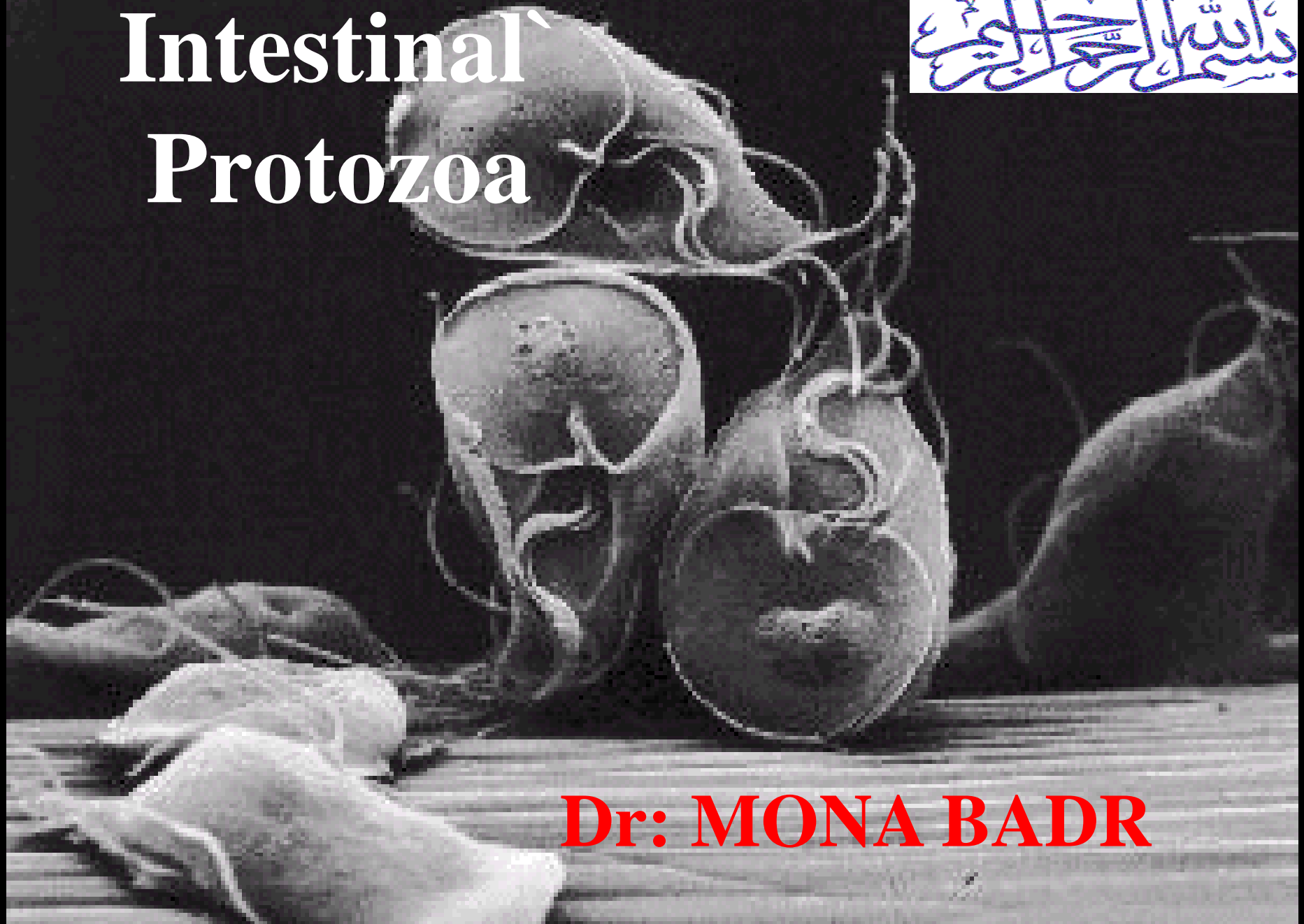


Intestinal Protozoa

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Dr: MONA BADR

CLASSIFICATION OF PARASITES

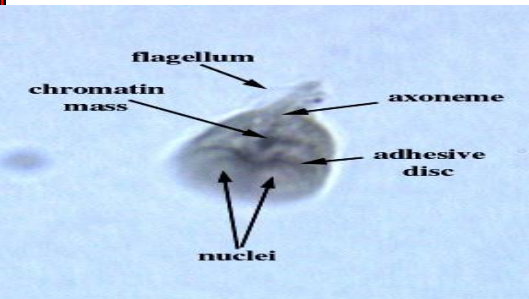
PROTOZOA	HELMINTHS
Unicellular Single cell for all functions	Multicellular Specialized cells
1:Amoebae: move by pseudopodia. 2:Flagellates: move by flagella. 3:Ciliates: move by cilia 4:Apicomplexa(Sporozoa) tissue parasites	<u>Round worms (Nematodes):</u> - elongated, cylindrical, unsegmented. <u>Flat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

- **Giardia lamblia** is a protozoan parasite capable of causing sporadic or epidemic diarrheal illness. Giardiasis is an important cause of waterborne and foodborne disease, daycare center outbreaks, and illness in international travelers. Giardiasis is especially common in areas with poor sanitary conditions and limited water-treatment facilities, **Water is a major source of giardiasis transmission.**

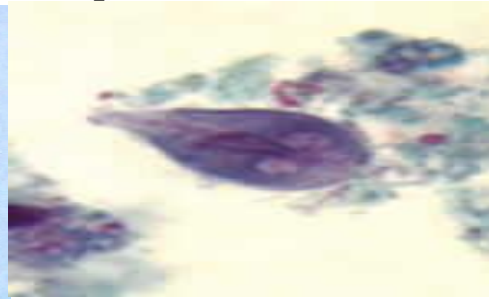
Giardia trophozoites
(electron microscopy)



Giardia trophozoites
(light microscope) can not survive in the environment ,can not resist gastric acidity ,diagnostic stage .



Trichrome stain
trophozoites



Giardia cyst

(light microscope) can survive in the environment and resist the gastric acidity ,infective and diagnostic stage.



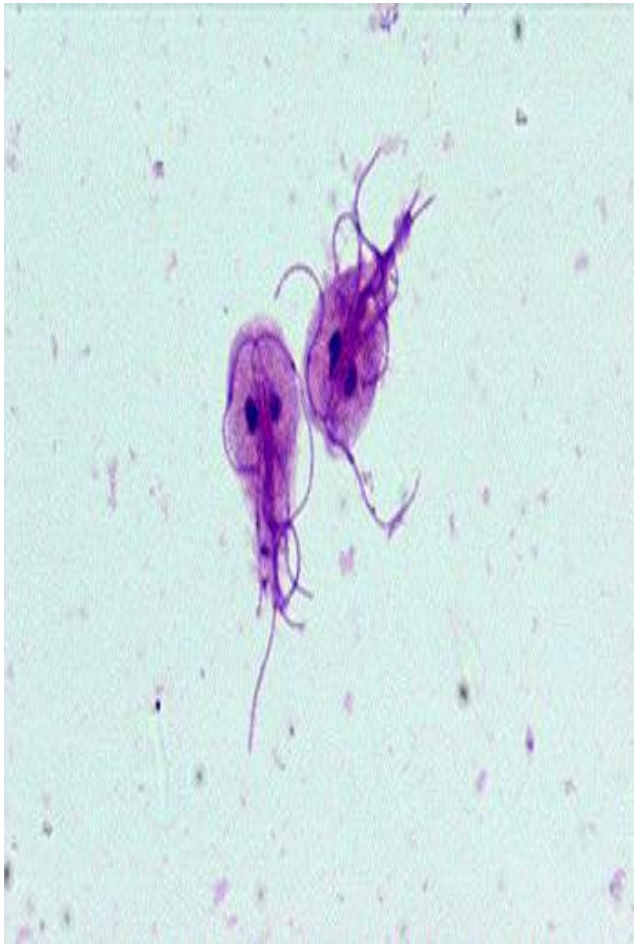
Giardia Lamblia

Trophozoite

Cyst

Giardia cyst
(light microscope)

INFECTIVE STAGE

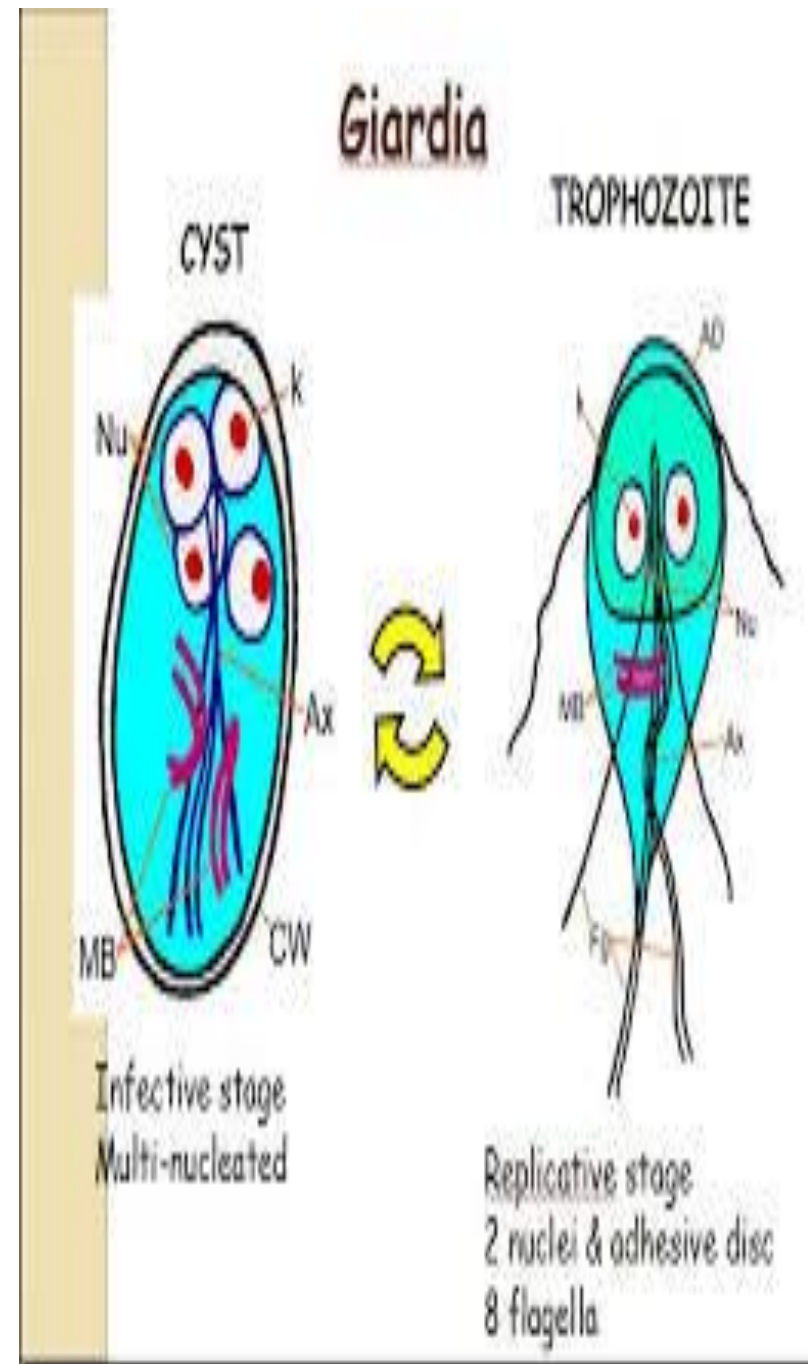


Giardiasis is transmitted via the fecal-oral route with the ingestion of **CYST(the infective stage)**.

These cysts can stay infectious in the environment for more than 3 months
These cysts can resist the stomach acidity.

After ingestion of the cysts and then cysts pass the stomach acidity , ex-cystation take place in small intestine to produce **TROPHOZOITE**
Trophozoite can multiply by binary fission and responsible for causing the disease : **diarrhea ,vomiting ,excessive gas and loss of appetite especially in children.**

Encystation taken place in the colon.



Infective stage only CYST

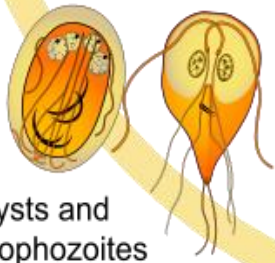
Ingestion of dormant cysts



cyst can survive for weeks to months in cold water



Only cysts can survive outside of the host.

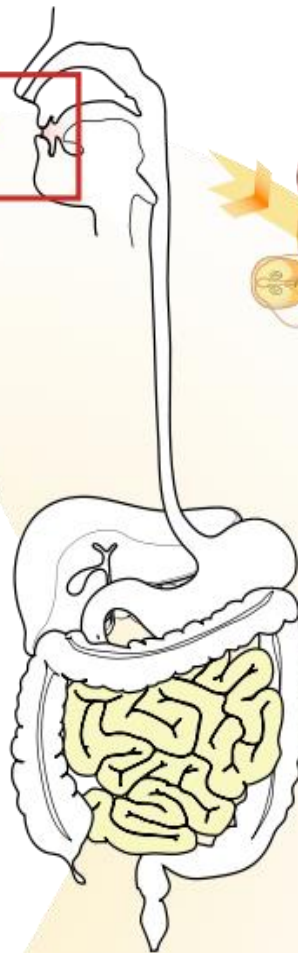


cysts and trophozoites expelled in the feces

In the colon

Encystation during transit toward the colon.

Not Everyone exhibit symptoms.



In the small intestine

Excystation
trophozoite emerge to an active state



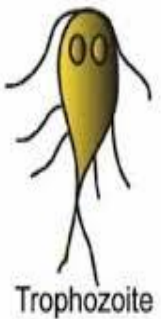
trophozoite undergo asexual replication



Diagnostic stage cyst and trophozoite in stool



Encysting
←
→
Excysting



Trophozoite

Giardia lamblia :

Giardia species have two forms: **cysts** & **trophozoites**. Cysts are the **infectious stage** of the parasite; they are excreted in stool . An incubation period of a week or more before symptoms of acute giardiasis may develop.

Following cyst ingestion, excystation occurs in the small intestine with release of trophozoites. Trophozoites are pear-shaped, binucleate, multi-flagellated parasite forms capable of division by binary fission. Trophozoites are localize to the small intestine, trophozoite attachment to the mucosal surface of the duodenum and jejunum, the trophozoite **does not invade the mucosal epithelium.*******

CLINICAL MANIFESTATIO It is mainly asymptomatic infection occurs in both children and adults, and asymptomatic cyst shedding can last six months or more, however, if symptoms occur will be as diarrhea, malaise, abdominal cramps, flatulence, weight loss & vomiting .

Complications :In a small number of patients, persistent infection is associated with development of malabsorption and weight loss ,Chronic giardiasis may affect growth and development in children .

Giardia trophozoites in tissue section

Seen by duodenal aspirate



Giadriasis: Clinical Picture.

The parasite mostly asymptomatic or can produce a wide range of gastrointestinal symptoms especially in children. .

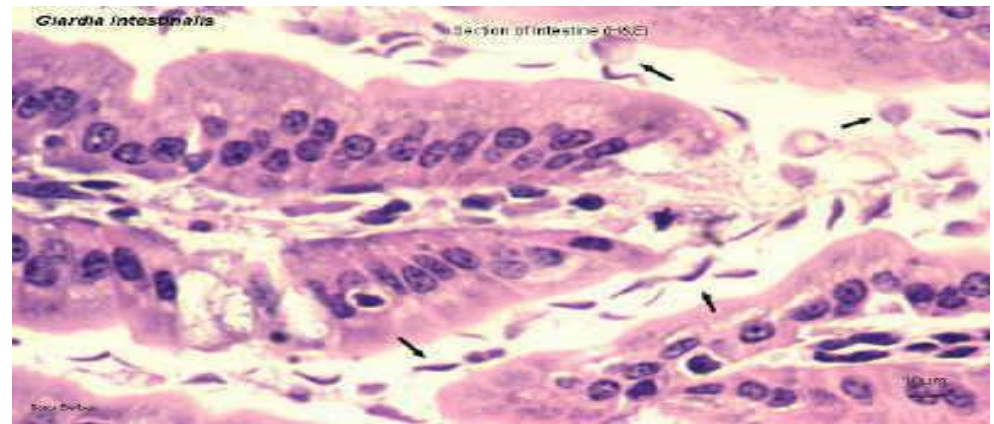
Symptomatic Infections:

Typical picture: IP 1-2 wks followed by diarrhea ,vomiting &flatulence for about 6 wks,

Atypical : Severe diarrhoea , malabsorption especially in children and cholecystitis.

***Giardia* trophozoites in tissue section**

Seen by duodenal aspirate in severe cases.



Giardiasis: diagnosis & treatment

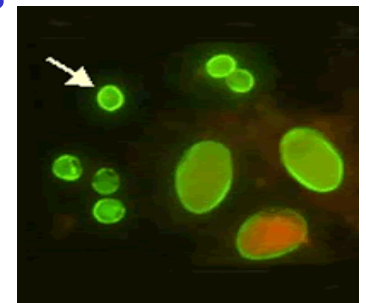
- **Stools examination :**
 - Microscopy for cysts or trophozoites
- **Antigen detection assays** a number of immunoassays using antibodies against cyst or trophozoite antigens have been developed for stool analysis.



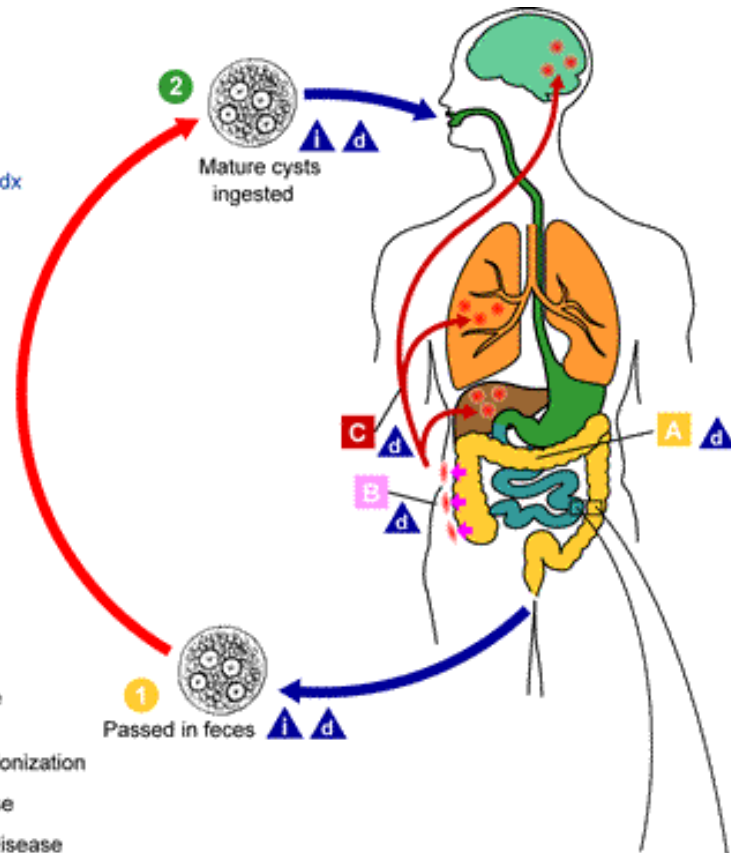
Examination of duodenal contents :
look for trophozoites.

Treatment :

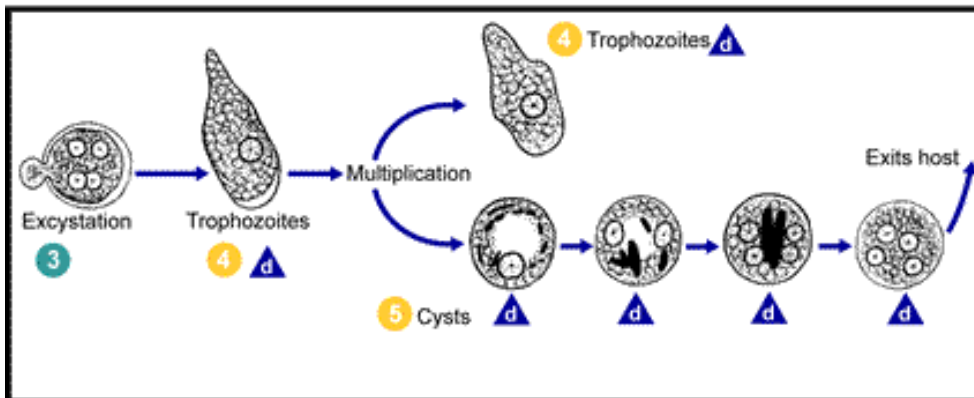
Drug of choice is Metronidazole



Crypto-Giardia FAT










Entamoeba histolytica



Intestinal Amoebae

There are a number of intestinal commensal amoebae , the only pathogenic species is *E. histolytica*

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

ENTAMOEBEA HISTOLYTICA...

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 is pathogenic and non pathogenic strains ,but we can't distinguish between them by microscopic examination.

There are 6 species of *Entamoeba*:

E.histolytica (*pathogenic invasive*)

E.Dispar (*non pathogenic non invasive*)

E.hartmanni

•*E.coli*

E.gingivalis

E.polecki

Entamoeba histolytica

Mode of infection

Water, food

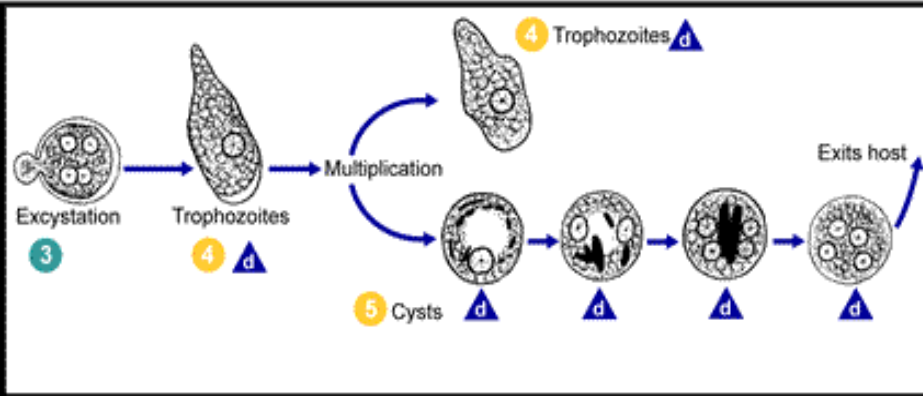
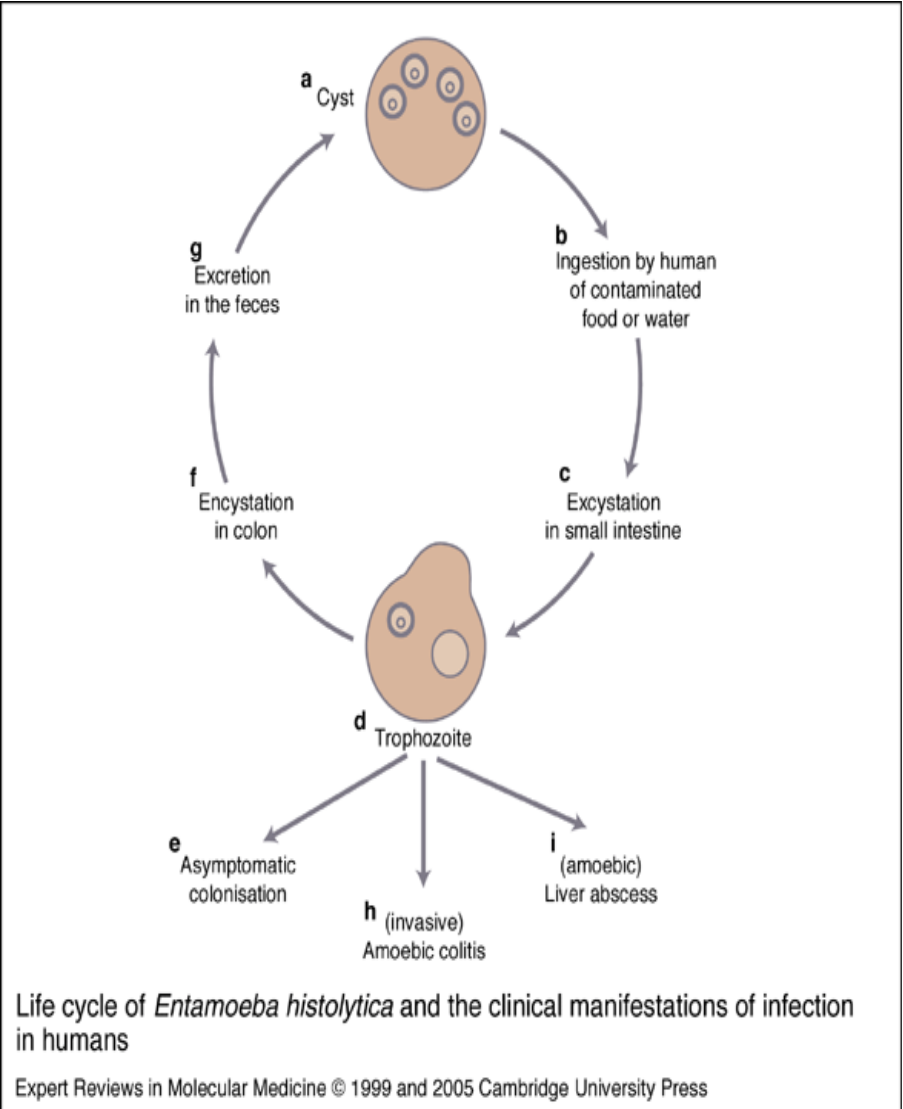
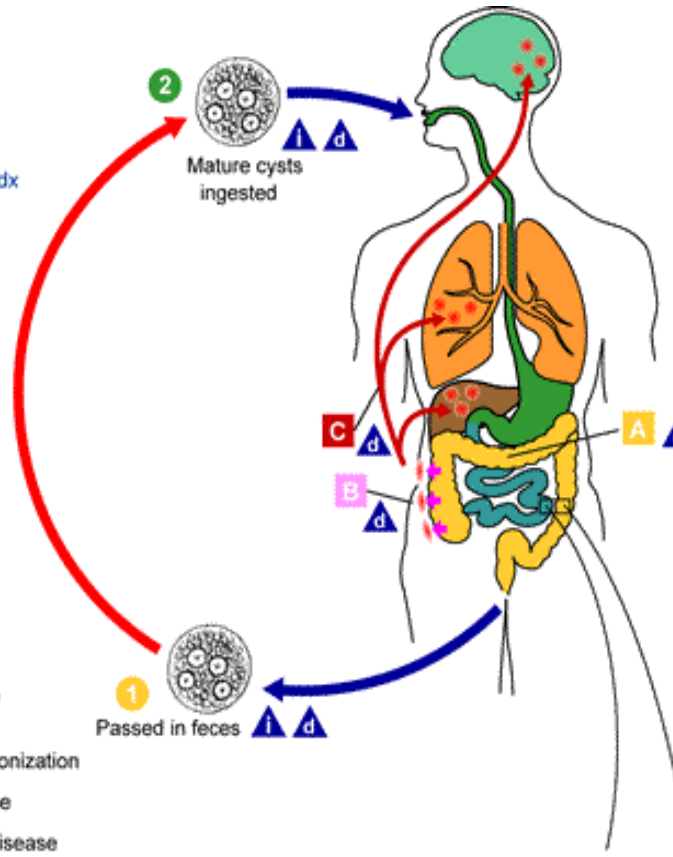
Flies can act as vector..

Can be sexually transmitted person -to -person contacts(homosexual)

Not a zoonosis ,the infective dose can be as little as one cyst , the incubation period can be from few days to few weeks depending on the infective dose.

Cysts can survive in the environment for weeks at appropriate temperature and humidity.

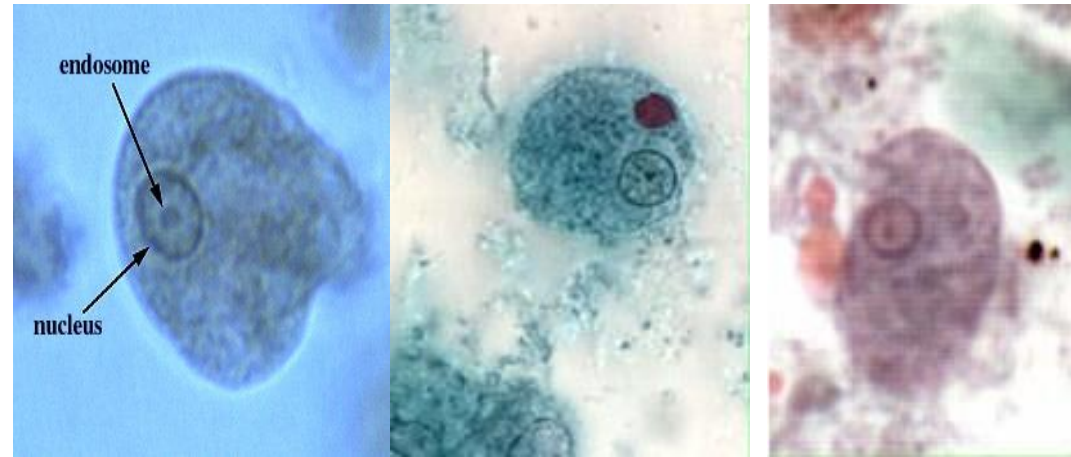
Entamoeba histolytica



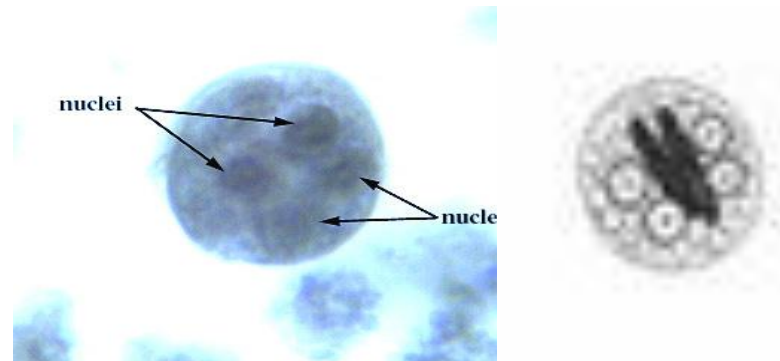
Life cycle of *Entamoeba histolytica* and the clinical manifestations of infection in humans

Entamoeba histolytica

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



Cyst: infective stage. Resist the harsh conditions of the environment.



The infective stage is the **cyst** but we can detect both in the stool **cysts & trophozoites diagnostic stage.**

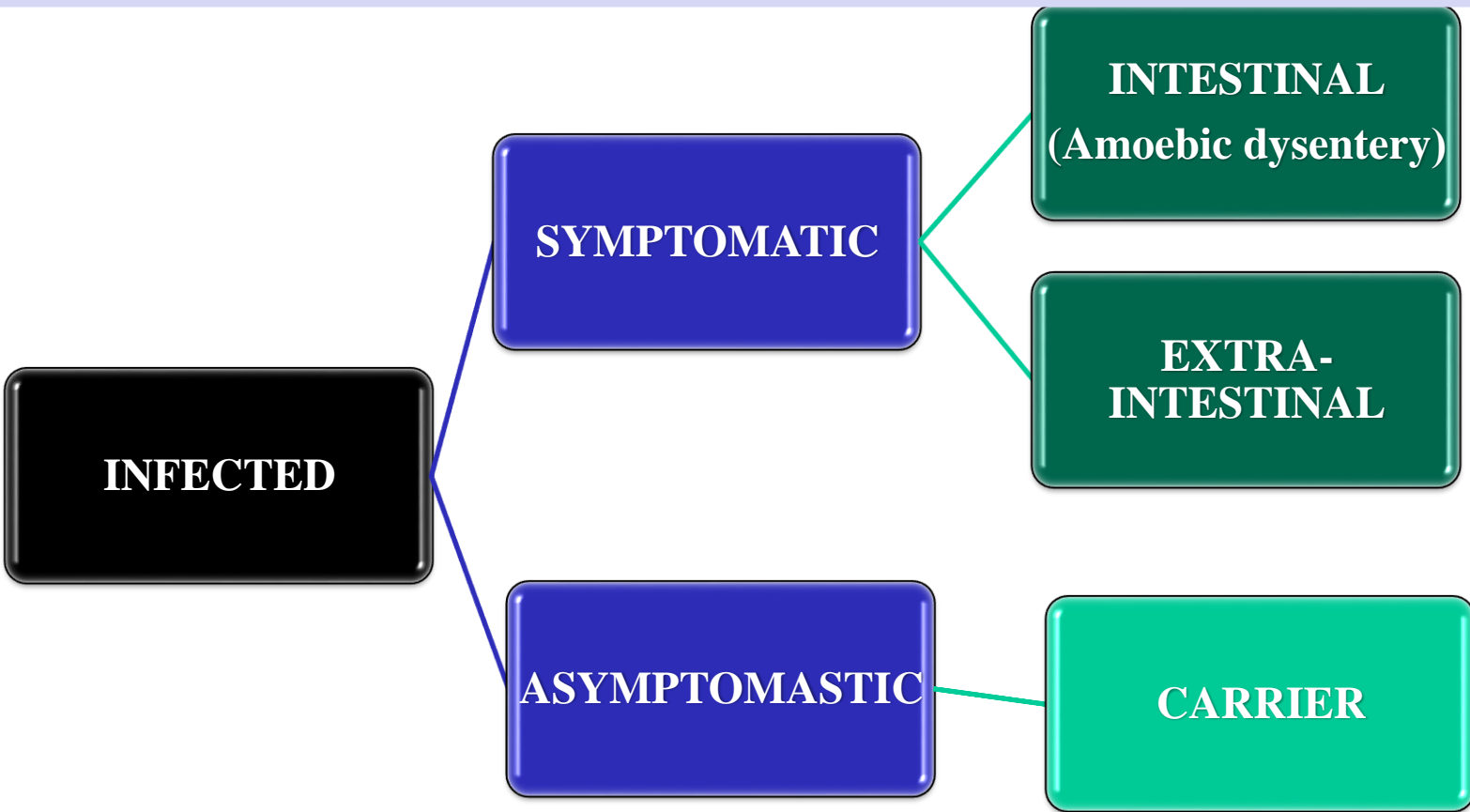
Entamoeba histolytica

Amebiasis occurs worldwide; the prevalence is increased in developing countries because of poor socioeconomic conditions and sanitation levels. The parasite exists in two forms, a **cyst stage** (the infective form) and a **trophozoite stage** which causes invasive disease. The cysts pass through the stomach to the small intestine, where they excyst to form trophozoites. **The trophozoites can invade and penetrate the mucous barrier of the colon**, causing tissue destruction colitis and increased intestinal secretion and can thereby ultimately lead to bloody diarrhea .

- **CLINICAL MANIFESTATIONS:**
- (1)The majority of entamoeba infections are **asymptomatic**, some have symptoms which range from mild diarrhea to severe amebic dysentery, producing abdominal pain , diarrhea , and bloody stools , to fulminant amebic colitis. Weight loss occurs in about half of patients, and fever can occur .
- (2) Amebic dysentery is diarrhea with visible blood and mucus in stools .
- (3) **Complications: perforation, blood invasion, direct extension , ameboma, amebic liver abscess.**

THE CLINICAL OUTCOMES OF INFECTION WITH

Entamoeba histolytica



Entamoeba histolytica

The infective dose can be as little as 1 **cyst** (highly virulent organism)

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 with 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 cysts and pass in the stool), in the carrier.

Only the **Cysts** can survive in the outside environment for weeks at appropriate temperature and humidity after excreted from stool of infected patients or carrier.

Entamoeba histolytica

PATHOLOGY

Intestinal amoebiasis :

Remarkable and unique ability to produce enzymes that lyses host tissue.

Lesions are found mainly in **the colon**.

They may heal.

Or it may cause complications :

- Perforation of the colon & flask shape ulcer.
- Ameboma : Granulomatous mass obstructing the bowel
- Blood invasion; **Amoebic liver abscess** , lung, brain
- Direct extension

Entamoeba histolytica

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 (causing ulcer and tissue perforation), also trophozoite has the ability to ingest blood cells.

The presenting symptom is diarrhea which is accompanied by blood, mucus and some times tenesmus.

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.

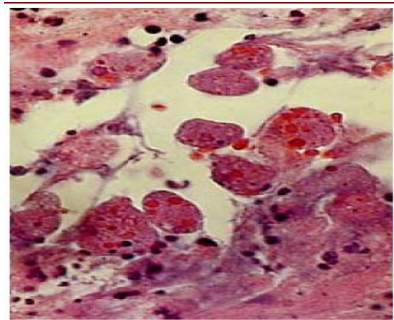
Amoeboma : Granulomatous mass obstructing the bowel.

PATHOLOGY : Intestinal amoebiasis & complication



***E. Histolytica* in mucosa.**

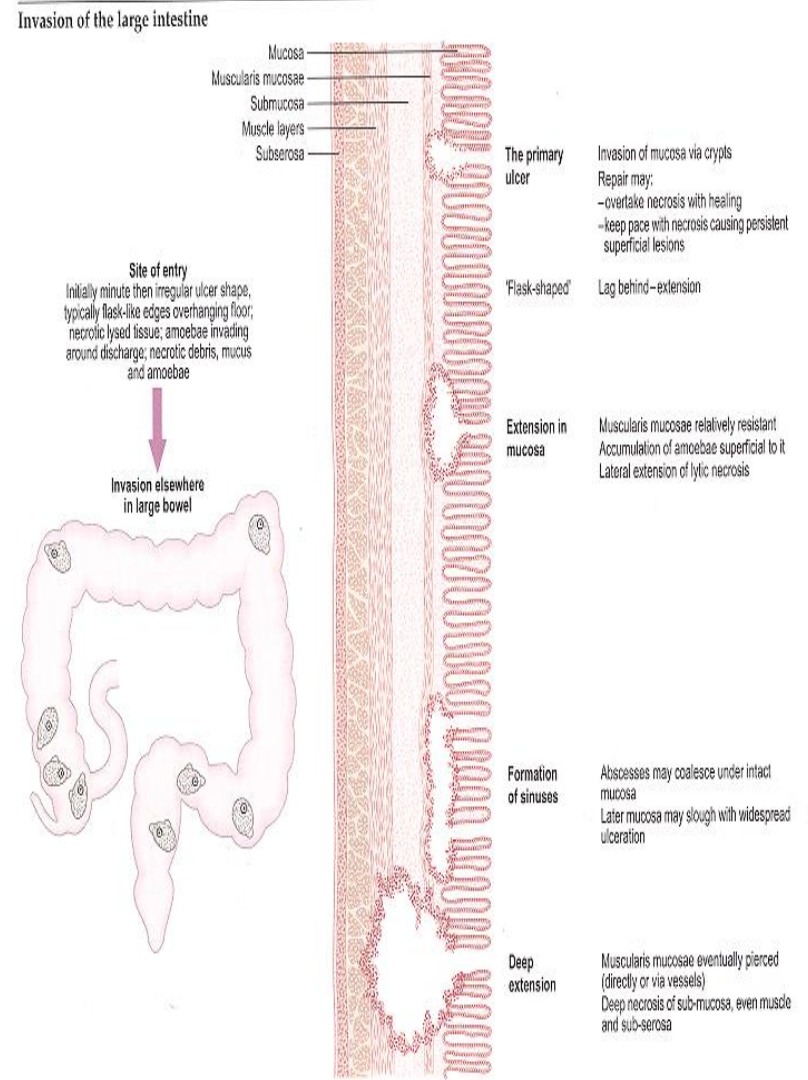
Numerous trophozoites can be seen with ingested erythrocytes.



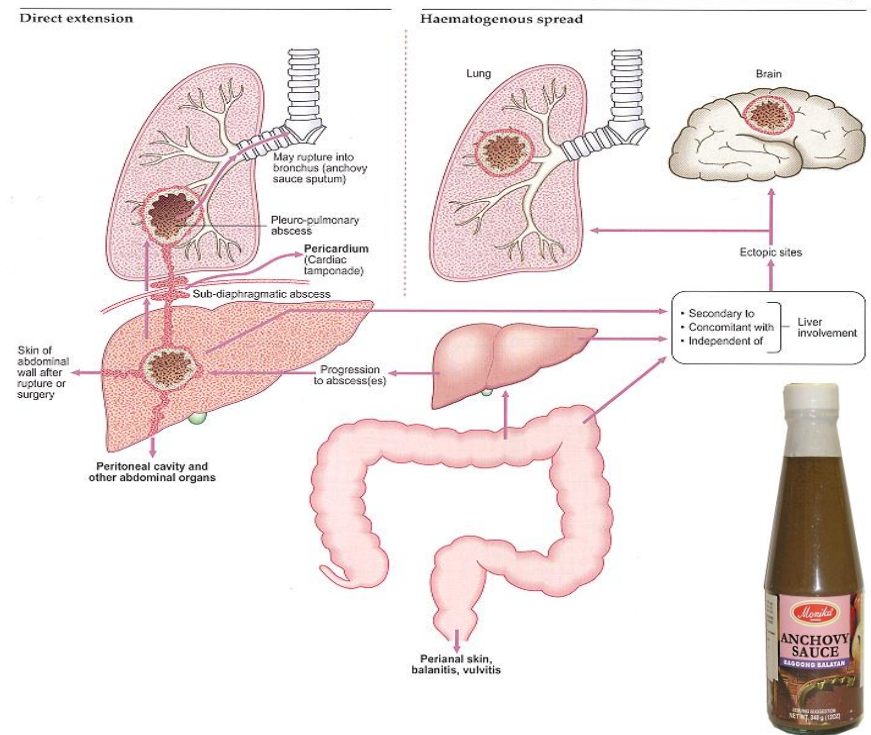
Intestinal perforation



Flask shape ulcer in large intestine



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. Physical examination revealed hepatomegaly 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.

Diagnosis & Treatment of Amoebiasis

• Intestinal:

- Stools :**microscopy**,
 - » Wet mount (cysts and trophozoites)
 - » Concentration methods (only cysts)
- **antigen detection**,
- **molecular methods** — Detection of parasitic DNA or RNA in feces via probes can also be used to diagnose amebic infection and to differentiate between the different strains.
- Serology (mainly for invasive infections): IHA , ELISA.
- Colonoscopy with biopsy and histological examination .

• Extra-intestinal:

- Serology: IHA , ELISA

• Surgical aspirate (needle aspiration not done as a diagnostic procedure due to risk of extension),to look for trophozoite.

Treatment of Amoebiasis

Intestinal :Symptomatic(cysts and trophozoites): **Metronidazole**

Extra-intestinal: **Metronidazole**

Cryptosporidium

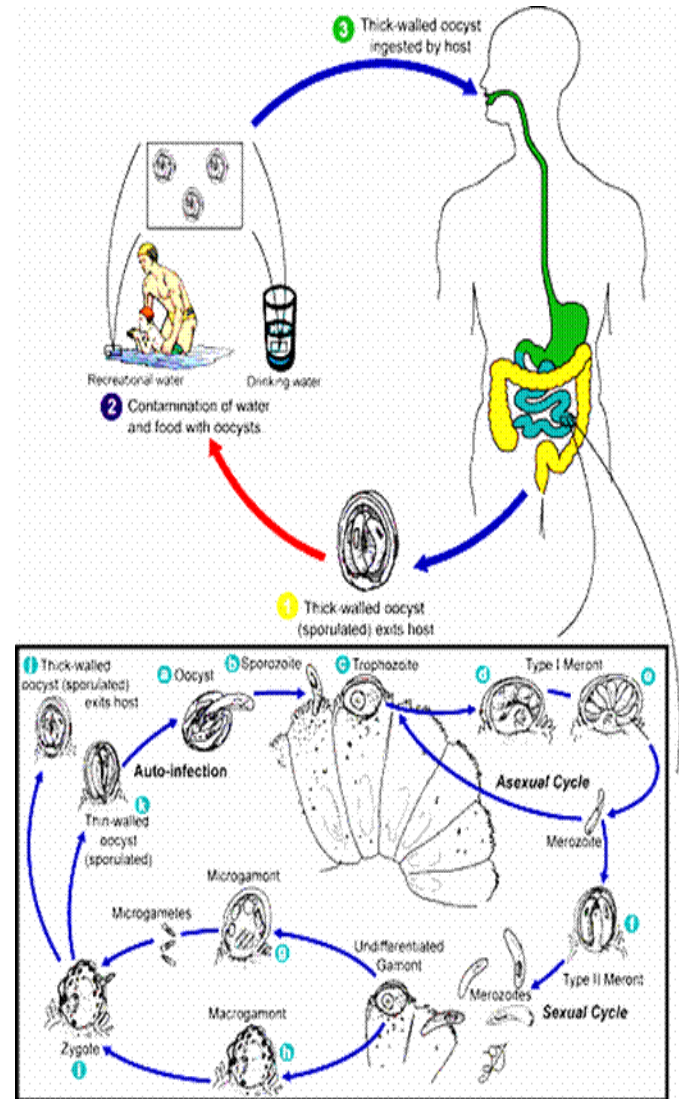
- Cryptosporidium is an intracellular protozoan parasite that is associated with self-limited diarrhea in immunocompetent hosts(normal) and severe debilitating diarrhea with weight loss and malabsorption in AIDS patients & those undergoing immunosuppressive therapy.
The diagnosis of cryptosporidiosis is generally based upon microscopy since *Cryptosporidium* species cannot be cultivated in vitro.
- Transmission of cryptosporidiosis occurs via spread from an infected person or animal, or from a feces contaminated environment, such as a food or water source.

Cryptosporidium Parvum

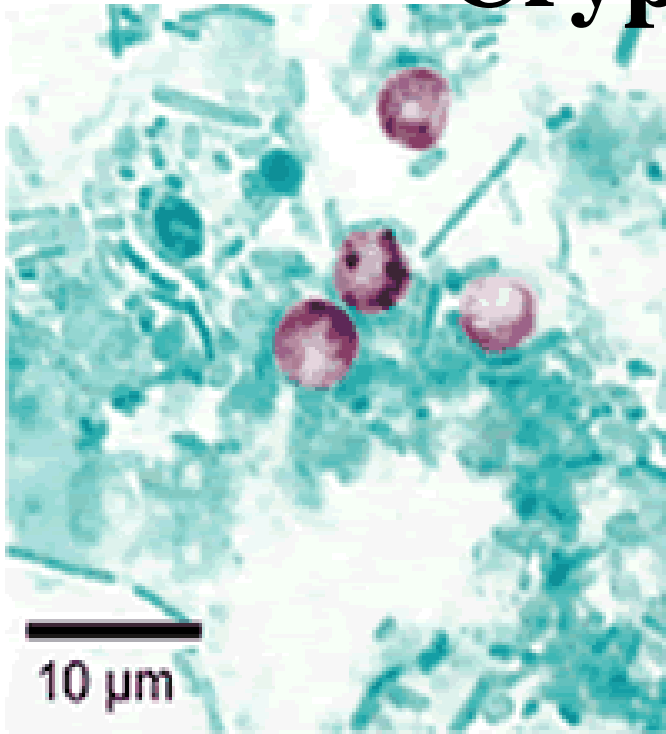
Infection is caused by ingestion of **sporulated oocysts** transmitted by the faecal-oral route

Infection is generally self-limiting in immunocompetent people. In immunocompromised patients, such as those

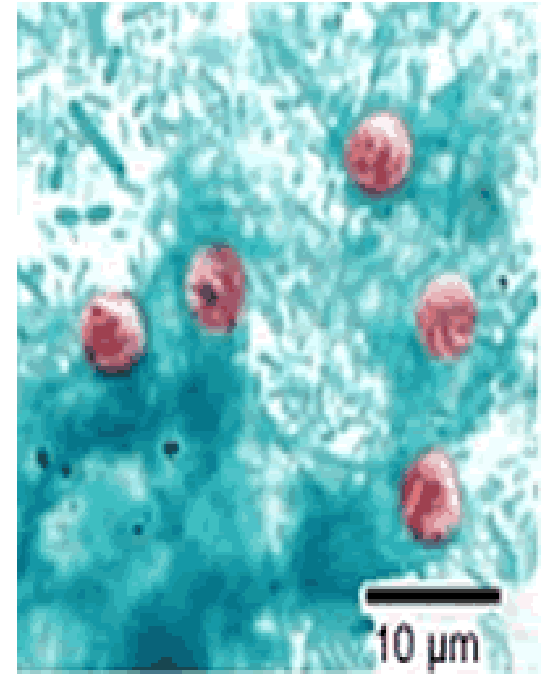
with **AIDS** or those undergoing immunosuppressive therapy, infection may not be self-limiting, leading to dehydration and, in severe cases, death



Cryptosporidium Diagnosis



Cryptosporidium oocyst in feces by stain acid-fast stain



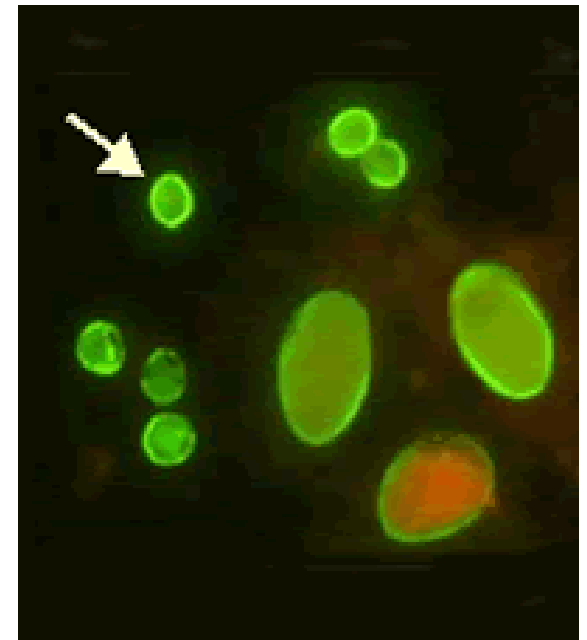
Cryptosporidium , safranin Ziehl-Neelsen

The diagnosis of cryptosporidiosis is generally made by microscopy & Ag detection in stools

Cryptosporidium Diagnosis



Crypto-Gardia : Ag detection test in stools



Crypto-Gardia FAT

Cryptosporidiosis Treatment & prevention

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

