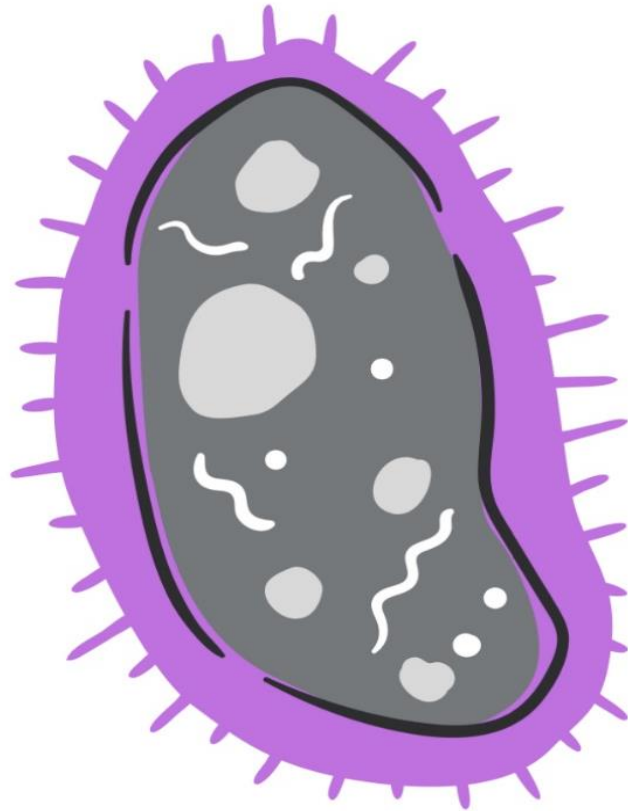


GIS



Sheet no. 8

Microbiology



Done by: *Rahaf Turab & Salsabeel Aljawabrah*

Correction: *Rahaf Turab & Salsabeel Aljawabrah*

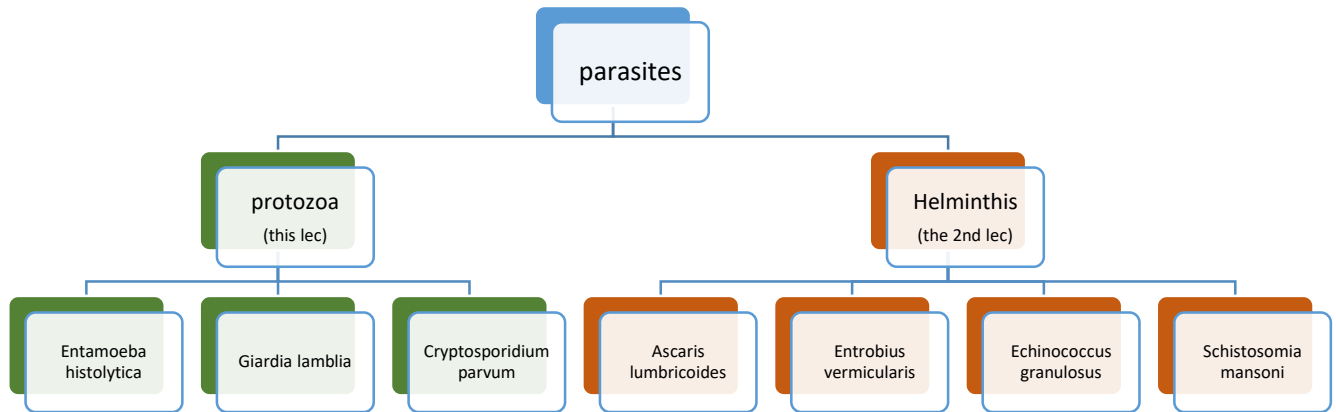
Doctor: *Nader Alaridah*

*Today's lecture we're going to talk about **parasitic infections of the GI tract**.

*pay attention that this topic is divided into 2 lecture but weighing 3 lectures in the exam. Let's start.



Overview:



Some notes about the above before we start:

- ✚ We divide the intestinal parasites into 2 phyla which are the 1. protozoa (unicellular) and 2. helminthis (metazoa, multicellular).
- ✚ Usually their division is based on the 1. organ of locomotion (if they have), and the 2. mode of reproduction.
- ✚ The first family of the protozoa is the rhizopoda → the organ of locomotion is the pseudopods and for the mode of reproduction they reproduce by binary fission (asexually).
- ✚ Entamoeba histolytica is the causative agent of **Amoebiasis** (wide spectrum, we know mainly about amoebic dysentery –which is only a single form of it-). الزحار الأميبي.
- ✚ Giardia lamblia (known also as Giardia deodenalis or Giardia intestinalis) the causative agent of **Giardiasis** –also known as Beaver Fever-.
- ✚ Cryptosporidium parvum, Cryptosporidium hominis causes **Cryptosporidiosis**.
- ✚ For helminthis it's imp. To dig deep into Echinococcus granulosus (especially in the GI system surgery), Causes **hydatid disease**.
- ✚ Schistosoma the causative agent of **schistosomiasis** –one of them is the bilharzia-.

Entamoeba histolytica

❖ Geographical distribution:

It's **world widely distributed**, but it is thought that it is more common in tropical and subtropical regions and in the areas where the personal hygiene level is low as well as the standards of sanitation are poor.

It has high prevalence in Jordan.

❖ Habitat:

The pathogenesis happens in the large intestine in the areas with fecal stasis where there is slow movement for the feces -mainly in the celiac flexures, caecum, and the sigmoidal region-

(In contrast the Giardiasis happens in the upper part of the small intestine).

Always remember that when talking about Entamoeba histolytica it is possible to have invasion to the mucosal & the submucosal layers.

The patient usually suffer from abdominal pain, diarrhea sometimes with mucus and RBCs as well as WBCs in it.

❖ Defenitive host:

Human

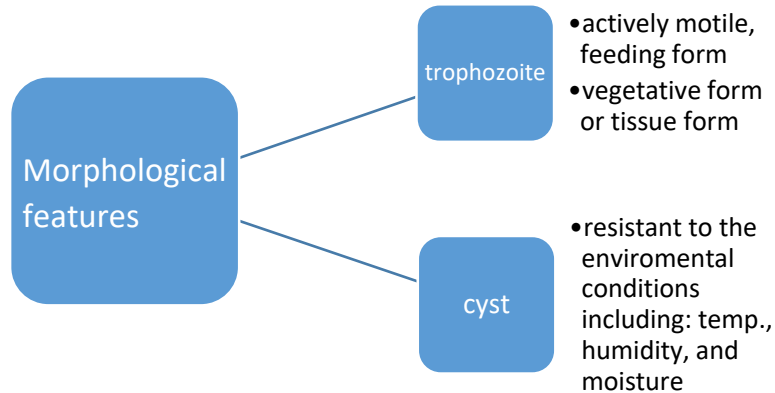
❖ Reservoir host:

Human as well as other animals such as dogs, pigs, rats, and monkeys.

❖ Disease:

Amoebiasis or amoebic dysentery.

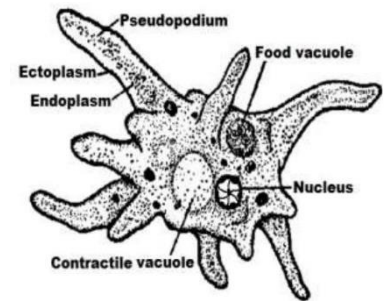
❖ Morphological features:



1. Trophozoite stage

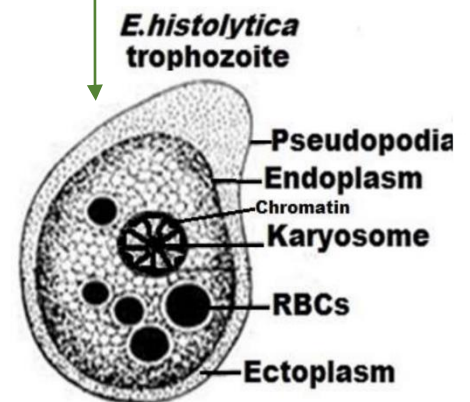
This is the shape of *Entamoeba histolytica* in the vegetative form.

When drawn it has a finger like projections which are called the pseudopods.



But virtually it looks like this, it has 2 plasma membranes (the endoplasm and the ectoplasm).

- The endoplasm is usually granular contains **nucleus** and **karyosomes** (fine chromatin granule in this family -which is the rhizopoda-) and also it contains **RBCs**.



When we find *Entamoeba histolytica* in feces we need to treat and eradicate it.

So again the presence of ingested **RBCs** is a **pathogenomic feature** for *Entamoeba histolytica* or other pathogenic one but not the comensal ones.

The presence of RBCs helps us to differentiate the *Entamoeba histolytica* from other non-pathogenic *Entamoeba* that can survive in the large bowel such as *Entamoeba hartmani* and *Entamoeba dispar* which also can be found in the feces of the patient.

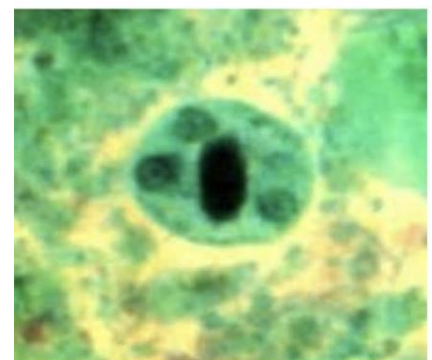
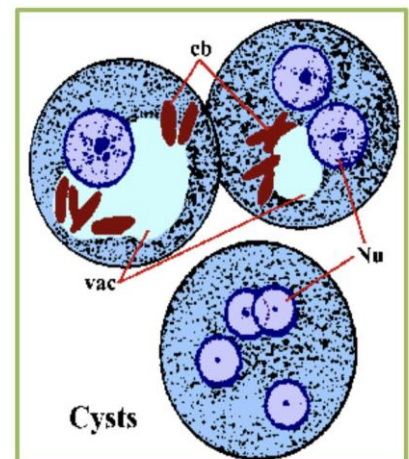
2. Cyst stage:

The cyst is more spherical in shape and have nucleus which can be **immature** including: uninucleated, binucleated or **mature** quadrinucleated.

The infective form is the quadrinucleated.

This type could be found in the lumen inside the large bowel.

This is the most common form for the spectrum of Amoebiasis which is found in the healthy carrier or the cyst passer.



❖ Mode of transmission

Now we will talk about the occurrence of the infection:

Firstly, the route of transmission is the **feco-oral route** by ingesting contaminated water or food.



Don't forget that when we say feco-oral route it also includes an indirect ways such as **flies, cockroaches** that carry the fecal material toward vegetables or fruits.



don't forget also about the **autoinfection** that happens in people with poor personal hygiene (from the anus to the mouth by hands), also the **homosexual** (anal-oral practices) these people are at higher risk of developing the disease.

The infection starts **by ingesting a mature quadrinucleated cyst** (as we said it can be found in contaminated food or water), then it passes its journey through the stomach → small intestine (where the excystation starts).

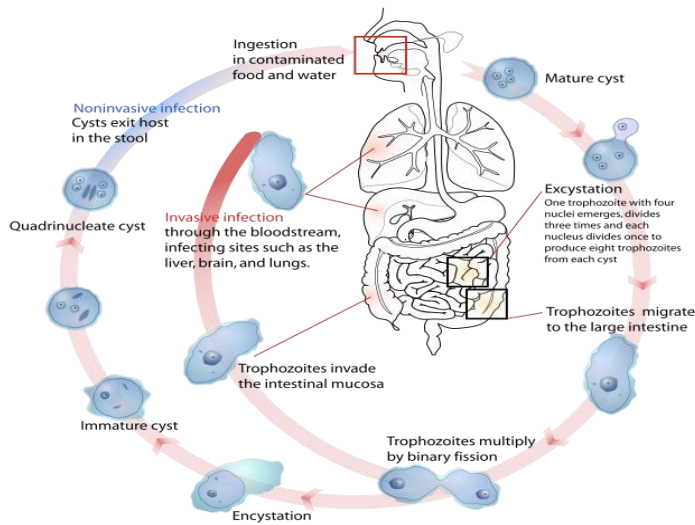
🌀 Each cyst gives rise to 8 trophozoites.

These trophozoites may reach the lumen of the large intestine with the cysts or start the process of invasion (mucosa → submucosa → and even they might disseminate hematogenously through the blood circulation to reach other organs such as the liver, lung, and the brain).

Another way to reach these organs is by direct extension (the colonic flexures are sites for ulcers which could be a result from direct extension to the liver or even to the lungs).

🌟 You must differentiate between the excystation that happens in the small bowel (1cyst → 8 trophozoites) and that which occurs when the cyst gets out of the body.

*the pic below will help you understand better...👍



Mode of infection

- 1- Contaminated water and foods (ex. green vegetables) or drinks or hands with human stool containing mature cyst.
- 2- Handling food by infected food handlers as cooks and waiters.
- 3- Flies and cockroaches that carry the cysts from faeces to exposed food.
- 4- Autoinfection (faeco-oral or hand to mouth infection).
- 5- Homosexual transmission.

This one is for you!!!! 🍌

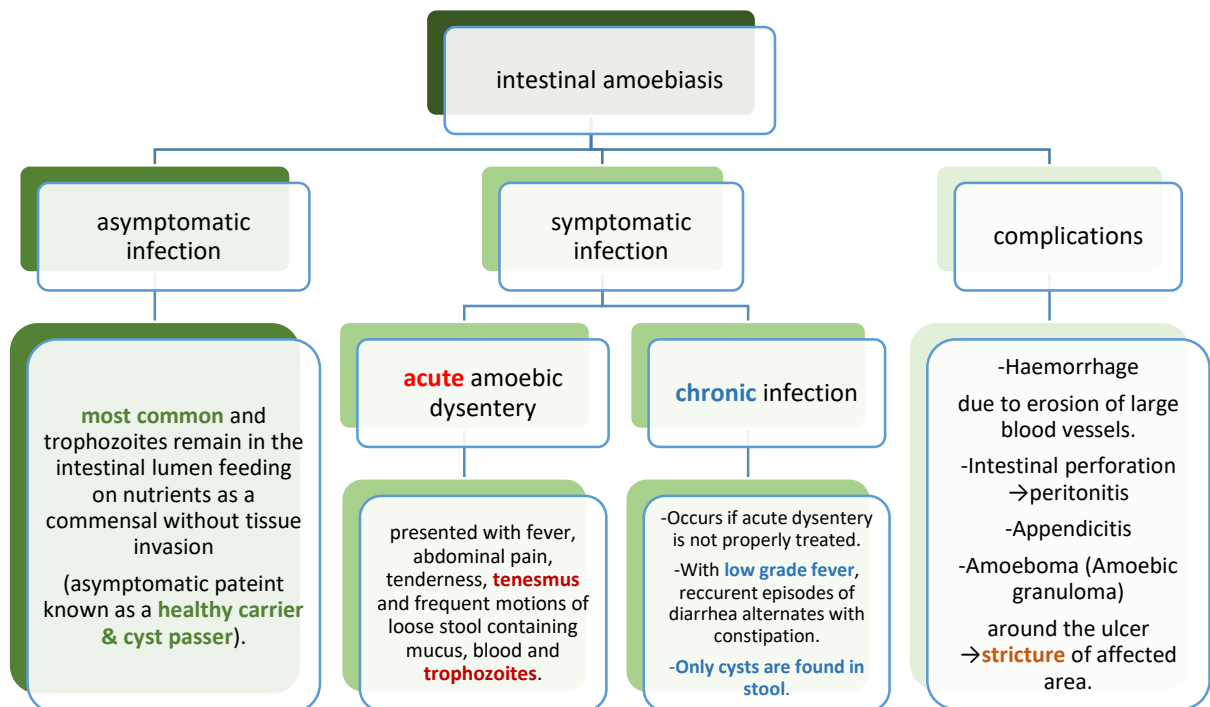
In general, **direct person to person transmission isn't well documented in Entamoeba histolytica** –in contrast to Giardiasis where the direct transmission from infected individual to susceptible host is high-.

This is known because in giardiasis there is clusters when there is an outbreak in a nursery, school, or even inside the family.

❖ Clinical pictures:

It is divided into intestinal amoebiasis & extra-intestinal amoebiasis.

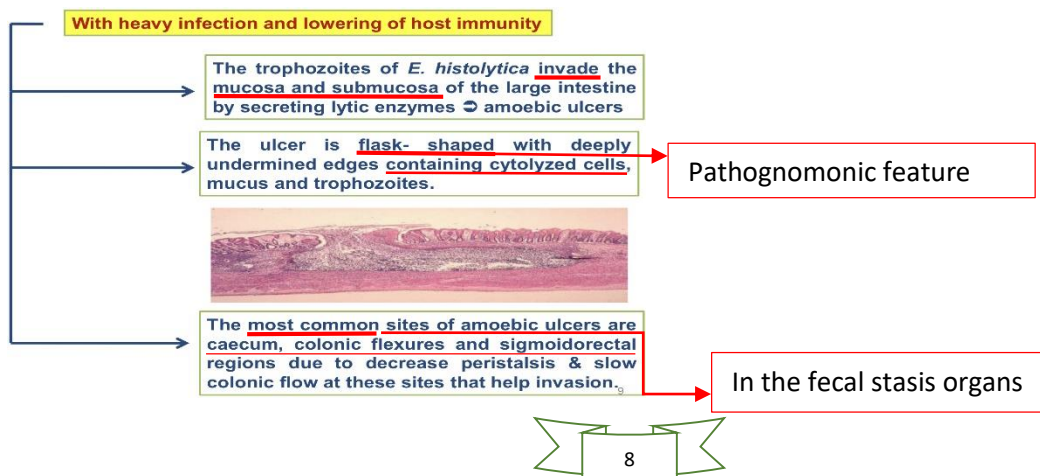
1. INTESTINAL AMOEBIASIS



Additional explanation about the scheme above: (pay attention to the colors☺)

🌀 The doctor really focused on the **wide spectrum** of amoebiasis so take care for this piece of information 😊

- ✚ In the **asymptomatic** infection **trophozoites & cysts** are found in the lumen of the large bowel but they are not invading the mucosa nor the submucosa →so they are **responsible for the continuation of the life cycle of Entamoeba histolytica**.
- ✚ If the patient is **symptomatic** (which is **less common** than the healthy carrier/ cyst passers) it might be acute or chronic.
 - In the **acute** one there is alteration in the bowel habit mainly diarrhea with **mucus, RBCs, and WBCs**.....and they even might suffer from **tenesmus** (an abdominal pain when the patient feels as if he want to defecate but there is nothing going out الختارية بحكولها التعنابة) which is a **differential diagnosis** for the acute .
 - The diarrhea (which is defined by knowing the consistency & the frequency) in the acute is loose →meaning that there is a high frequency so you can find **trophozoites in the stool** under the microscope (despite that the trophozoite is considered a tissue form & can't resist environmental conditions such as humidity & temp.).
 - So in the **acute amoebic dysentery the trophozoite is considered a diagnostic** stage but not in the chronic infection –here it must be cyst-.
 - In **chronic infection**, the constipation is followed by diarrhea which also may contain **mucus, RBCs, and WBCs**.
- ✚ Some **complications** in the pathogenesis include:
 - Invasion to the mucosa →submucosa →erosion to the blood vessels →**intestinal haemorrhage**.
 - It may perforate from the mucosa →submucosa →causing **intestinal perforation** in the abdomen & this causes the abdominal content to get out the abdomen to make **peritonitis** (inflammation in the peritoneum).
 - The granuloma formed in the healing process of Entamoeba histolytica may be found in the appendix causing **appendicitis**.
 - Every ulcer when healing makes **stricture** in the body (scar).



❖ **Laboratory diagnosis:**

The intestinal amoebiasis is diagnosed using one of the methods below:

1. **Direct:**

-**macroscopic:** by seeing the dysenteric stool which is loose, with the presence of mucus & RBCs.

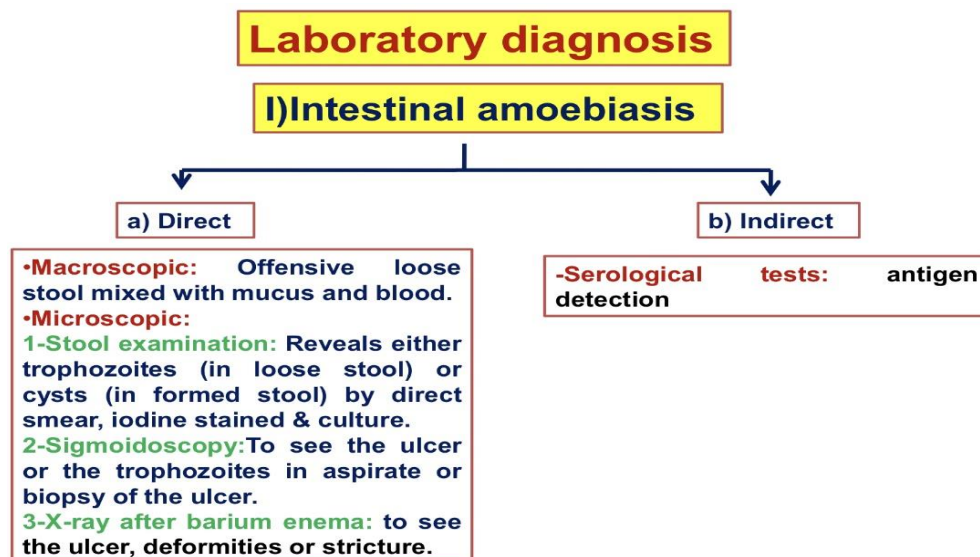
-**microscopic:**

- **Stool examination:** by preparing wet mount then searching for trophozoite or cyst according to the type of infection. Check the scheme above (page 9)
- **Sigmoidoscopy:** taking a biopsy to the histopathologist to observe the present of flask shaped ulcer.
- **X-ray after barium enema:** by giving the patient a dose of liquid like stain, white colored, which will cause strictures inside the body →then making x-ray.

2. **Indirect:**

-**serological tests:** antigen detection. (commonly used nowadays). Its disadvantage is that they are not positive in the most common form (asymptomatic infection).

🌿They becomes positive once there is invasion to the mucosa & submucosa (ex. Complement fixation, immunohistochemistry, immunofluorescence, rapid antigen detection by kits, commercial available enzyme immune assay).



2. EXTRA-INTESTINAL AMOEBIASIS:

Due to invasion of the blood vessels by the trophozoites in the intestinal ulcer → reach the blood → to spread to different organs as:

→ **Liver** →

-Amoebic liver abscess or diffuse amoebic hepatitis.
 -Affect commonly **right lobe** either due to spread via portal vein or extension from perforating ulcer in right colonic flexure.
 -CP: include fever, hepatomegaly and pain in right hypochondrium.

*Check page 6 ☺

Mainly by direct extension

→ Lung abscess, brain abscess →

Mainly haematogenously

☼ It may also reach the skin in the perineal region around the anus causing amoebic cutis (direct extension from sigmoidorectal amoebic ulcer causing amoebiasis on the skin of the perineum). Extra info. in the lec.

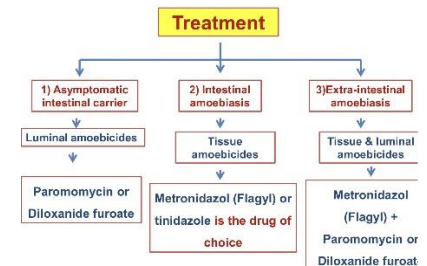
❖ Treatment:

- The drug of choice for the Entamoeba histolytica is the **flagyl**.
- Its mechanism isn't well understood, but it is known that it works by inhibiting the nucleic acid synthesis, and can't be activated unless it is reduced inside the body.
- Tissue amoebicides kills the trophozoites that are invading the mucosa & submucosa (the patient feels well after 48 hour, but after 2-3 weeks the same signs & symptoms will occur → because you didn't get rid of the cysts in the lumen of the large bowel) -the flagyl doesn't work on them-, so you need to give them **paromomycin** or **diloxanide furoate**.

2 main uses of flagyl:

*Anaerobic bacterial infection

*protozoal infection



❖ Prevention:

- Mostly the control of sanitation & the personal hygiene are the best ways for prevention.
- The water is the most common route of transmission for the Entamoeba histolytica where it remain viable in water for 4 months, and their cysts can't be killed by the conc. used to purify the water.

• Prevention:

- Amoebic infection is prevented by eradicating fecal contamination of food and water
- Water is a prime source of infection and therefore the most contaminated foods are vegetables such as lettuce
- Amoebic cysts are not killed with low doses of chlorine or iodine
- Bringing water to a boil ensures the absence of amoeba

The best way to get rid of these cysts is by mechanical filtration based on size, or even by chemical filtration → by giving iodine in a certain conc.

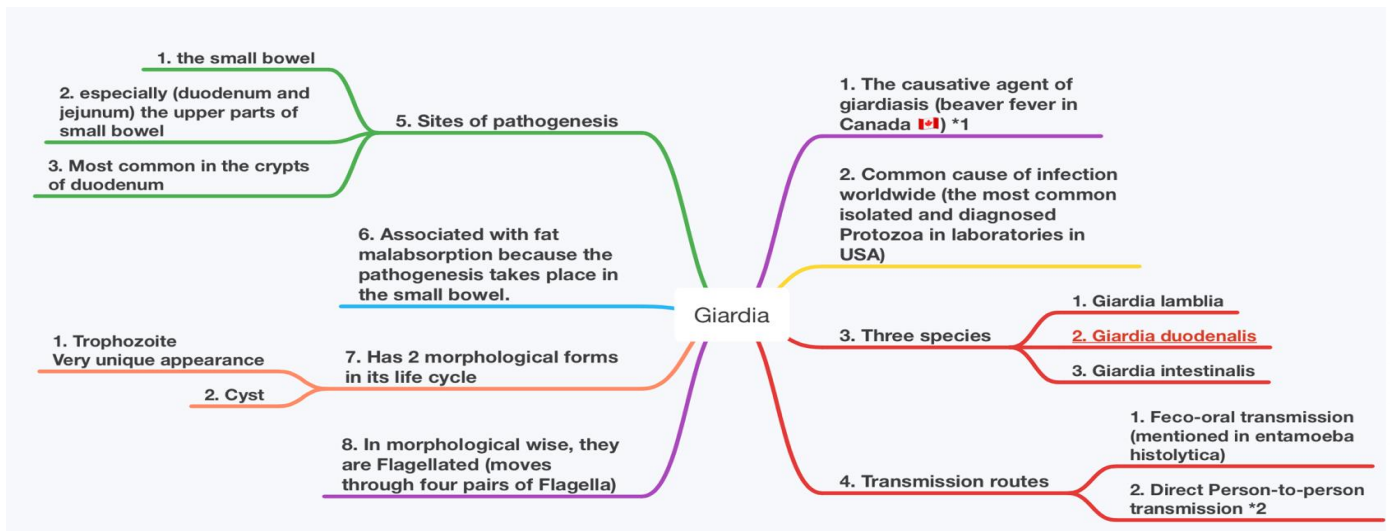
The rest is with salsabeel ☺☺

Salsabeel Jawabrah

you can ask me about anything regarding the following part...

good luck, good luck, good luck

B. Giardia:



A. Some notes about the mind map above

*1. Why beaver fever?

- It is thought that beavers □ (القدس: نوع من أنواع القوارض) are the reservoir host of giardia, they can carry the organisms in their bodies and they don't show symptoms and signs.

*2. Why person-to-person transmission?

- Clusters of giardiasis take place, these clusters may appear with in families, prison habitats or the care centers of children.

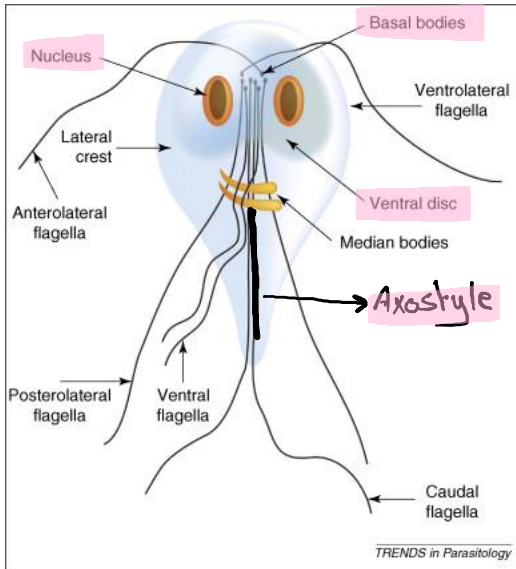
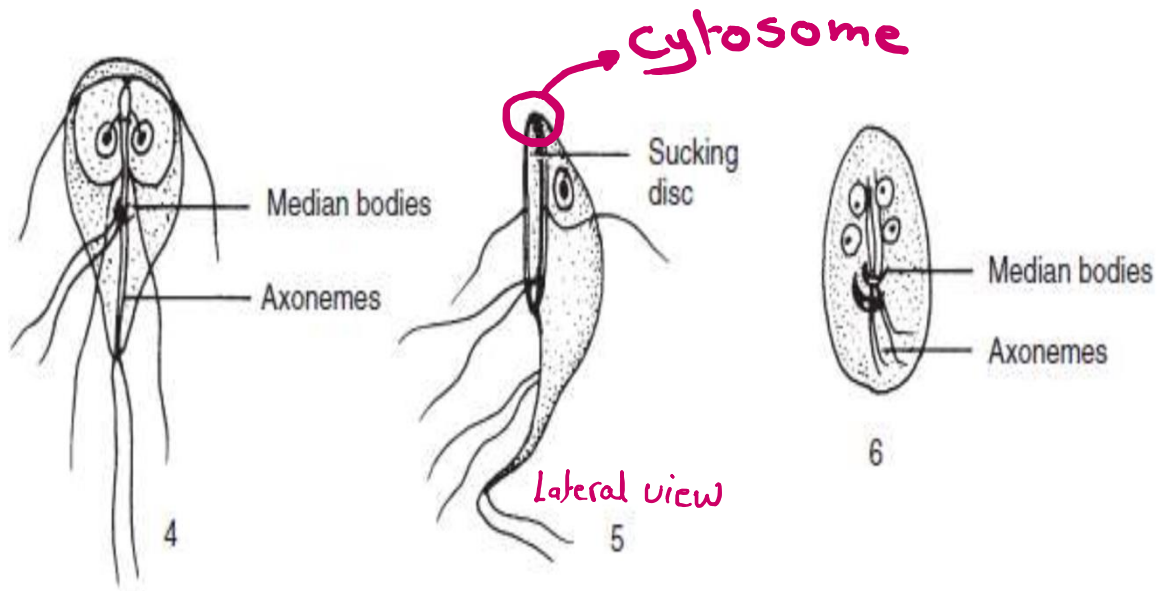
Trophozoites are attached to the epithelium of the host villi by means of the ventral disk.

Cyst formation takes place as the organisms move down through the jejunum after exposure to biliary secretions.

B. The morphological features:

1. Trophozoite :

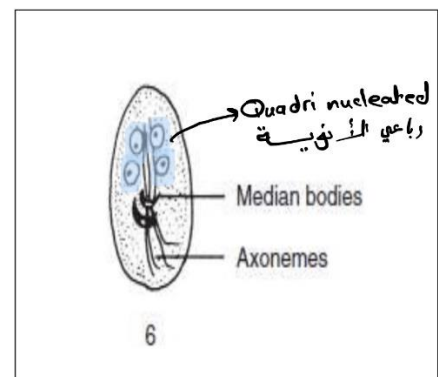




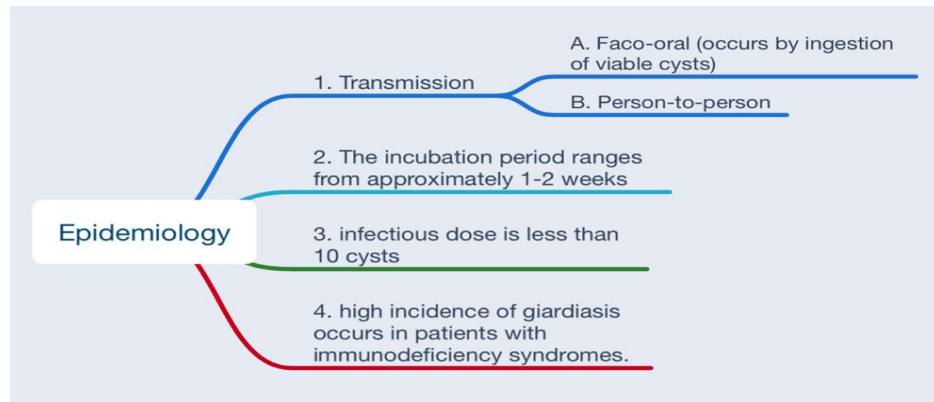
2. cyst:

Cyst

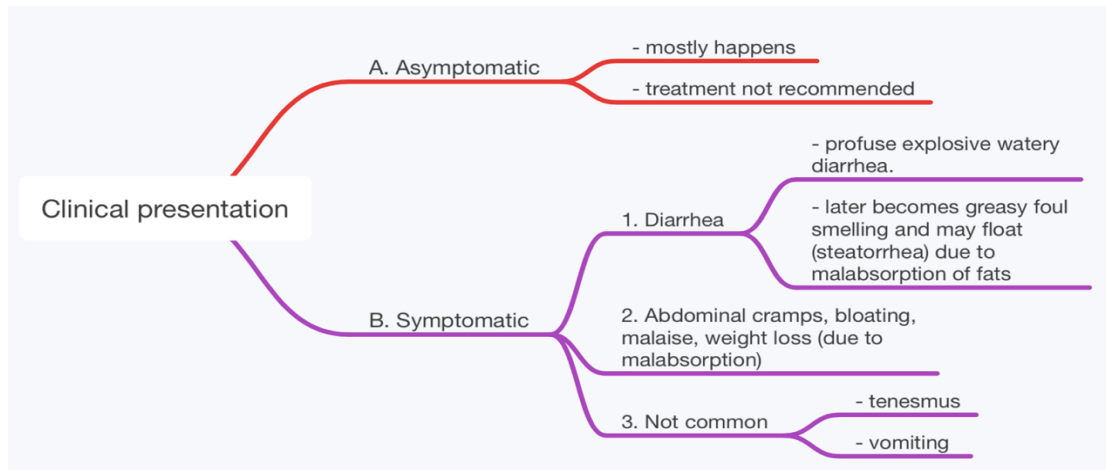
1. Elliptical in shape (بيضاوي)
2. The infective stage is quadrinucleated cyst



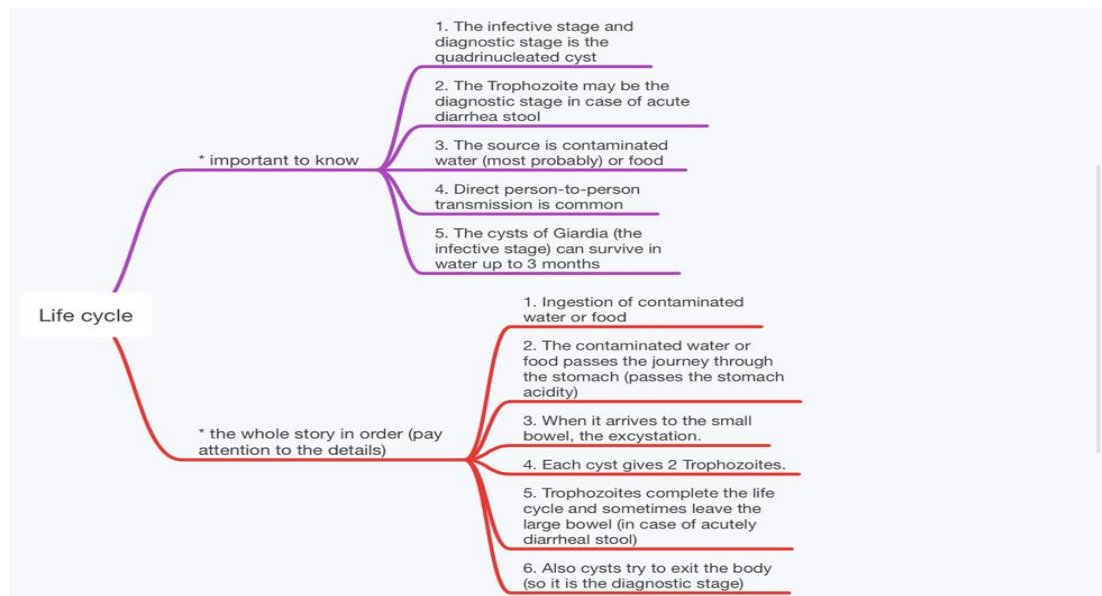
C. The epidemiology of Giardia :

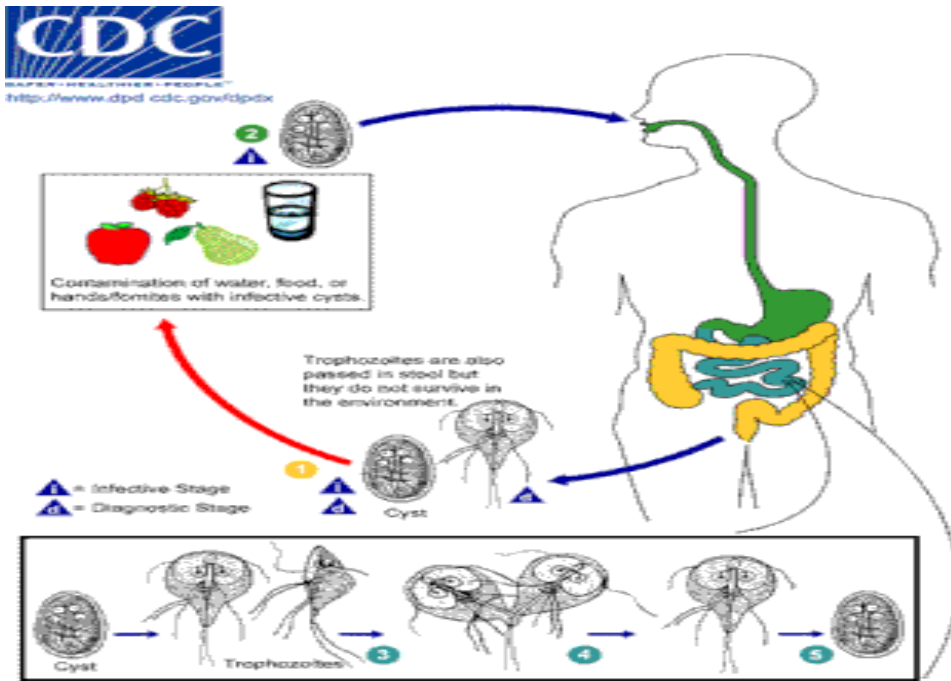


D. Clinical presentation:

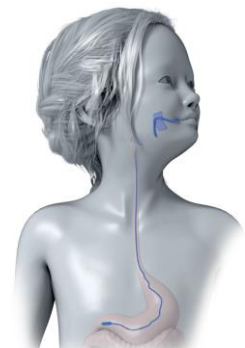
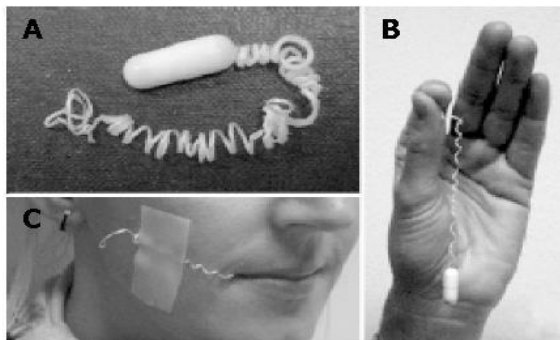
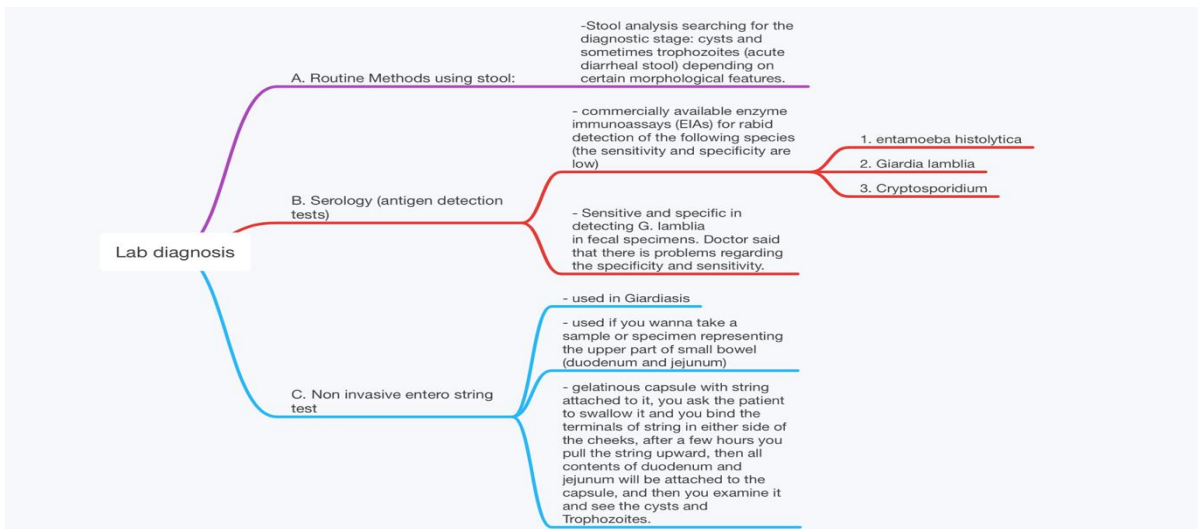


E. The life cycle / how does the infection take place ?





F. Lab diagnosis:

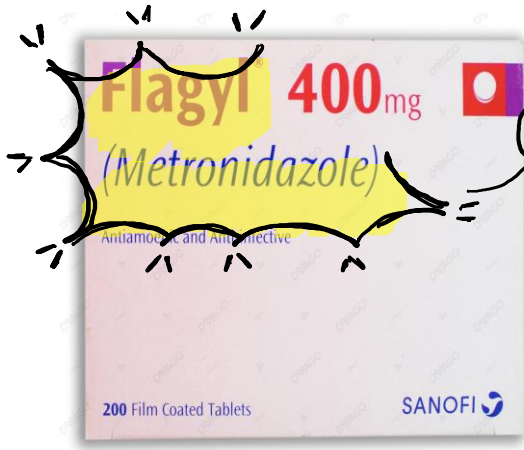


ADDITIONAL

PHOTOS

Yes, Dr. Nader asks about drugs ...

G. Treatment :



used for 5-7 Days
 Can be replaced by

Tinidazole

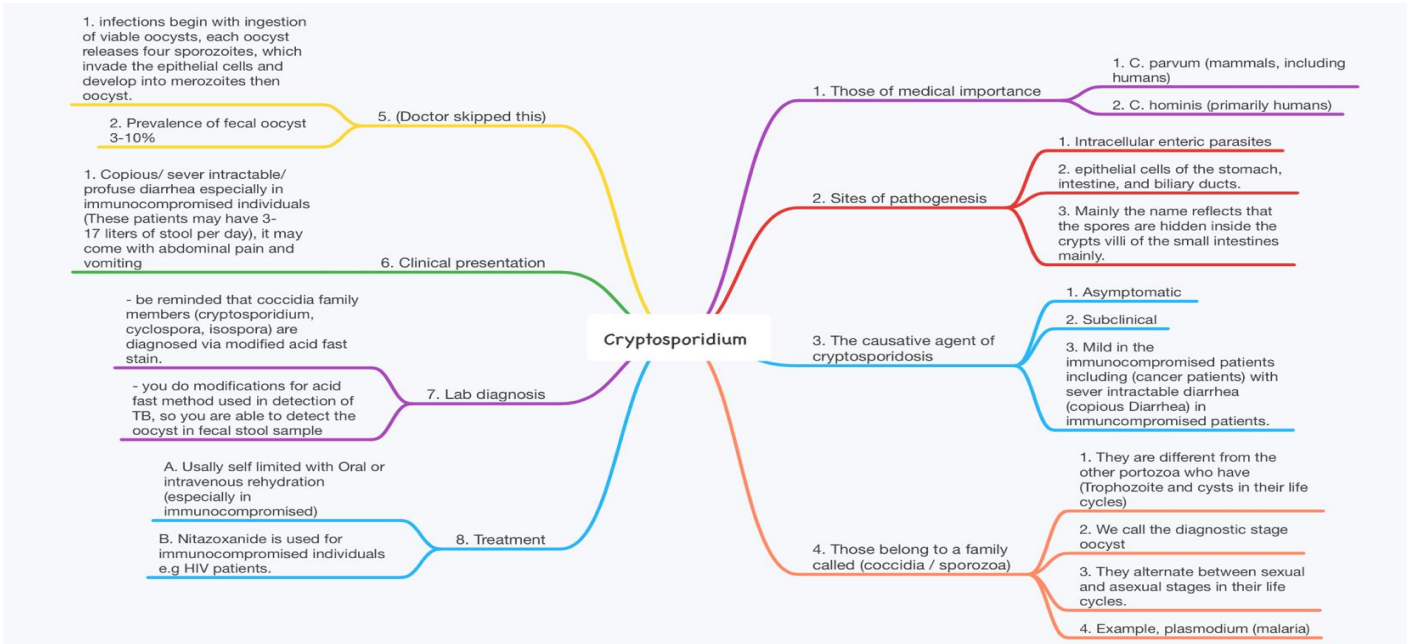
أفضل إنشوي / إيجام
 Doctor said
 but some books
 said 5-7 Days

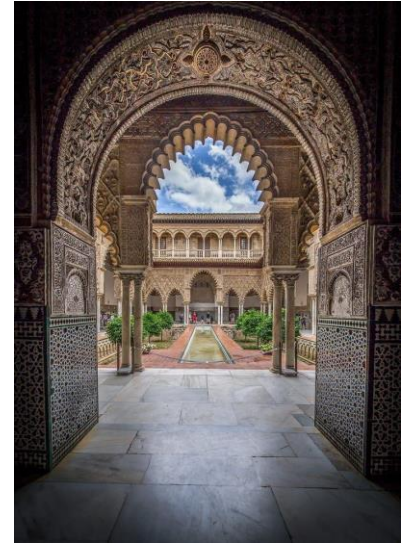


* Single Dose (just one time)

Doctor explained it in
last 3 min.

C. Cryptosporidium :





These two amazing pictures back to Andalusia, which was opened by Muslims in 28th Ramadan, never forget this piece of paradise 🌟

The end