VISCERAL OSTEOPATHY

Seminar

The Stomach

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2019

The author of the Seminar

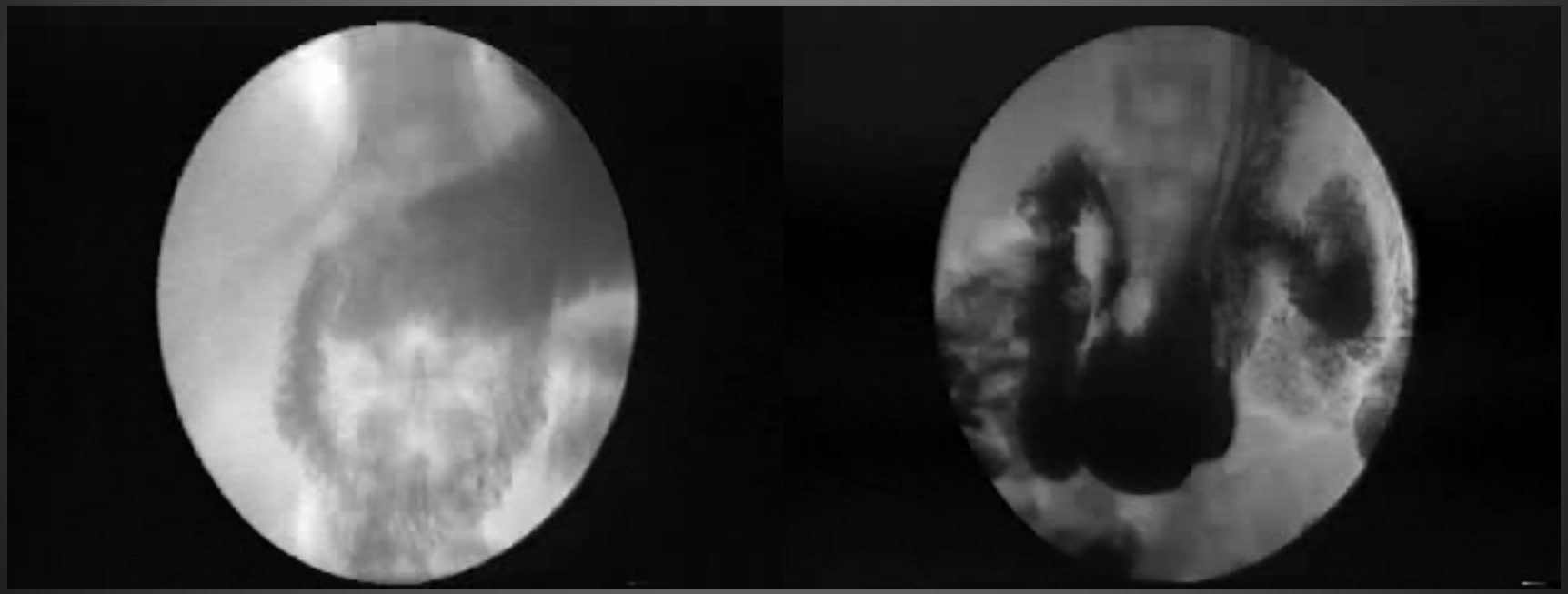
- Graduated D.O. in 2005 – 6 years full time studies
- Private practice near Lyon – FR
- Since 2018 : Anatomy teacher in Lyon
- 2006-2017 : Visceral Osteopathy teacher in Lyon
- 2011-2015 : Visceral and Urogenital Osteopathy teacher in Nantes
- Since 2014 : Collaborator of Finet and Williame D.O. : Workshops in France, Belgium, Spain, Germany… Structuring the osteopathic treatment : simplified procedure, visceral and urogenital osteopathy on Evidence Based Medicine and own Researches.
- http://deltadyn.be Instagram : osteopat_niko

Finet and Williame

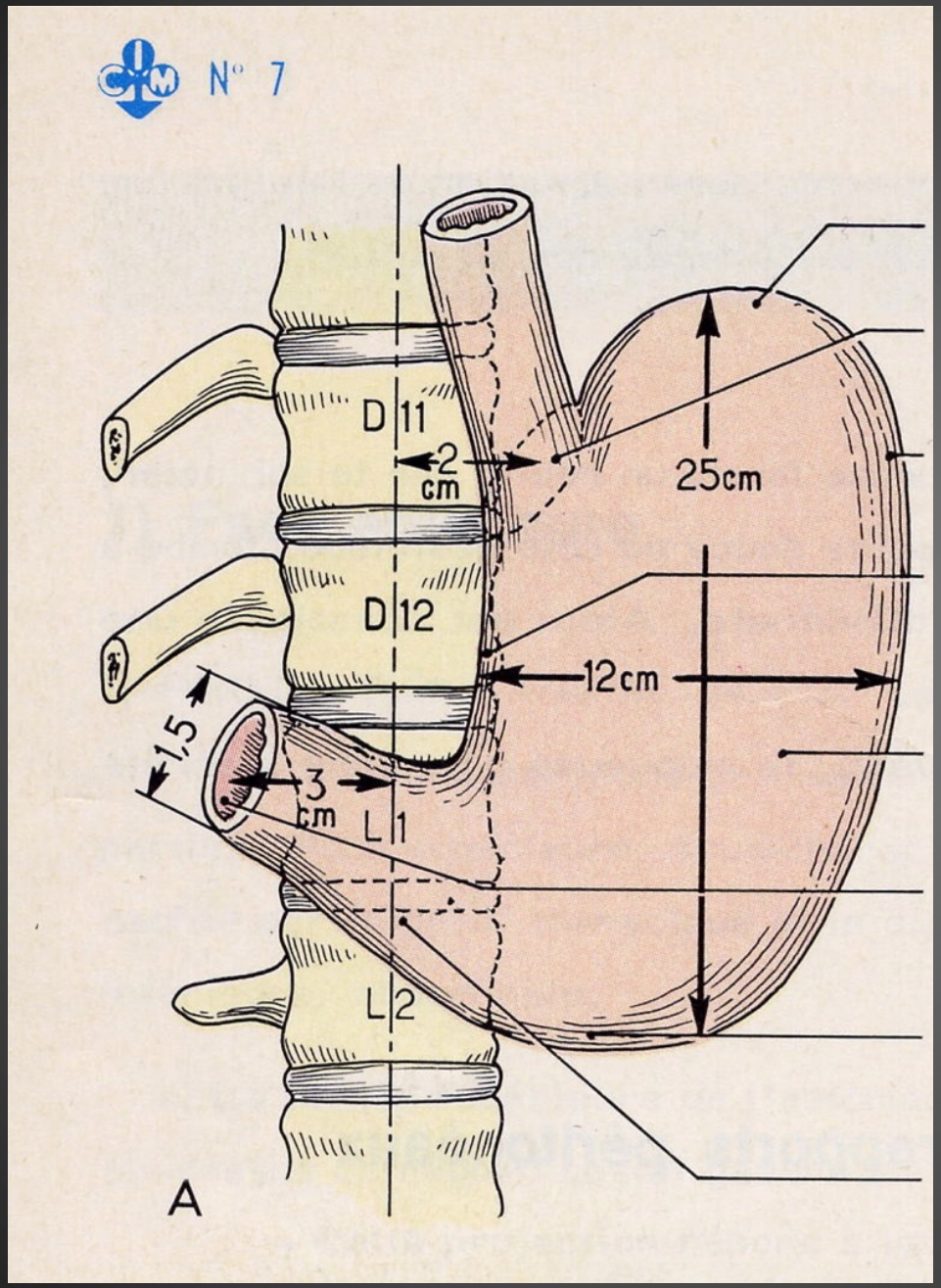
Since 1985 : Studies on the visceral movements.

Physiological and non physiological movements of the organs.

Deltadyn.be



The stomach



Fundus

Cardia

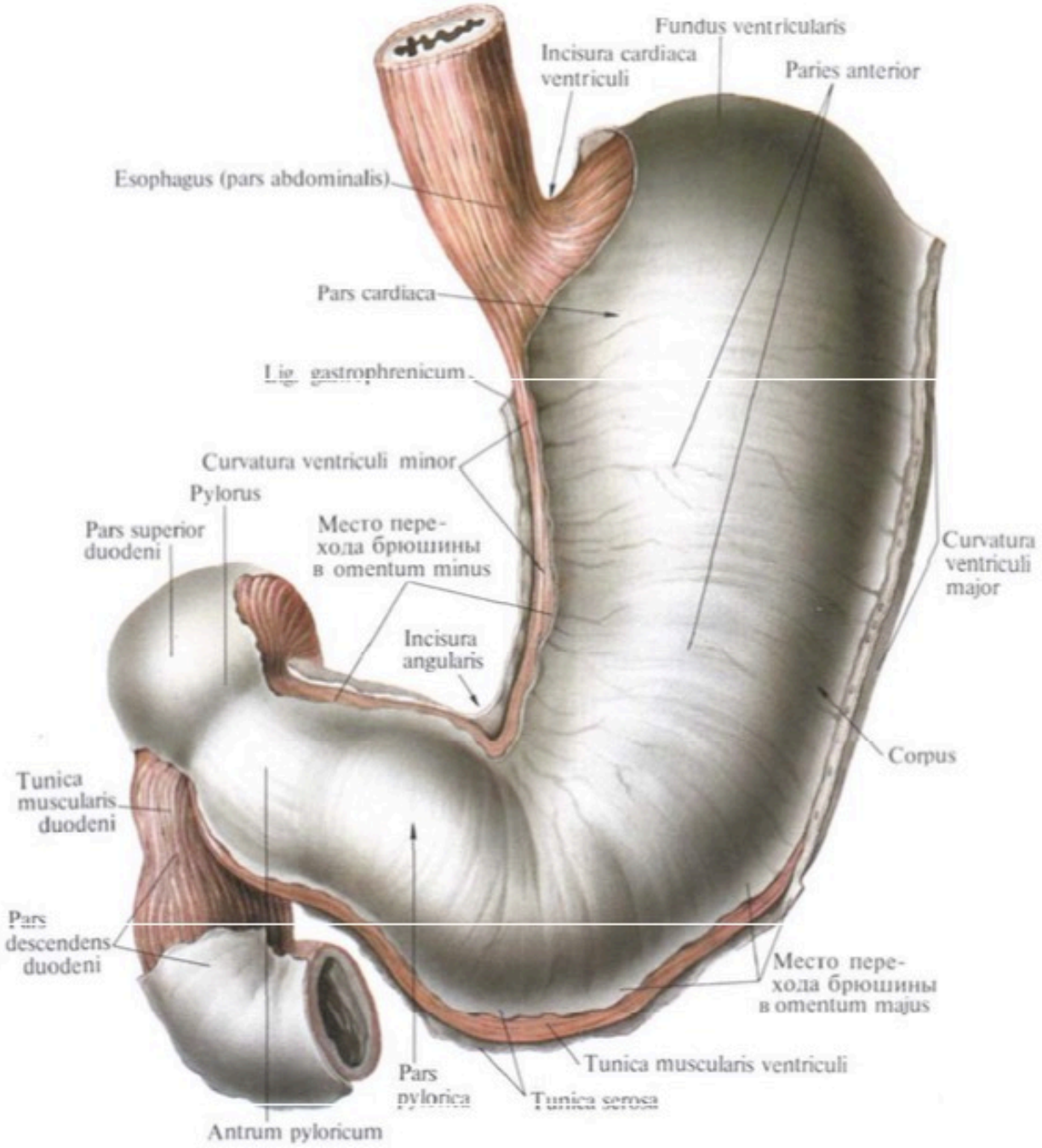
Greater curvature

Lesser curvature

Body

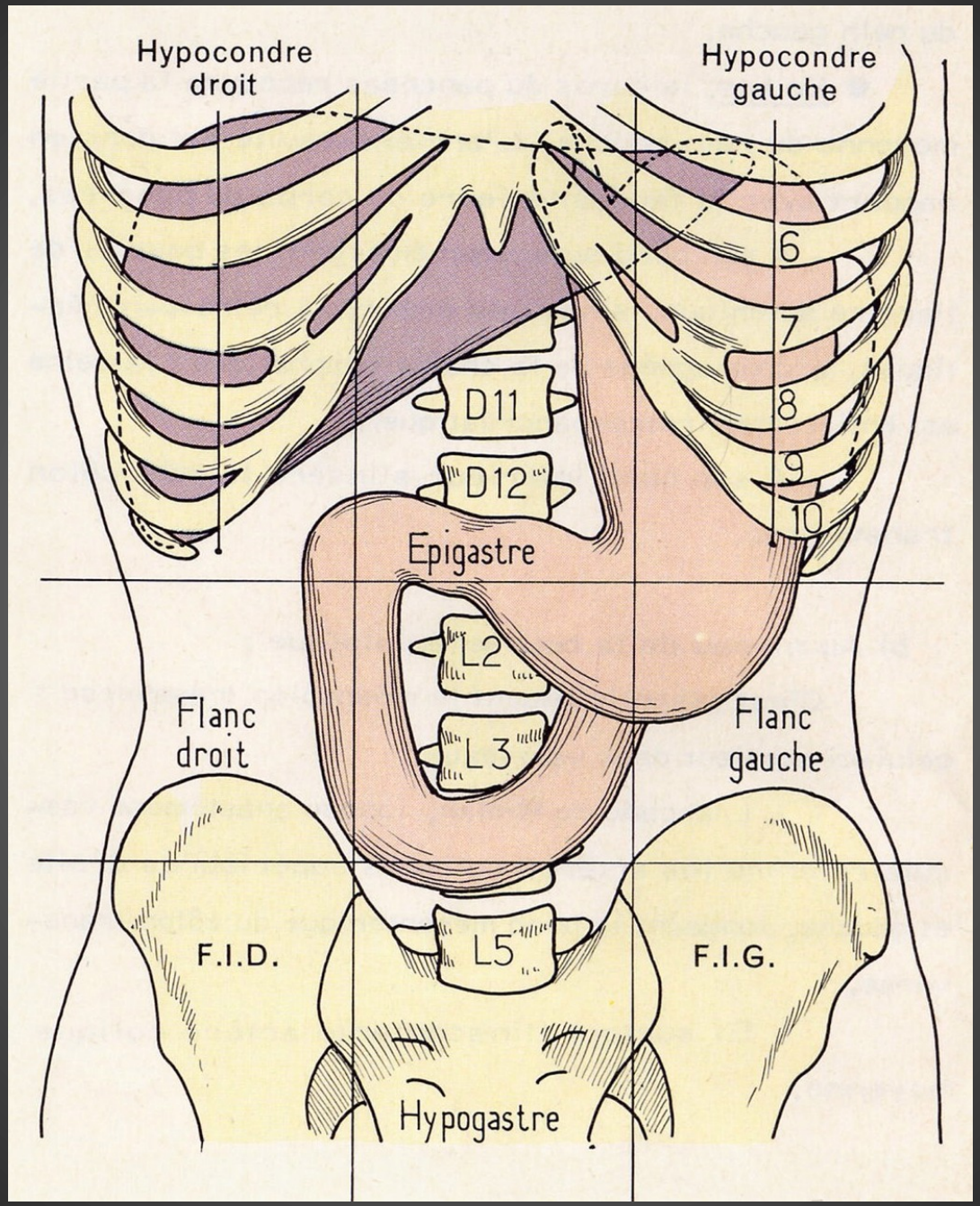
Pyloric sphincter

Pylorus


Fundus ventricularis
Incisura cardiaca ventriculi
Paries anterior
Esophagus (pars abdominalis)
Pars cardiaca
Lig. gastrophrenicum
Curvatura ventriculi minor
Pylorus
Pars superior duodeni
Место перехода брюшины в omentum minus
Curvatura ventriculi major
Incisura angularis
Corpus
Tunica muscularis duodeni
Pars descendens duodeni
Место перехода брюшины в omentum majus
Tunica muscularis ventriculi
Pars pylorica
Tunica serosa
Antrum pyloricum

I – General anatomy

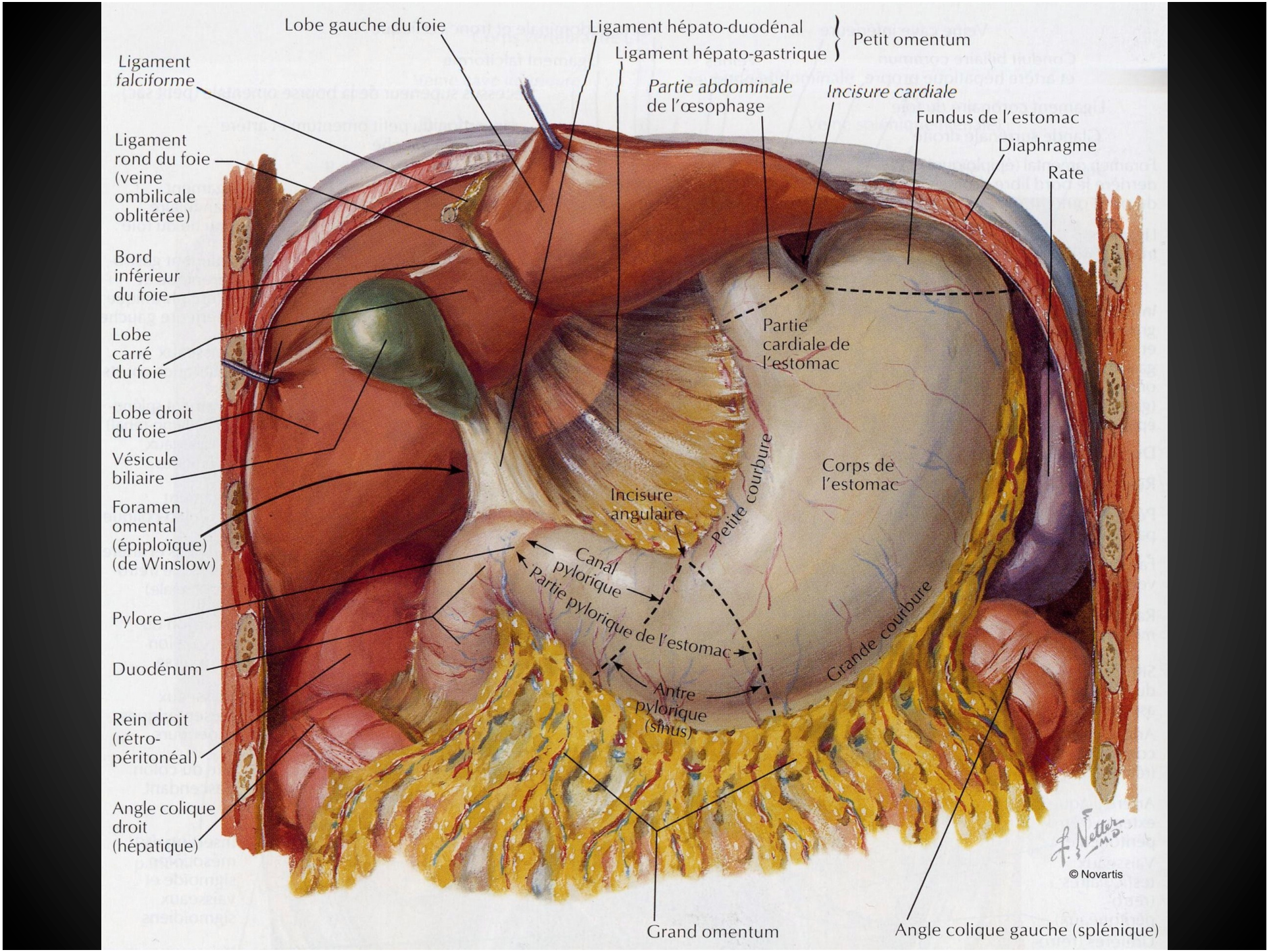
- Superior part in the hypochondrium, inferior part in the epigastric area
- Cardia : continues the oesophagus
- Fundus ventricularis : Superior part of the stomach, air inside
- Corpus : Medium part, stretched
- Pars pylorica : inferior part of the stomach, followed by the pylorus (orientation : cephalic, right, posterior)


Hypocondre droit
Hypocondre gauche
6
7
8
9
10
D11
D12
Epigastre
L2
L3
Flanc droit
Flanc gauche
L5
F.I.D.
F.I.G.
Hypogastre

- **Functions** :
- Fundus ventricularis : mostly static, growing when filling the stomach
- Distal part : more dynamic = mixing the content and evacuation through the pylorus
- H = 25cm, W = 12cm, D = 8cm
- Capacity : 1 to 2L in adult.

B – Fixing structures

- Cross fixing structures :
  - Sup. : Lig. gastrophrenicum
  - Right : Omentum minus
  - Inf. : lig. Gastrocolicum / omentum majus
  - Left : lig. gastrosplenicum
- Cardia : fixed structure


Lobe gauche du foie
Ligament hépato-duodénal
Ligament hépato-gastrique
Petit omentum
Ligament falciforme
Partie abdominale de l'œsophage
Incisure cardiale
Fundus de l'estomac
Diaphragme
Rate
Ligament rond du foie (veine ombilicale oblitérée)
Bord inférieur du foie
Lobe carré du foie
Lobe droit du foie
Vésicule biliaire
Foramen omental (épiploïque) (de Winslow)
Pylore
Duodénum
Rein droit (rétro-péritonéal)
Angle colique droit (hépatique)
Partie cardiale de l'estomac
Petite courbure
Corps de l'estomac
Incisure angulaire
Canal pylorique
Partie pylorique de l'estomac
Grande courbure
Antre pylorique (sinus)
Grand omentum
Angle colique gauche (splénique)
F. Netter M.D.
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C – Links :

- Anterior surface :
  - Liver
  - Recessus costodiaphragmaticus (through the diaphragm)
  - Abdominal wall

- Posterior surface :
  - Diaphragm,
- And through the bursa omentalis :
  - Left crus diaphragmatis
  - Left glandula suprarenalis and left ren
  - Body and tail of the pancreas
  - Splenic vessels
  - Flexura duodenojejunalis
  - Intestinum tenue

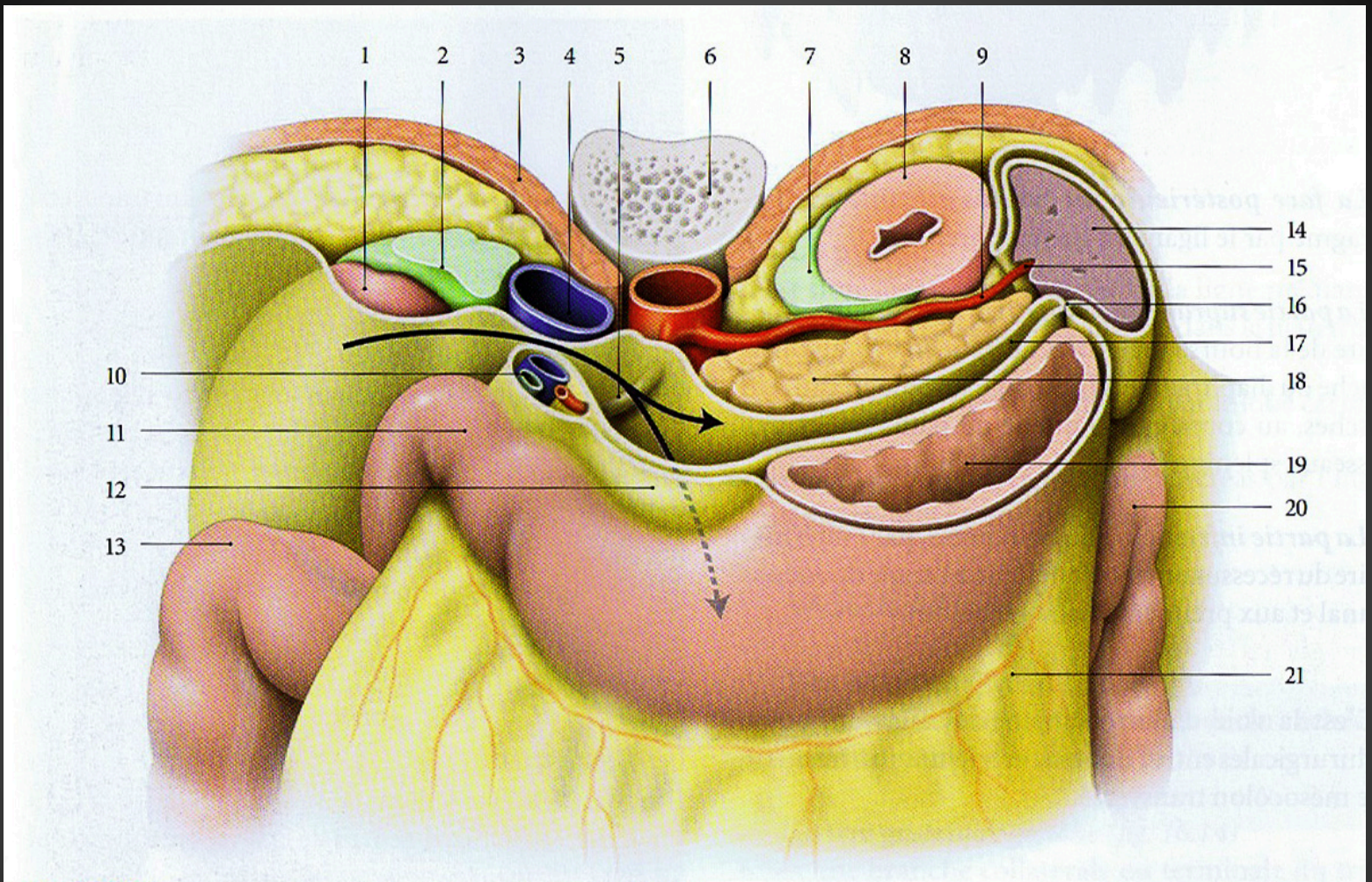


FIG. 16.10. Bourse omentale : flèche (coupe transversale oblique)

1. rein droit
2. surrénale droite
3. diaphragme
4. v. cave inf.
5. pli hépato-pancréatique
6. aorte abdominale
7. surrénale gauche
8. rein gauche
9. a. splénique
10. lig. hépato-duodénal (v. porte, conduit cholédoque, a. hépatique propre)
11. duodénum
12. lig. gastro-hépatique
13. angle colique droit
14. rate
15. lig. spléno-rénal
16. lig. gastro-splénique
17. récessus splénique
18. pancréas
19. estomac
20. angle colique gauche
21. grand omentum

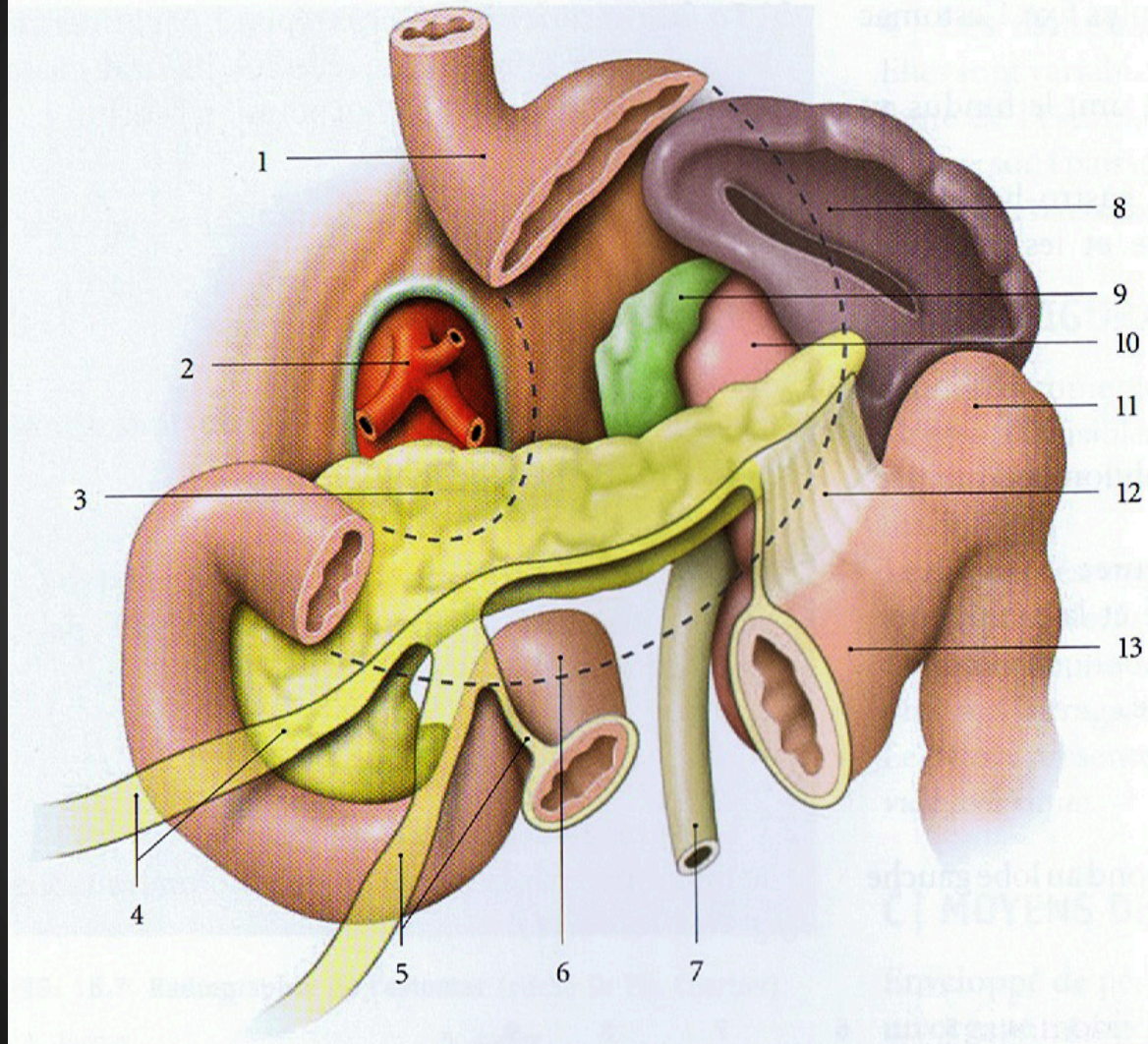
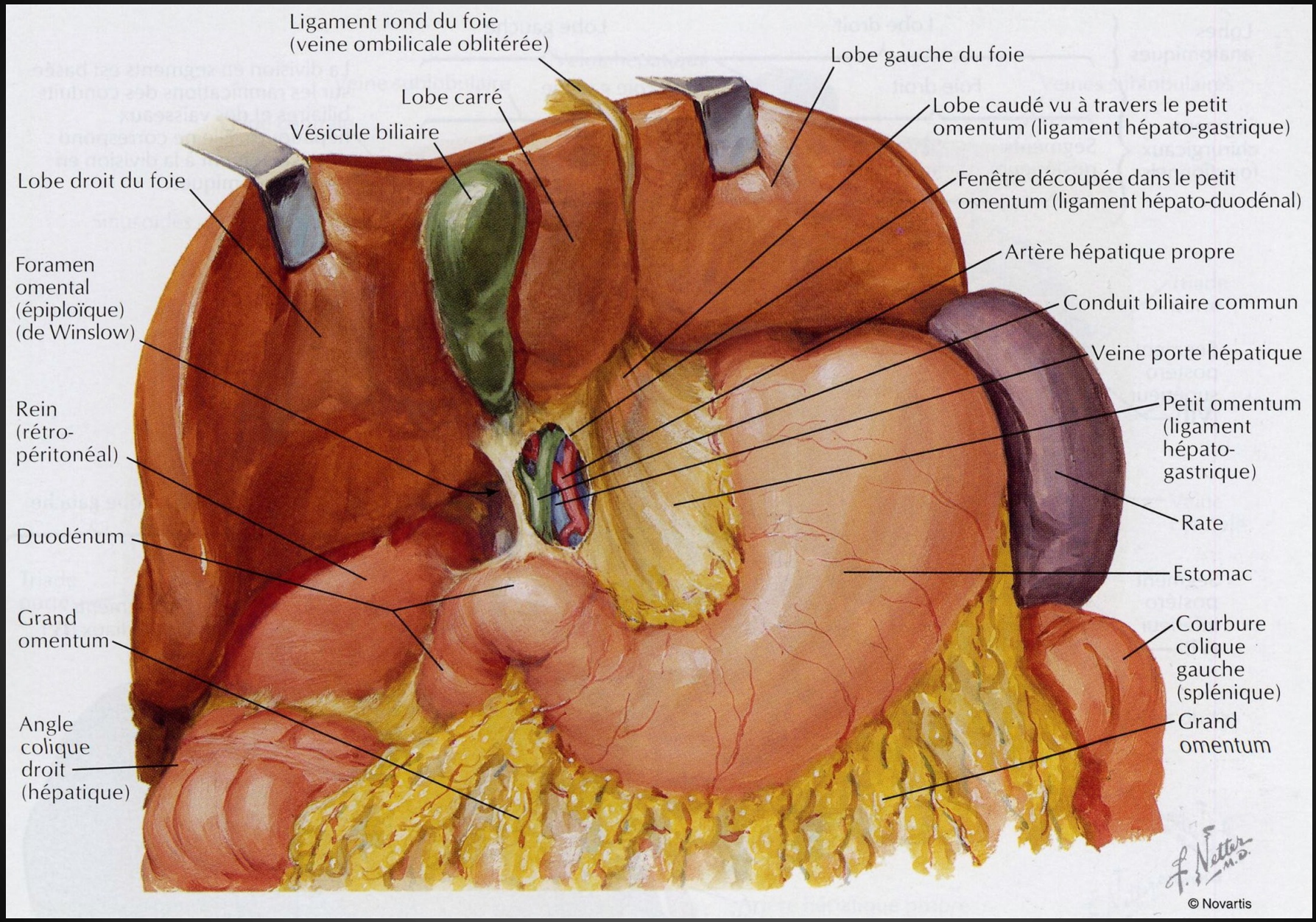


FIG. 16.11. Rapports postérieurs de l'estomac

1. estomac (en pointillés)
2. tronc cœliaque
3. pancréas
4. racine du mésocôlon transverse
5. racine du mésentère
6. angle duodéno-jéjunal
7. uretère gauche
8. rate
9. surrénale gauche
10. rein gauche
11. angle colique gauche
12. mésocôlon transverse
13. côlon transverse

- Curvatura ventriculi major :
  - Lig. Gastrophrenicum fixes the upper part to the diaphragm
  - Lig. gastrosplenicum fixes the curvatura ventriculi major to the splen
  - Lig. gastrocolicum fixes the caudal part to the colon transversum
- Curvatura ventriculi minor :
  - Linked to the hepar by the omentum minus
  - Incisura angularis : between the vertical and horizontal part of the curvatura ventriculi Minor

- Cardia :
  - At the height of TH11
  - Projection to the 7th rib cartilageus
  - Contact with the liver anteriorly, the left diaphragmatic pilar posteriorly
- Pylorus :
  - At the height of L1, on the transpyloric plane (horizontal line)
  - Slightly on the right of the median line
  - Contact with the pancreas posteriorly through the bursa omentalis


Ligament rond du foie
(veine ombilicale oblitérée)
Lobe gauche du foie
Lobe carré
Lobe caudé vu à travers le petit
omentum (ligament hépato-gastrique)
Vésicule biliaire
Lobe droit du foie
Fenêtre découpée dans le petit
omentum (ligament hépato-duodénal)
Artère hépatique propre
Foramen
omental
(épiploïque)
(de Winslow)
Conduit biliaire commun
Veine porte hépatique
Rein
(rétro-
péritonéal)
Petit omentum
(ligament
hépato-
gastrique)
Rate
Duodénum
Estomac
Grand
omentum
Courbure
colique
gauche
(splénique)
Angle
colique
droit
(hépatique)
Grand
omentum
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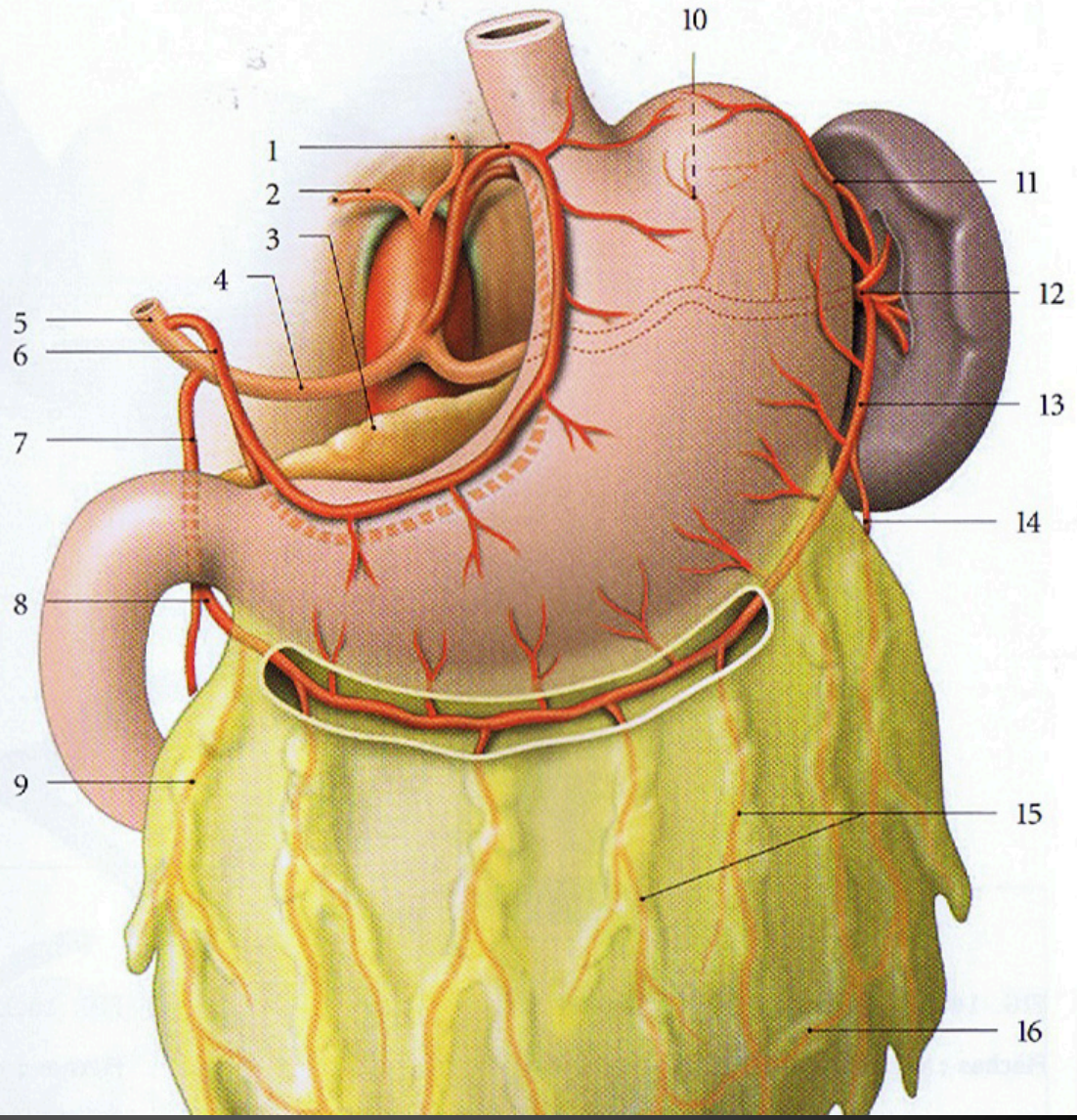
D – Vessels

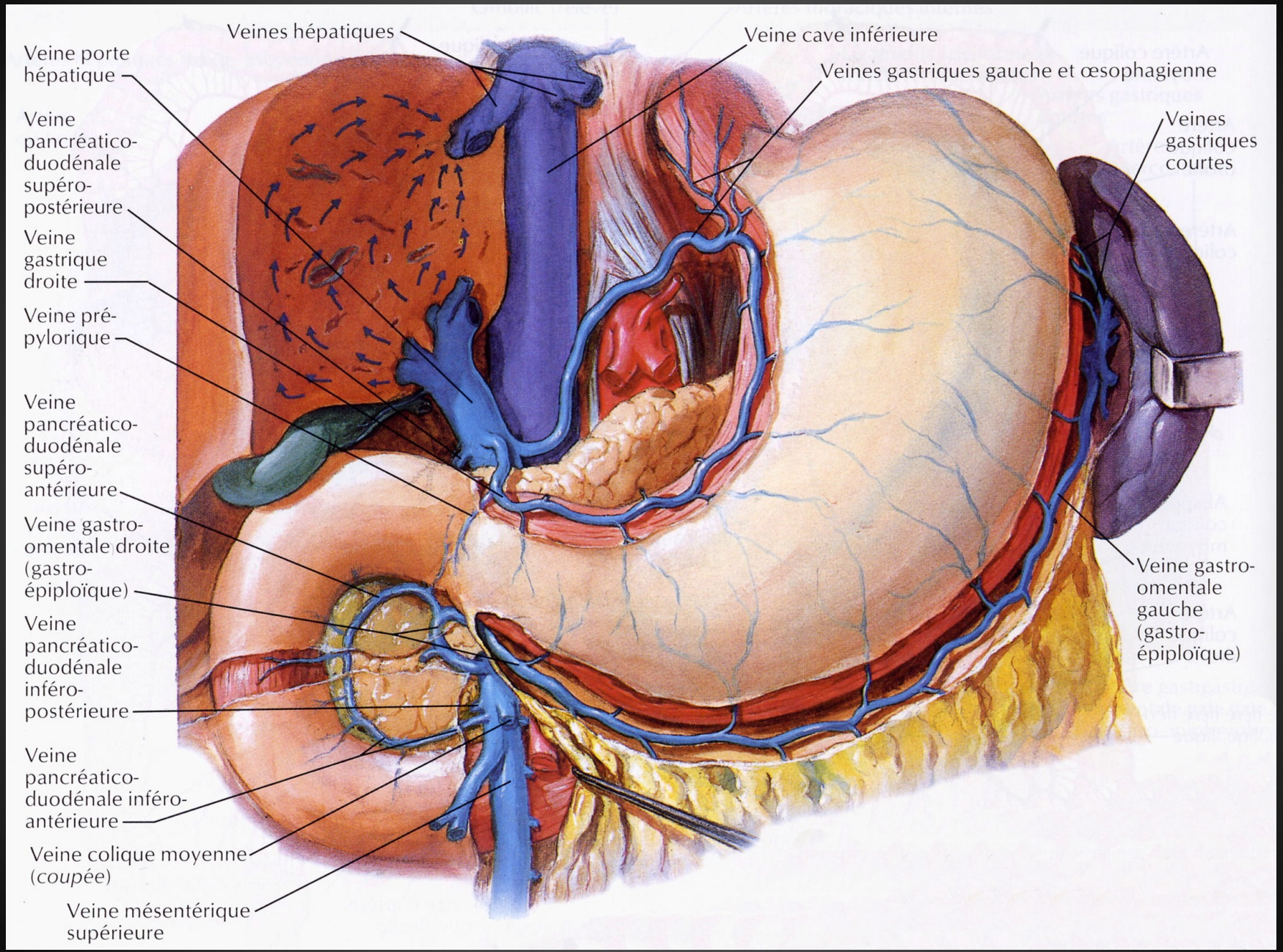
- Arteries :
  - Art. gastrica sinistra (truncus coeliacus), divides in anterior and posterior branches, then anastomosis with the same arteries from the art. gastrica dextra
  - Art. gastrica dextra (art. hepatica propria), divides in ant. and post. branches
  - Art. gastroomentalis sinistra (art. splenica), divides in rami gastrici (curvatura ventriculi major) et rami omentales (omentum majus)
  - Art. gastroomentalis dextra (art. gastroduodenalis) : same as art. gastroomentalis sinistra
  - Art. gastricae breves, and art. gastrica posterior (art. splenica).

FIG. 16.12. Artères de l'estomac

1. a. gastrique gauche
2. a. phrénique inf.
3. pancréas
4. a. hépatique commune
5. a. hépatique propre
6. a. gastrique droite
7. a. gastro-duodénale
8. a. gastro-omentale droite
9. a. omentale droite
10. a. gastrique post.
11. aa. courtes de l'estomac
12. a. splénique (liénale)
13. a. gastro-omentale gauche
14. a. omentale gauche
15. branches omentales
16. anastomose omentale



- Veins :
  - Satellites of the arteries,
  - V. gastrica sinistra and dextra : drain in the v. portae hepatis directly
  - Vv. Gastricae breves and v. gastroomentalis sinistra : drain in the v. splenica
  - V. gastroomentalis dextra : drains in the v. mesenterica superior


Veines hépatiques
Veine cave inférieure
Veine porte hépatique
Veines gastriques gauche et œsophagienne
Veines gastriques courtes
Veine pancréatico-duodénale supéro-postérieure
Veine gastrique droite
Veine pré-pylorique
Veine pancréatico-duodénale supéro-antérieure
Veine gastro-omentale droite (gastro-épiploïque)
Veine gastro-omentale gauche (gastro-épiploïque)
Veine pancréatico-duodénale inféro-postérieure
Veine pancréatico-duodénale inféro-antérieure
Veine colique moyenne (*coupée*)
Veine mésentérique supérieure

E – Innervation

- Sympathetic : n. splanchnicus majus (TH6-TH9) through the par le plexus coeliacus
- Parasympathetic : nervus vagus (Left mostly, and Right)
- Sensitivity given by the n. splanchnicus majus (afferences)

F - Motor control

2 centers of control :

1 - Hormonal control : Gastrin and cholecystokinin relax the proximal stomach and contract the distal stomach,

2 - Nervous control : Pacemaker cells in the fundus give a basal electrical rythm spreading to the pyloric sphincter (3 to 8 contractions per min).

- Relaxation of the stomach (to accept food) : by the inhibitory fibers of vagus nerve.

Inhibitory fibers are stimulated by :

- Action of swallowing,
- Stretch receptors in the stomach walls (activation when bolus arrives),

Then, stomach will mix food with gastric fluid and break the bolus :

- NANC control (non adrenergic, non cholinergic) by substances like nitric oxide, vasointestinal peptide…
- Sympathetic fibers (norepinephrine),
- Excitatory vagal stimulation.

When the bolus reaches the pylorus -> contraction of the pyloric sphincter :

- Mixing the bolus + inhibition of the forward movement of the bolus through the pylorus,
- Then the antral muscle cells bring food back to the fundus,

Only the smallest particles will go through the pylorus to the duodenum.

Gastrocolic reflex

- Physiological reflex that controls the motility of the lower gastrointestinal tract following a meal.
- Result : the colon has increased motility in response to the stretch of the stomach with the ingestion of food.
- Myoelectric recordings demonstrate the reflex in the large intestine that shows a spike in electrical activity within minutes of food consumption.
- These motor complexes act cyclically during the digestion process and can be broken up into four phases.

Gastrocolic reflex

- The control of these phases is multifactorial : neurological, mechanical, and paracrine mediators (ex : cholecystokinin, serotonin, neurotensin, and gastrin).
- The sigmoid colon is the region most affected during the phasic response of digestion, which consists of cyclical periods of contraction followed by relaxation.
- The gastrocolic reflex results in the urge to defecate after a meal. When food enters the rectum and drives pressures up, the gastrocolic reflex stimulates expulsion of the contents of the rectum via defecation.

See :

- Colonic motor response to eating: a manometric investigation in proximal and distal portions of the viscus in man. Bassotti G[1], Betti C, Imbimbo BP, Pelli MA, Morelli A. PMID: 2916518

- Regional complexity in enteric neuron wiring reflects diversity of motility patterns in the mouse large intestine. Li Z[1], Hao MM[2], Van den Haute C[3,4], Baekelandt V[3], Boesmans W[1,5,6], Vanden Berghe P. PMID: 30747710

II - Histology

- Mucosa :
- Surface mucous cells (one layer),
- Gastric pits,
- Gastric glands : parietal, chief, endocrine cells,
- Lamina propria : connective tissue,
- Muscularis mucosa : 2 smooth muscle layers,
- Submucosa :
- Connective tissue,

Impact of an Energy Drink on the Structure of Stomach and Pancreas of Albino Rat: Can Omega-3 Provide a Protection?

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1 Anatomy Department, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

doi:10.1371/journal.pone.0149191

Background and Objectives

- A controversy developed between the benefits of energy drinks (EDs) versus the possible health threats since its revolution. Lack of information was a call to assess the effect of chronic consumption of Power Horse (PH) as one of the EDs, on the structure of pancreas and fundic mucosa of stomach in rats, and possible protective role of Omega-3.

Conclusion

- Power Horse intake significantly injures … the glandular cells of the fundic mucosa. Omega-3 decreases these detrimental effects mostly through its antioxidant and anti-inflammatory action.

III - Pathology

- Gastric ulcer :
- Loss of tissue on the gastric wall.
- Etiologies :
  - Chronic gastritis,
  - non-steroidal antiinflammatory drugs (NSAID), aspirin,
  - Helicobacter pylori,
  - Tobacco.
- Symptoms :
  - Cramps/heartburn far from the meal time, settled by the meals, antacid drugs,
  - Moderate slimming often,
  - Nausea / possible vomiting,
  - Anemia, possible internal bleeding if complication.

- Complementary examinations :
  - Gastro-duodenal fibroscopy (with biopsy),
  - Blood test : helicobacter pylori. (possible respiratory test).

- <u>Gastritis :</u>
- Inflammation of the gastric mucosa, acute, chronic, can evolve towards a cancer.
- Etiologies :
  - Alcool,
  - Medicine (aspirin, non steroidal anti-inflammatory drugs),
  - Bacterial infections or viruses,
  - Helicobacter pylori (Chronic),
  - Stress,
  - Other causes…

- Symptoms :
  - Can be symptomless,
  - Epigastric heartburn not related to food,
  - Pain can be aggravated by acid food (tomatoes…),
  - Hematemesis sometimes,
  - Possible anemia if bleeding.
- Complementary examinations :
  - Gastro-duodenal fibroscopy.

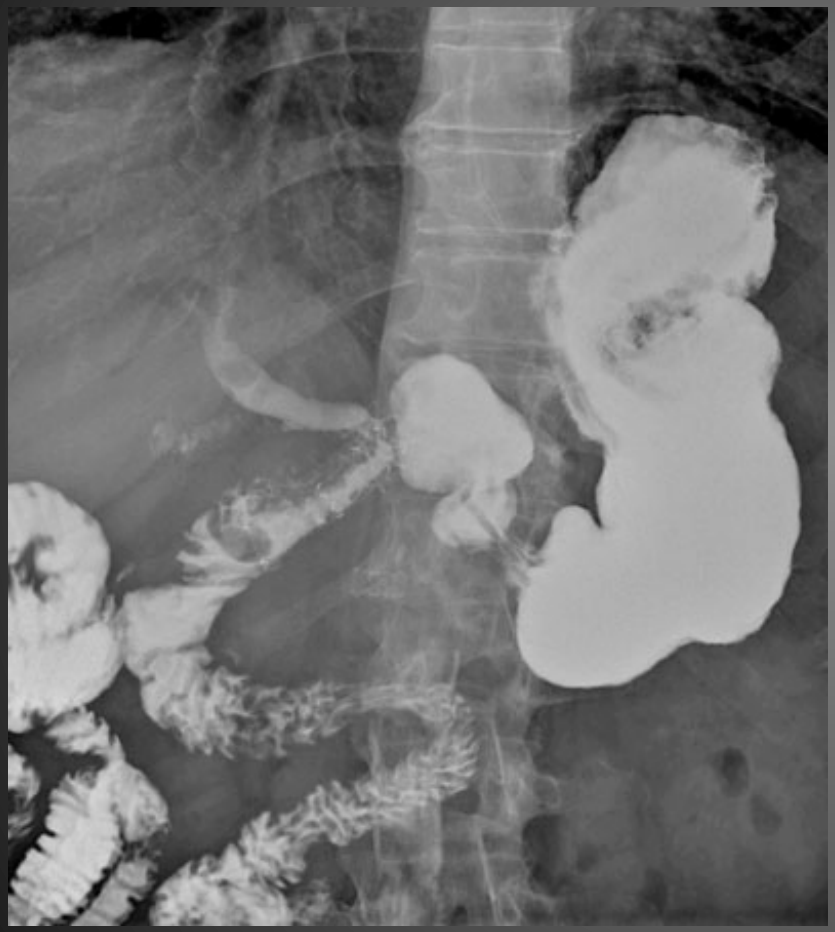
- <u>Gastro-enteritis :</u>
- Inflammation of the intestinal wall by an infection (virus, bacteria or parasite).
- Etiologies :
  - Most of the time : rotavirus,
  - By contact : hands, saliva, water, food…
- Symptoms :
  - Diarrhea,
  - Abdominal pain,
  - Nausea / vomiting,
  - Possible fieber,
  - Lasts usually 24-48 hours (if longer : bacteria or parasite).

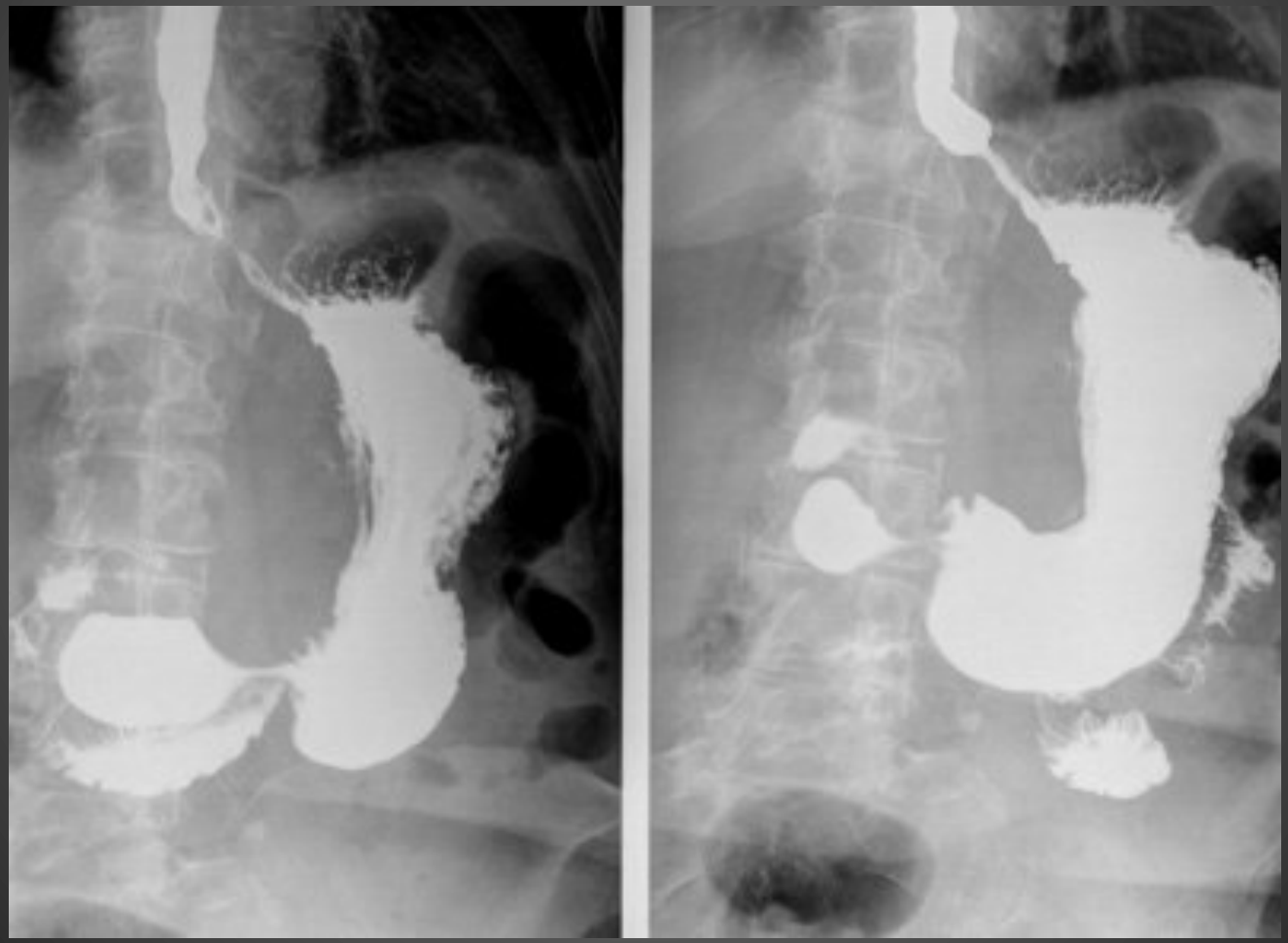
- Complementary examinations :
  - Most of the time : useless,
  - Coproculture if symptoms stay longer,
  - Blood analysis if si complications (dehydration).

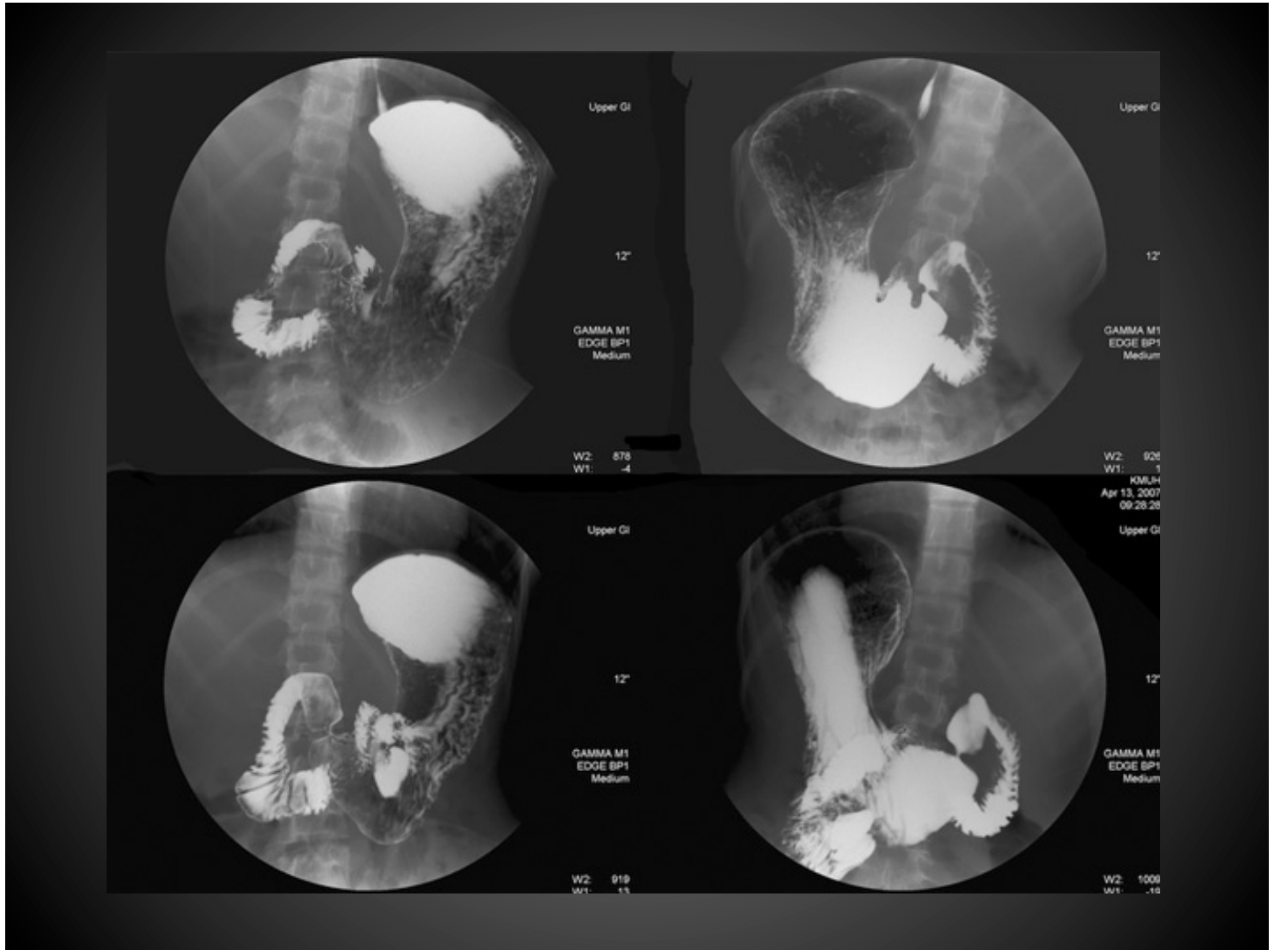
- <u>Stomach cancer :</u>
- Adenocarcinoma which develops on the gastric epithelium. High mortality in the World.
- Etiologies :
  - Lower social level : bad quality of food,
  - Vitamins A and C carencies,
  - Nitrates : Smoked food, too salty food,
  - Tobacco,
  - History of gastric surgery,
  - Gastritis, ulcer,
  - Genetic predisposals, or environmental conditions (pollution).

- Symptoms :
  - Fast loss of weight,
  - Epigastric pain,
  - Anemia,
  - Aversion/repulsion for meat +++.
- Complementary examinations :
  - Gastro-duodenal fibroscopy (multiple biopsies),
  - Thoraco abdomino pelvic Tomodensitometry (for the extension).

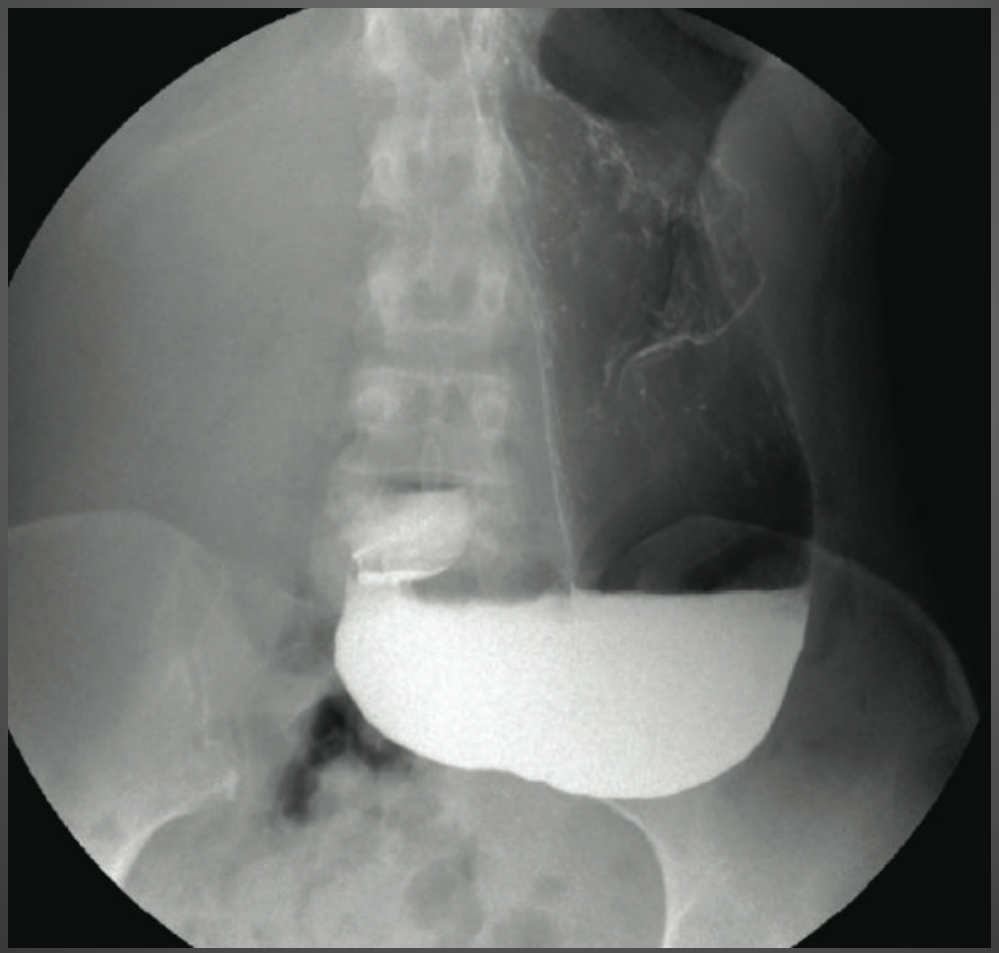
The stomach during baryta XRay






Upper GI
12"
GAMMA M1
EDGE BP1
Medium
W2: 878
W1: -4
Upper GI
12"
GAMMA M1
EDGE BP1
Medium
Upper GI
12"
GAMMA M1
EDGE BP1
Medium
W2: 919
Upper GI
12"
GAMMA M1
EDGE BP1
Medium

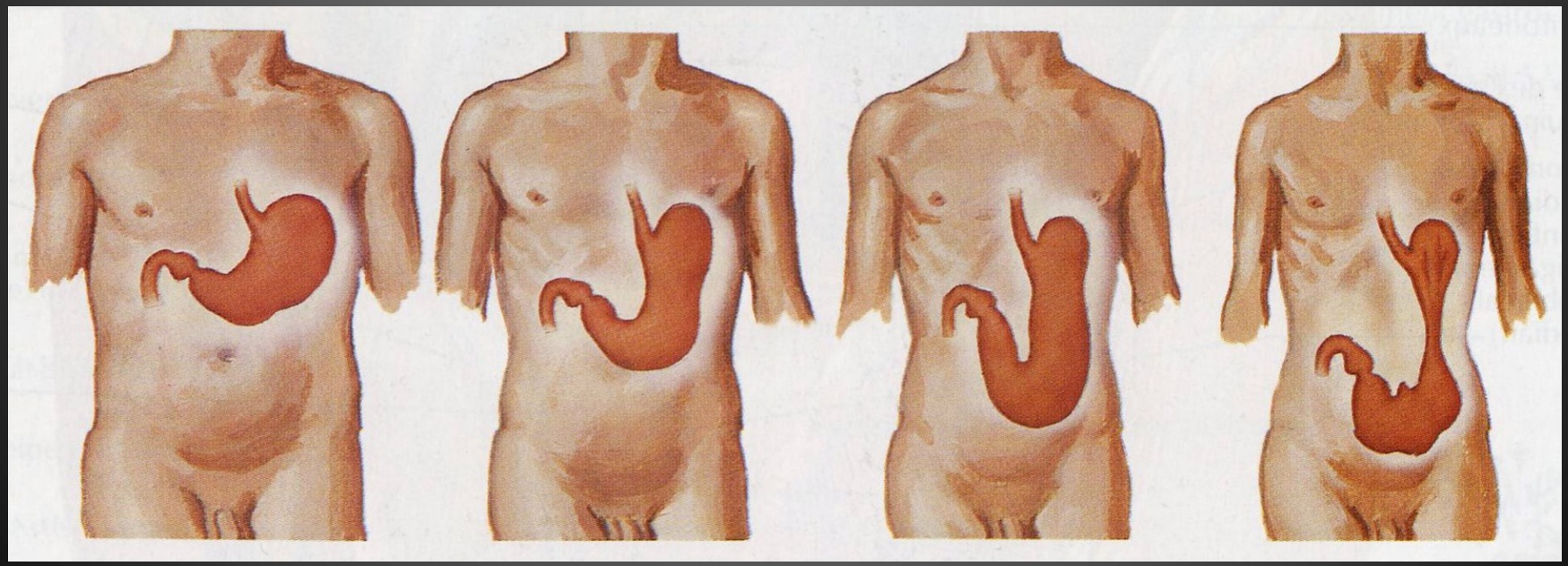
Ehlers-Danlos gastroptosis



Osteopathy

Dysfunctions

- 3 dysfonctions :
  - Retraction,
  - Long stomach,
  - Ptosis.



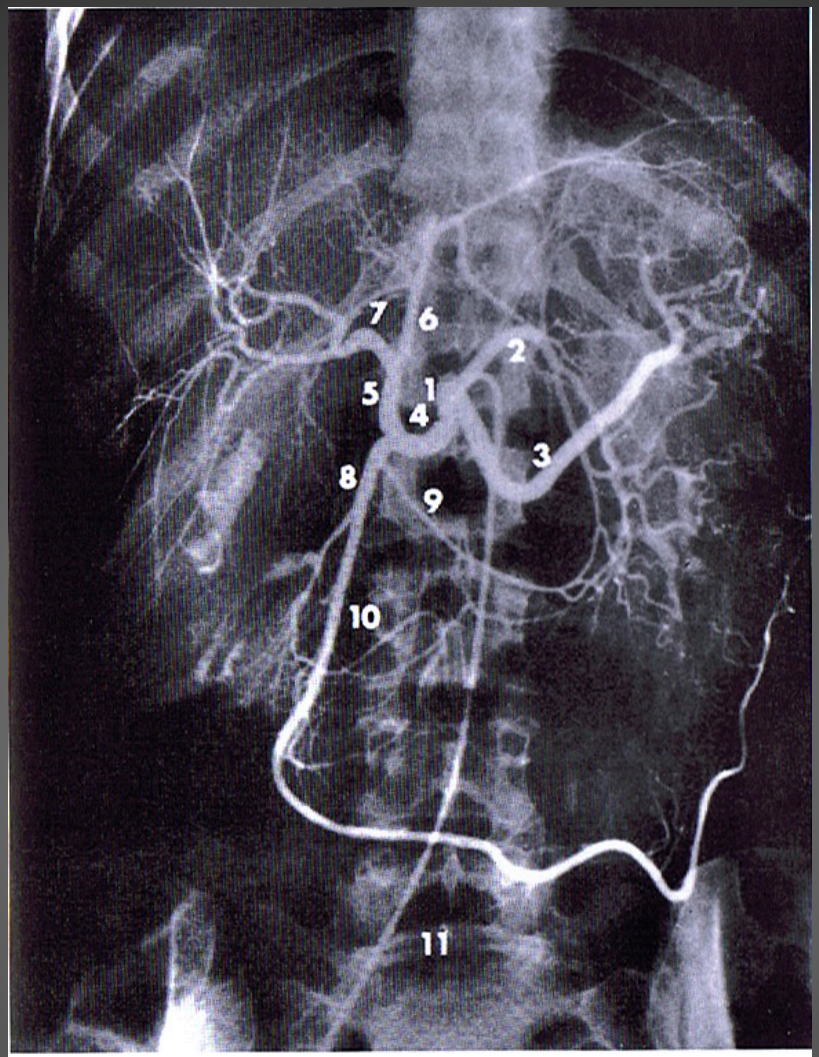


FIG. 16.13. Branches du tronc cœliaque : artériographie (cliché Dr Ph. Chartier)

1. tronc cœliaque
2. a. gastrique gauche
3. a. splénique (liénale)
4. a. hépatique commune
5. a. hépatique propre
6. r. hépatique gauche
7. r. hépatique droit
8. a. gastro-duodénale
9. a. gastrique droite
10. a. gastro-épiploïque droite
11. cathéter

I - Symptoms

- <u>Retraction :</u>
  - Gastric inflammation = burning, cramps,
  - Stress +++ is a factor,
  - Fast eating,
  - Can eat only small amount of food (full fast),
  - Eructation relieves often,
  - Bloating usually above the umbilicus,
  - Distant pains : left shoulder, neck on the left, middle dorsalgia.

- Long stomach :
  - = 1st degree ptosis : The muscular layer is loose,
  - Slow digestion,
  - Usually people who eat and drink a lot,
  - Difficult to lie down on the belly,
  - Abdominal fullness,
  - Meal is « heavy » in the belly,
  - Post-partum, age, after stopping sport…
  - Distant pains : Left shoulder pain / neck pain, middle dorsalgia.

- Ptosis :
  - = 2nd degree ptosis : Muscular layer is loose + suspensory ligaments are loose (gastrophrenic ligament),
  - Same symptoms as 1st degree, but more intense,
  - Slow digestion,
  - Usually people who eat and drink a lot,
  - Difficult to lie down on the belly, difficult to wear a belt,
  - Abdominal fullness,
  - Meal is « heavy » in the belly,
  - Post-partum, age, after stopping sport…
  - Asthenic posture,
  - Distant pains : Left shoulder pain / neck pain, middle dorsalgia.

II - Diagnosis

- <u>Retraction :</u>
  - Hard hemithorax on the left side,
  - Finger pressing on the stomach is painful,
  - Left diaphragmatic dome is high,
  - Hypertension on the left abdominal side,
  - Top of the stomach is normal or little bit higher than normal,
  - Bottom of the stomach is higher than normal,
  - Stomach is « hard »,
  - Rumbling when moving the stomach.

- Long stomach :
  - Hard hemithorax on the left side,
  - The left diaphragm dome is low,
  - Abdomen is normal or slightly tensed on the left,
  - Top of the stomach is normal,
  - Bottom of the stomach is lower,
  - Stomach is « soft » during palpation,
  - « Splashing noise » above the umbilicus,
  - Relieve/Worsening tests are positive,
  - Rebound test on the bottom of stomach is positive.

- Ptosis :
  - Hard hemithorax on the left side,
  - Left diaphragmatic dome is low,
  - Abdomen muscles are loose (softer),
  - Top of the stomach is lower than normal,
  - Bottom of the stomach is lower than normal,
  - Stomach is « soft » during palpation,
  - « Splashing noise » below the umbilicus,
  - Relieve/Worsening tests are positive,
  - Rebound test on the top and bottom of stomach is positive.

Pratique

Tests

Top of the stomach : 6th intercostal space on the left :

Percussion : tympanism

Bottom of the stomach :

1 or 2 fingers above the stomach

Relieve/worsening test :

If suspicion of long stomach or ptosis

Rebound Test :

- Bottom of the stomach = long stomach,
- Or Top of the stomach = gastrophrenic ligament (ptosis).

Tests of the ligaments :

Lesser omentum,

Gastrosplenic ligament,

Gastrocolic ligament.

Corrections

Don’t forget to ask and advise the patient about his lifestyle (food, way to eat, what he eats…)

+ sport if ptosis.

- <u>Global treatment :</u>
- Mecanical links :
  - Ribs + vertebrae,
  - Left diaphragmatic dome,
  - Transverse colon, mesocolon and angles,
  - Spleen,
  - Liver,
  - Jejunum and ileum.
- Vascular links :
  - Lesser omentum, gastrosplenic ligament,
- Neurological links :
  - Vagus nerves,
  - Greater splanchnic nerves.

Correction of the ligaments :

Lesser omentum

Correction of the ligaments :

Gastrocolic ligament,

Gastrosplenic ligament.

Correction of the retraction :

1 – Empty the stomach,

2 – Releasing the muscular layer.

Correction of the retraction :

Stretching the muscular layer (sitting position).

Correction of a long stomach :

Ascending the bottom of the stomach (+ vibrations).

Correction of the ptosis :

Correction of the gastrophrenic ligament (ascending the fundus).

Correction of the ptosis :

Ascending the bottom of the stomach (ptosis technique).

Intrinsic technique for the muscular layer of the stomach