

# Intestinal Protozoa



# CLASSIFICATION OF PARASITES

PROTOZOA	HELMINTHS
Unicellular Single cell for all functions	Multicellular Specialized cells
1: <u>Amoebae</u> : move by pseudopodia 2: <u>Flagellates</u> : move by flagella 3: <u>Ciliates</u> : move by cilia 4: <u>Apicomplexa</u> (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***

***Giardia* trophozoites  
(SEM)**

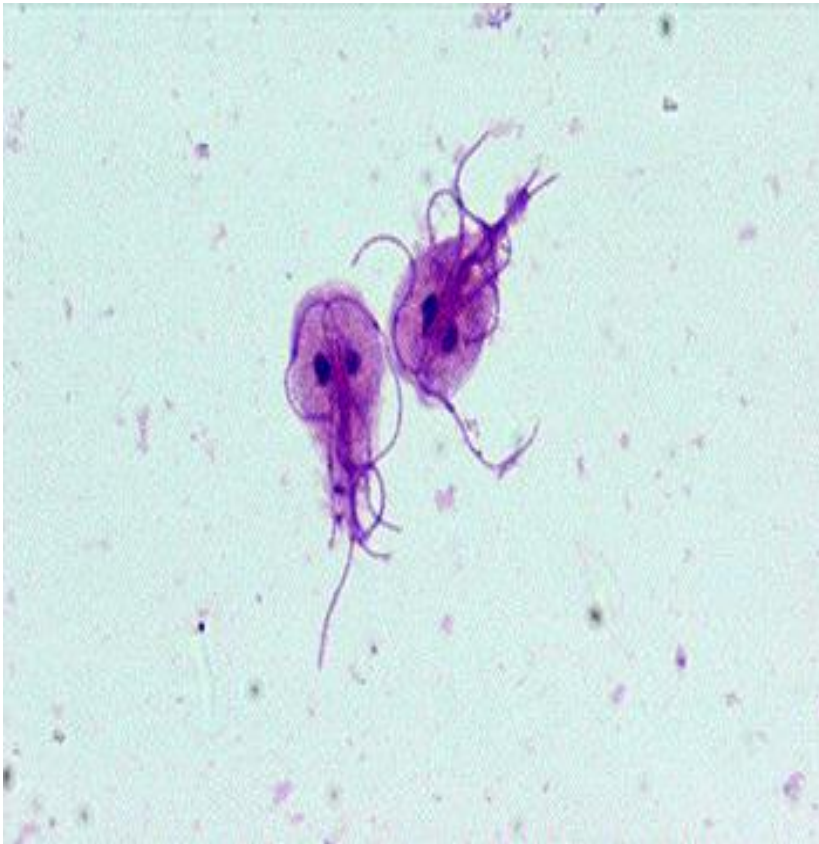


***Giardia* trophozoites  
(light microscope)**



# Flagellates: *Giardia lamblia*

**Trophozoite**

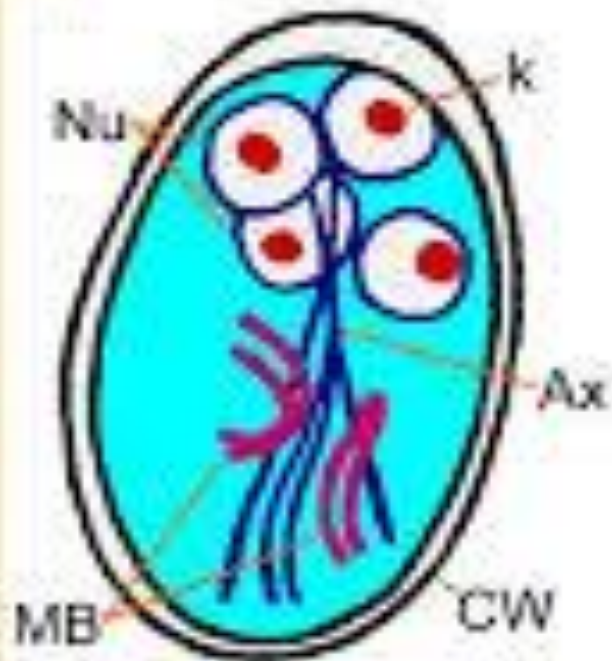


**Cyct**



# Giardia

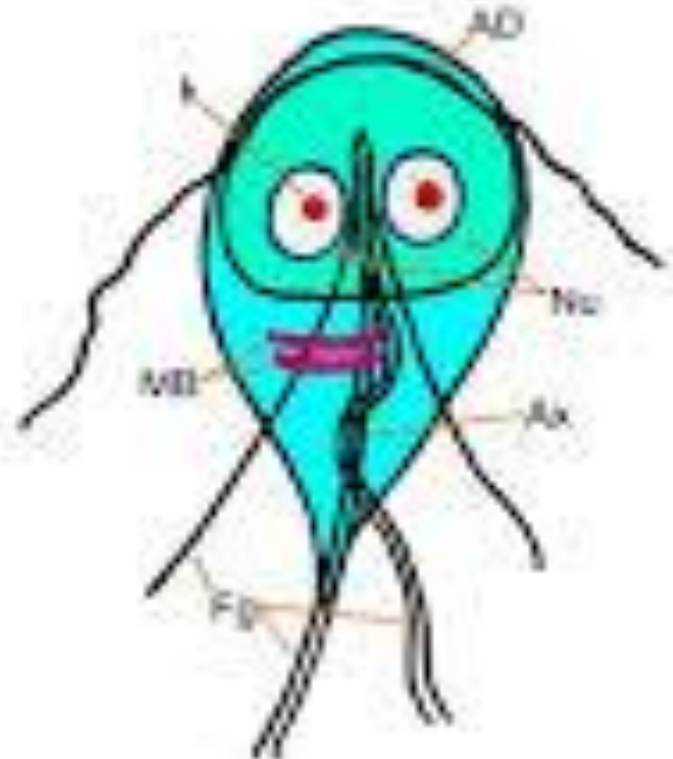
## CYST



Infective stage  
Multi-nucleated



## TROPHOZOITE

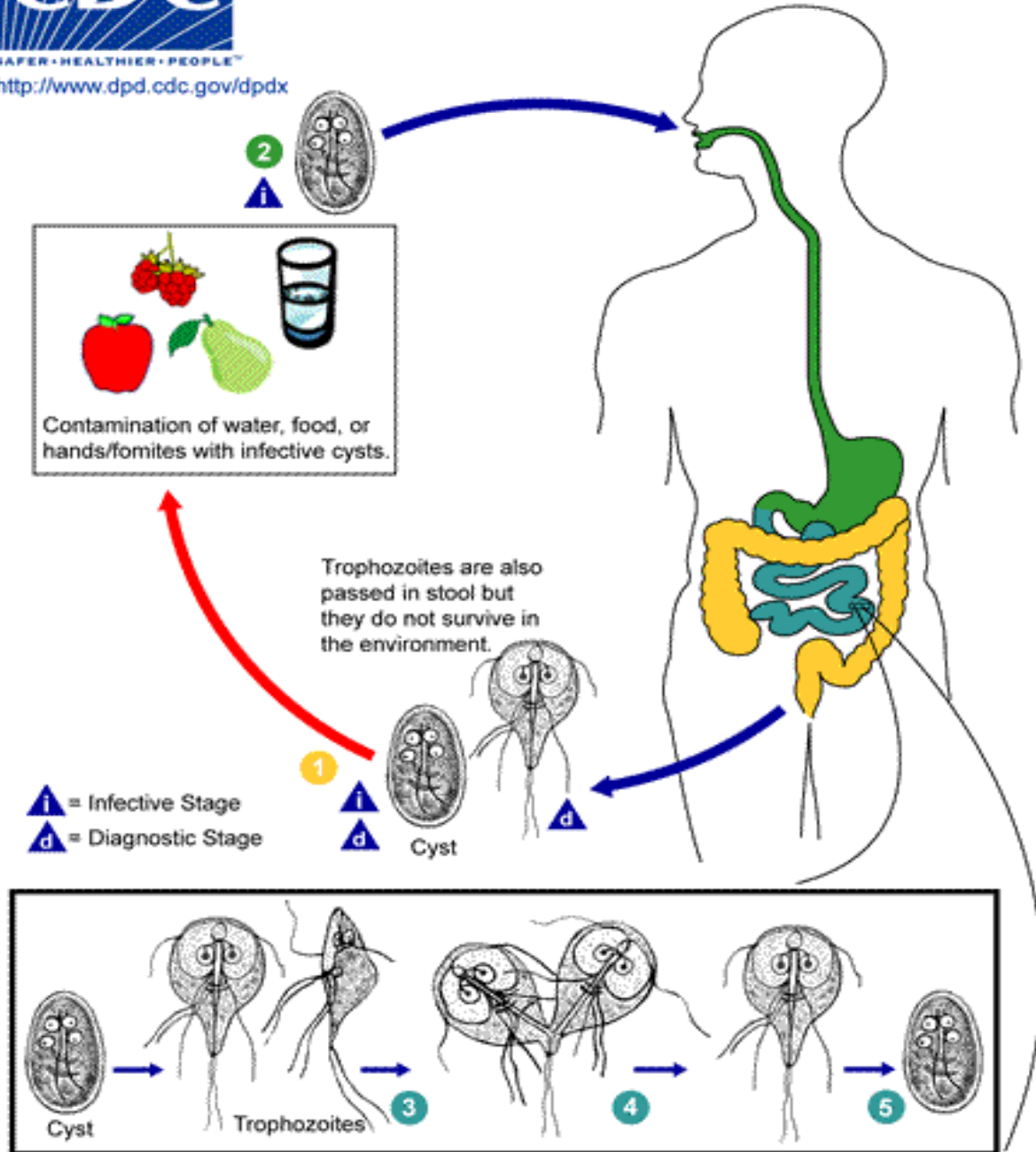


Replicative stage  
2 nuclei & adhesive disc  
8 flagella

***Giardia* cyst**  
**(light microscope)**

**INFECTIVE STAGE**

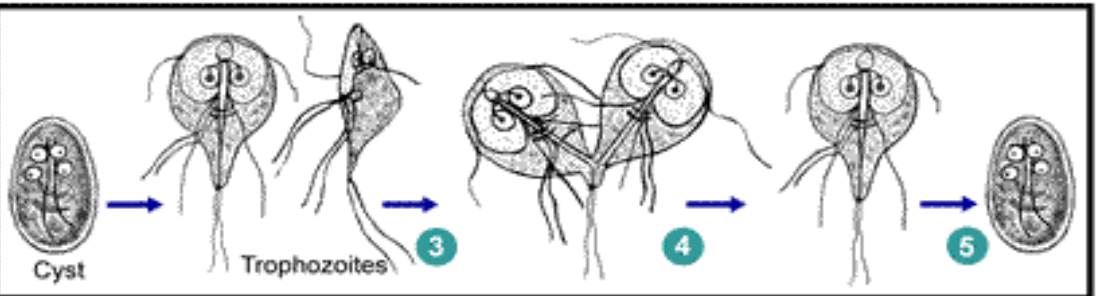




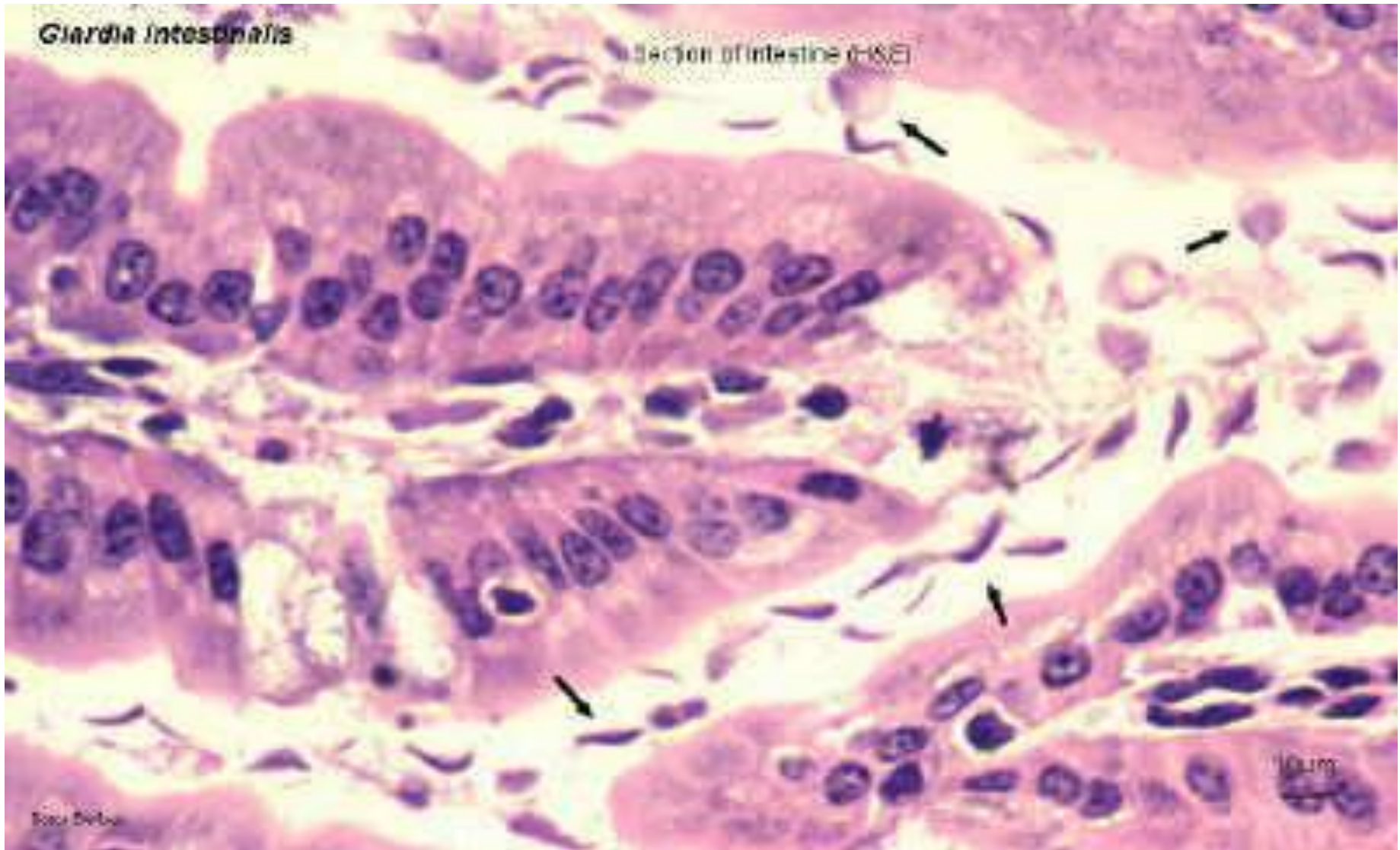
# *Giardia lamblia*: Life cycle

**i** = Infective Stage  
**d** = Diagnostic Stage

Trophozoites are also passed in stool but they do not survive in the environment.



# *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: Incubation period 1-2 wks followed by diarrhea, vomiting & flatulence for about 6 wks

Atypical: Severe diarrhea, malabsorption especially in children and cholecystitis








# Giardiasis: Laboratory diagnosis

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

# Giardiasis: Chemotherapy

- **Drug of choice: Metronidazole**

# 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...

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*:

1. ***E. histolytica***
2. *E. dispar*
3. *E. hartmanni*
4. *E. coli*
5. *E. gingivalis*
6. *E. polecki*

## *E. histolytica* vs *E. dispar*

### *Entamoeba histolytica*:

Amoebae that are pathogenic and invasive.

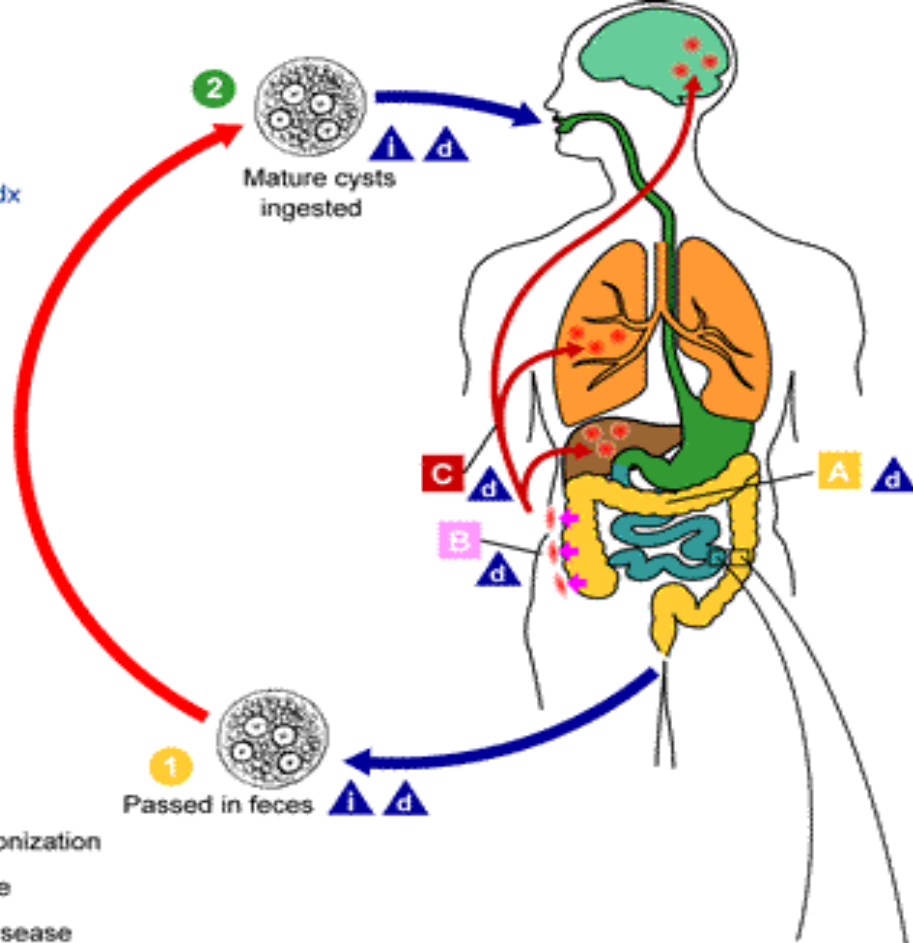
### *E. dispar*:

The non-pathogenic, non invasive form.

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

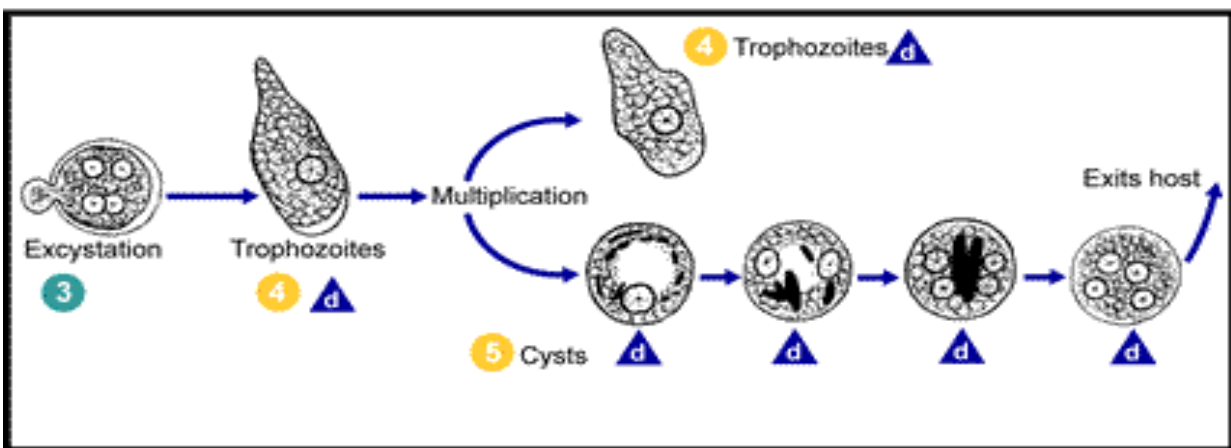


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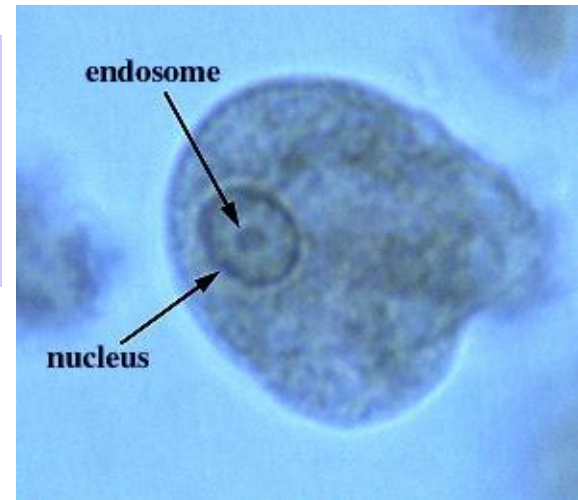
- i** = Infective Stage
- d** = Diagnostic Stage
- A** = Noninvasive Colonization
- B** = Intestinal Disease
- C** = Extraintestinal Disease

*Entamoeba histolytica*

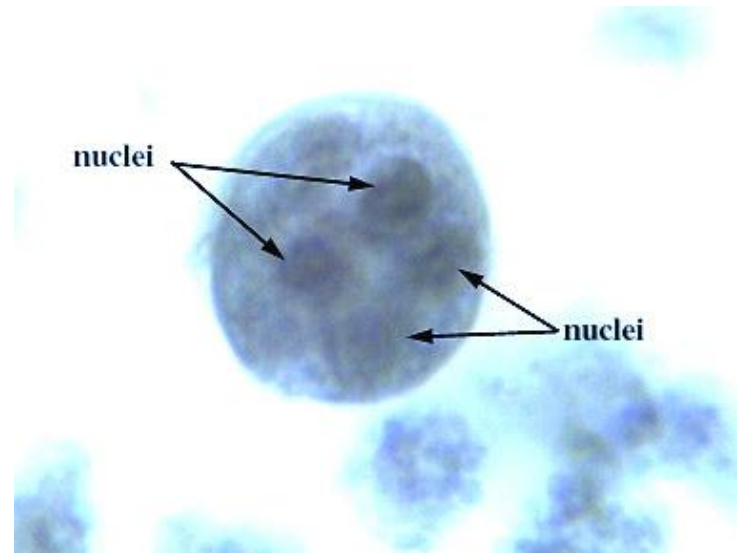


# *Entamoeba histolytica*

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

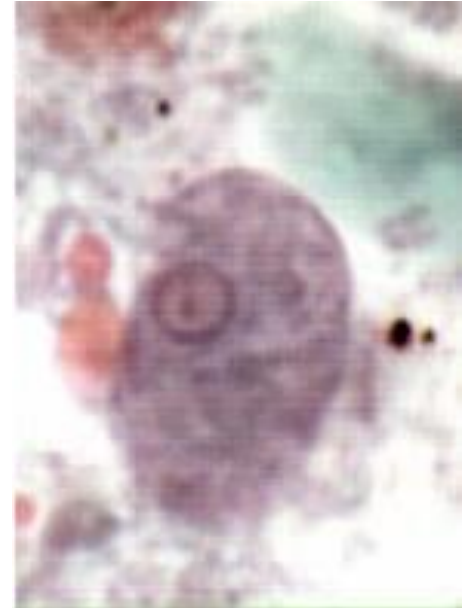
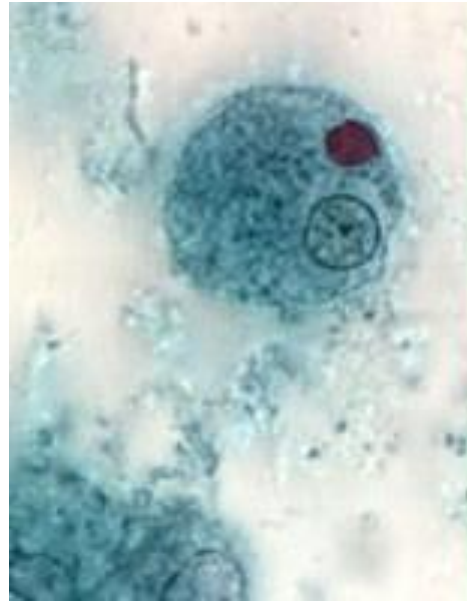


**Cyst**: infective stage. Resist the harsh conditions of the environment.





***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**

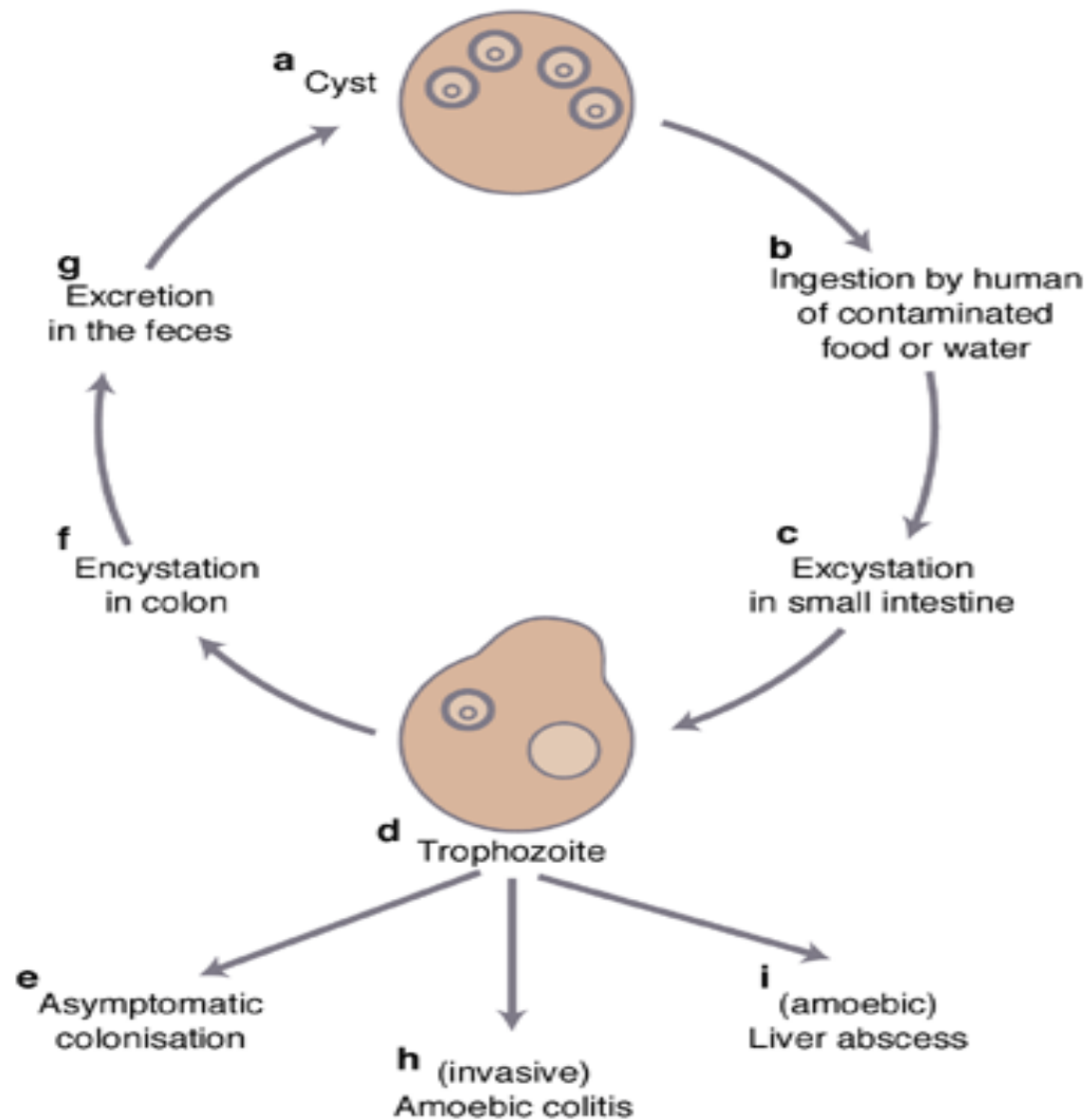
# *Entamoeba histolytica*

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.



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

# *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, also trophozoite has the ability to ingest blood cells.

The presenting symptom is diarrhoea which is accompanied by blood, mucus and sometimes tenesmus.

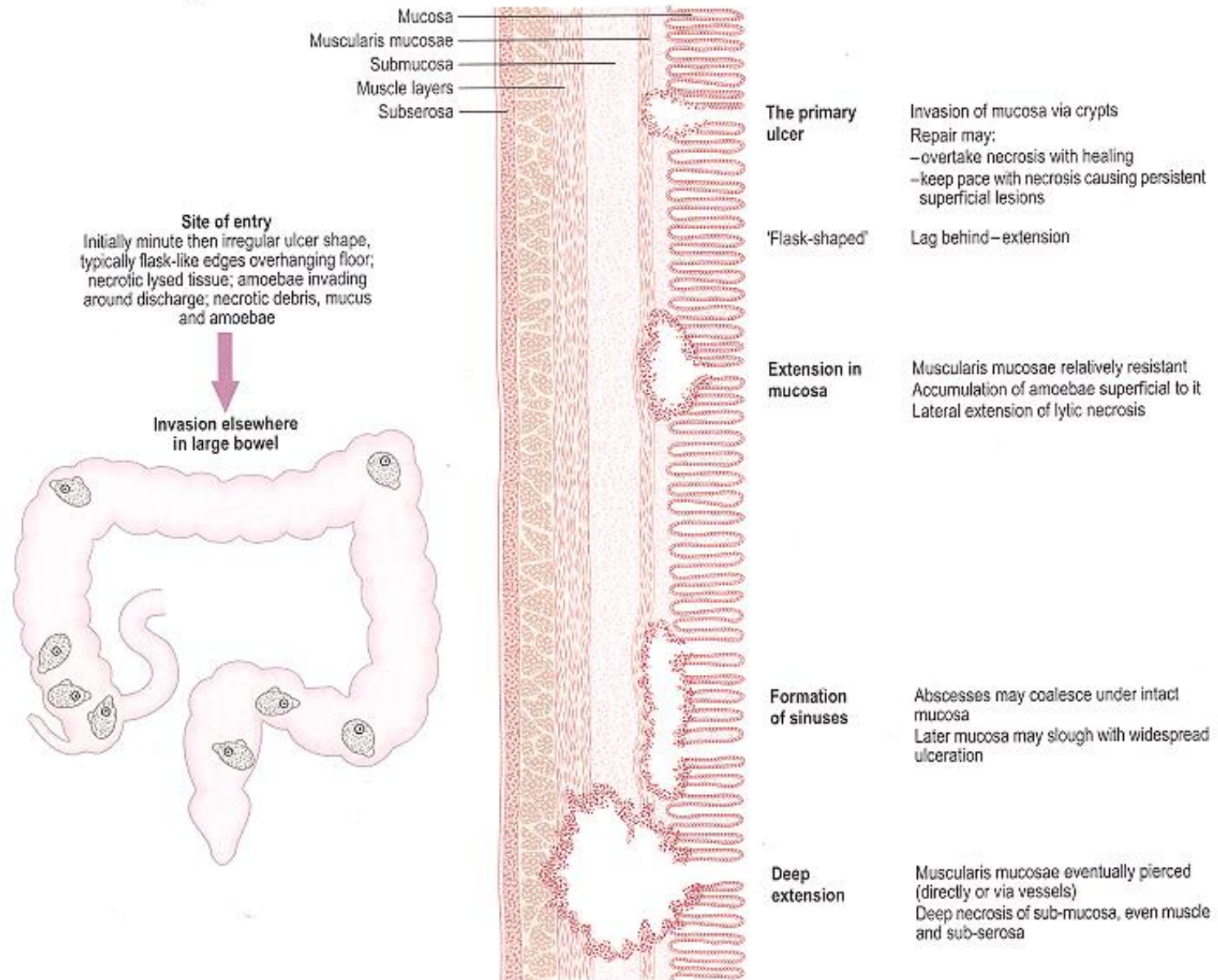
As a complication, severe intestinal hemorrhage or rarely perforation may occur, lesions are found in cecum, appendix or colon.

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

## Invasion of the large intestine



**PATHOLOGY: Intestinal amoebiasis :**



# PATHOLOGY: Intestinal amoebiasis

## Complications

### Complications and sequelae

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



# **PATHOLOGY**

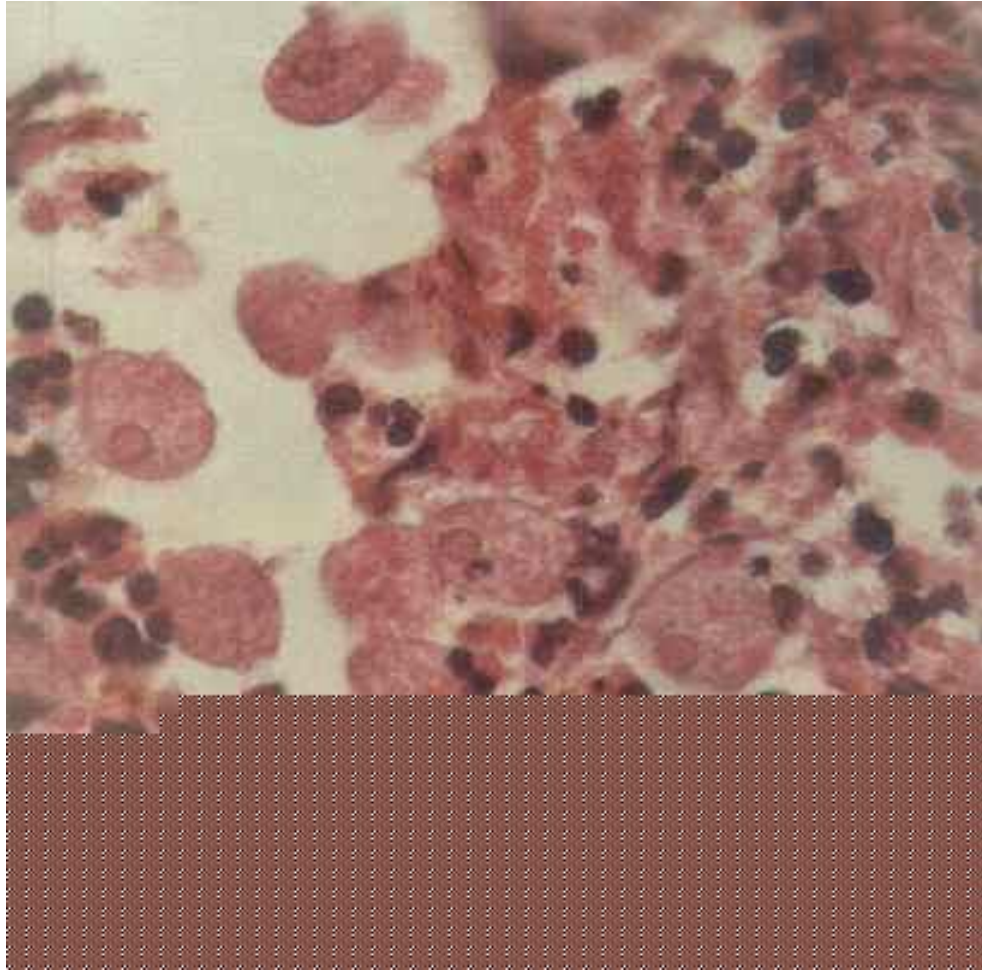
## **Intestinal amoebiasis :**



*Entamoeba histolytica*

# PATHOLOGY

## Intestinal amoebiasis :

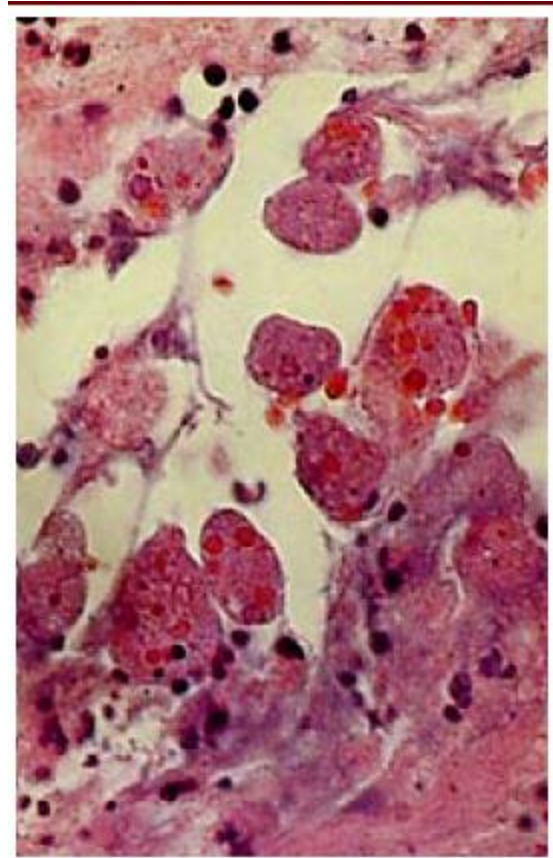


*Entamoeba histolytica*

# **PATHOLOGY: Intestinal amoebiasis :**

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

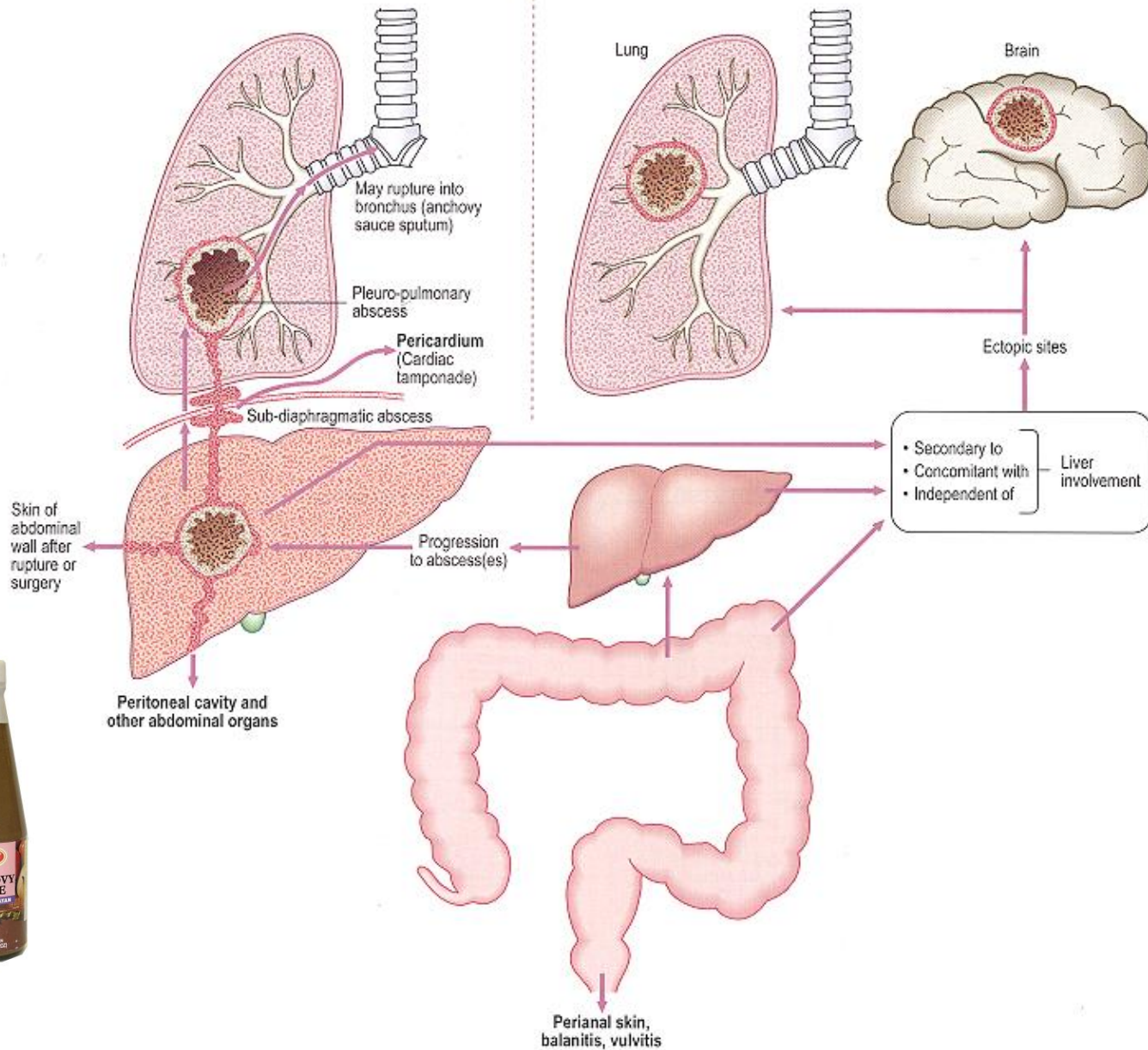
**Numerous trophozoites can be seen with ingested erythrocytes.**



# PATHOLOGY: Extra-intestinal amoebiasis :

Direct extension

Haematogenous spread

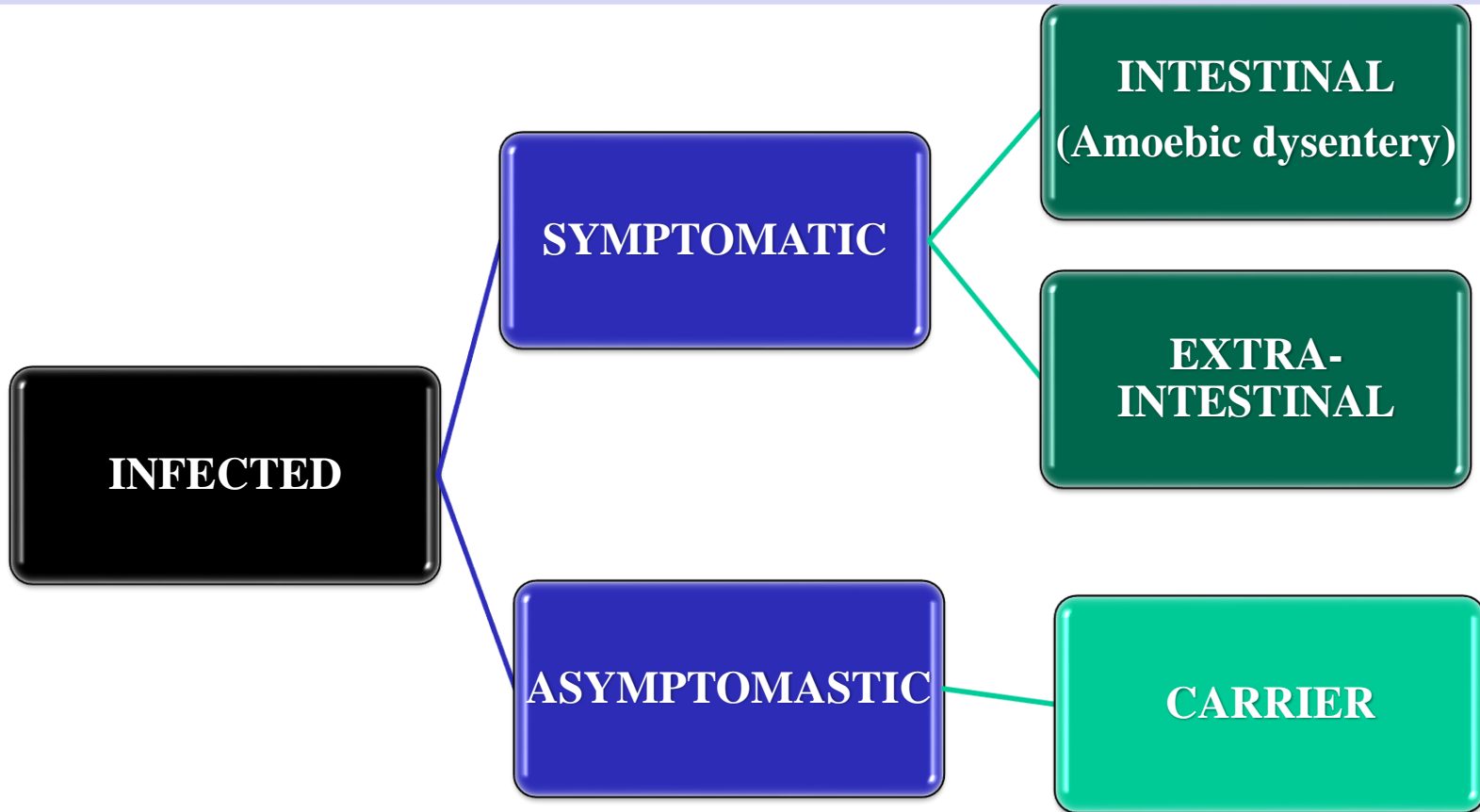




A 30-year-old male experienced diarrhea for two weeks with fever of 39° C, nausea, vomiting, malaise and right upper abdominal pain. Physical examination revealed hepatomegaly 6 cm below the right costal margin. CT scan showed a single hypodense mass in the right lobe of 7.8 x 5.2 cm, round, with well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

# THE CLINICAL OUTCOMES OF INFECTION WITH

*Entamoeba histolytica*



# Main Drugs for Treatment of Amoebiasis

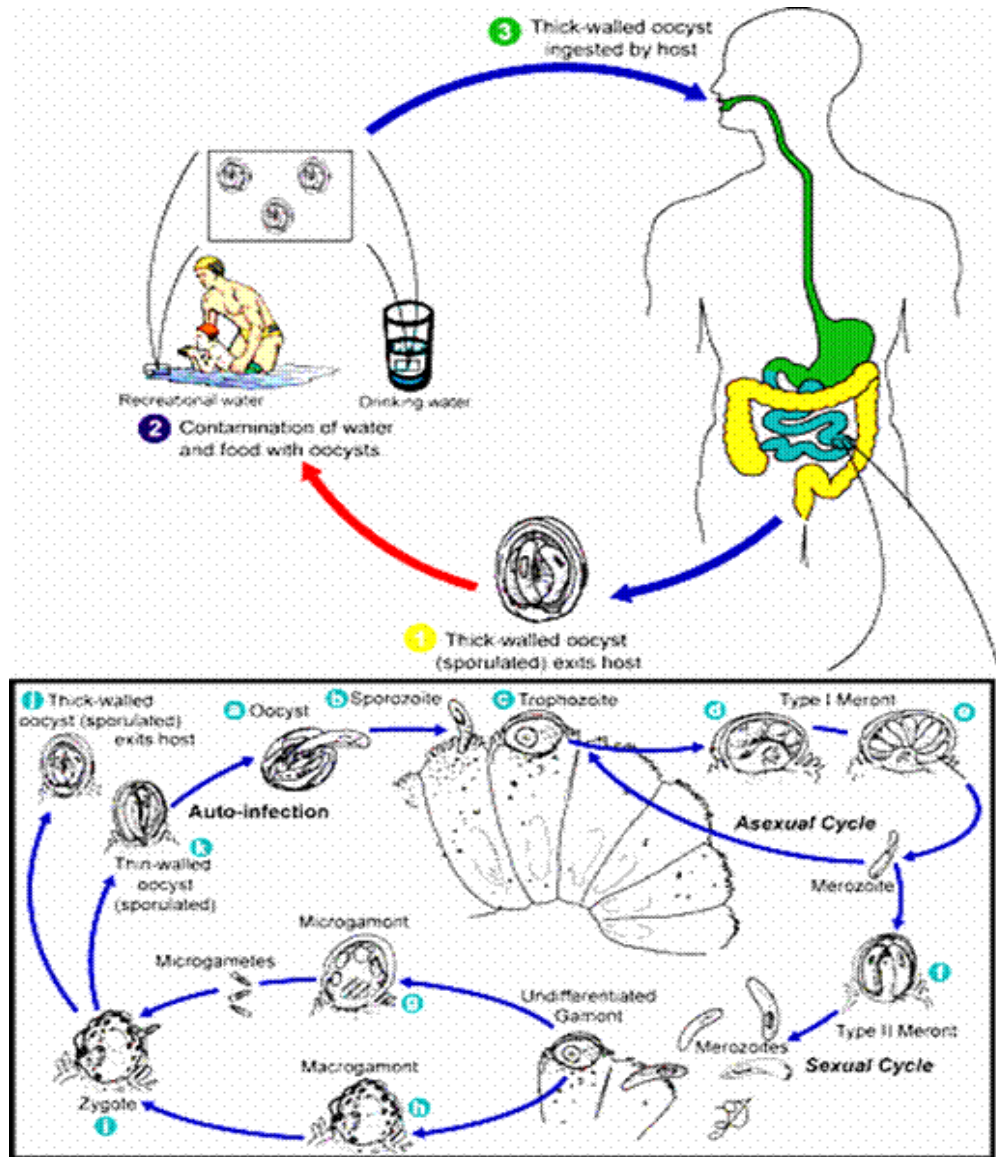
- Intestinal:
  - Asymptomatic (cysts only): diloxanide furoate (Furamide)
  - Symptomatic (cysts and trophozoites):  
Metronidazole
- Extra-intestinal:
  - Metronidazole

# Laboratory Diagnosis of Amoebiasis

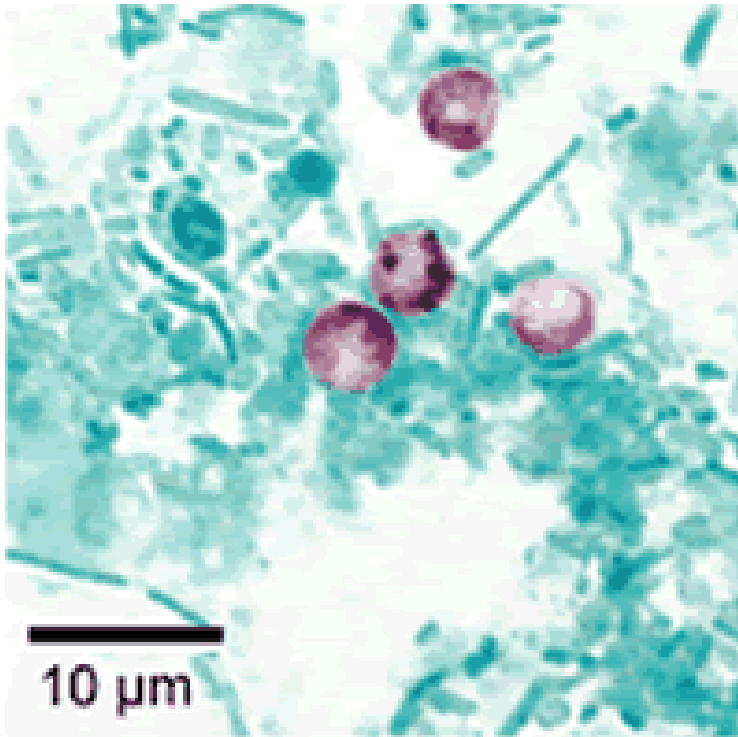
- Intestinal:
  - Stools examination:
    - Wet mount (cysts and trophozoites)
    - Concentration methods (only cysts)
  - Serology (mainly for invasive infections): IHA , ELISA
- Extra-intestinal:
  - Serology: IHA, ELISA
  - Microscopy of tissues or fluids



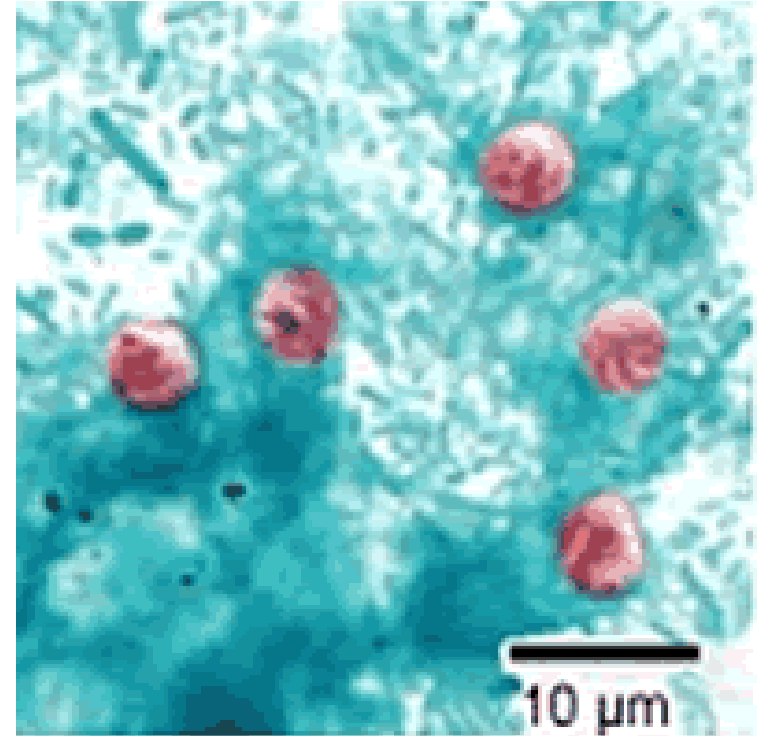
# Cryptosporidium Parvum



# Cryptosporidium Diagnosis

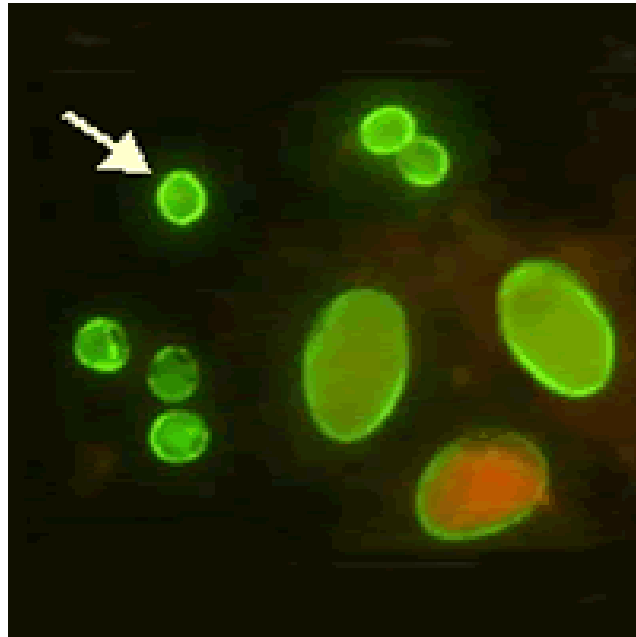


*Cryptosporidium*, acid-fast stain



*Cryptosporidium*, safranin

# Cryptosporidium Diagnosis



Crypto-Gardia FAT

# Cryptosporidiosis Treatment

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