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The stomach

*the stomach is a dilated part of the gastrointestinal tract, it's "J" shape.

*the lower surface of the stomach (the greater curvature) reaches the umbilical region, but sometimes it is found above the umbilical region and runs transversely.

*this short, transverse stomach looks like a deer's horn and it is called steer-horn stomach.

*also there is another type which the stomach looks like a "fish hook" as a long "J" shape making the lower margin reaches the pelvis, especially in people who are eating large amounts of food.

*the stomach is located in the epigastric region and in the left hypochondriac region.

*the stomach have various shapes, sizes, and positions, depending on the posture of the human body, as lying horizontally or standing or bending, also nervous tension changes the shape of the stomach.

*the size of the stomach depends on the content or the food you eat, it dilates as you eat, and shrinks as you fast, and it can dilate and stretch to give a great capacity such in over obese people.

*the stomach have anterior and posterior surfaces, lesser and greater curvatures.

*lesser curvature extends from the end of the esophagus down, and to the right of the stomach (forms the right side) with the lesser omentum between
the stomach and the liver, and in the free margin of the lesser omentum we have 3 vessels running, which are: common bile duct (the most revealed vessel), hepatic artery, and the portal vein.

* the greater curvature begins from the left side of the esophagus and the left side of the stomach.

- attached to the greater curvature there is an attachment called; **greater omentum”policeman”**.

- The greater omentum (policeman) covers the small intestine and the large intestine. And localizes the inflammation area in the abdomen by the attachment to the organ, to prevent the spread of the inflammation to another organ.

*the stomach can be divided to the following parts:*

1- **Cardiac portion**: which is located around the end of the esophagus.
2- **Fundus**: is the part located above the esophageal opening.

3- **Body**: extends from the lower border of the fundus to the incisura angularis.

4- **Pyloric portion**: extends from the Incisura angularis to the junction between the stomach and the dudenum. It divides into two parts: 1. the dilated part (pyloric antrum) 2. Pyloric canal.

    - Pylorus is the pyloric sphincter. Which is anatomical and physiological sphincter.
- The stomach is lined by a mucous membrane that folds into a longitudinal folds called **Rugae**. And we can visualize this (rugae) by giving the patient a barium meal (fluid mea), the barium is a radio-opaque and the soft tissue of the stomach is radio-transluscent.
- Soft tissues (muscles, skin) don’t appear on the radial image. How can we take a radial image for the stomach (which is a soft tissue)?

We fill the stomach with a radio-opaque substance (a substance which blocks the radiation) so the swallowed barium being like a gypsum in a container (the stomach), the barium will take the shape of the stomach, then because it is a soft tissue the radiation will pass through it, but the barium will reflect it, so we will see the barium taking the shape of the lumen of the stomach and by this we can see the rugae as a wrinkles in the barium.

* **radio-opaque**: is a substance that don’t allow the radiation to pass through it (reflexes the radiation so it can be visualized).

* **radio-translucent**: is a substance that allows the radiation to pass through it (don’t reflex the radiation so it can’t be visualized).

- This wrinkling in the mucous membrane gives the stomach the ability to dilate.

When you eat, the stomach is filled and dilated, then the rugae **disappears**.

- **What is the function of the mucous inside the stomach?** To protect the mucosa from digestion, because the stomach secretes HCL to digest the food particles. So, a thick layer of mucous lining the stomach wall to **protect** it from the action of HCL.

- Being a nervous person makes it easier to develop an ulcer in stomach or in duodenum (mainly in duodenum) and this ulcer may be anterior or posterior.

So, we have two types of ulcers; gastric ulcer and duodenal ulcer. And this increase the secretion of HCL.

It is treated by anti-acid (sodium bicarbonate, magnesium trisilicate), and this will give us salt and water. (acid+base-> salt + water), so reducing the acidity.
Stomach has got:

1. posterior surface.  
2. anterior surface. 
3. greater curvature. 
4. lesser curvature.  
5. Rugae.  
6. pyloric sphincter. 
7. esophageal sphincter.

* **pyloric sphincter** is an anatomical and physiological sphincter.  
* **esophageal sphincter** is a physiological sphincter.

- Esophagus enter the stomach in an acute angle (incisura cardiaca) through the esophageal sphincter. 

- No actual esophageal sphincter (physiological sphincter), due to the absence of muscles within the sphincter.

- when the stomach is filled with food the fundus dilates and press on this sphincter and close the opening (esophageal sphincter).

**- The relations of the stomach:**

- The stomach is surrounded by the **peritoneum** from all the sides.

  - **Anteriorly:**

    1. the diaphragm. 
    2. Left lobe of the liver
    3. abdominal wall. 
    4. left costal margin.

  - **Posteriorly; “stomach bed”**
1. lesser sac.  
2. transverse mesocolon.  
3. Transverse colon.  
4. spleen/splennic artery.  
5. Pancreas.  

- Stomach bed separated from the stomach **by the lesser sac**.

- lesser sac is confined behind the stomach behind the lesser omentum and extends downwards “it is component of the stomach bed”.

- **common bile duct** located at the free margin of the lesser omentum and hepatic artery and behind them the portal vein.

- **epicolic foramen**; between the lesser sac & greater sac. The intestine can enter from this foramen and confined in the lesser sac. Also you can put your finger in the lesser sac through this foramen.

- the spleen behind the stomach (surrounded by the left side of the lesser sac). So the spleen is a part of the stomach bed, separated from the stomach by **gastroplenic ligament**. And separated from the left kidney by **splenorenal ligament or lienorenal ligament**.
so the spleen is one of the stomach bed structures.

the spleen is posteriolateral and to the left of the stomach.

* the mesentery or ligament between the spleen and the stomach is called: gastrosplenic ligament.

* the stomach bed structures or the posterior stomach relations are:
  1- lesser sack   2- diaphragm (both posterior and anterior)   3- left kidney
  4- left suprarenal gland   5- pancreas   6- splenic artery   7- spleen

* the lesser curvature relations (superior border of the stomach):
lesser omentum: there are two arteries running through the lesser omentum, the left gastric and right gastric arteries.

* the greater curvature relations (inferior border of the stomach):
greater omentum: running through the greater omentum some arteries which are short gastric arteries, left gastroepiploic artery, and right gastroepiploic artery.
blood supply of the stomach:

*the celiac artery supplies the stomach because it is a part of the foregut, the celiac artery (2cm length) arises from front of the abdominal aorta above the level of the pancreas and devides to three branches: left gastric artery, splenic artery, and hepatic artery.

*so from celiac artery; the branch that supplies the stomach is the left gastric artery, it goes to the esophagus and supplies the lower part of it and then turns around the lesser curvature and supplies the upper part of the lesser curvature.

*hepatic artery gives rise to the right gastric artery which supplies the remaining part of the lesser curvature.

*also hepatic artery give rise to another branch, which is the gastroduodenal artery, this artery passes behind the first inch of the duodenum (intra peritoneal), and this artery gives two arteries: right gastroepiploic artery and superior pancreatieoduodenal artery, now the right gastroepiploic artery supplies the right side of the greater curvature (the inferior portion).
as we mentioned regarding the celiac trunk, one on the three arteries is the splenic artery, it goes behind the stomach, it supplies the spleen by splenic branches and the fundus by the short gastric branches. Also, the splenic artery gives rise to the left gastroepiploic artery which supplies the remaining portion of the greater curvature.

so the greater curvature is supplied by the: 1- short gastric arteries, 2- left gastroepiploic, and 3- right gastroepiploic arteries.

the lesser curvature is supplied by the: 1- left gastric artery, 2- right gastric artery.

what goes for arterial supply also goes for venous drainage, and it will end with portal circulation.

nerve supply of the stomach:

the stomach receives sympathetic and parasympathetic innervation.

A the parasympathetic's role is motor-secretor and its source is the vagus nerve, we have two vagus nerves descends from the chest with GI and they are lateral on the right and left, but because of the rotation of the stomach they became anterior and posterior vagus nerves.

the anterior vagus nerve (left vagus) supplies the anterior surface of the stomach and give a branch to the liver (hepatic branch) and from the hepatic branch arise the pyloric branch which supplies the pylorus region.

the posterior vagus nerve (right vagus) supplies posterior surface of the stomach and gives a branch to the celiac plexus to extend the innervation to the small and large intestine.

B the sympathetic's role carries the pain sensation, and motor to pyloric sphincter (contraction of the sphincter, while the parasympathetic relaxes it).

the sympathetic innervation comes from spinal segments T6-T10 via the greater splanchnic nerve.
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<th><strong>parasympathetic</strong></th>
<th><strong>sympathetic</strong></th>
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<td>Pre-ganglionic fibers</td>
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<td>Arises from T6-T10 spinal segments through greater</td>
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<td>Post-ganglionic fibers</td>
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<td>lymphatic drainage :</td>
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<td><em>lymphatic drainage runs alongside the arteries as :</em></td>
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<td>hepatic and celiac lymph nodes .</td>
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<td><strong>C</strong></td>
<td>from the upper part of the greater curvature the lymph</td>
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<td>goes to the pancreaticosplenic lymph nodes &quot;also called pancreaticocolienal&quot; then goes ( alongside the splenic artery ) to the celiac lymph node .</td>
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D from the lower left part of the greater curvature i didn't really understood what is the name of the node he said but it moves after it alongside the splenic artery to the celiac lymph node.

E from the lower right part of the greater curvature the lymph goes (alongside the right gastroepiploic) to the hepatic lymph nodes then to the celiac lymph node.

*the lymph from all around the stomach drains in the celiac lymph node, so if there was a tumor in the stomach you'll have to check the celiac lymph node to see if the metastasis reached it, so you could take a decision of removing it or leaving it.

*if an ulcer developed in the duodenum it might perforate to an adjacent artery, the artery that is most likely perforated is the gastroduodenal artery, and this injury has a high risk and it may be fatal.

**histology of the stomach:**

*the gastric mucosa consists of surface epithelium (columnar epithelium), gastric pits and gastric glands, The gastric glands extends in the mucosa, from the muscular mucosae to the stomach lumen; they open via gastric pits.

*Glands differ in different regions of the stomach as:

A **cardiac area**: small area of predominantly mucus secreting glands surrounding the entrance of the oesophagus, glands are less coiled than in the pyloric antrum glands, the pits are shorter than the pyloric antrum pits.
**B fundus & body**: consists of straight, tubular glands that secrete gastric juices, as well as protective mucus. The glands contain mucous cells (secrete mucus), oxyntic "parietal cells" (secrete acid and intrinsic factor), peptic cells "chief cells" (secrete pepsinogen enzyme), and endocrine cells (secrete gastrin).

**C pyloric portion**: branched glands open into deep irregular shaped pits composed of mucus secreting cells. It also contains scattered 'G' cells (endocrine cells secrete gastrin).

*types of different cells in the stomach as:

**A mucous secreting cells**: on the mucosal surface (goblet cells) Line the luminal surface of the stomach and gastric pits and gastric glands. Produce mucus and bicarbonate, mucous cells are also present in the neck of glands.

**B parietal cells (oxyntic cells)**: distributed throughout the length of the gland, but are numerous in the middle portion, large, and rounded cells with eosinophilic cytoplasm and centrally located nucleus, produce gastric acid.

**C Chief cells (peptic or zymogenic cells)**: clustered at the base of the gland, identified by basally located nuclei and strongly basophilic granular cytoplasm, produce pepsinogen, digests protein.
gastric gland in fundus and body (eosinophilic oxyntic cells & basophilic chief cells)

gastric gland in pyloric region