

## Protozoa(PROTOS=PRIMITIVE, ZOA= ANIMAL OR ORGANISM)

### ¥→→ General characters

- 1-Unicellular microorganism ( just one cell) eukaryotic with true nucleus, cytoplasm and the nucleus contain karyosome.
- 2-The most important protozoan range usually from 10 to 52  $\mu$ .
- 3-are seen easily by microscope
- 4-They move by a variety of organs Pseudopodia, Flagella, Cilia.
- 5-Perfom all metabolic mechanisms( e.g. Breathing , Digesting, Excretion, Reproduction ( asexually& asexually).
- 6-They are founding in different parts of the body intestinal lumen, liver ,spleen, blood and tissues, cavities like mouth, UGS...etc.

# Classification Of Protozoa

Kingdom :Protista=(simplest of eukaryotic microorganisms)

Subkingdom: protozoa

1-Phylum: Sarcomastigophora

Subphylum:1- Sarcodina. *Ex. Entamoeba histolytica and E.Coli*

2- Mastigophora .*Leishmania.*

2-Phylum: Ciliphora (carrying cilia) *Ex. Balantidium coli*

3-Phylum: Apicomplexa: Like *Plasmodium*(Malaria).

# The Parameters of this study

**We can study for each parasite**

**£→→ Morphology of the organism.**

**£→→ Life cycle, hosts and Vectors.**

**£→→ Disease, symptoms, pathogenesis.**

**£→→ Diagnosis, Prevention and control.**

**£→→ Treatment.**

# General Morphology

Intestinal, lumen-dwelling protozoa has either both:

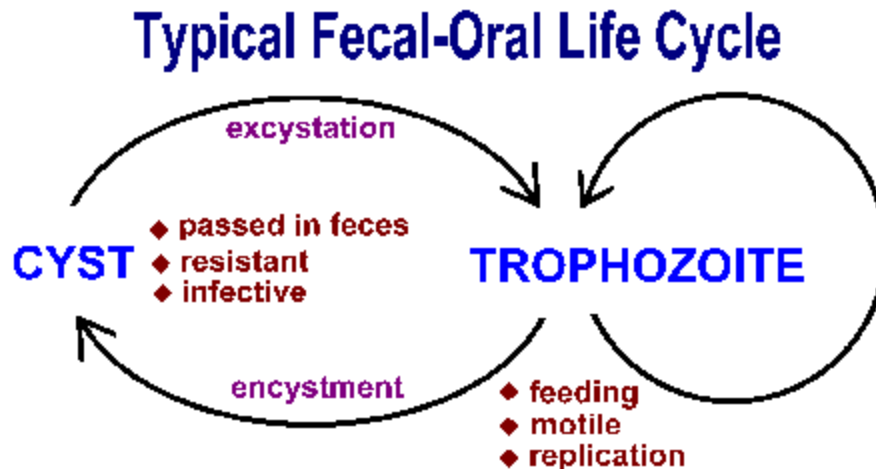
£→→ **1-Trophozoite:** it is the pathogenic stage or diagnostic stage, usually motile , active, feeding, appear in acute diarrheic infection.

£→→ **2-Cyst stage:** it is the infective stage, diagnostic stage (It is usually non motile , inactive , non feeding appear in the chronic diarrheic infection stage.

£→→ **3-Or It has only Trophozoite without cyst stage.**

# *Entamoeba histolytica*

- \$\$ → Disease: AMEBIASIS (Amebic dysentery, amebic hepatitis).
- \$\$ → Epidemiology world wide and more in under developed country 50%.
- \$\$ → habitat is small intestine.
- \$\$ → Infective stage is mature quadrinucleated cyst.
- \$\$ → Pathogenic stage is active trophozoite.
- \$\$ → Diagnostic stage is mature cyst and trophozoite.
- \$\$ → Mode of infection contamination of food and water.



# Morphology(Shape)

## 1-Trophozoite:

¥→→ also known active vegetative stage. This form has an amoeboid appearance( no fixed shape ), small actively motile by pseudopodia. Cytoplasm divided into two portions ; a clear ectoplasm and a granular endoplasm. The granular endoplasm may contain ingested erythrocytes.

It is the pathogenic stage.

¥→→ The organism has a single nucleus with a distinctive small central karyosome, trophozoite is the only form present in tissues, it is also found in fluid feces during amebic dysentery.

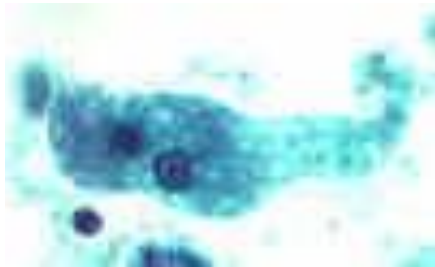
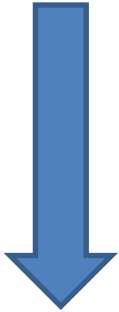
## 2-Mature Cyst:

¥→→ It is both infective stage and diagnostic stage, spherical in shape also contain 1 - 4 nuclei with central karyosome.

# Troph. And Cyst

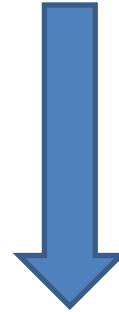
**A- Trophozoite stage**

A

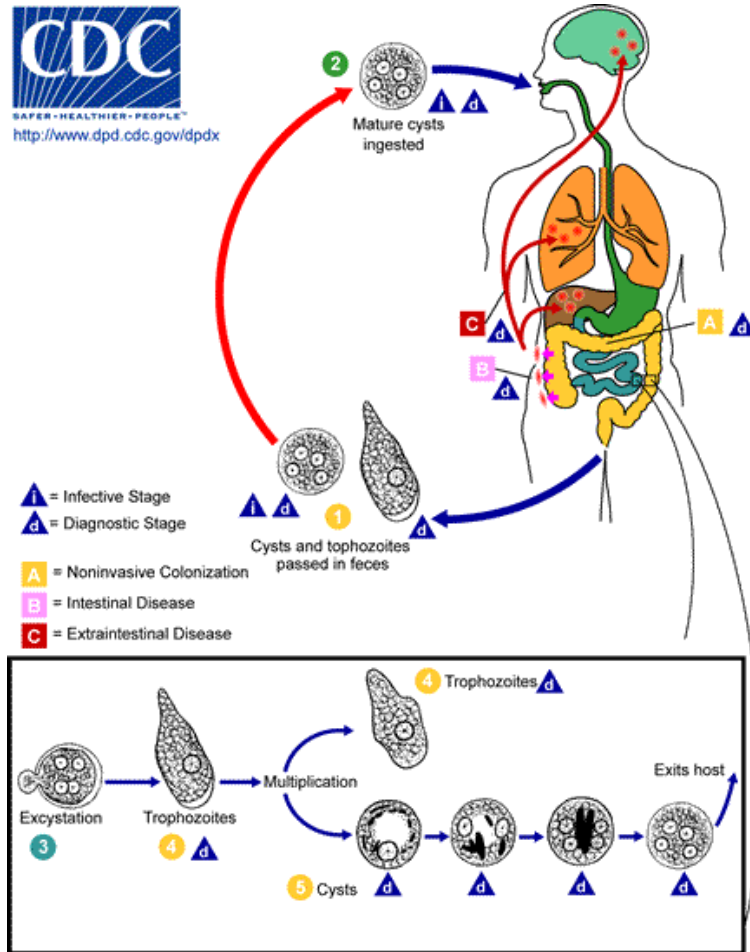


**B-Mature cyst stage has 4 nuclei with central karyosome**

B



# Life cycle of *E. histolytica*



# Symptoms

- \$\$ → Acute: Amoebic dysentery with necrotic mucosa and abdominal pain.**
- \$\$ → Chronic: Recurrent dysentery with blood and mucus in the feces. There are gastro-intestinal disturbances & constipation.**
- \$\$ → Trophozoite may found in acute bloody dysenteric stool.**
- \$\$ → Cysts are found in the chronic formed stool.**
- \$\$ → The organism may invade the liver, lung and brain ( Extra intestinal amoebiasis) where it produces abscess in liver, lung brain...etc & this is called systemic infection.**

# PATHOLOGY

⇒ Pathology:

⇒ Intestinal infection.

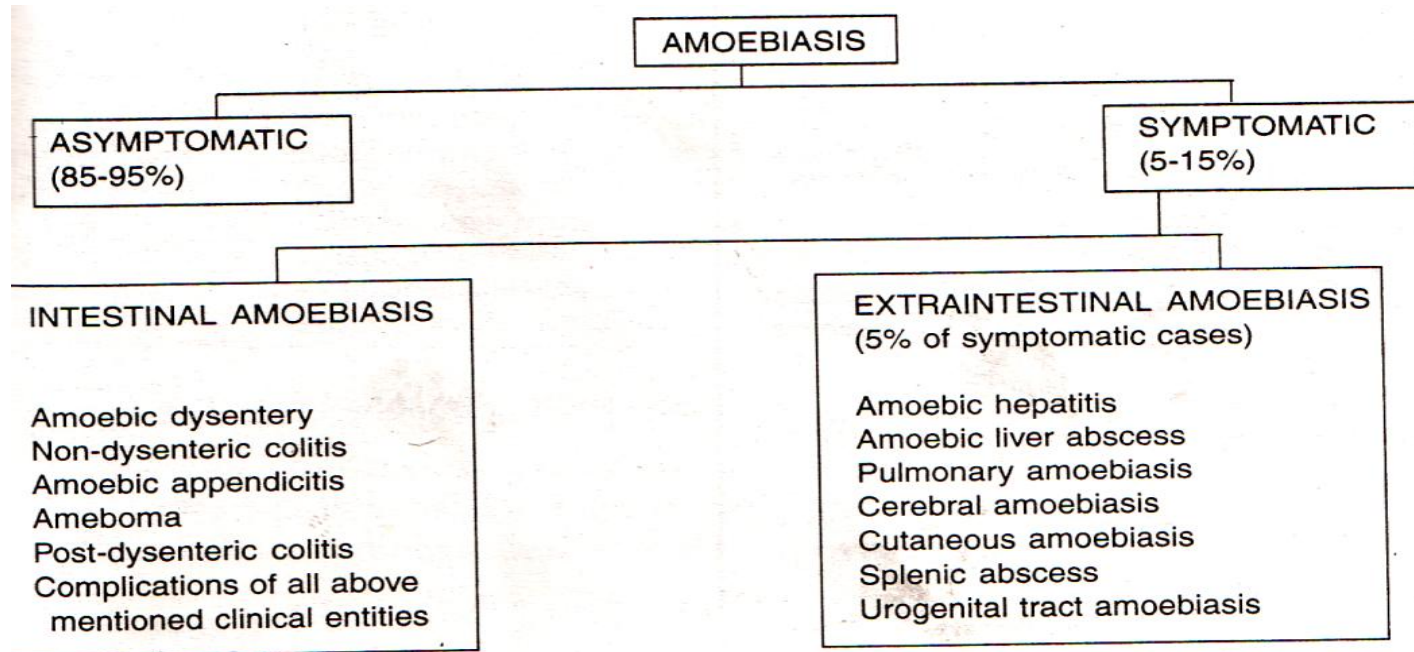
⇒ Extra-intestinal infection.

⇒ Intestinal ulcers /flasks are due to enzymatic degradation of tissue and may be ameboma.

⇒ Extra intestinal: (Systemic Infection) .liver abscess, sometimes brain, lung and spleen abscesses can also occur.

⇒ liver is the most common extra-intestinal organ involved.

# PATHOLOGY IN SUMMARY



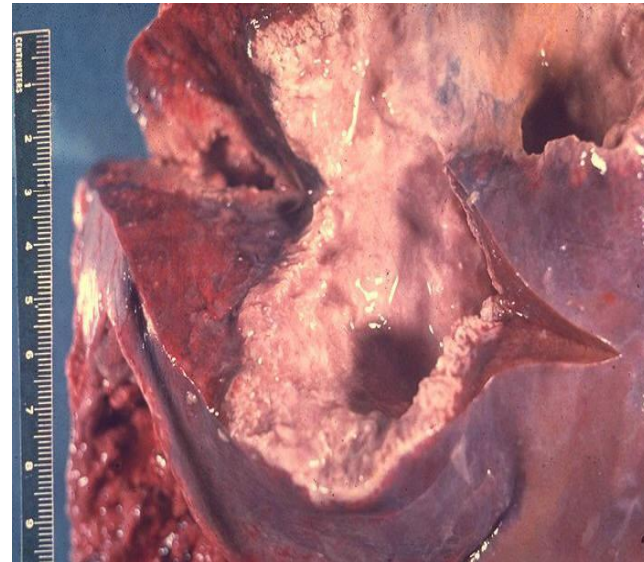
**Fig. 9.8:** Clinical classification of amoebiasis

# PATHOLOGY

**FLASK-SHAPED ULCER**



**LIVER ABSCESS**



## LAB. DIAGNOSIS

- ⇒ Symptoms → confirmed by finding Trophozoite in blood diarrhea or cysts in the formed stool.
- ⇒ Distinct from bacillary dysentery due to lack and absence PMN.
- ⇒ Differentiation must be made from nonpathogenic intestinal protozoa.  
(EX. *Entamoeba coli*).

# Prevention and control:

Determin:

- ➔ The source of infection by lab. Tests.
- ➔ Symptomatic cyst carriers detection.
- ➔ Diagnose and treat the cases.
- ➔ Improvement water supply and sewages.
- ➔ Good health education.

# Treatment

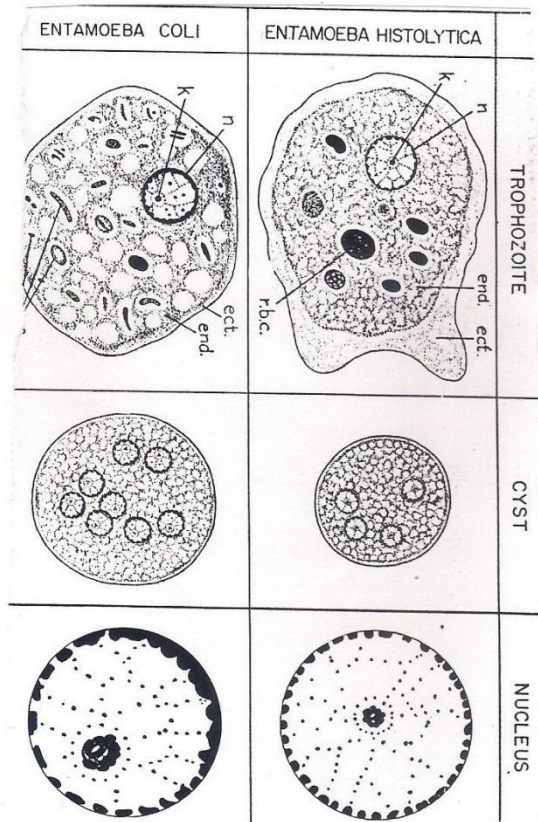
- Two classes are used in treatment of amoebiasis –the luminal infection drugs e.g. Iodoquinol and tetracycline.
- Tissue amoebiasis are treated by (emetine and chloroquine) which they are effective in systemic infection.
- Metronidazole for both sites
- The dose depends on:
  - 1-Severity of the parasite infection(Burden).
  - 2-Infected organ(If it is local or systemic).
  - 3-Age of patients.

2-Age of patients.

# ***Entamoeba coli* :**

- ¥→ This parasite is non- pathogenic & lives commensally in large intestine of human**
- ¥→ It has the same life cycle of E.histolytica but it differs in some properties**

# Differences between *E. histolytica* and *E. coli*



**Table 9.9:** Differences between *E. histolytica* and *E. coli*

	<i>E. histolytica</i>	<i>E. coli</i>
<b>Cystic stage</b>		
Size	5-20 $\mu\text{m}$	10-38 $\mu\text{m}$
Number of nuclei	Four or fewer	Upto eight
Ratio between cyst and nuclear diameter	6:1	4:1
Chromatoidal bodies	Cigar shaped	Splinter shaped
Karyosome	Small, central	Large, eccentric
<b>Trophozoite stage</b>		
Size	10-60 $\mu\text{m}$	10-50 $\mu\text{m}$
Motility	Progressive	Non-progressive
Pseudopodia	Single	Multiple
Cytoplasm	Finely granular	Coarsely granular
Karyosome	Small, central	Large, eccentric
• Peripheral chromatin	Fine, uniform, Evenly distributed	Coarse, irregular Uneven distributed
<b>Cytoplasmic inclusion bodies</b>	Red cells	Bacteria

# Subphylum: Ciliphora

## *Balantidium coli*

**Disease** : Balantidiasis or Balantidial dysentery:

£→→ *Balantidium coli* is the only ciliate known to parasitize humans. Ciliates represent a phylum of protozoa characterized by simple or compound ciliary organelles on the surface of their membranes that are used for locomotion.

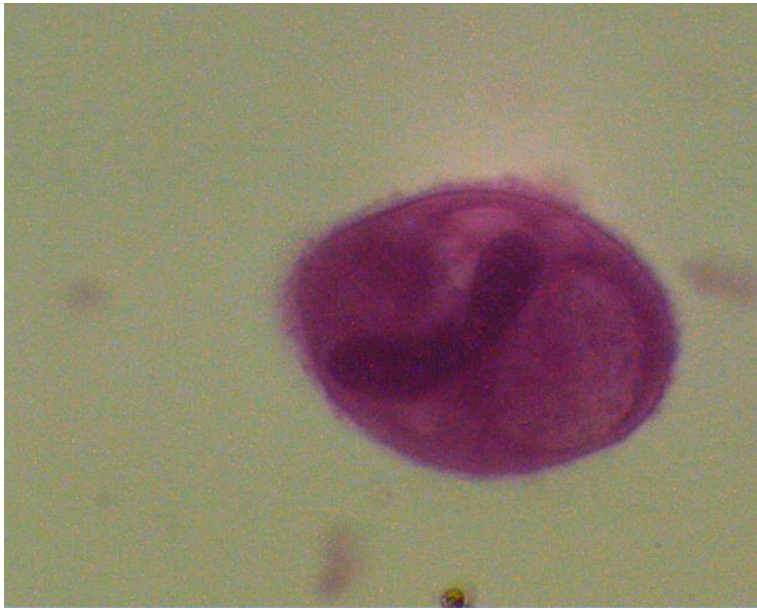
£→→ Ciliates have 2 nuclei (one macronucleus and one micronucleus) and reproduce by transverse binary fission or by conjugation.

£→→ *Balantidium coli* has 2 contractile vacuoles. Although contractile vacuoles are common to ciliates, they are rare in parasitic protozoa, which suggests that *Balantidium coli* has a unique osmoregulatory capacity.

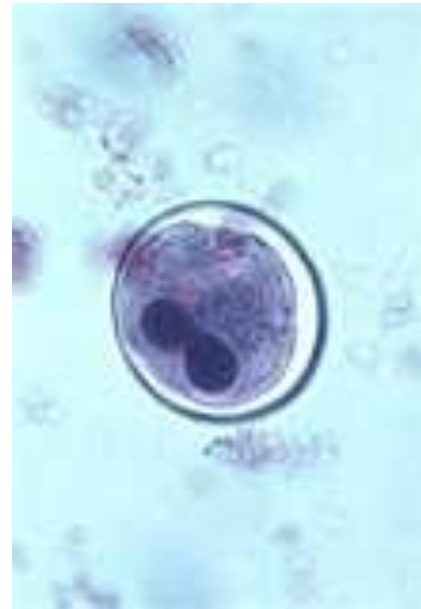
£→→ *Balantidium coli* has 2 developmental stages: a trophozoite stage and cyst stage.

# *Balantidium coli*

trophozoite



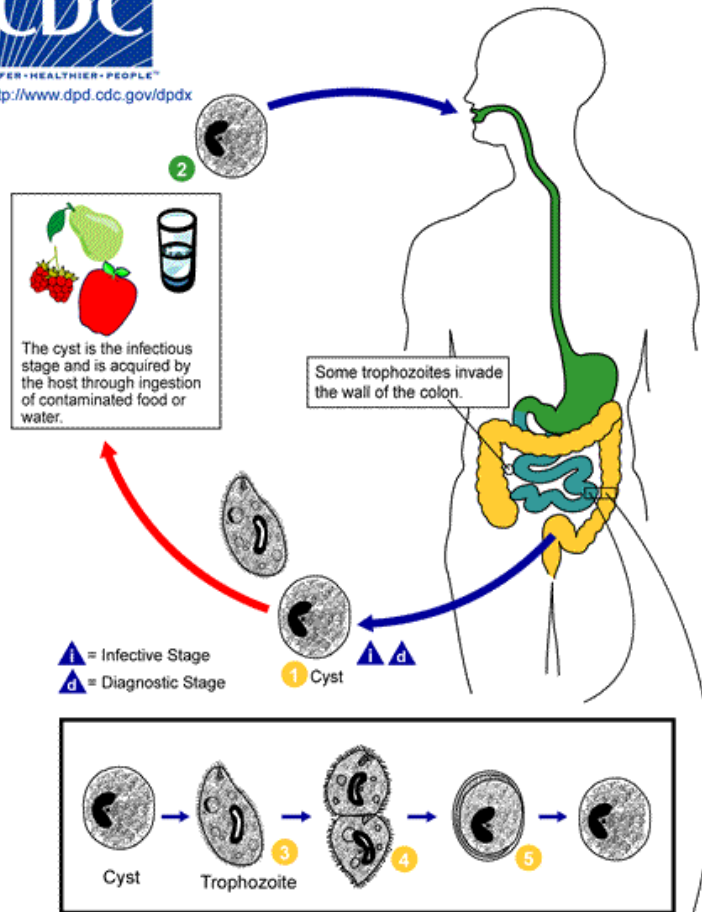
cyst



# Life cycle



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# Symptoms

## Clinical Disease :

££→→ Symptoms and Pathogenesis of balantidiasis are similar to those seen in amoebiasis including intestinal epithelial erosion, BLOODY diarrhea, nausea, vomiting and anorexia.

££→→ The **bloody** diarrhea may persist for long periods of time resulting in acute fluid loss.

££→→ *B. coli* also has ability to penetrate the mucosa resulting in ulceration.

££→→ Extra-intestinal disease has also been reported BUT RARELY.

# TRANSMISSION

☛→ To the human feco-oral transmission is rare but possible (Accidentally).

## TREATMENT:

1-Metronidazole and iodoquinol are effective.

2-Oxytetracyclin.