Intestinal Protozoa

CLASSIFICATION OF PARASITES

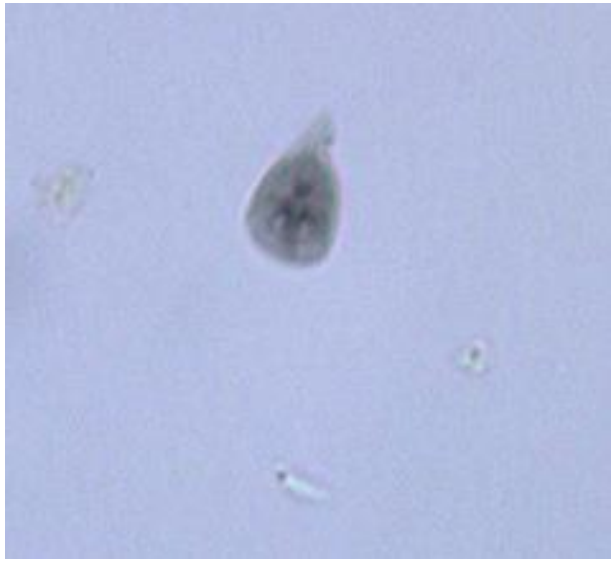
PROTOZOA	HELMINTHS
Unicellular Single cell for all functions	Multicellular Specialized cells
1: Amoebae: move by pseudopodia 2: Flagellates: move by flagella 3: Ciliates: move by cilia 4: Apicomplexa (Sporozoa) tissue parasites	Round worms (Nematodes): - elongated, cylindrical, unsegmented. Flat worms: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

Flagellates: *Giardia lamblia*

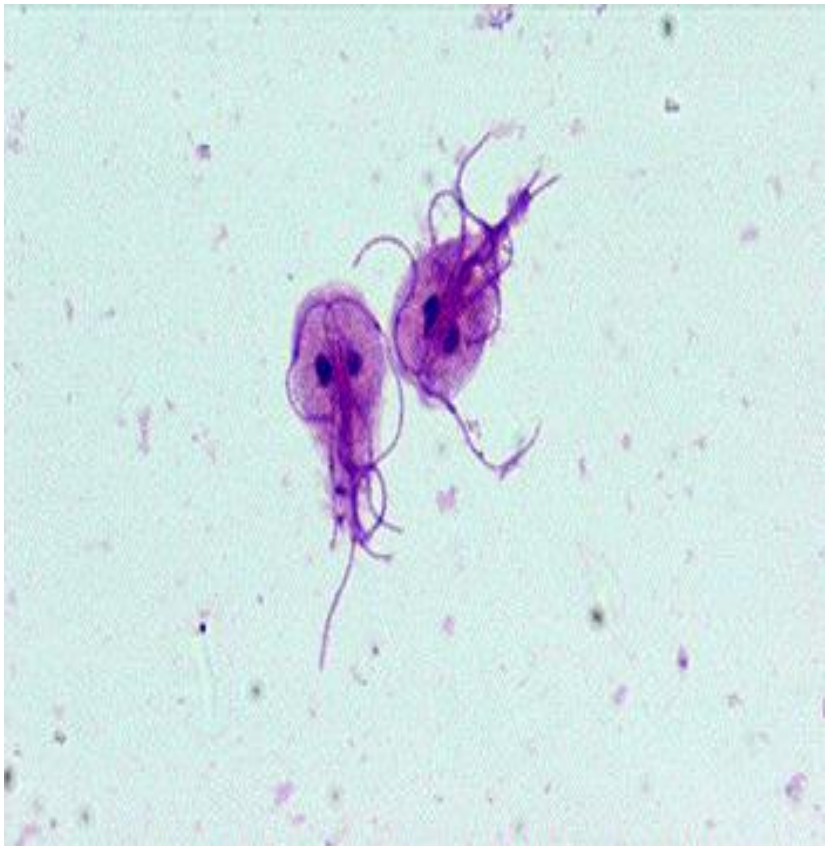
Giardia **trophozoites**

(electron microscopy)

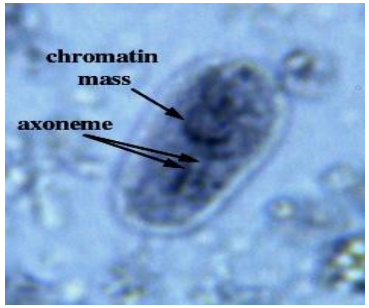
Giardia **trophozoites (light microscope) can not survive in the environment, can not resist gastric acidity, diagnostic stage**



Trichrome stain
trophozoites

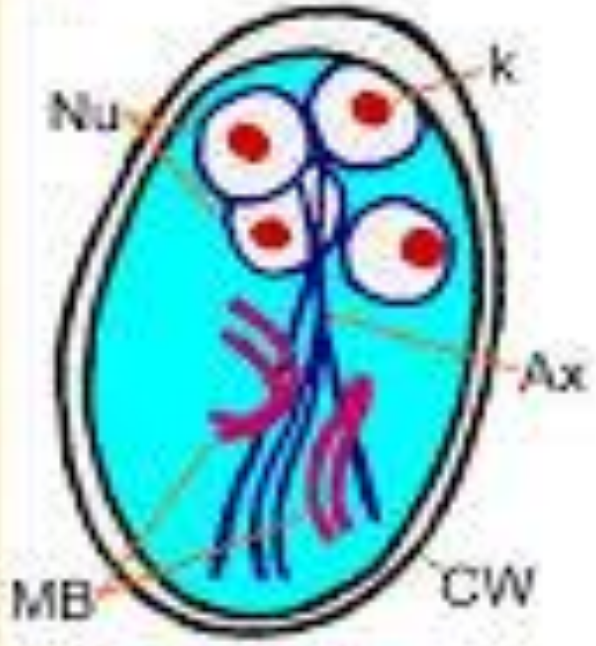


Giardia **cyst (light microscope) can survive in the environment and resist the gastric acidity, infective and diagnostic stage.**



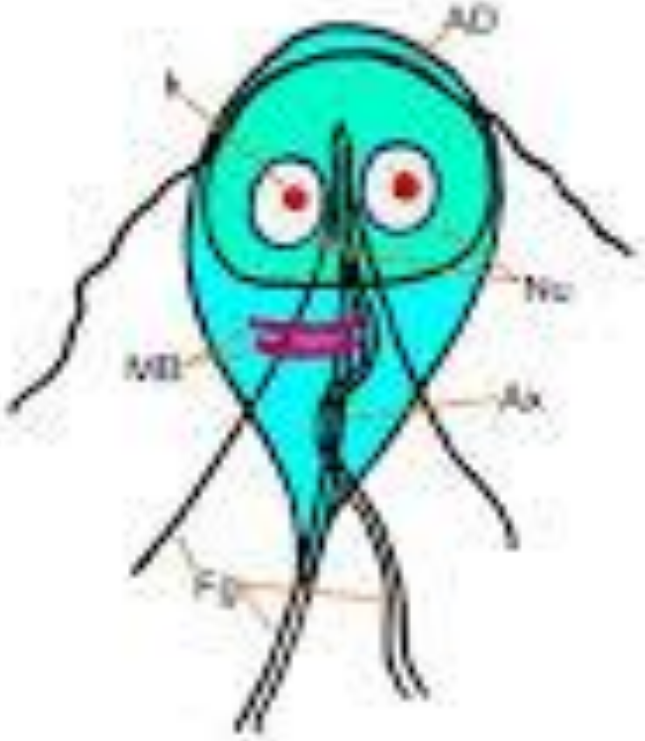
Giardia

CYST



Infective stage
Multi-nucleated

TROPHOZOITE



Replicative stage
2 nuclei & adhesive disc
8 flagella

- ***Giardia lamblia***

  a protozoan parasite capable of causing sporadic or epidemic diarrheal illness.

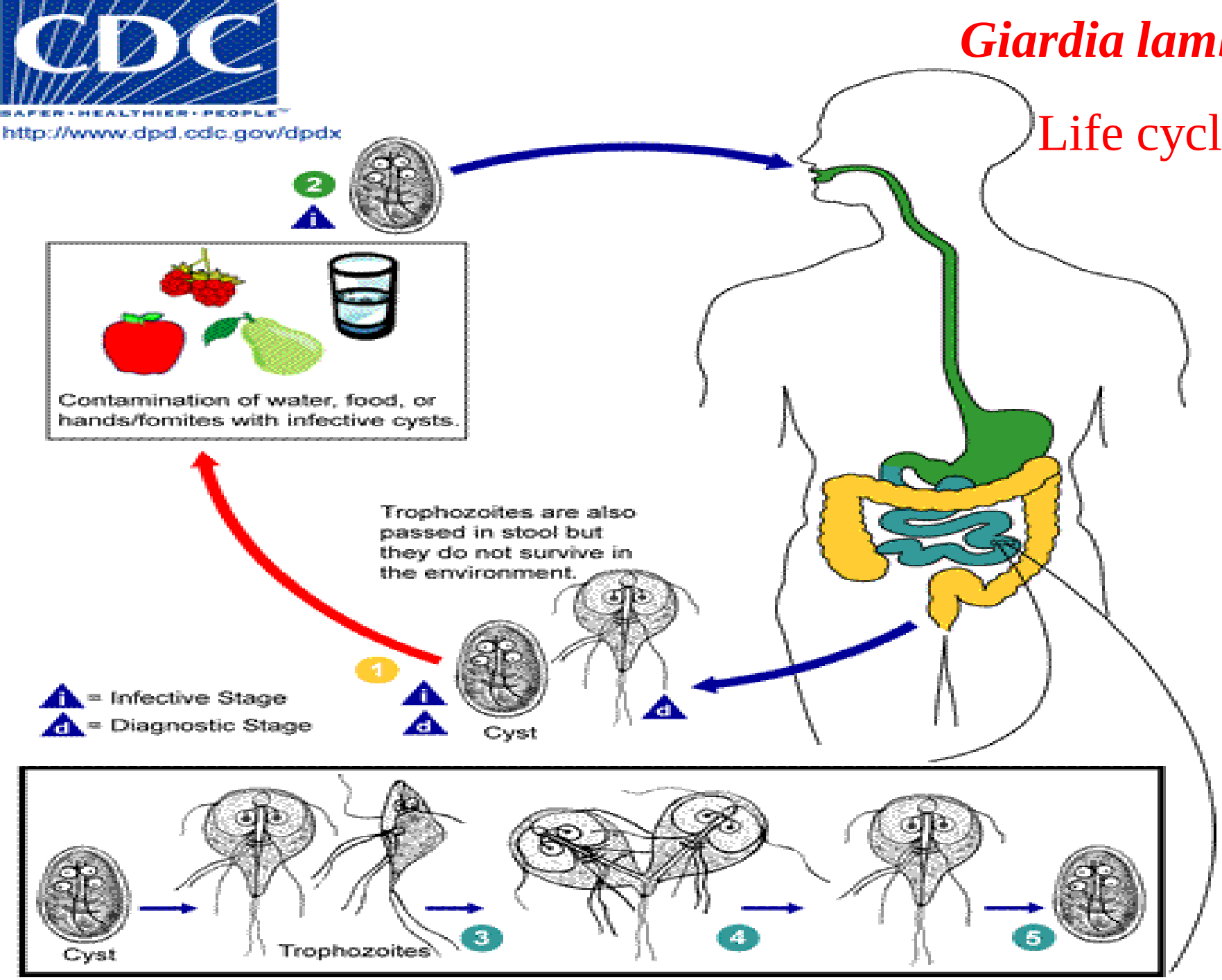
  Giardiasis is an important cause of waterborne and foodborne disease, daycare center outbreaks, and illness in international travelers.

  Giardiasis is especially common in areas with poor sanitary conditions and limited water-treatment facilities.

  Water is a major source of giardiasis transmission.

Giardia lamblia

Life cycle



Giardia lamblia:
Life cycle

Giardia species have two forms: **cysts** & **trophozoites**. Cysts are the ***infectious stage*** of the parasite; they are excreted in stool. Following cyst ingestion, excystation occurs in the small intestine with release of trophozoites.

Trophozoites are pear-shaped, bi-nucleate, multi-flagellated parasite forms capable of division by binary fission. Following cyst ingestion, infections have an incubation of a week or more before symptoms of acute giardiasis may develop.

Trophozoites are localize to the small intestine, trophozoite attachment to the mucosal surface of the duodenum and jejunum, although the trophozoite does not invade the mucosal epithelium.

Clinical manifestation: It is mainly asymptomatic infection occurs in both children and adults, and asymptomatic cyst & trophozoits 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

Giardiasis: Laboratory diagnosis

- **Stools examination**
  - **Microscopy for cysts or trophozoits**
  - **Detection of *Giardia* antigens in stools**
- **Examination of duodenal contents: trophozoites**

Chemotherapy

- **Drug of choice: Metronidazole**

Intestinal Amoebae

Stained

	Entamoeba coli	*Endolimax nana*	*Iodamoeba bütschlii*	*Dientamoeba fragilis*	*Entamoeba histolytica*	*Entamoeba dispar*	*Entamoeba hartmanni*
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

Entaemoeba histolytica

500 million people are infected. 100,000 deaths per year.

It is a waterborne infection.

There are 6 species of *Entamoeba:*

1. ***E. histolytica*** Amoebae that are pathogenic & invasive
2. ***E. dispar.*** The non-pathogenic, non invasive form
3. ***E. hartmanni***
4. ***E. coli***
5. ***E. gingivalis***
6. ***E. polecki***

E. histolytica and E. dispar can't be distinguished by microscopic observation

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.

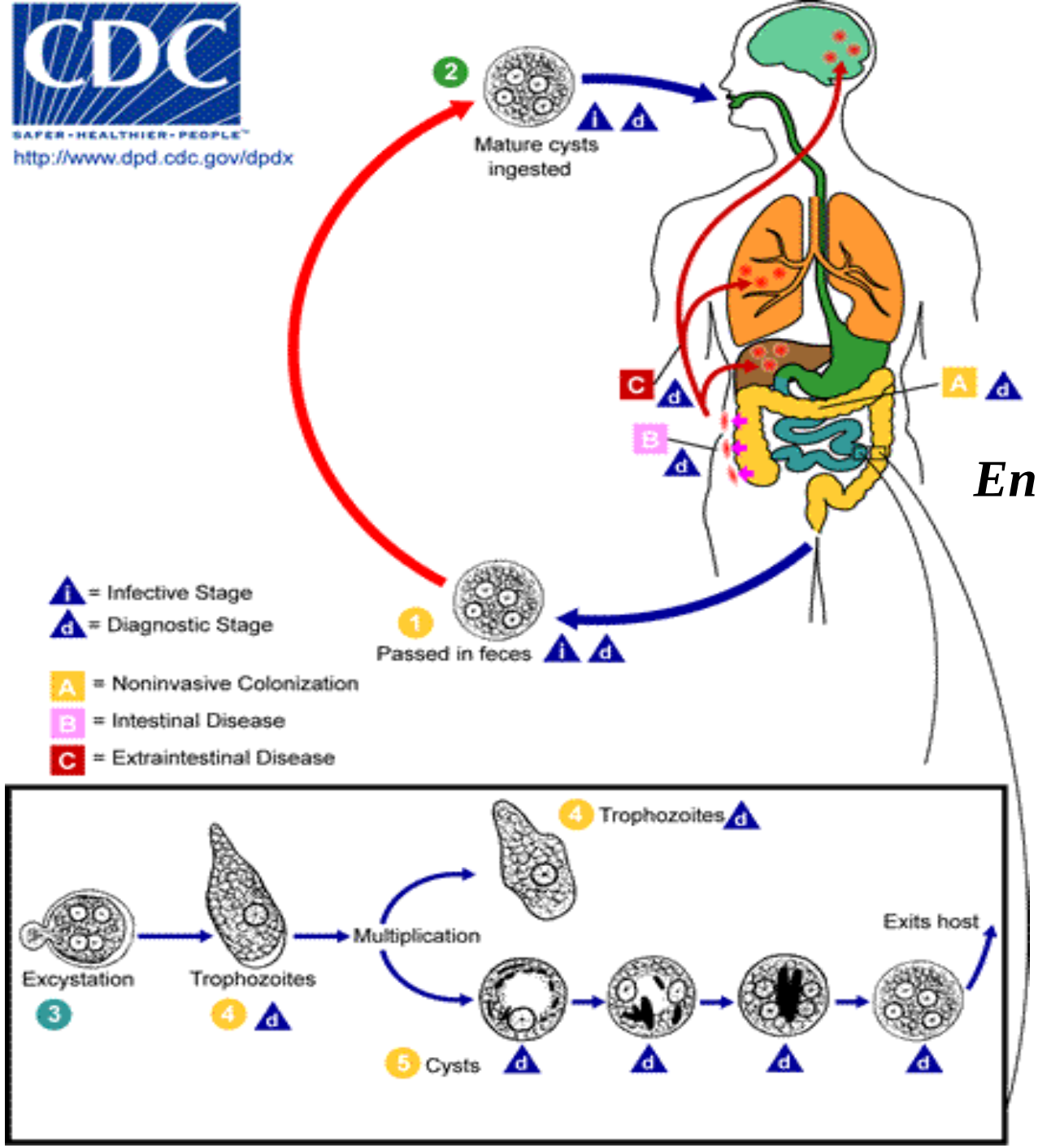
The cysts pass through the stomach to the small intestine, where they excyst to form trophozoites.

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 manifestation:

The majority of *Entamoeba* infections are **asymptomatic**
some have Symptoms which range from mild diarrhea to severe **amebic dysentery (abdominal pain, bloody diarrhea and mucus in stools) & fulminant amebic colitis.**
Weight loss occurs in about half of patients, and fever can occur.

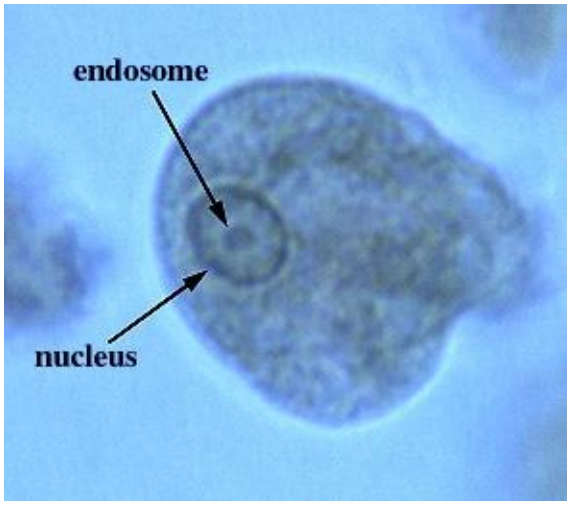
Fulminant colitis with **bowel necrosis** leading to **perforation**, and peritonitis has been observed in approximately 0.5 percent of cases; associated mortality rate is more than 40 percent.



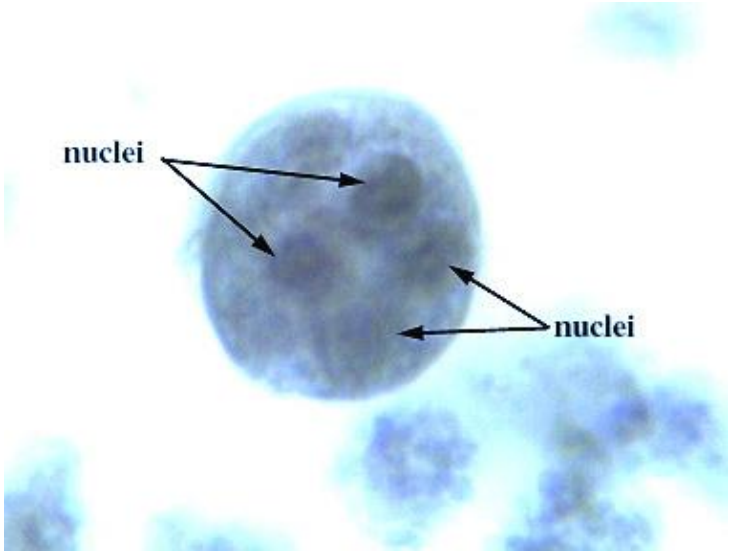
Entamoeba histolytica

Entamoeba histolytica

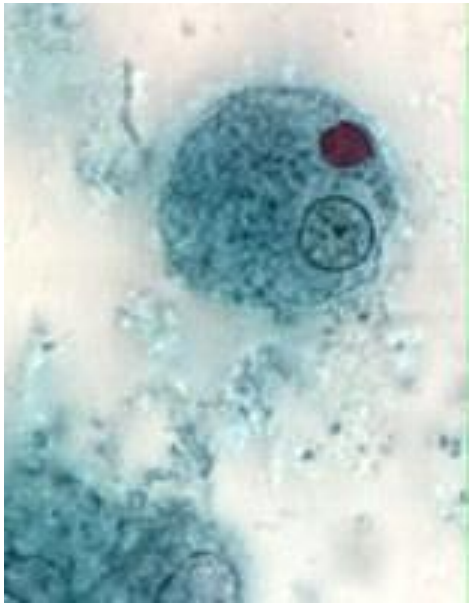
Trophozoite: vegetative stage, must encyst to survive in the environment. It is a fragile structure.

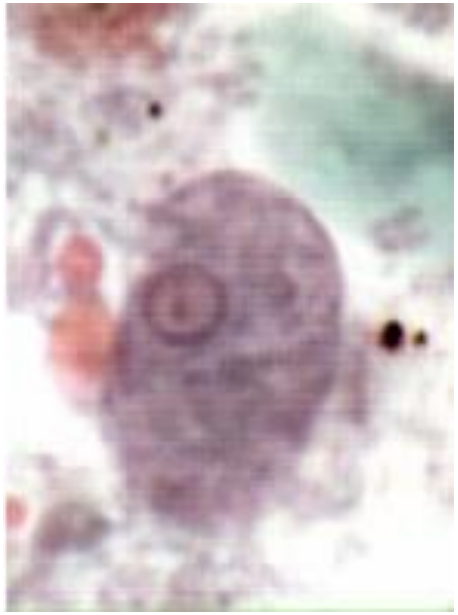


Cyst: infective stage. Resist the harsh conditions of the environment.



E. histolytica **cyst**





E. histolytica **trophozoite**

Entamoeba histolytica

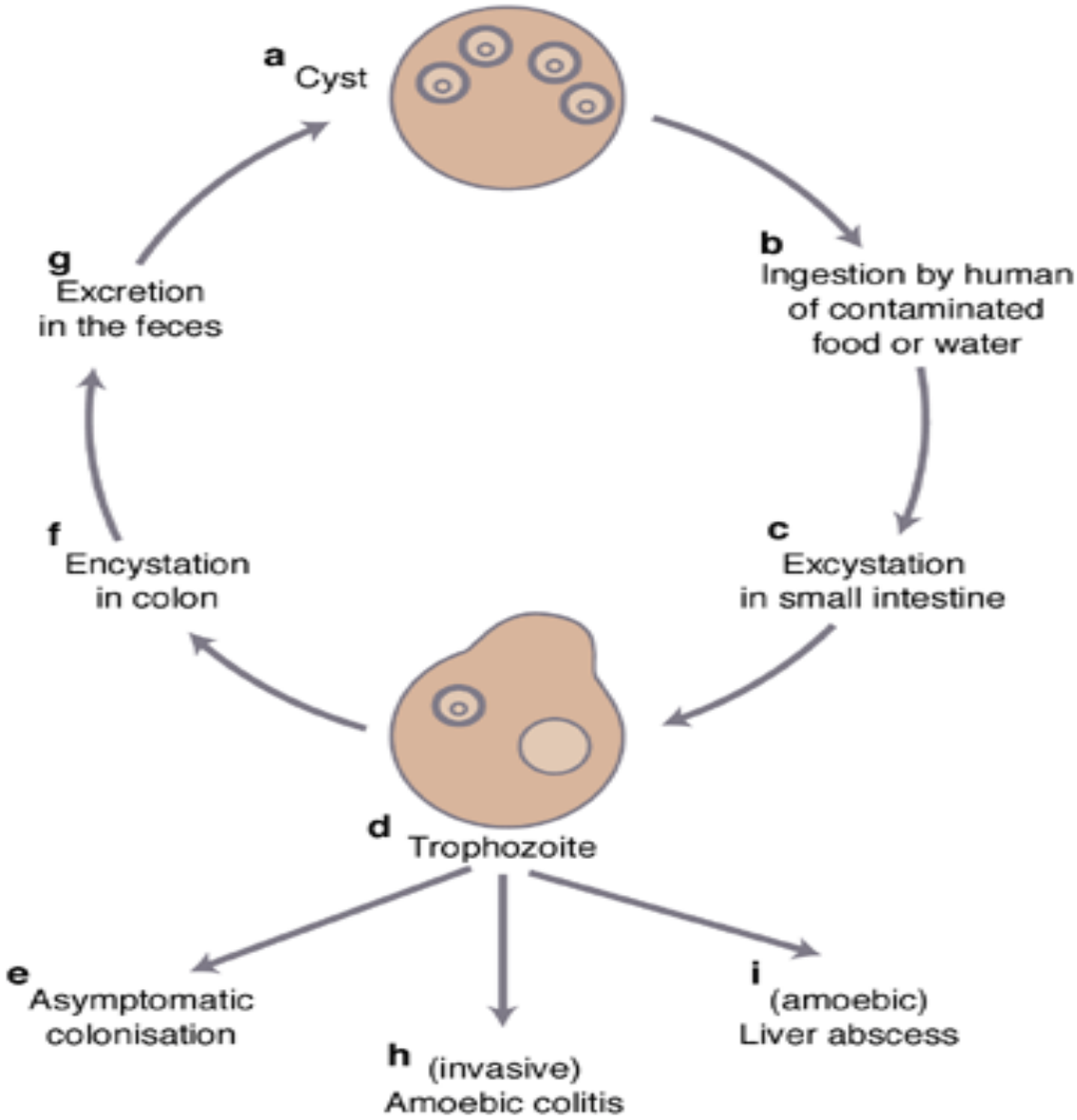
Mode of infection (fecal-oral route)

- **Water, food**
- **Flies can act as vector.**
- **Can be sexually transmitted person to person contacts**
- **Not a zoonosis**

The infective dose can be as little as 1 cyst (very virulent).

The incubation period can be from few days to few weeks depending on the infective dose

Cysts can survive for weeks at appropriate temperature and humidity.



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

Entamoeba histolytica

PATHOLOGY

Intsetinal amoebiasis :

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

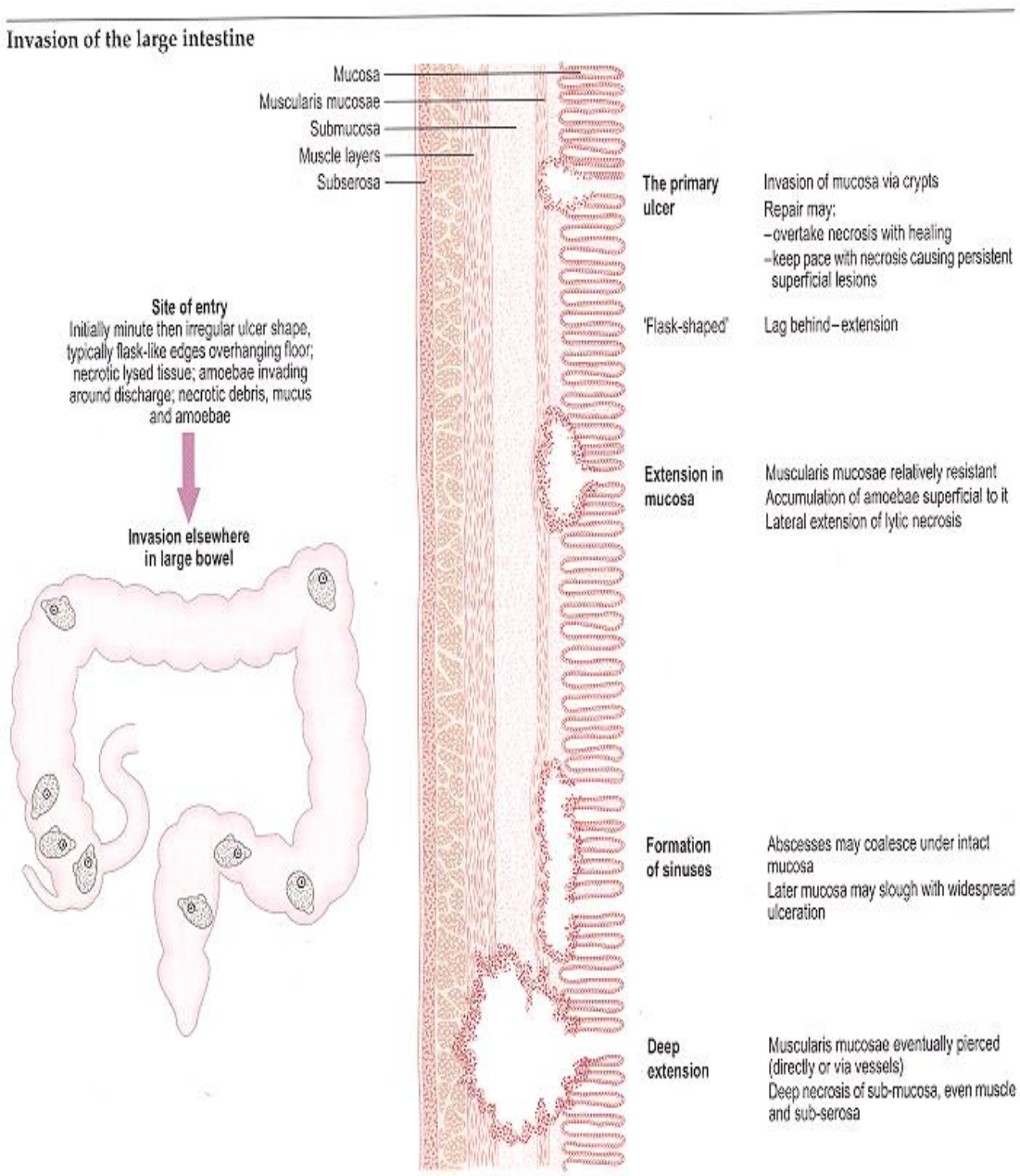
Lesions are found mainly in the colon.

They may heal.

Or it may cause serious complications:

- **Perforation of the colon.**
- **Amoeboma: Granulomatous mass obstructing the bowel**
- **Blood invasion; Amoebic liver abscess, lung, brain**
- **Direct extension**

PATHOLOGY: Intsetinal amoebiasis



PATHOLOGY: Intsetinal amoebiasis

Complications

Complications and sequelae

Perforation
Haemorrhage (rare)

Peritonitis
Haemorrhage

Secondary infection

Surrounding inflammatory reaction and fibroblastic proliferation

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

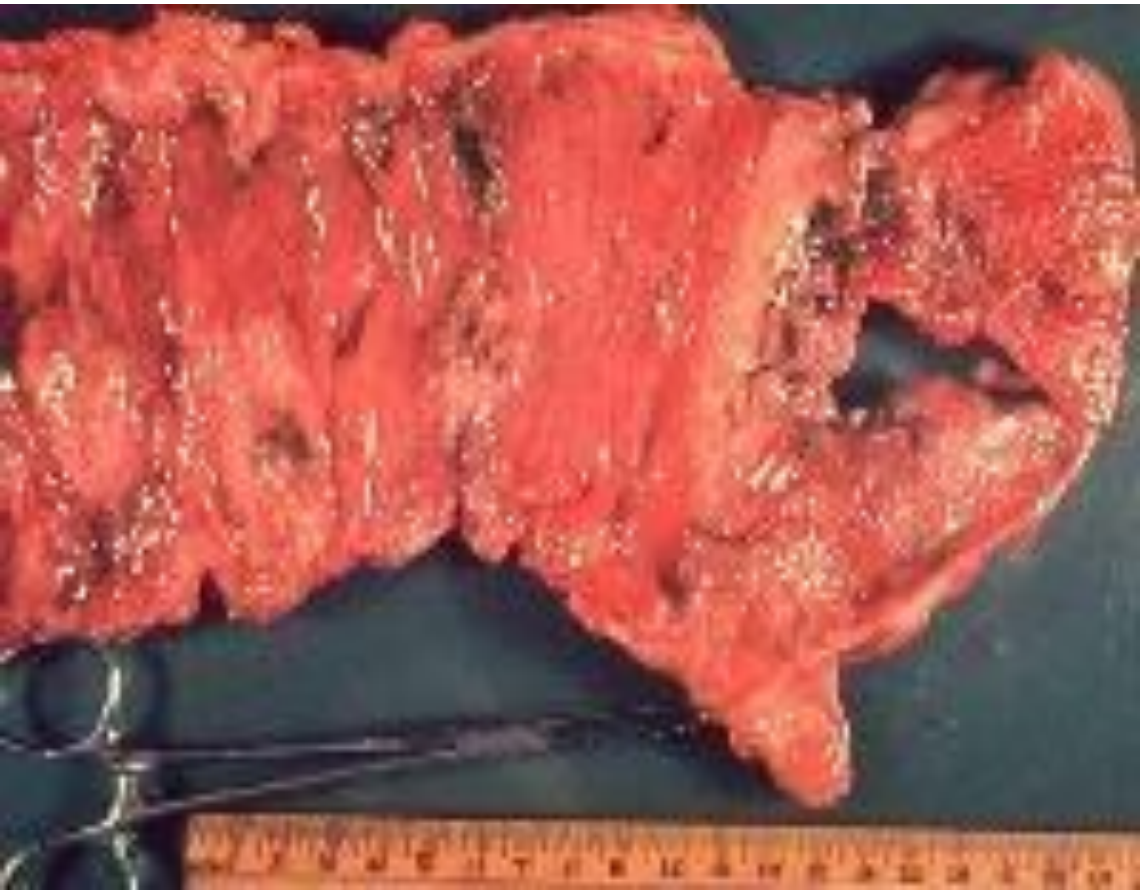
A mass under oedematous mucosa with
– internal abscesses of necrotic tissue and amoebae
– surrounding granulomatous tissue zone with eosinophils, lymphocytes and fibroblasts
– outer firm nodular fibrous tissue

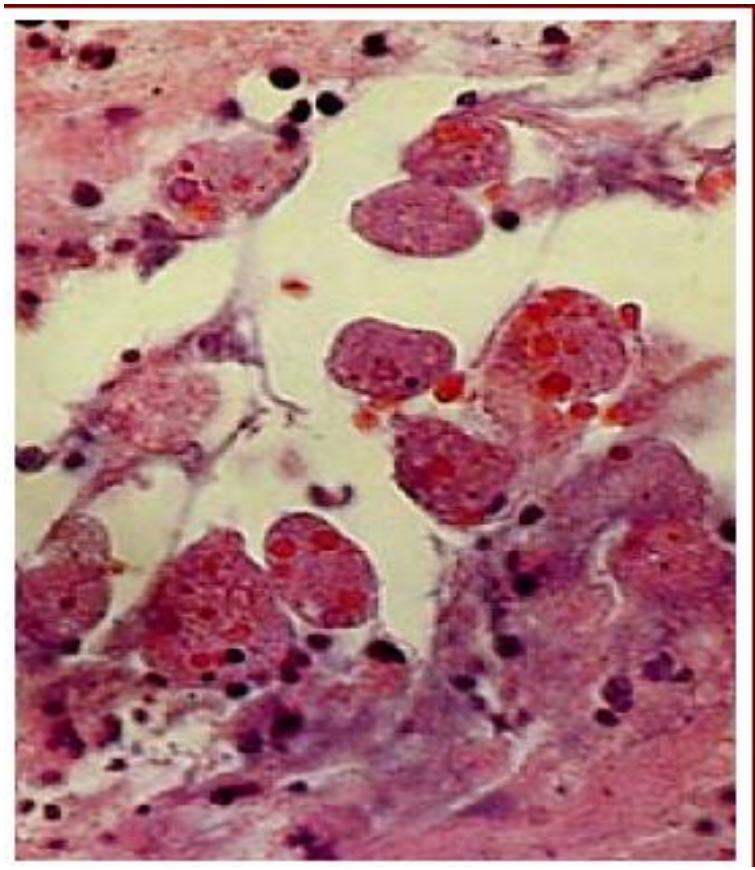
Invasion of blood vessels

Direct extension outside bowel

Extraintestinal lesions-page 52

PATHOLOGY: Intsetinal amoebiasis



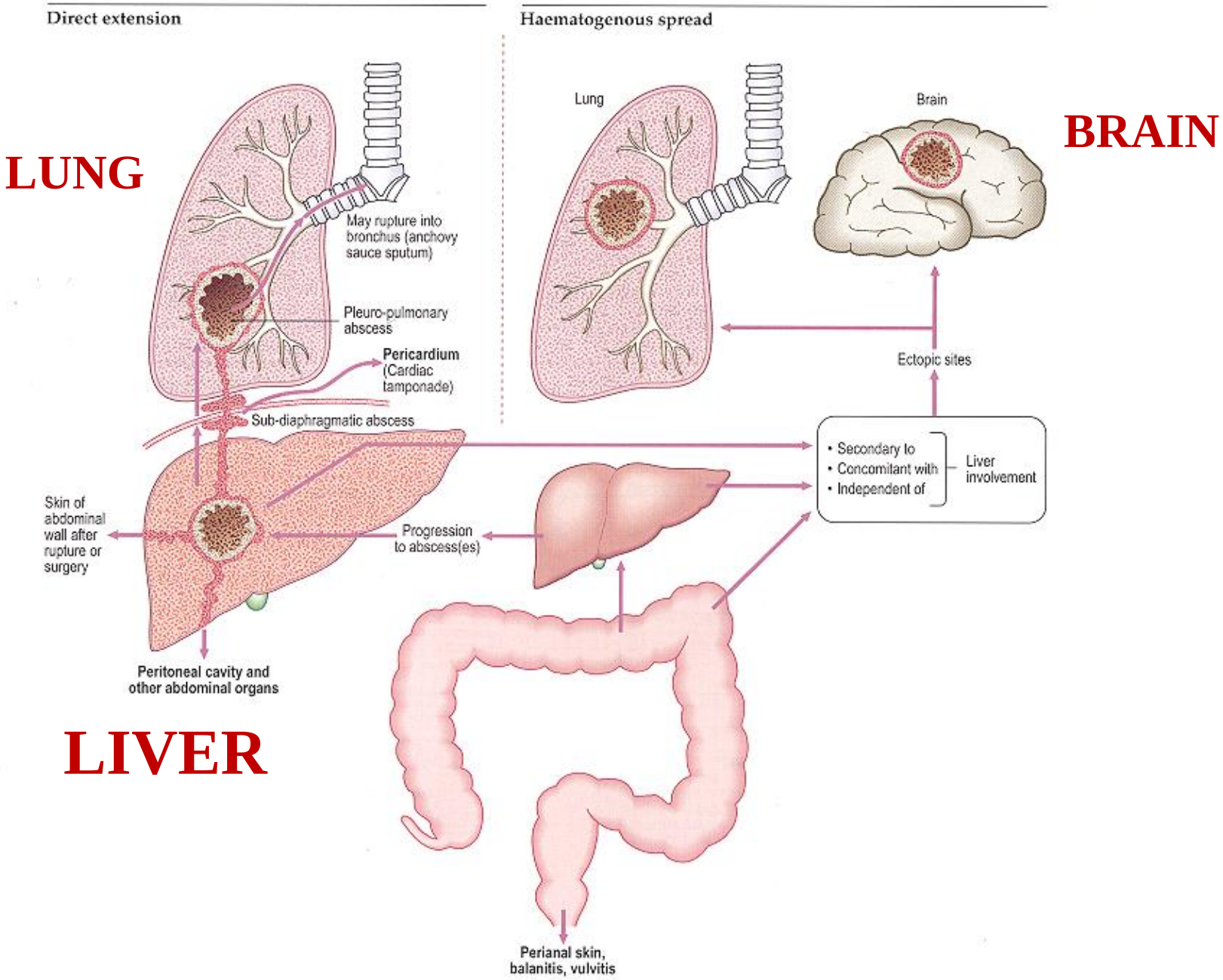


Entamoeba histolytica

E. Histolytica **in mucosa.**

Numerous trophozoites can be seen with ingested erythrocytes

PATHOLOGY: Extra-intestinal amoebiasis :

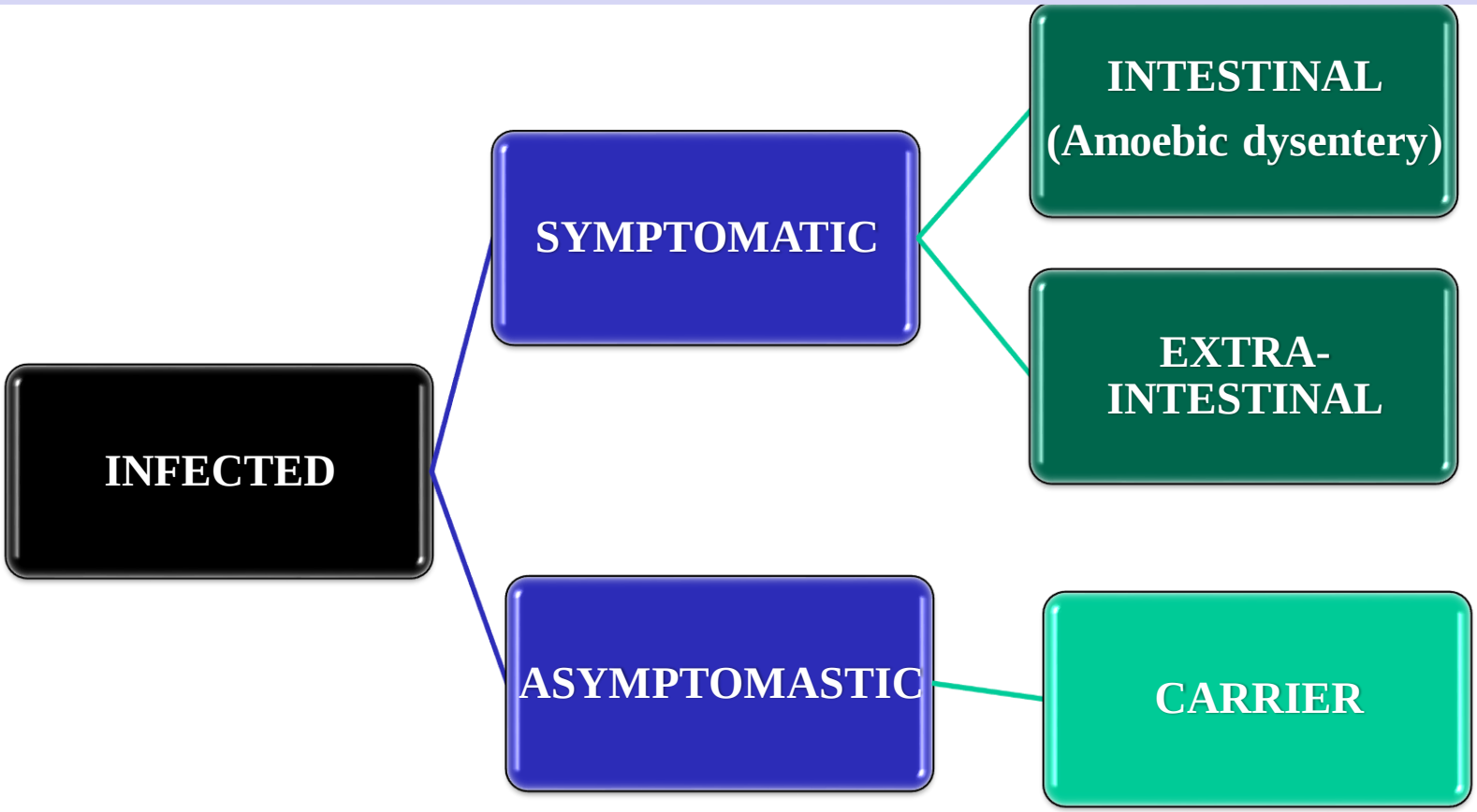


A 30-year-old male experienced diarrhea for two weeks with fever of 39° C, nausea, vomiting, malaise and **right upper abdominal pain.** Physical examination revealed hepatomegaly 6 cm below the right costal margin. CT scan showed a single hypodense mass in the rigth lobe of 7.8 x 5.2 cm, round, with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

Amebic liver abscess was diagnosed.

THE CLINICAL OUTCOMES OF INFECTION WITH

Entamoeba histolytica



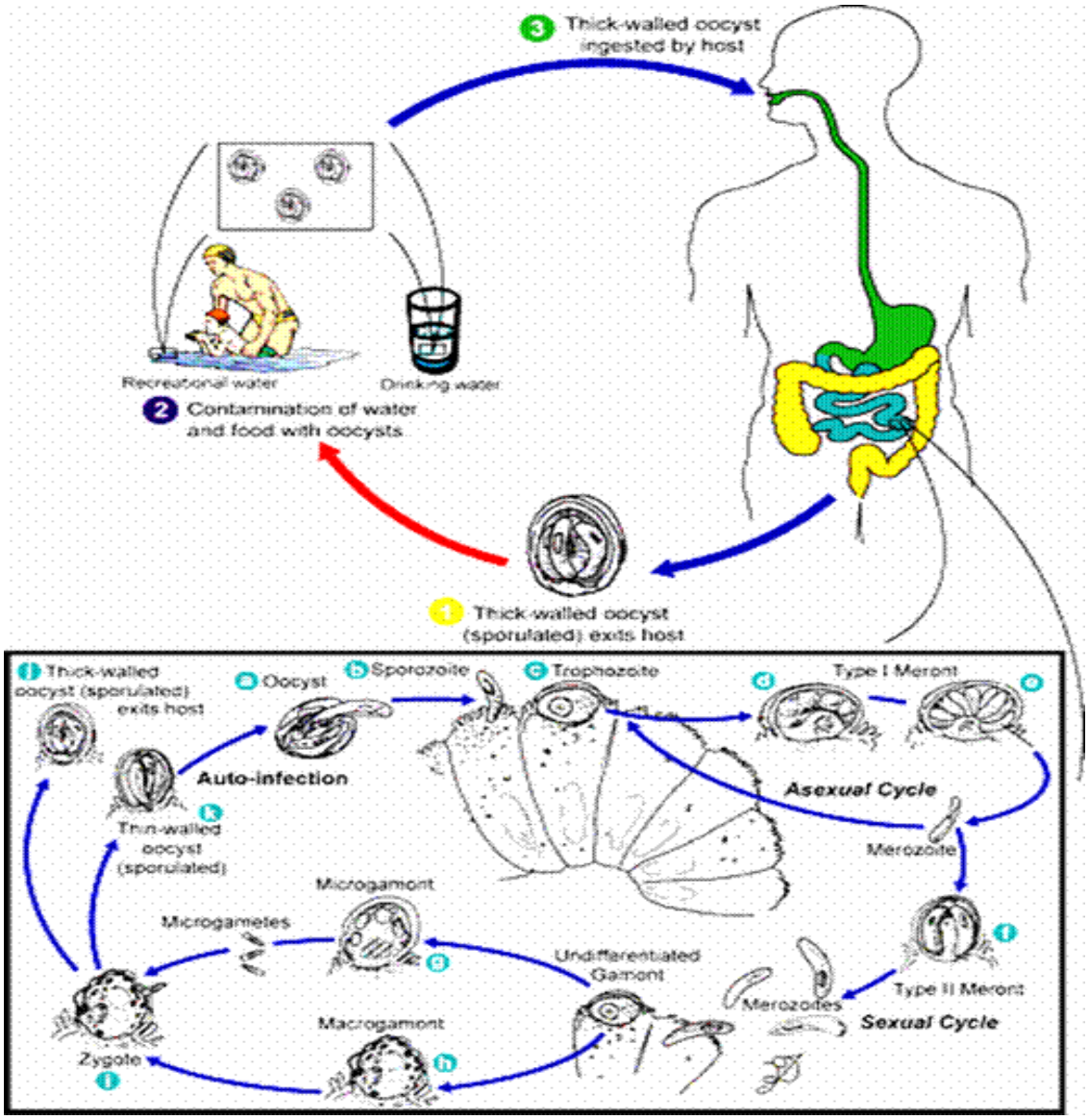
Laboratory Diagnosis of Amoebiasis

- Diagnostic techniques include **microscopy, antigen detection (serology), molecular**, **and colonoscopy with histological examination**.
  - **Stools examination (Microscopy)**:
    - Wet mount (cysts and trophozoites)
    - Concentration methods (only cysts)
  - **Serology antigen detection** (mainly for invasive infections): IHA, ELISA.
  - **Molecular** — 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.
- **Extra-intestinal:**
  - Serology: IHA , ELISA
  - Surgical aspirate (not done as a diagnostic procedure due to risk of extension) trophozoite
  - Sigmoidoscopy and/or colonoscopy and taking biopsy: trophozoite.

Main Drugs for Treatment of Amoebiasis

- **Intestinal :**
  - Asympromatic (cysts only): diloxanide furoate (Furamide)
  - Symptomatic (cysts and trophozoites): metronidazole
- **Extra-intestinal:**
  - Metronidazole

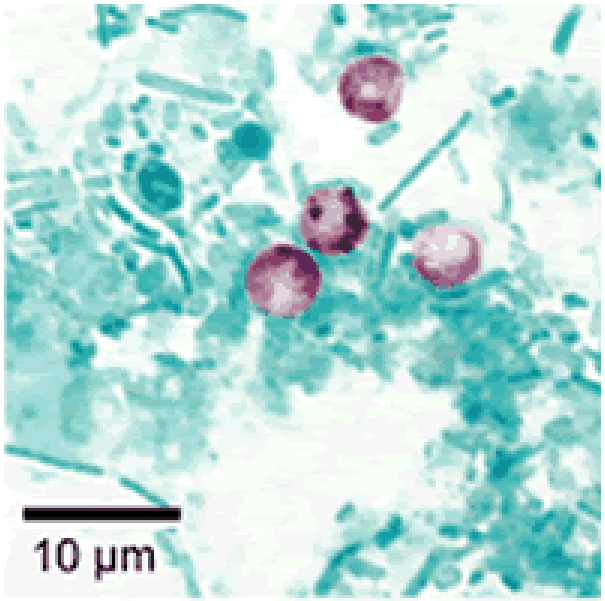
Cryptosporidium Parvum



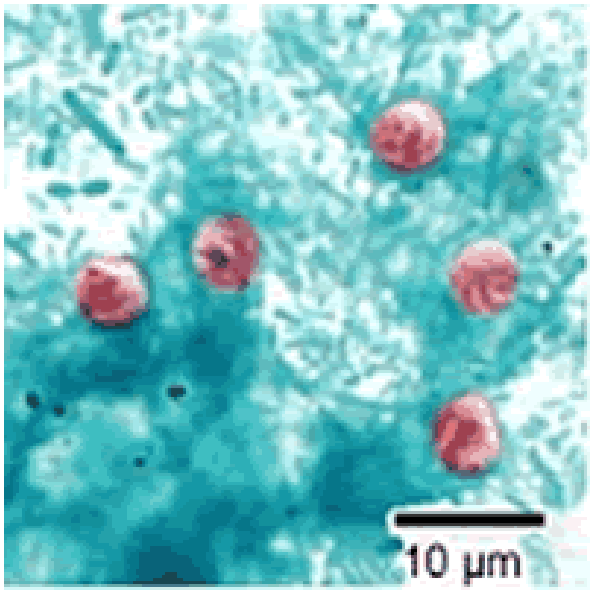
Cryptosporidium

- is an intracellular protozoan parasite that is associated with self-limited diarrhea in normal immunocompetent hosts
- and severe debilitating diarrhea with weight loss and malabsorption in **HIV-infected patients.**
  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, by fecal oral rout. Contaminated environment, such as food or water source.

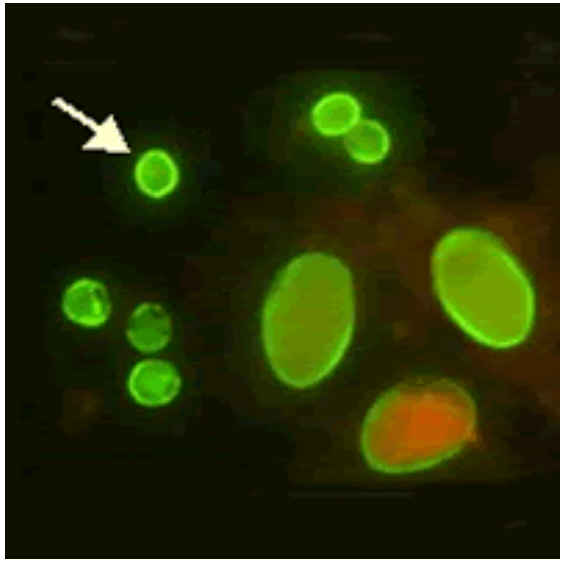
Cryptosporidium Diagnosis



Modified acid-fast stain ZN.



safranin



IMMUONOFLOURECENT (IF)

Cryptosporidium Diagnosis

From stool

The diagnosis of cryptosporidiosis is made by finding oocysts in fecal smears when using modified acid –fast stain (ZN)

And by Antigen detection by using ELIZA, IF.

From duodenal aspirates, bile secretions & biopsy specimens from affected gastrointestinal tissue

also we can do polymerase chain reaction **(PCR)**, or enzyme immunoassays **(ELIZA) & IF.**

Cryptosporidiosis Treatment

- Self-limited in immunocompetent patients
- In AIDS patients: paromomycin


Thank
you