

LECTURE: Intestinal Protozoa

Editing File

- Important
- Doctor's notes
- Extra explanation
- Only F or only M

"لا حول ولا قوة إلا بالله العلي العظيم" وتقال هذه الجملة إذا
داهم الإنسان أمر عظيم لا يستطيعه ، أو يصعب عليه القيام به .

OBJECTIVES:

- Know morphology of cysts and trophozoites of *Giardia lamblia* parasites
 - Describe life cycle of *Giardia* parasites
 - Describe *Giardia* trophozoites in tissue sections
 - Discuss the clinical picture of *Giardia* parasites (Typical and Atypical).
 - How to diagnose *Giardia* in the labs
 - Know the chemotherapy against *Giardia* parasites.
 - Summarize general features of Intestinal Entamoebae.
 - Know the six types of Entamoebae.
 - Compare between *E. histolytica* and *E. dispar*.
 - Describe Life cycle of *E. histolytica*
 - Discuss Pathology of *E. histolytica* (intestinal and extra-intestinal).
 - Diagnosis and treatment of Amoebae
 - Life cycle of *Cryptosporidium* and diagnosis
-

Classification Of Parasites

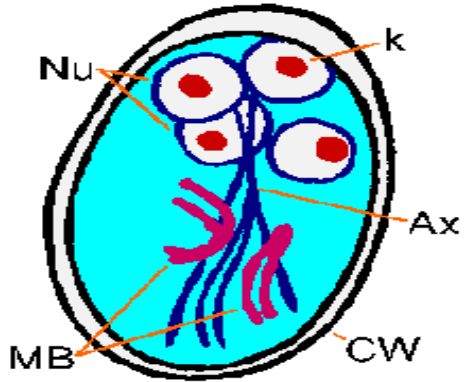
PROTOZOA	HELMINTHS
Unicellular Single cell for all functions	Multicellular Specialized cells
1) Amoebae : move by pseudopodia. 2) Flagellates : move by flagella. 3) Ciliates : move by cilia 4) Apicomplexa (Sporozoa) tissue parasites	<u>Round worms (Nematodes):</u> - elongated, cylindrical, unsegmented. <u>Flat worms :</u> - Trematodes : leaf-like, unsegmented. - Cestodes : tape-like, segmented.

Giardia Lamblia

2 stages:

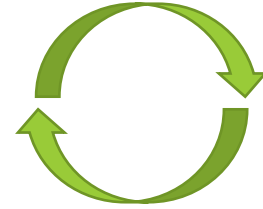
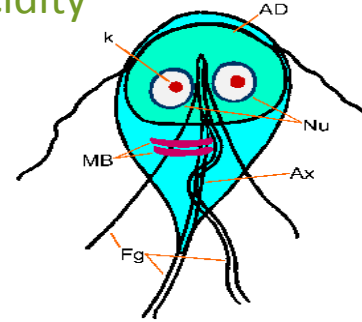
CYST

- **Infective stage**
why? Because it can resist the acidity of the stomach
- Multi-nucleated

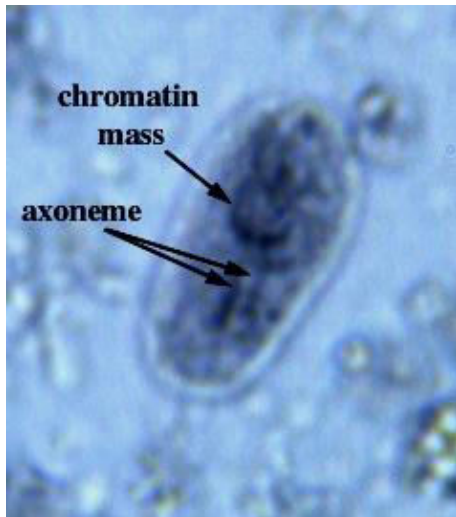


TROPHOZITE

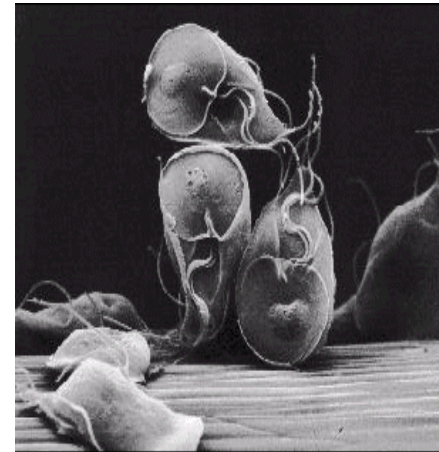
- Die in the stomach because of high acidity
- **Replicative stage**
- 2 nuclei & adhesive disc
- 8 flagella



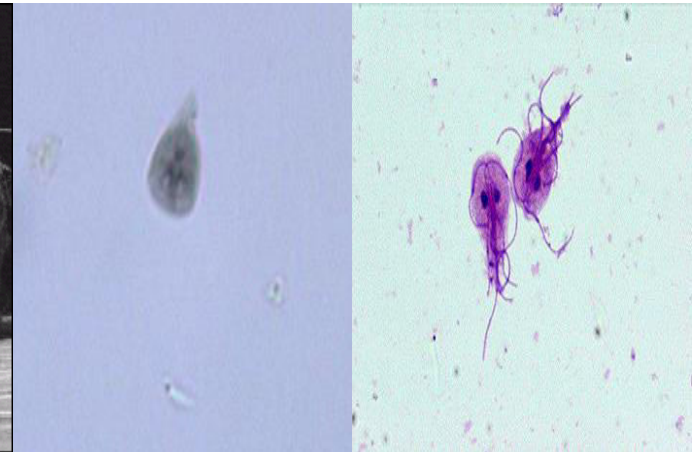
Diagnostic stage : both cyst and trophozoite



Giardia cyst (light microscope)



Giardia trophozoites (SEM)



Giardia trophozoites (light microscope)

Giardiasis

Clinical Picture

- The parasite mostly asymptomatic or can produce a wide range of gastrointestinal symptoms especially in children.
- Symptomatic Infections:
 - Typical picture: IP 1-2 wks followed by diarrhea, vomiting & flatulence for about 6 wks,
 - Atypical: Severe diarrhea, malabsorption (especially in children) and cholecystitis.

Laboratory diagnosis

- Stools examination:
 - Microscopy for cysts or trophozoites why? Because diagnostic stage are both
 - Detection of Giardia antigens in stools
- Examination of duodenal contents: trophozoites
because the pathogenesis and inflammation due to trophozoid but the infective stage is cyst








Chemotherapy

Drug of choice: **Metronidazole**



Giardia trophozoites in tissue section Seen by duodenal aspirate

Intestinal Amoebae

Stained							
	<i>Entamoeba coli</i>	<i>Endolimax nana</i>	<i>Iodamoeba bütschlii</i>	<i>Dientamoeba fragilis</i>	<i>Entamoeba histolytica</i>	<i>Entamoeba dispar</i>	<i>Entamoeba hartmanni</i>
Cytoplasm inclusions	With haematoxylin, stains bluish-grey Stain black except glycogen as clear area				RBCs also stain black		
Nuclear characteristics							
Membrane	Thick	Thin	Thick	Very delicate		Delicate	
Chromatin on membrane	Coarse	None	Sometimes granular	None		Fine granules	
Karyosome	Coarse, generally eccentric	Large irregular	Large lateral	Central granules		Small central	
Fibril network	May be chromatin particles	No chromatin	No chromatin	Delicate fibrils		Not often seen	
Pathogenicity	Harmless commensal	Harmless commensal	Harmless commensal	Disputed	Invasive	Harmless commensal Non-invasive	Harmless commensal Non-invasive

Entamoeba Histolytica

- Ameba is protozoa, unicellular and it can move by pseudopodia
- 500 million people are infected. 100,000 deaths per year. Worldwide distribution but is seen more often in tropical countries with poor sanitary conditions. **It is a waterborne infection.**
- There are 6 species of *Entamoeba*: (*important*)

1. E.histolytic →

Entamoeba histolytica:

- Amoebae that are **pathogenic** and **invasive**.

2. E.dispar →

E. dispar :

- The nonpathogenic, non invasive form.

3. **E.hartmanni**

4. **E.coli**

5. **E.gingivalis**

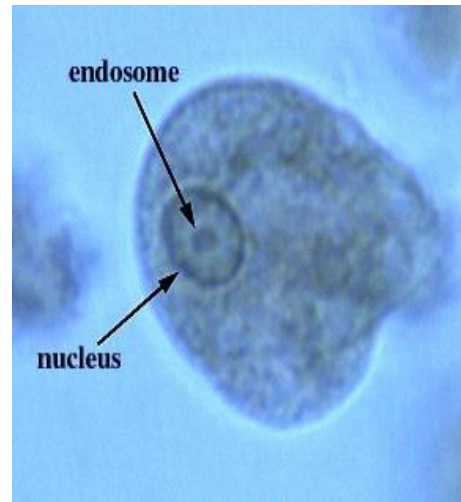
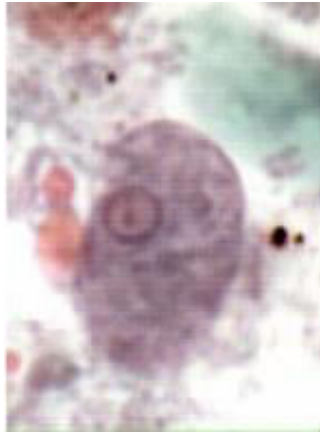
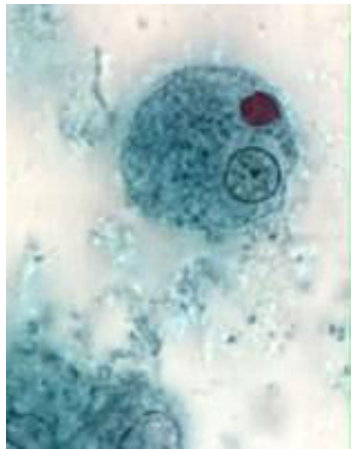
6. **E.polecki**

The 2 amoebae can't be distinguish by microscopic observation.

Entamoeba Histolytica

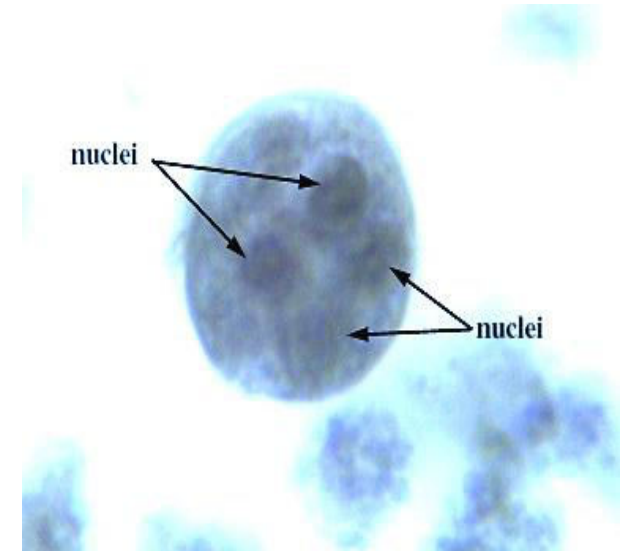
Trophozoite:

- **vegetative stage**,
- must encyst to survive in the environment.
- It is a fragile structure.

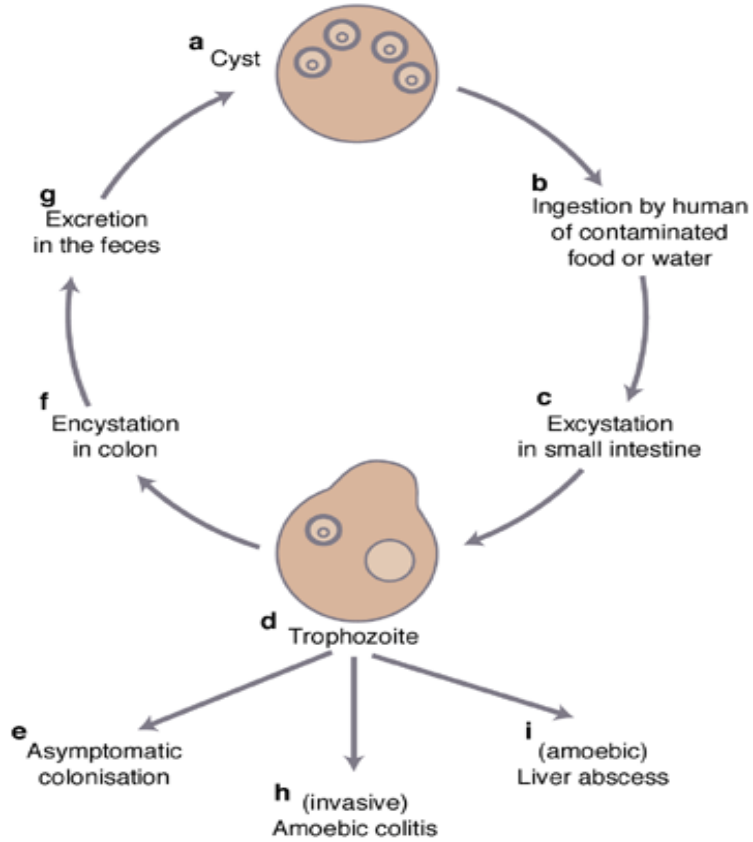


Cyst:

- **infective stage** and **diagnostic as well**
- Resist the harsh conditions of the environment.

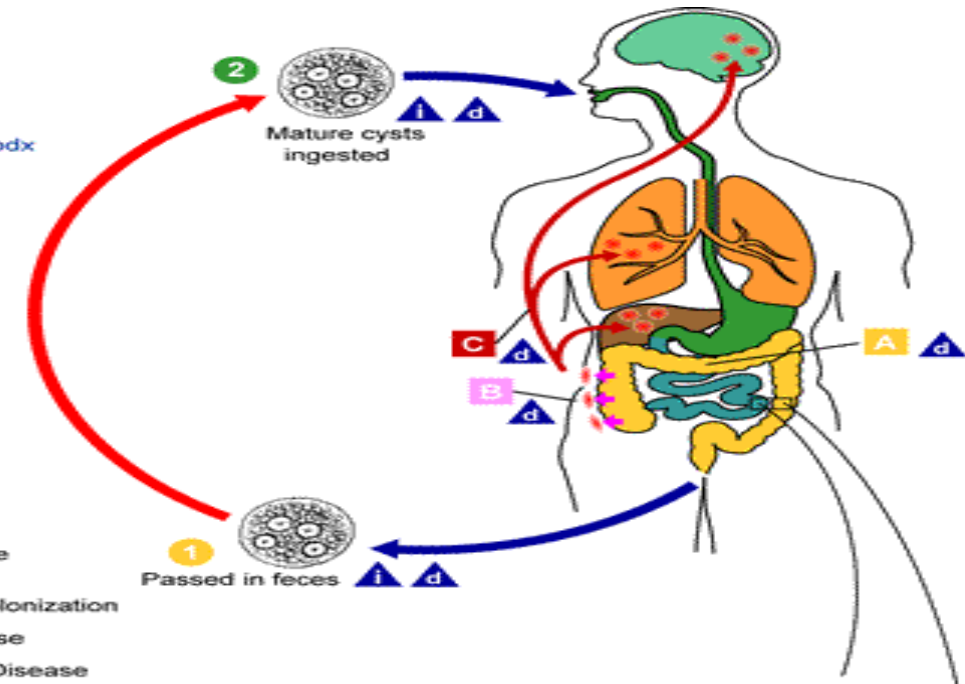


Entamoeba Histolytica

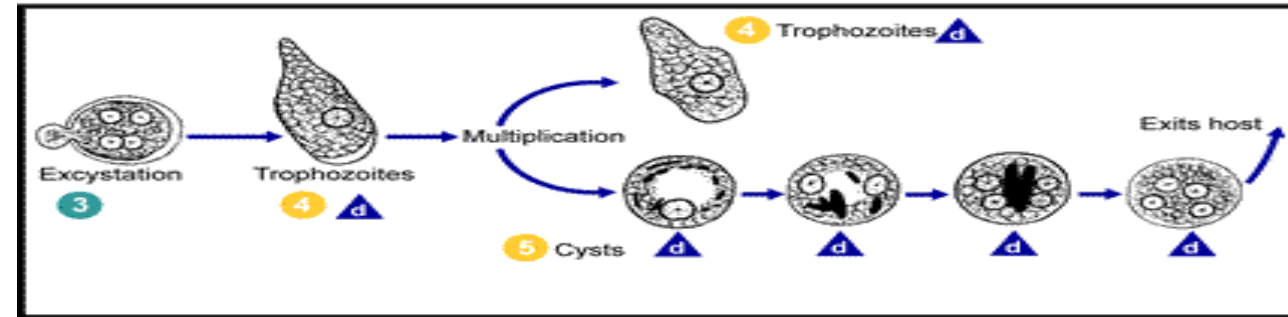


Life cycle of *Entamoeba histolytica* and the clinical manifestations of infection in humans

Expert Reviews in Molecular Medicine © 1999 and 2005 Cambridge University Press



- i** = Infective Stage
- d** = Diagnostic Stage
- A** = Noninvasive Colonization
- B** = Intestinal Disease
- C** = Extraintestinal Disease



Entameba: infective and diagnostic stage are cyst
 It is highly infectious even if you eat 1 cyst it will affect you

Asymptomatic colonisation: in High immunity individuals, protect himself and affect others by spread the infection

Entamoeba Histolytica

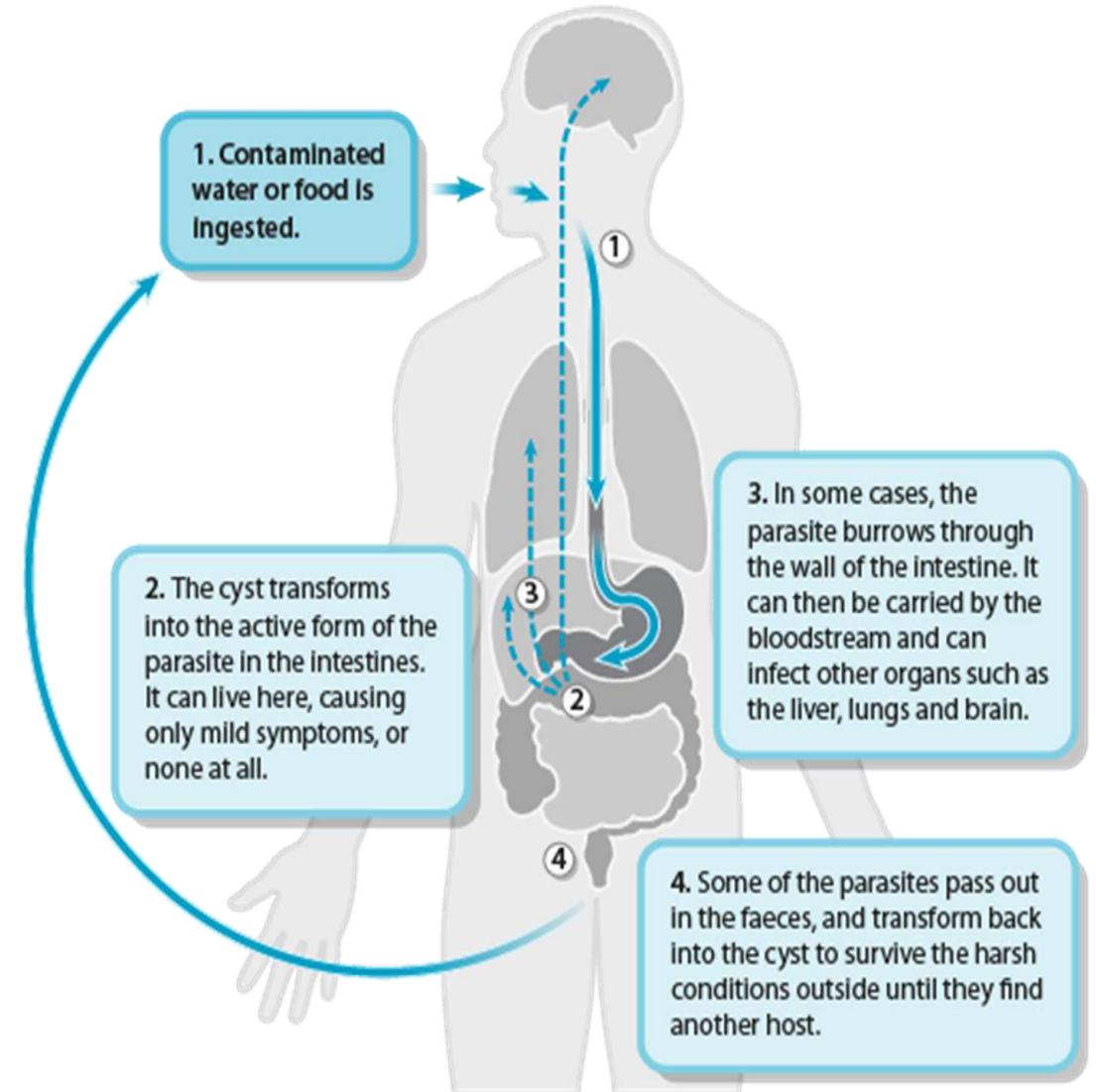
- Mode of infection (faecal-oral route)
 - Water, food
 - Flies can act as vector.
 - Can be sexually transmitted person to person contacts (cancel this point ! Because it is very very rare)
 - Not a zoonosis
 - The infective dose can be as little as **1 cyst**.
 - The incubation period can be from few **days** to few **weeks** depending on the infective dose. If the TROPHOZOITE is ingested it disintegrates in the stomach without producing infection.
 - Excystation occurs in the lower region of the small intestine and then production of 8 small amoebae which enter the large intestine and may: **(1) invade the tissue, (2) live in the lumen of large intestine without invasion, or (3) encyst (become a cysts and pass in the stool).**
 - Only the Cysts can survive in the environment for weeks at appropriate temperature and humidity after excreted from stool of infected patients.
 - *Tenia solium* can make cyst in liver, lung, brain and muscle AND amoeba can make 1- intestinal disease : intestinal ulcers in the large intestine 2-extraintestinal disease: radiate to liver, lung and brain
-

Entamoeba Histolytica

Only on the female slides

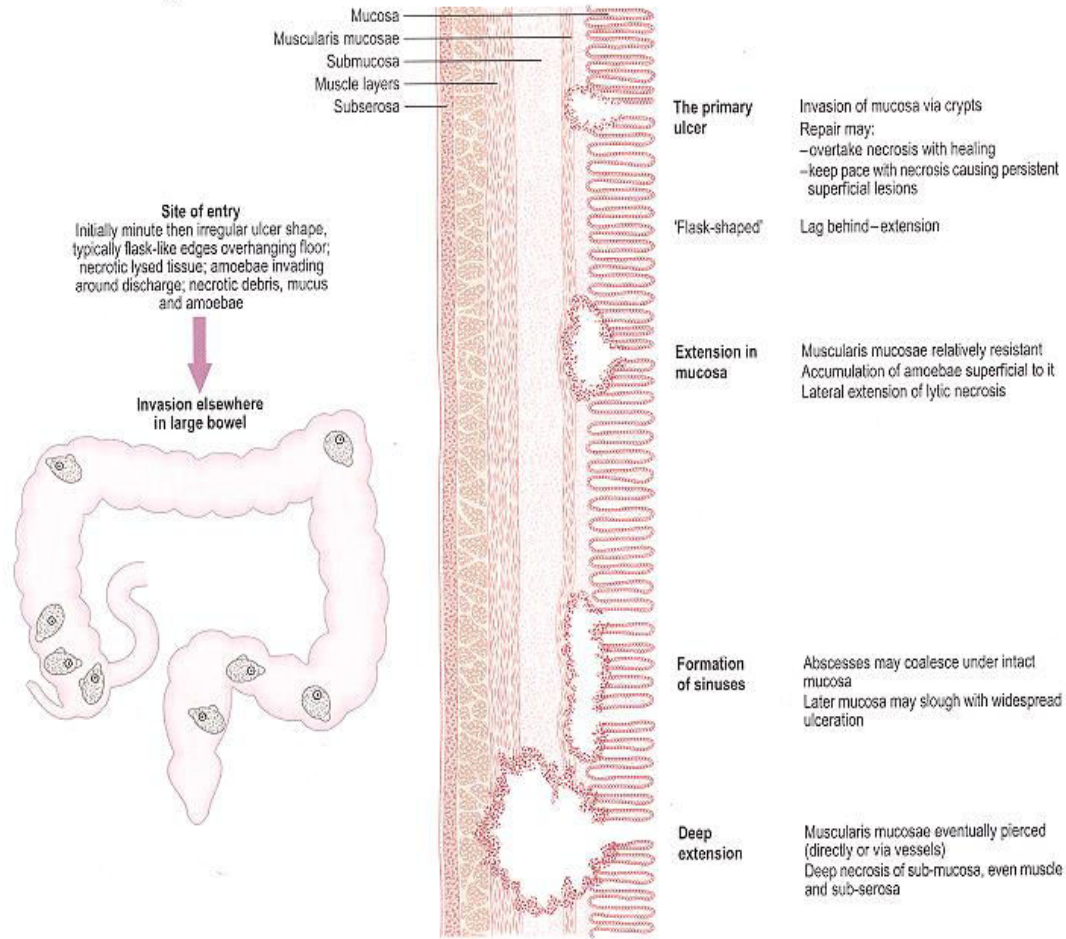
Intestinal amoebiasis (Acute amoebic dysentery) :

- Trophozoite has the ability to hydrolyze host tissues with their active enzymes present on the surface membrane of the trophozoite, also trophozoite has the ability to **ingest blood cells**. =Invasion+ anemia
- The presenting symptom is diarrhea which is accompanied by blood, mucus and sometimes tenesmus (difficulty in passing stool)
- As a complication, **severe intestinal hemorrhage** or rarely **perforation** may occur, lesions are found in cecum, appendix or colon.
- They may heal. If perforation of the colon occurs, this may lead to **peritonitis** that can lead to death.
- **Amoeboma: Granulomatous mass obstructing the bowel.**



PATHOLOGY: Intestinal amoebiasis

Invasion of the large intestine



Complications

Perforation
Haemorrhage (rare)

Secondary infection

Amoeboma (rare)
(Clinically simulates neoplasm)
-intussusception
-obstruction

Invasion of blood vessels

Direct extension outside bowel



Peritonitis
Haemorrhage

Surrounding inflammatory reaction and fibroblastic proliferation

A mass under oedematous mucosa with
-internal abscesses of necrotic tissue and amoebae
-surrounding granulomatous tissue zone with eosinophils, lymphocytes and fibroblasts
-outer firm nodular fibrous tissue

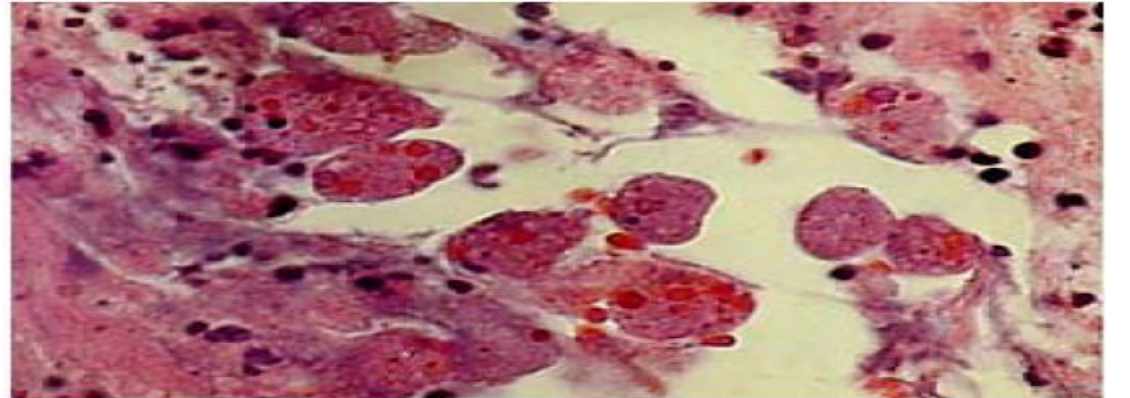
Extraintestinal lesions-page 52

In the large intestine the ameba may cause ulcers or deep ulcers and form a sinus

PATHOLOGY: Intestinal amoebiasis
Flask shape ulcer in large intestine



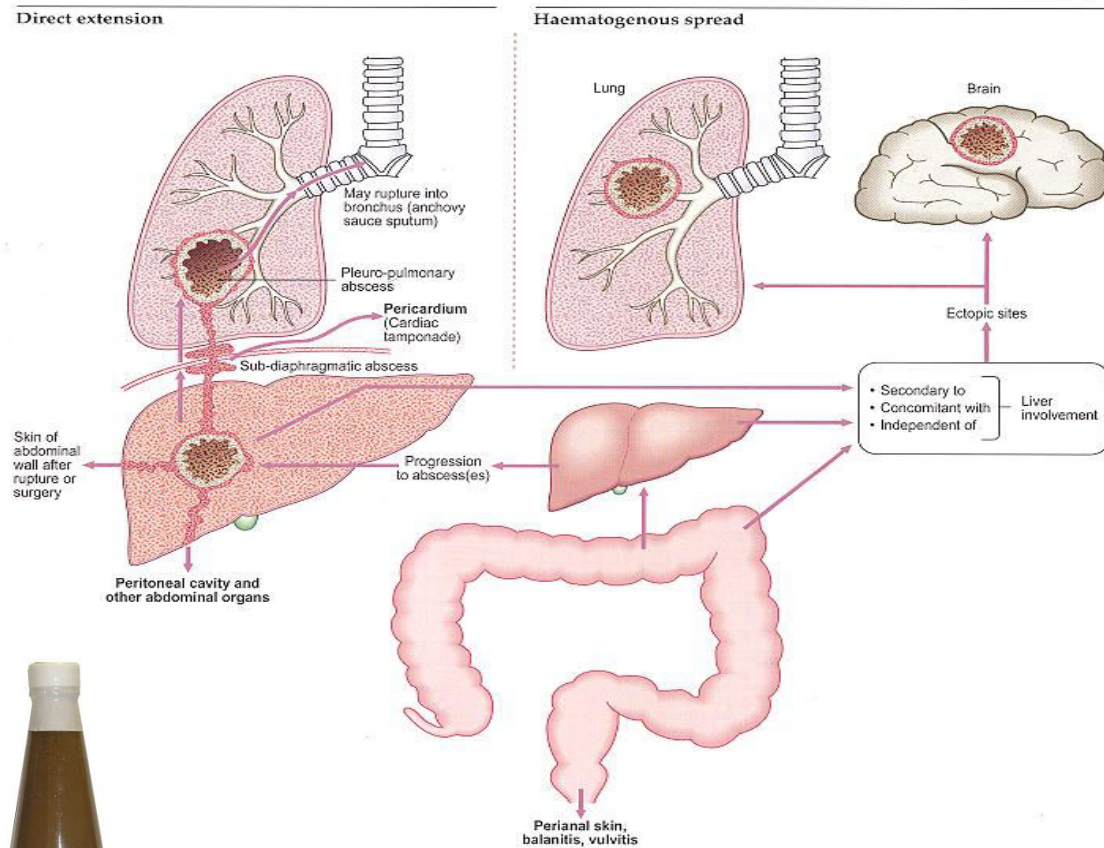
Entamoeba histolytica



E. Histolytica in mucosa.

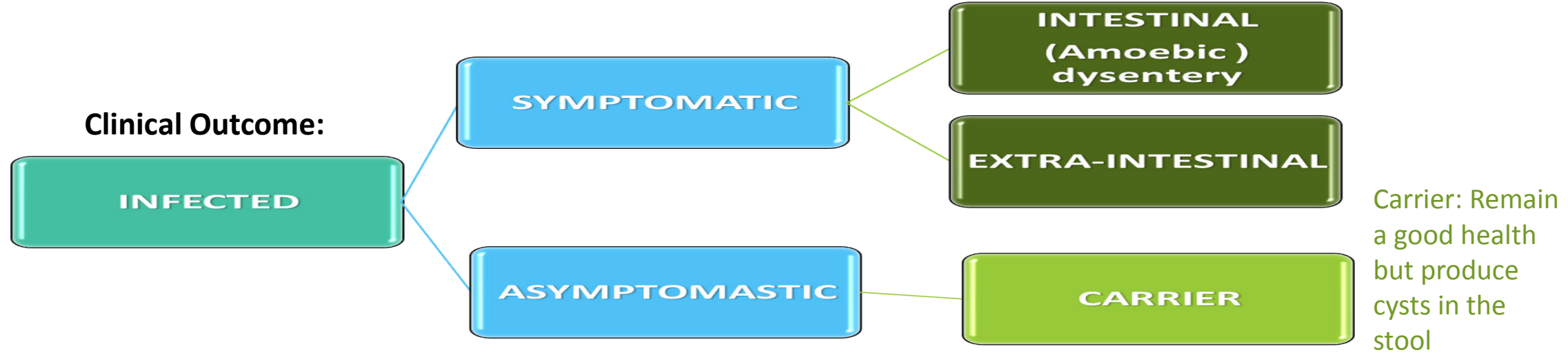
Numerous trophozoites can be seen with ingested erythrocytes.

PATHOLOGY: Extra-Intestinal amoebiasis



A 30-year-old male experienced diarrhea for two weeks with fever of 39° C, nausea, vomiting, malaise and right upper abdominal pain (liver). Physical examination revealed hepatomegaly (increase in size) 6 cm below the right costal margin. CT scan showed a single hypodense mass in the right lobe of 7.8 x 5.2 cm, round, with well defined borders. Serology was positive for *Entamoeba histolytica* at 1/512. Amoebic liver abscess was diagnosed.

Amoebiasis: Entamoeba histolytica



	Main drugs for treatment:	Laboratory Diagnosis of Amoebiasis
<i>Intestinal</i>	<ul style="list-style-type: none"> Asymptomatic (cysts only): diloxanide furoate (furamide) Symptomatic (cysts and trophozoites): metronidazole 	Stools examination : <ul style="list-style-type: none"> Wet mount (cysts and trophozoites) Concentration methods (only cysts) Serology (mainly for invasive infections): IHA , ELISA
<i>Extra-intestinal</i>	Metronidazole	Serology: IHA , ELISA Microscopy of tissues or fluids also xray

Cryptosporidium Parvum

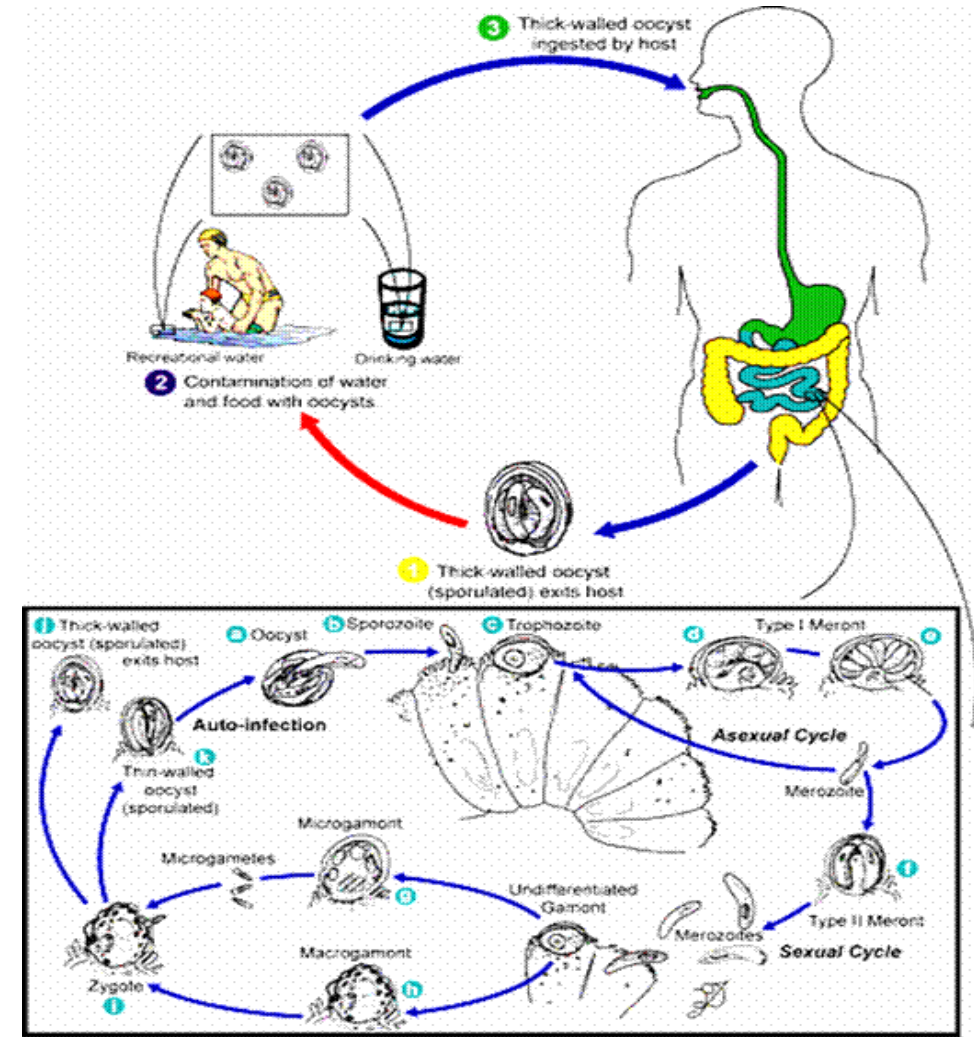
- Usually not pathogenic but turned to be in immunocompromised patients especially AIDS
- Infection is caused by ingestion of sporulated oocysts transmitted by the **faecal-oral route**
- Infection is generally self-limiting in immunocompetent people. In immunocompromised patients, such as those with **AIDS** or those undergoing immunosuppressive therapy, infection may not be self-limiting, leading to dehydration and, in severe cases, **death**.

Treatment

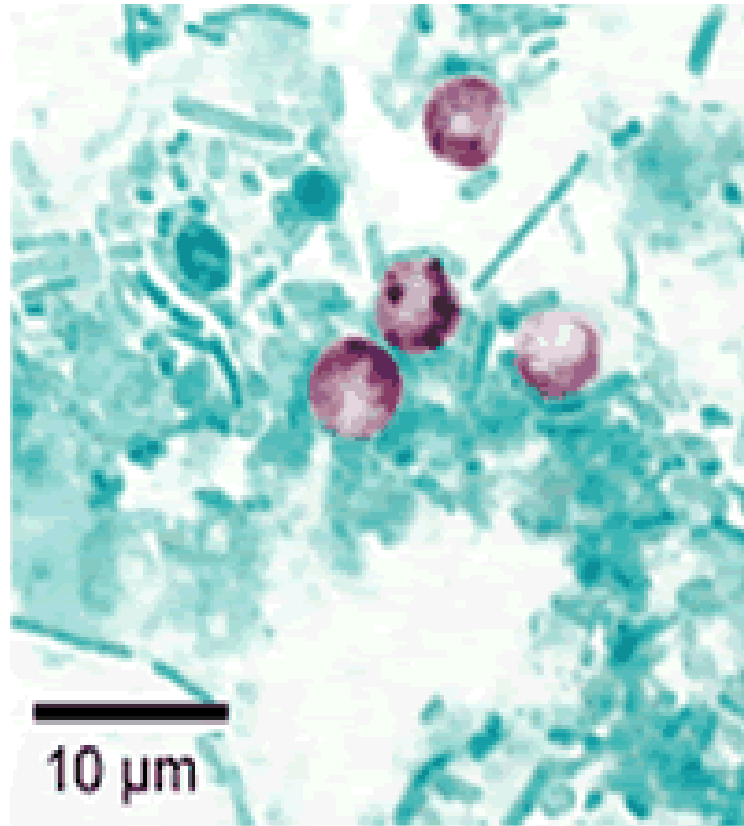
- The most effective way to prevent the spread of *C. parvum* is to avoid contact with contaminated feces. Avoiding this contact, especially with young children, Hygiene is the most effective way to combat this difficult-to-prevent parasite
- **Self-limited** in immunocompetent patients
- In AIDS patients: paromomycin
- **STAIN : ziehl-neelsen stain**

Female only

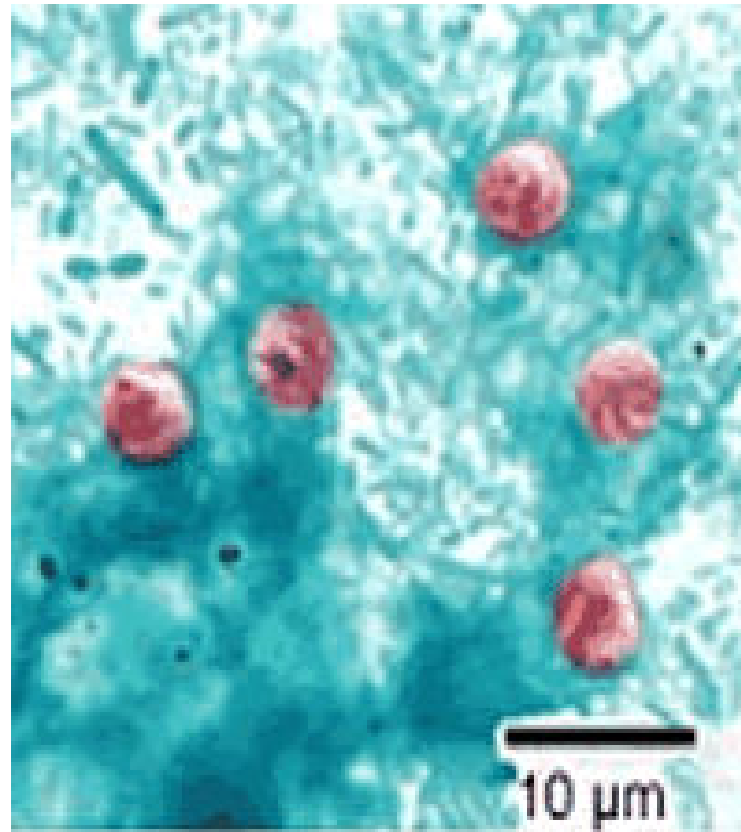
Female only



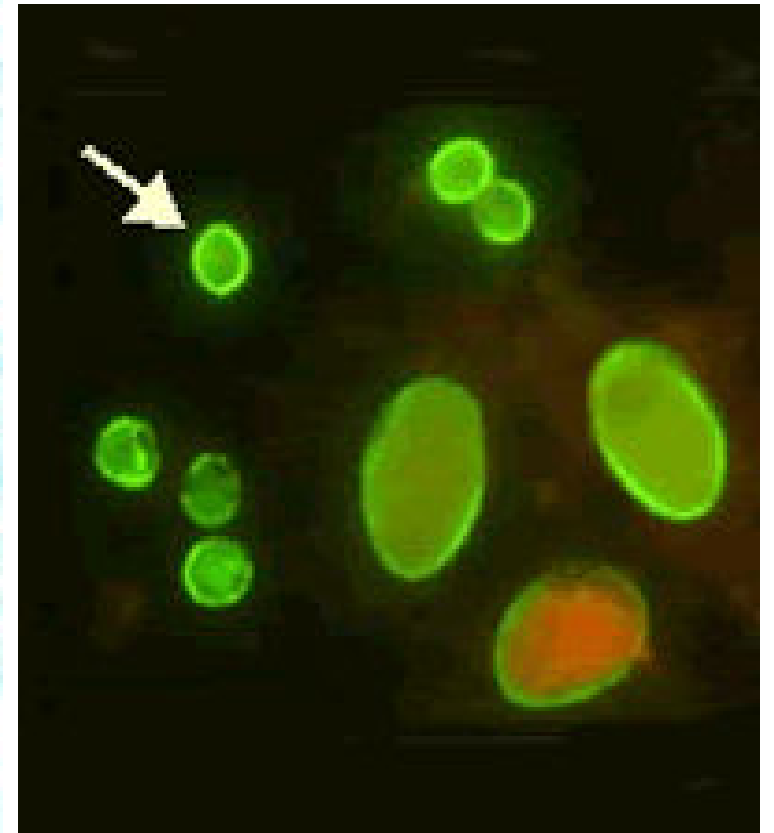
Cryptosporidium Parvum: Diagnosis



Cryptosporidium oocyt in feces by **acid-fast stain**



Cryptosporidium, **safranin ziehl-neelsen**



Crypto-Gardia **FAT**

SUMMARY:

Protozoa	Life cycle	Pathogenesis	Symptoms	Investigation and treatment
Giardia Lamblia (Unicellular, move by flagella)	Ingested food contaminated with cysts (infective stage=cyst) resists harsh environments (causes pathogenesis=trophozoites) (Diagnostic stage=Cyst+Trophozoites)	Asymptomatic or symptomatic (typical or Atypical)	Typical: IP 1-2 wks followed by diarrhea ,vomiting & flatulence for about 6 wks Atypical: Severe diarrhoea , malabsorption especially in children and cholecystitis.	Metronidazole
Entamoeba: (Unicellular, move by pseudopodia) 1- E.histolytica (pathogenic) + 5 other nonpathogenic	Waterborne infection -The infective dose can be as little as 1 cyst. -Fecal>Oral route (infective stage=Cyst) resists harsh environments (replicative stage=Trophozoites) (Diagnostic stage=Cyst)	Excystation in lower small intestines > production of amoeba in large intestine which will: 1-Invade tissue (extra-intestinal) 2-Live in lumen of Large intestines 3-Encyst Symptomatic: -Intestinal amoebiasis -Extra-intestinal amoebiasis (liver, lung, brain) Asymptomatic: Carrier	-diarrhea with blood, Mucus and sometimes Tenesmus Complication: -Severe intestinal hemorrhage or perforation -lesions in cecum , appendix, Colon>can lead to peritonitis -Granulomatous mass obstructing the bowel -Ulcer and fistulas	-intestinal: Stool examination, Serology -Extra-intestinal: Serology, microscopy of tissues or fluids Drugs: -Symptomatic intestinal+ extra-intestinal: Metronidazole
Cryptosporidium Parvum	Ingestion of oocysts by fecal-oral route	Nonpathogenic in immunocompetent, only in immunocompromised (AIDS)	infection may not be self- limiting, leading to dehydration and, in severe cases, death (in immunocompromised)	Not important

QUIZ:

1. Which of the following protozoa is self-limiting?

- a) Giardia Lamblia b) Entamoeba Histolytica c) Cryptosporidium pavum

2. The infectious stage of giardia lamblia is:

- a) Cyst b) Trophozoite d) both

3. What is the best stain used for cryptosporidium diagnosis?

- a) H&E stain b) Zeihl-neelsen c) silver stain

4. Atypical symptom of giardiasis is:

- a) Diarrhea b) Malabsorption c) Vomiting

5. Which of the following species of Entamoeba is pathogenic?

- a) E. histolytica b) E. dispar c) E. gingivalis

6. Which of the following forms of E. histolytica can cause infection when ingested?

- a) Cyst b) Trophozoite c) Both

1.	C
2.	A
3.	B
4.	B
5.	A
6.	A

THANK YOU FOR CHECKING OUR WORK, BEST OF LUCK!



Doctors slides



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