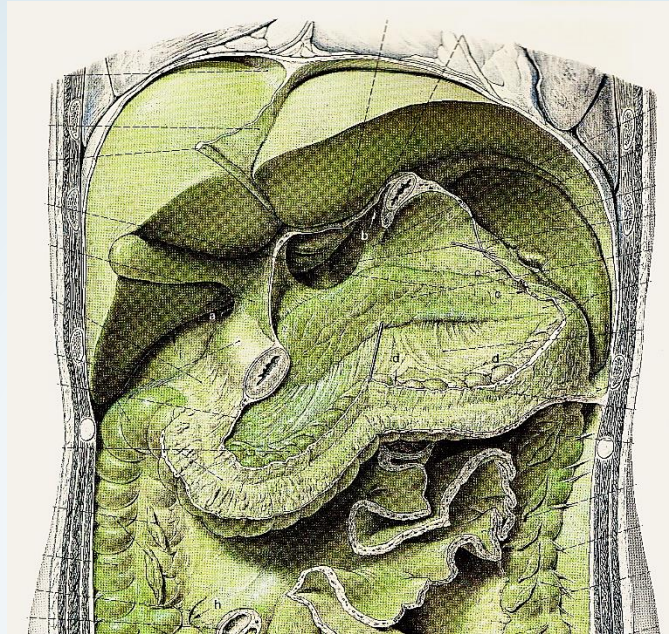
Behind the stomach pancreas can be found, separated by the peritoneum (abdominal surgery!)

The space between the stomach and the pancreas: bursa omentalis

Stomach – „fastening”, bands



Pernkopf

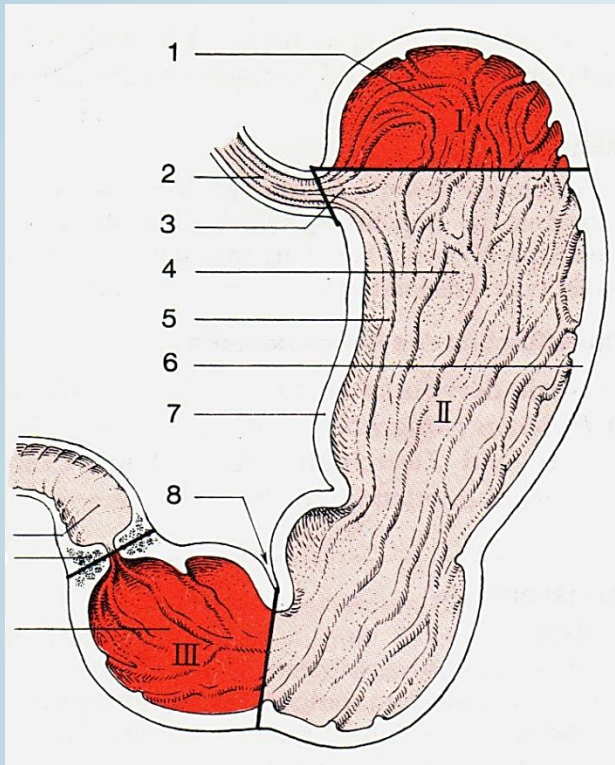


greater omentum by the greater curvature
lesser omentum by the lesser curvature: hepatogastric lig. (et hepatoduodenale)
towards to the visceral surfac of the liver
omentum Greek : epiploon (innen az erek, nyirokcsomók „-epiploica” elnevezése)
gastrolial lig.
gastrophrenic lig.

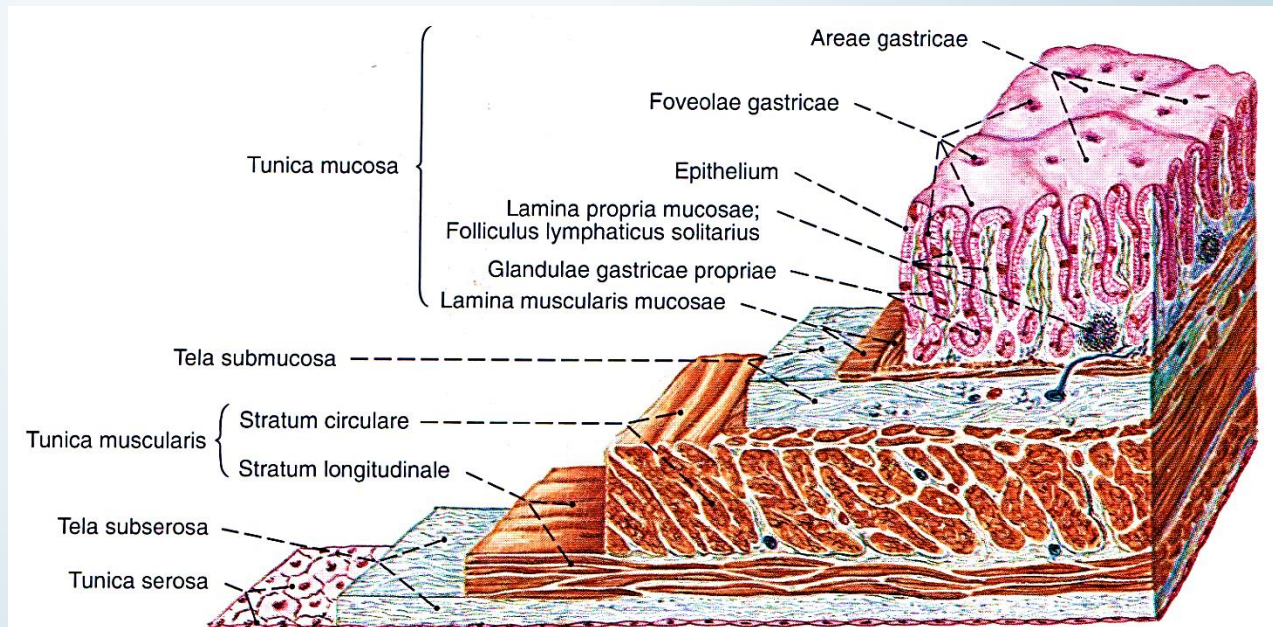
totally intraperitoneal organ

Histology of the stomach

- typically to hollow organs: stratified wall
- certain areas of the stomach are different, especially the mucosa, mainly in the shape of the glands and the cell components

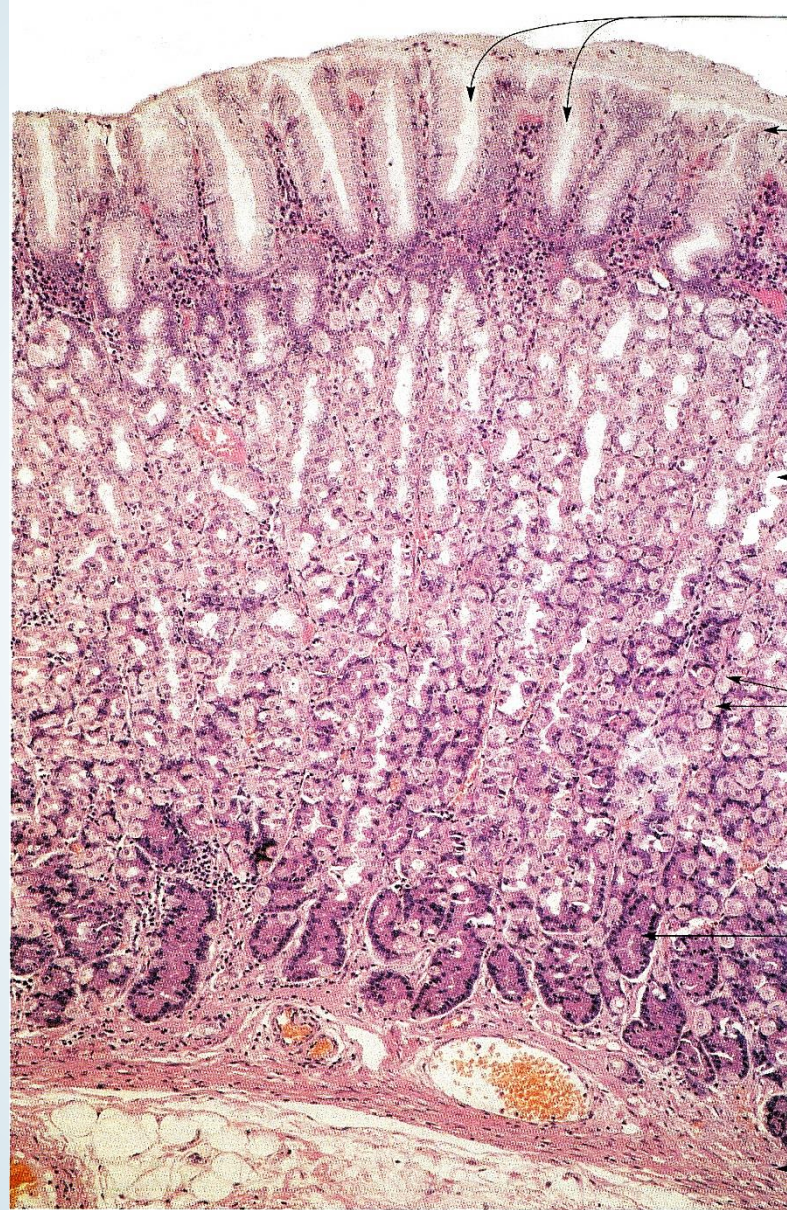
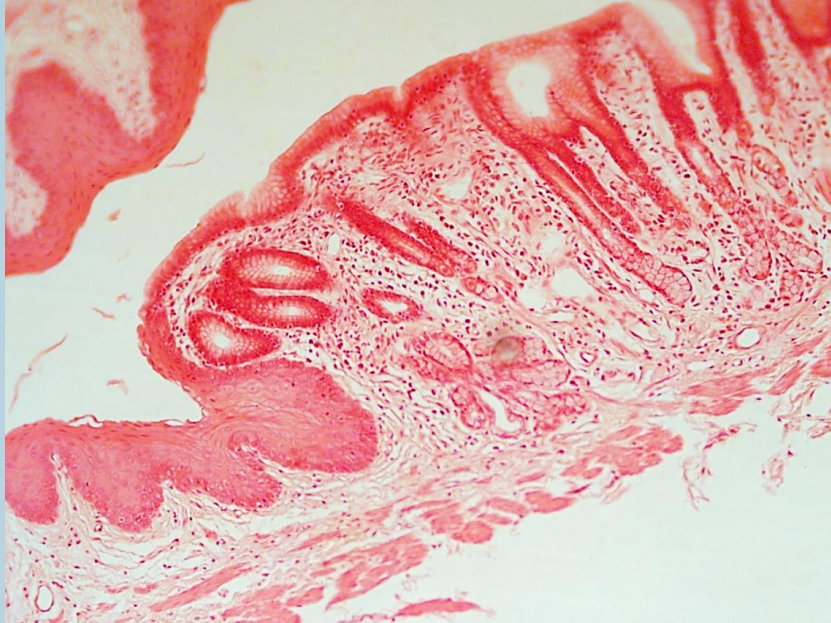


Faller



Later will be important in oncological
Grading and staging

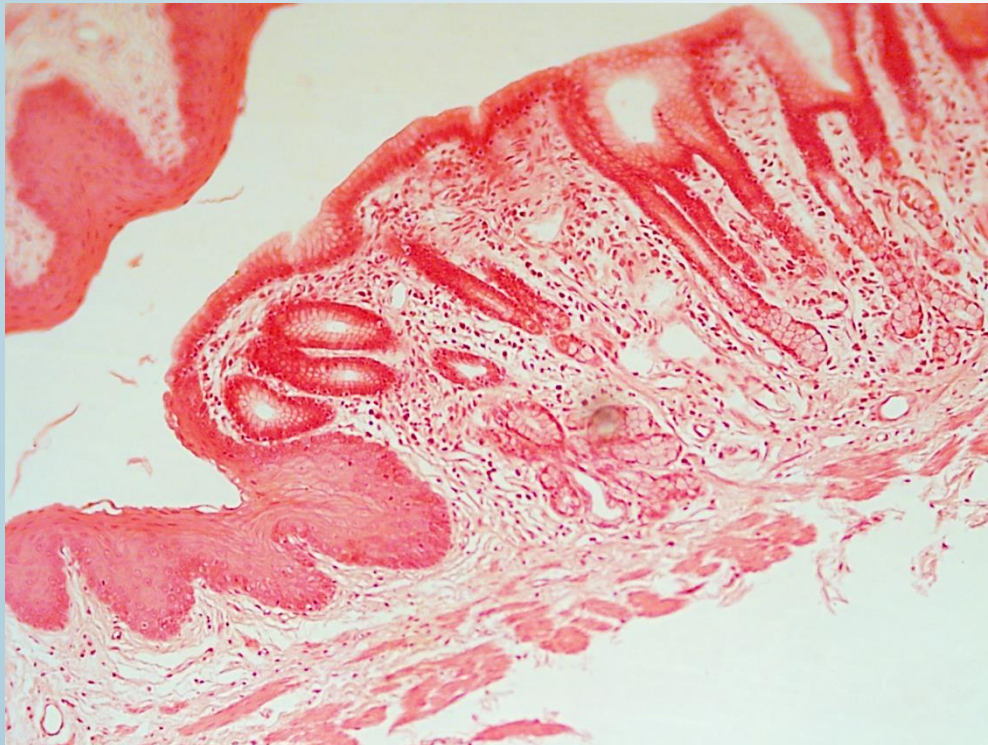
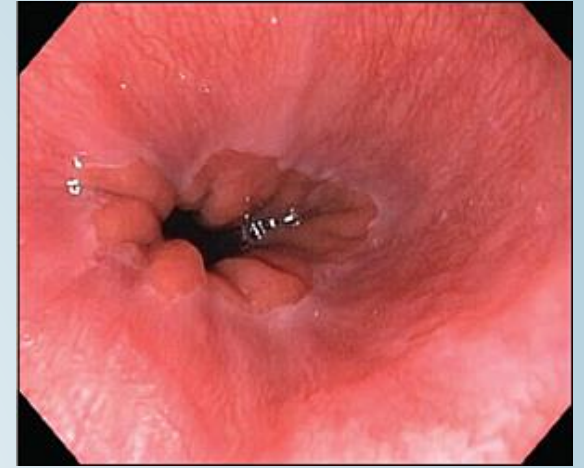
910. ábra A gyomorfal sémája lupe nagyítással.
A falrétegek lépcsőzetesen eltávolítva.



Histology of the cardia

Sharp epithelial changing, the SNCE continues :

- simple columnar epithelium (endoscopic: Z-line)
- Typical locations of early staged tumours (metaplasia),
Barret (app. 2 cm above)



- Mixed tubular glands embedded in the lamina, mostly mucous: cardia glands
- branched, tubular glands, short and wide lumen
- wide foveola
- dense, protective mucus
- Some cells are producing gastrin

Fundus, corpus histology

Wide lamina propria of the mucosa

Elongated tubular, sometimes branched fundus glands.

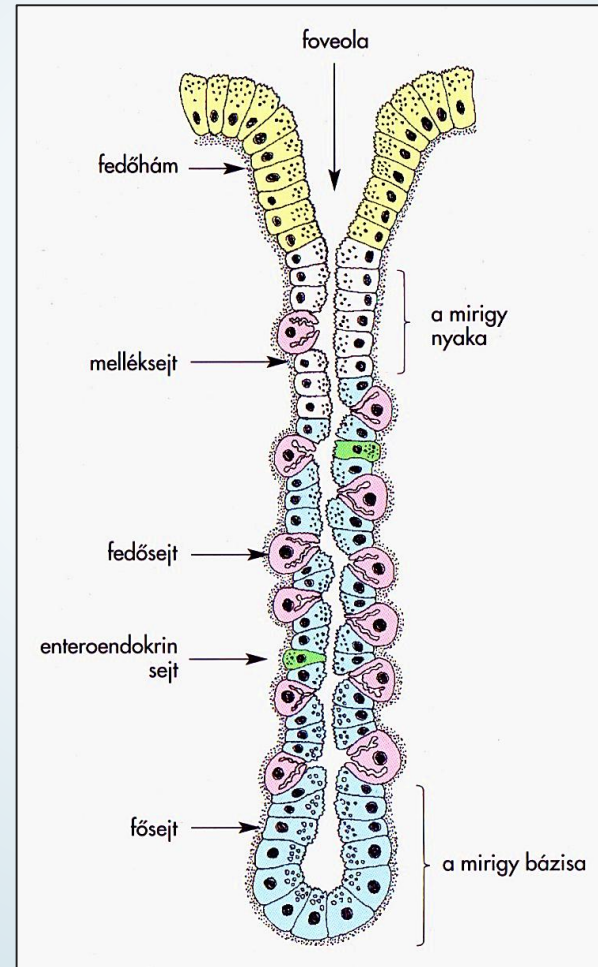
Characteristic cells of the fundus glands:

1. Undifferentiated cells:

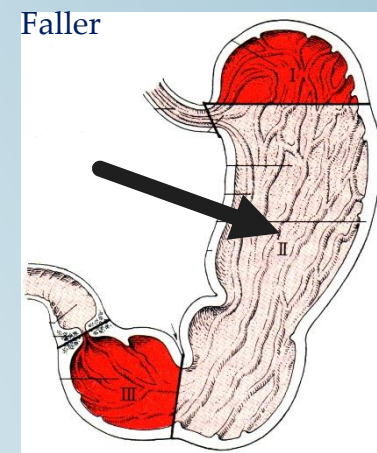
- Gastric pits
- Upper columnar epithelium replacement
- Mucus producement

2. Mucous cells:

- Mostly nin the neck and isthmus
- secretory granuls apically
- Liquid , mucus producement



Röhlich



Faller

3. Parietal cells:

- As they „cover” the gland
- Extremely apical surface increase
- HCl, KCl, intrinsic factor

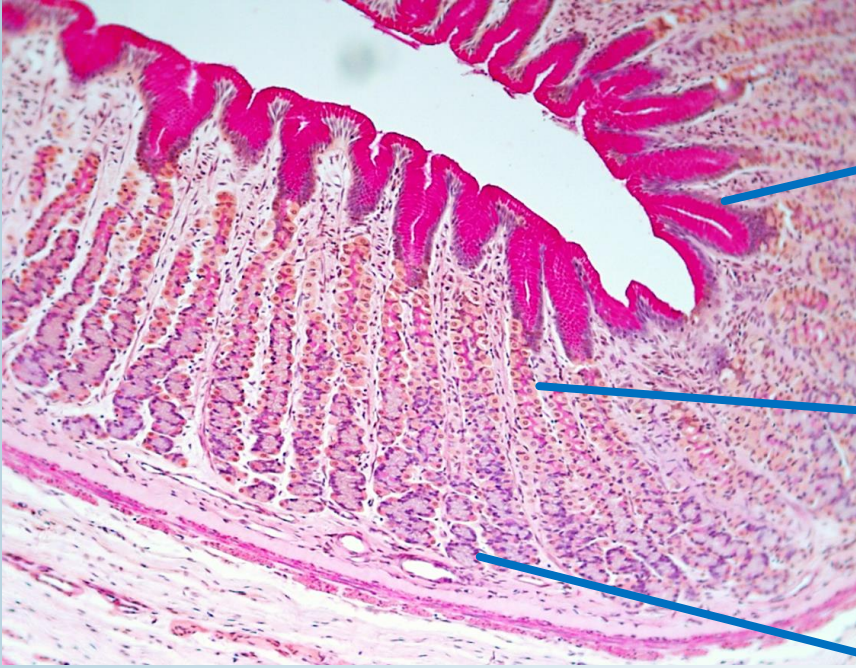
4. Chief cells

- zymogenic cells
- pepszinogen, lipase
- At the basal part of the gland

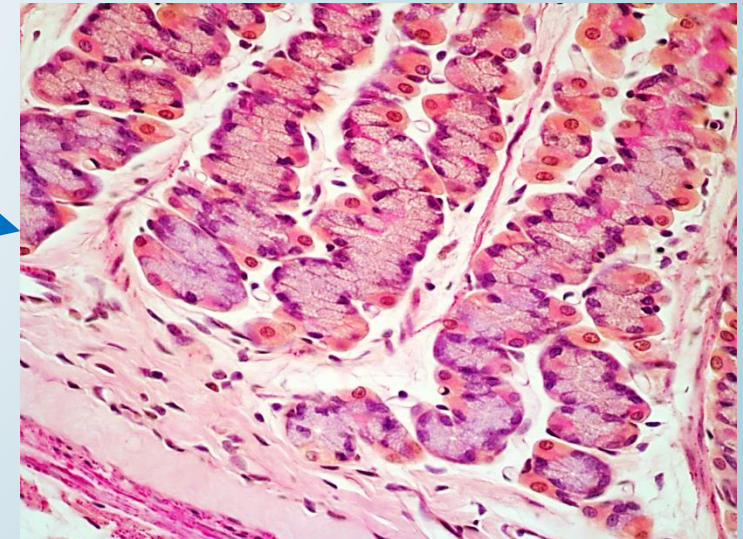
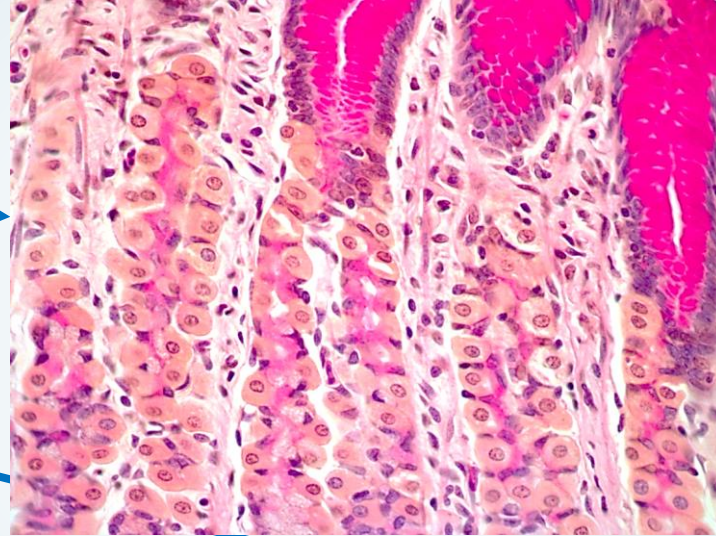
5. enteroendocrine cells

gastrine, somatostatine,
glukagon, serotonin, histamin

fundus, corpus histology

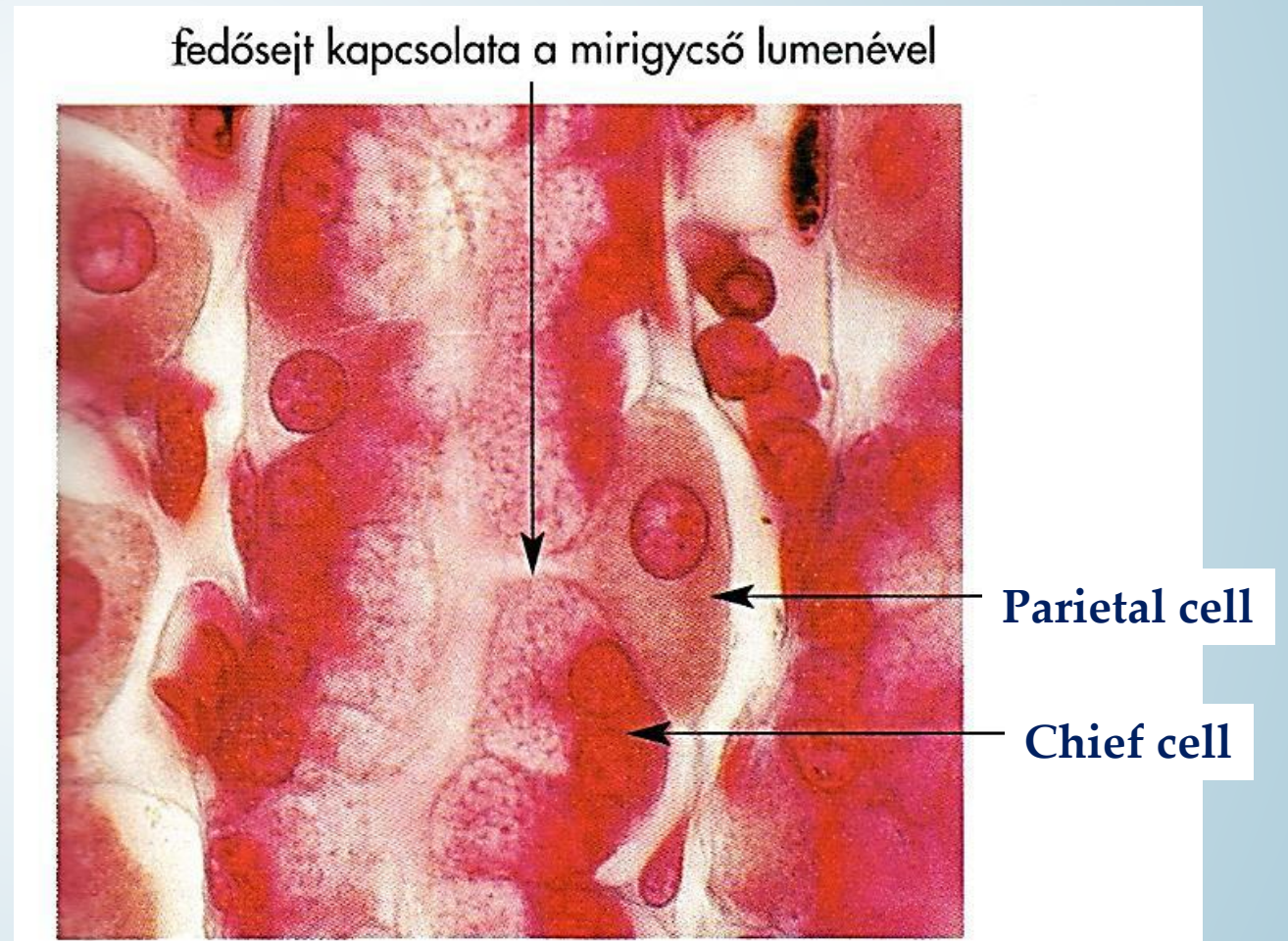
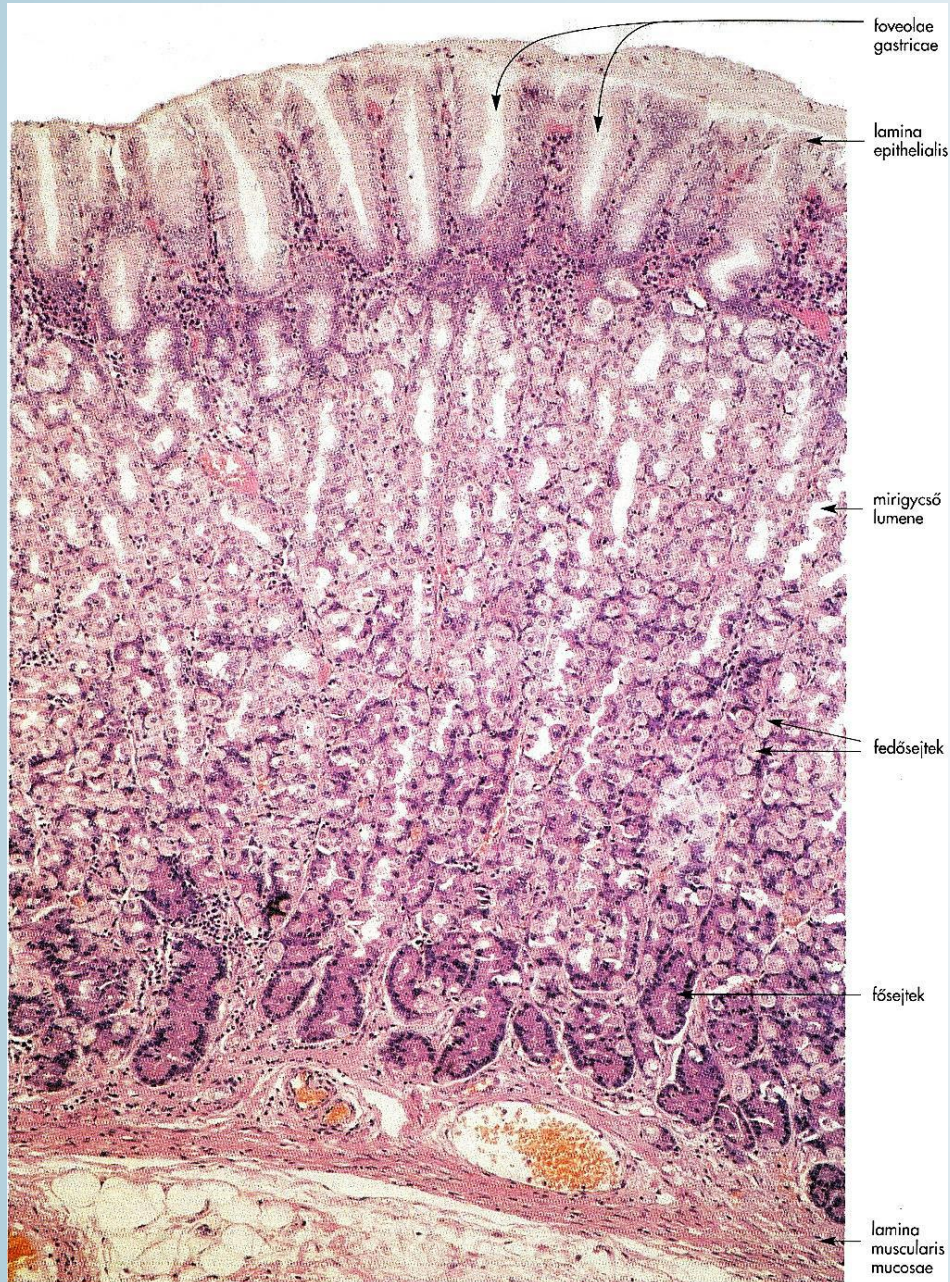


fundus, PAS – Kongo - Hematoxylin

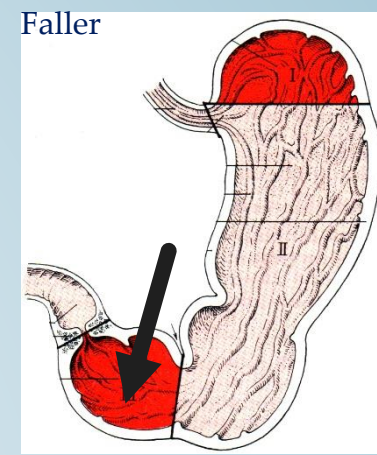


- PAS – undifferentiated and **mucous cell**
- Kongo(vörös) – parietal cells
- Hematoxylin – chief cells

A fundus, corpus histology



Histology of the pylorus

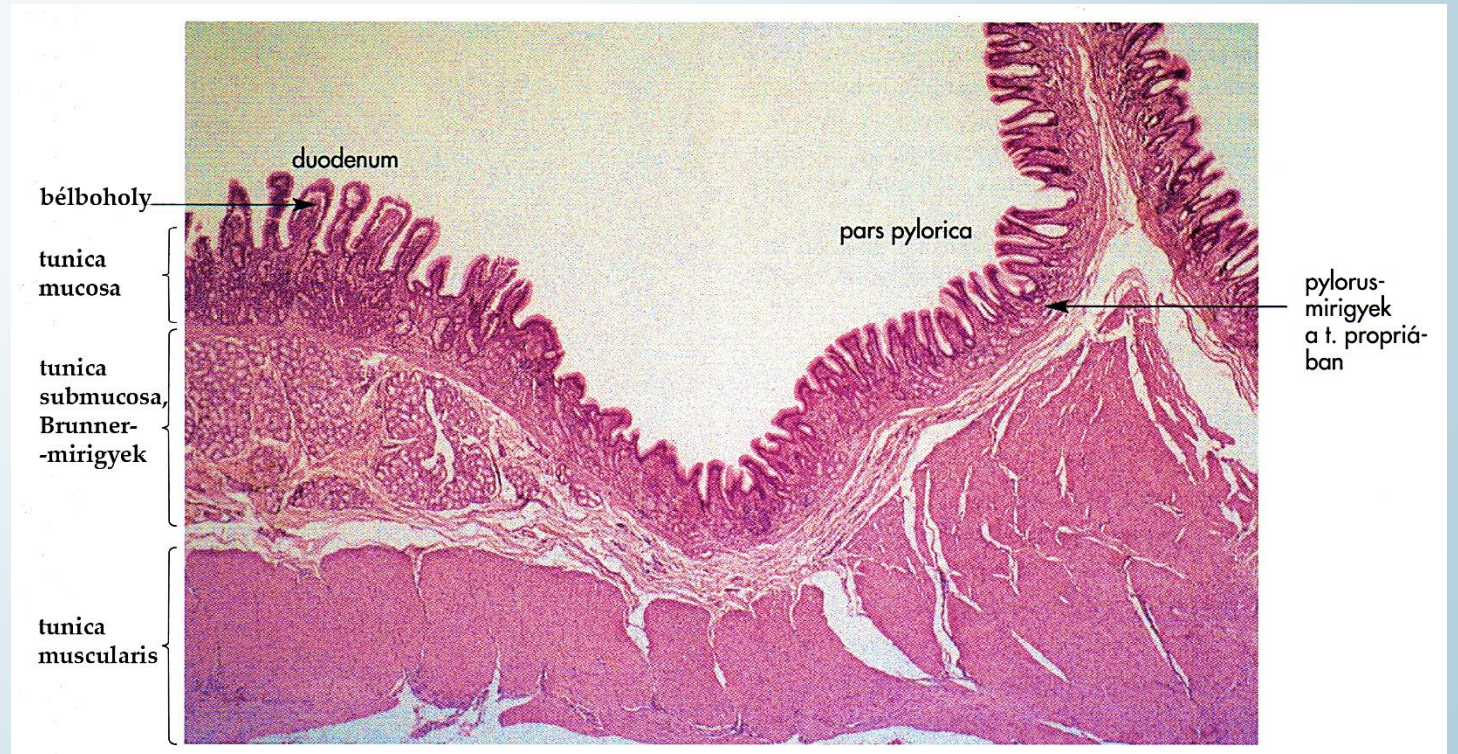


13-27. ábra. Pars pylorica. A nyálkahártya kevesebb mirigyet tartalmaz és vékonyabb, mint a fundus területén. A mirigyeket alkotó sejtek mucinosus jellegűek (HE, 70x).

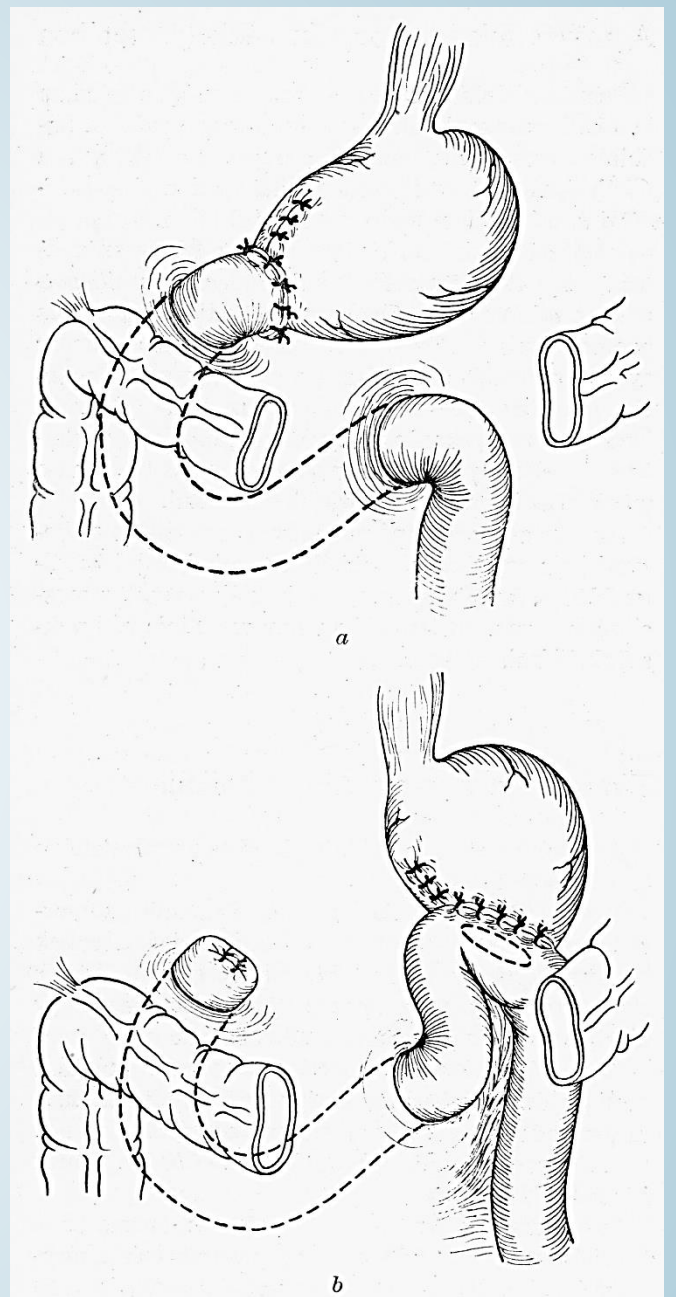
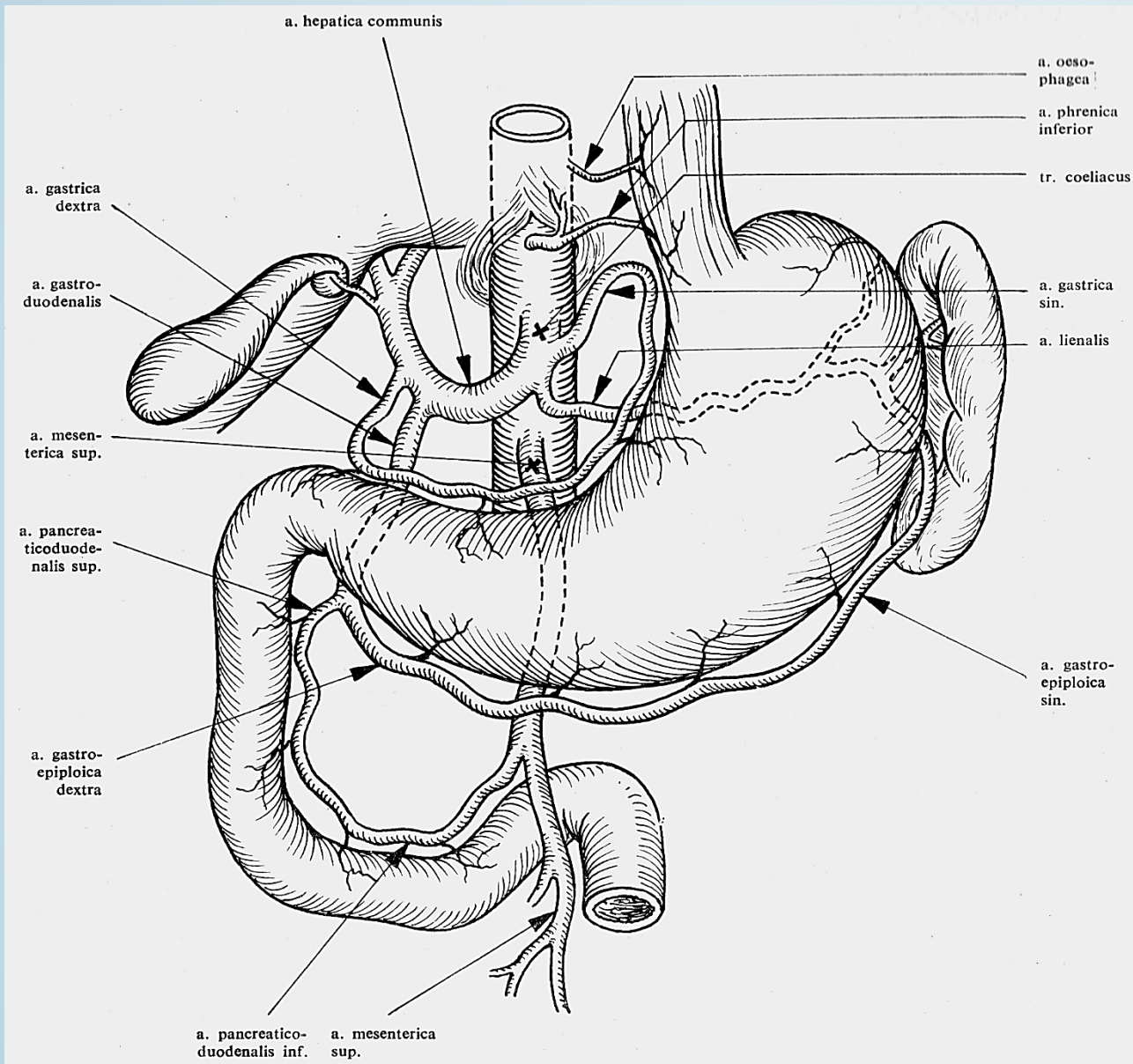
Röhlich

Deep and wide gastric pits
short , branched tubular glands
mucus producing cells
enteroendocrine cells (gastrin!!)

Thickened circular tunicae muscularis str.: sphincter pylori m.



Röhlich



5-175. ábra. Gyomor-resectio
 a: BILLROTH I és b: BILLROTH II szerint