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# ENTAMOEBA HISTOLYTICA

# INTRODUCTION

- . Kingdom- Protista
- . Subkingdom- Protozoa
- . Phylum- Sarcomastigophora
- . Subphylum- Sarcodina
- . Superclass- Rhizopoda
- . Class- Lobosea
- . Subclass- Gymnamoebia
- . Order- Amoebida
- . Subclass- Tubulina
- . Genus- Entamoeba
- . Species- Entamoeba histolytica.

# Entamoeba histolytica

- Geographical distribution--- Worldwide. More common in the tropics and subtropics than in the temperate zone.
- Habitat- Trophozoites of *E. histolytica* live in the mucous and submucous layers of the large intestine.

# MORPHOLOGY

.There are three phases in the life cycle of *E. histolytica*—

## 1. **Trophozoite (Growing or feeding stage)**—

.shows slow gliding movement .The clear hyaline ectoplasm (pseudopodium) has a jerky movement ,ejected under high pressure, followed by flowing in of the whole granular endoplasm.

.Shape- not fixed.

.Size-ranges from 18- 40  $\mu\text{m}$ , average being 20-30  $\mu\text{m}$ .

.Cytoplasm- a clear translucent ectoplasm and a granular endoplasm.

Red blood cells, occasionally leucocytes and tissue debris are found inside the endoplasm.

.Nucleus- shape- spherical.

size- 4-6 $\mu\text{m}$ .

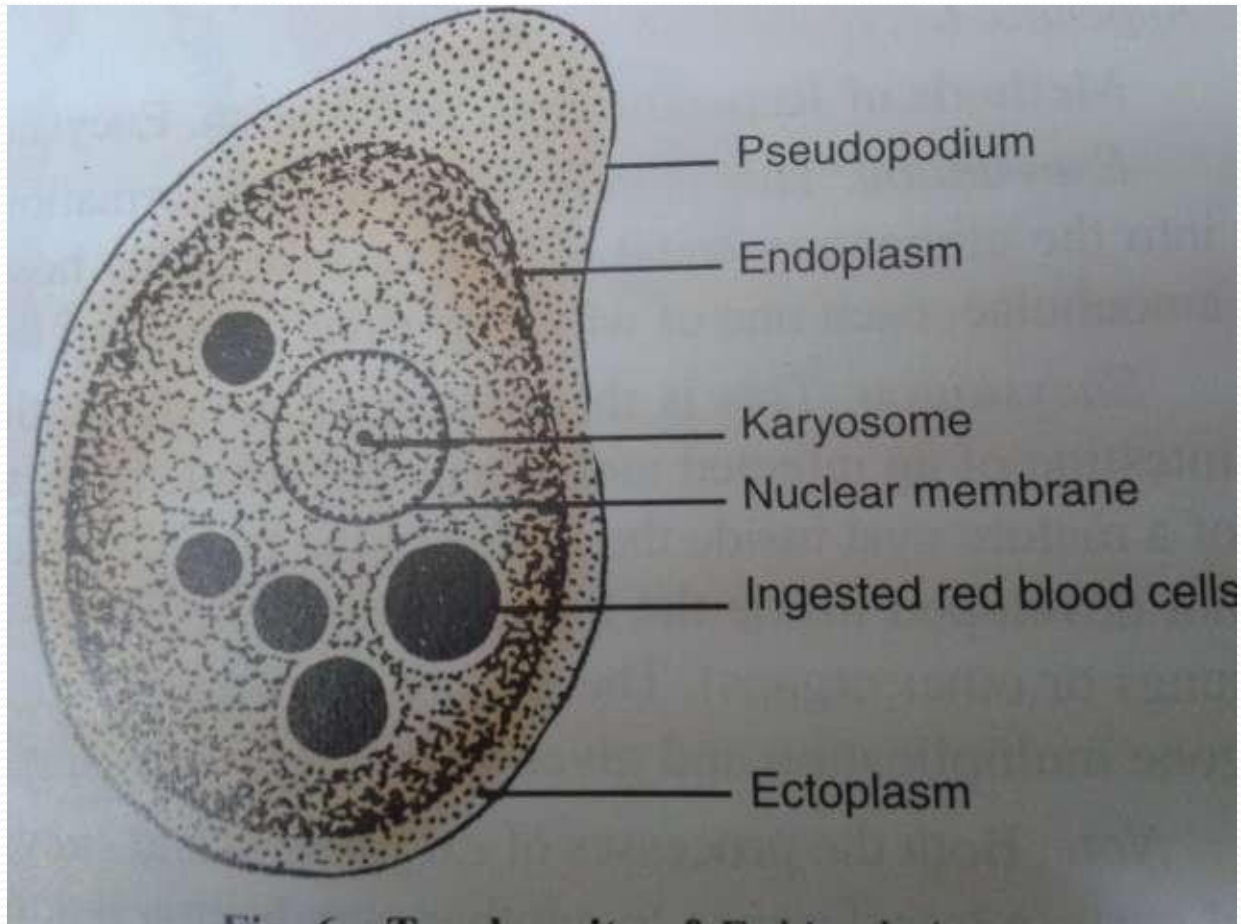
In stained preparation nuclear structure shows

a.)Karyosome- small dot like, central in position, surrounded by a clear halo.

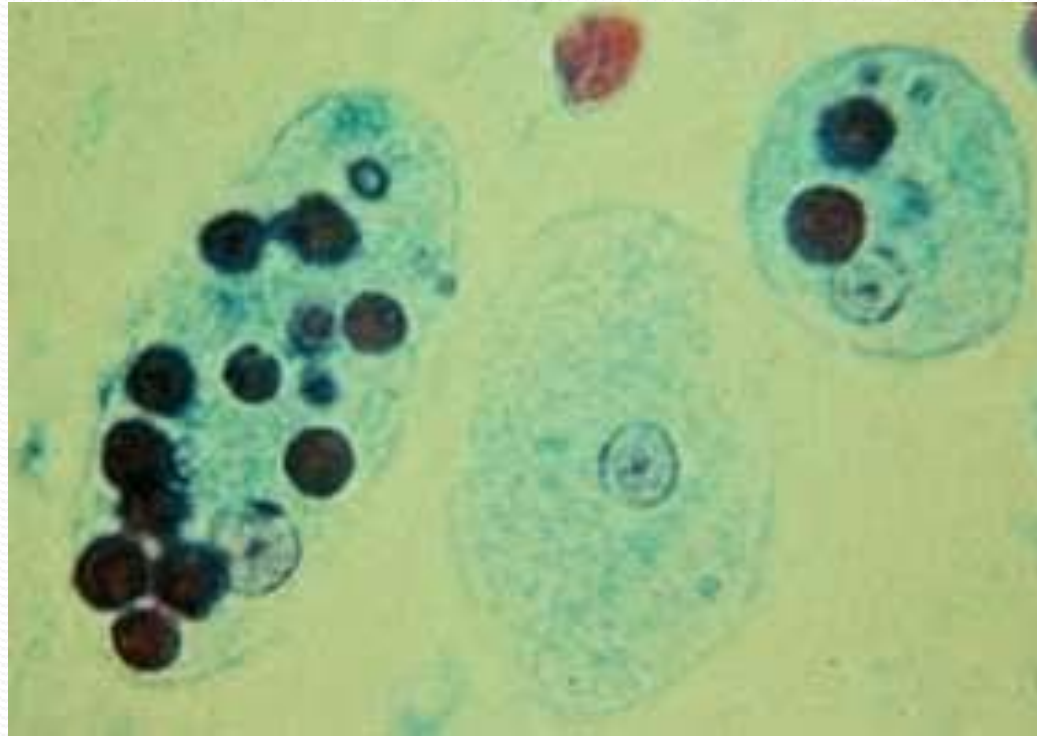
b.)Nuclear membrane-lined with a single layer of uniformly distributed fine chromatic granules.

c.)Space between the karyosome and the nuclear membrane is traversed by a fine thread of linin network having a spoke like radial arrangement.

# TROPHOZOITE



# TROPHOZOITE





- 2.) **Pre-cystic stage—**

- .size- 10-20 um.

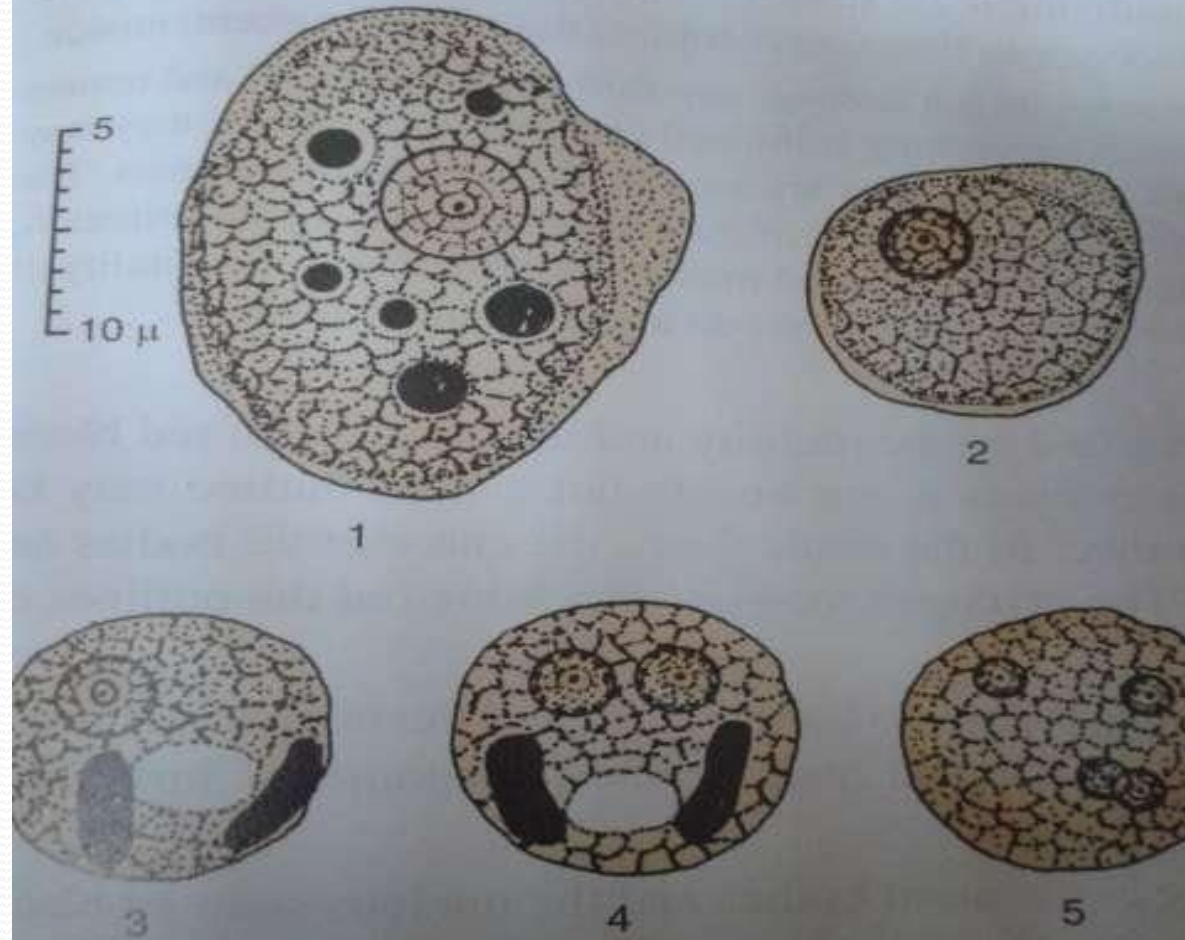
- .shape- round or slightly ovoid with a blunt pseudopodium projecting from the periphery.

- .Endoplasm is free of red blood cells and other food particles.

- .Nuclear structure is same as that of trophozoite.



(iodine and iron-haematoxylin). The morphology of the parasite is described.



**Fig. 5—Three stages of *Entamoeba histolytica*.**  
1, Trophozoite; 2, Pre-cystic stage; 3, 4, 5, Uninucleate, binucleate and quadrinucleate cysts.

### 3.) Cystic stage—

.**Size**- the small race being 6-9  $\mu\text{m}$  and the large race 12-15  $\mu\text{m}$ .

.during encystment, the parasite becomes rounded and is surrounded by a highly refractile membrane, called the cyst wall.

.**cytoplasm** is clear and hyaline .In early stage of development,cytoplasm of cyst shows—

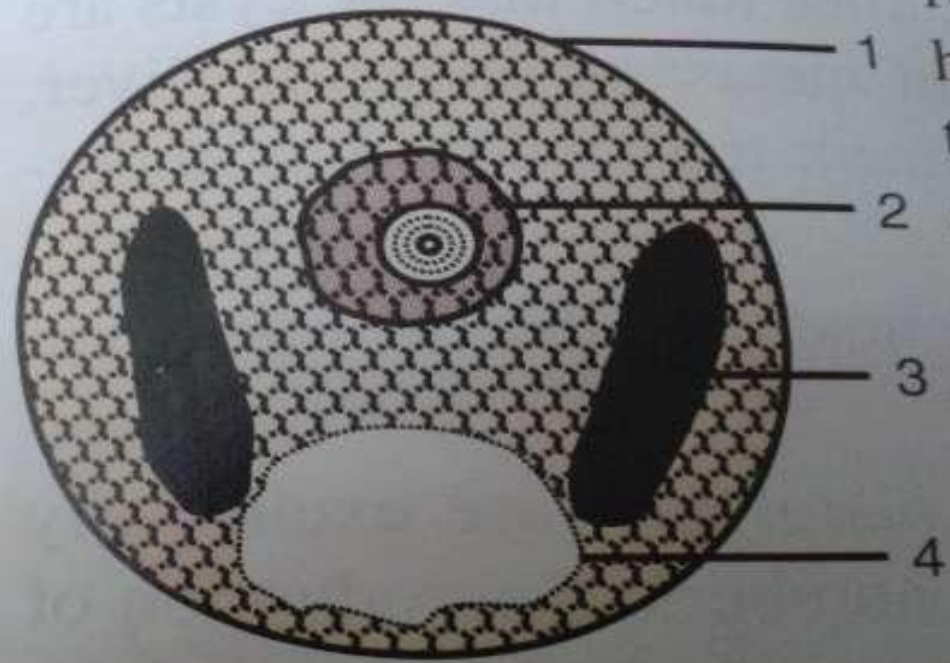
**a.)Chromatid or Chromidial Bars**---seen as refractile oblong bars with rounded ends in preparations with normal saline and black when stained with iron haematoxylin;1-4 in no. and one half –two third the diameter of the cyst.

**b.)Glycogen Mass**---- stains brown with iodine.

.Nuclear structure is same as that of trophozoite.Mature cyst is quadrinucleate.

.Cyst -uninucleate body----- binucleate -----quadrinucleate by binary fission.

.during the process of division the nuclei undergo reduction in size becoming 2 $\mu\text{m}$  in dia.



**Fig. 7—Cyst of *E. histolytica*.**

- 1, Cyst wall; 2, Nucleus;
- 3, Chromatoid bodies;
- 4, Excystment pore.

# METHOD OF REPRODUCTION

.EXCYSTATION

.ENCYSTATION

.MULTIPLICATION

# METHOD OF REPRODUCTION

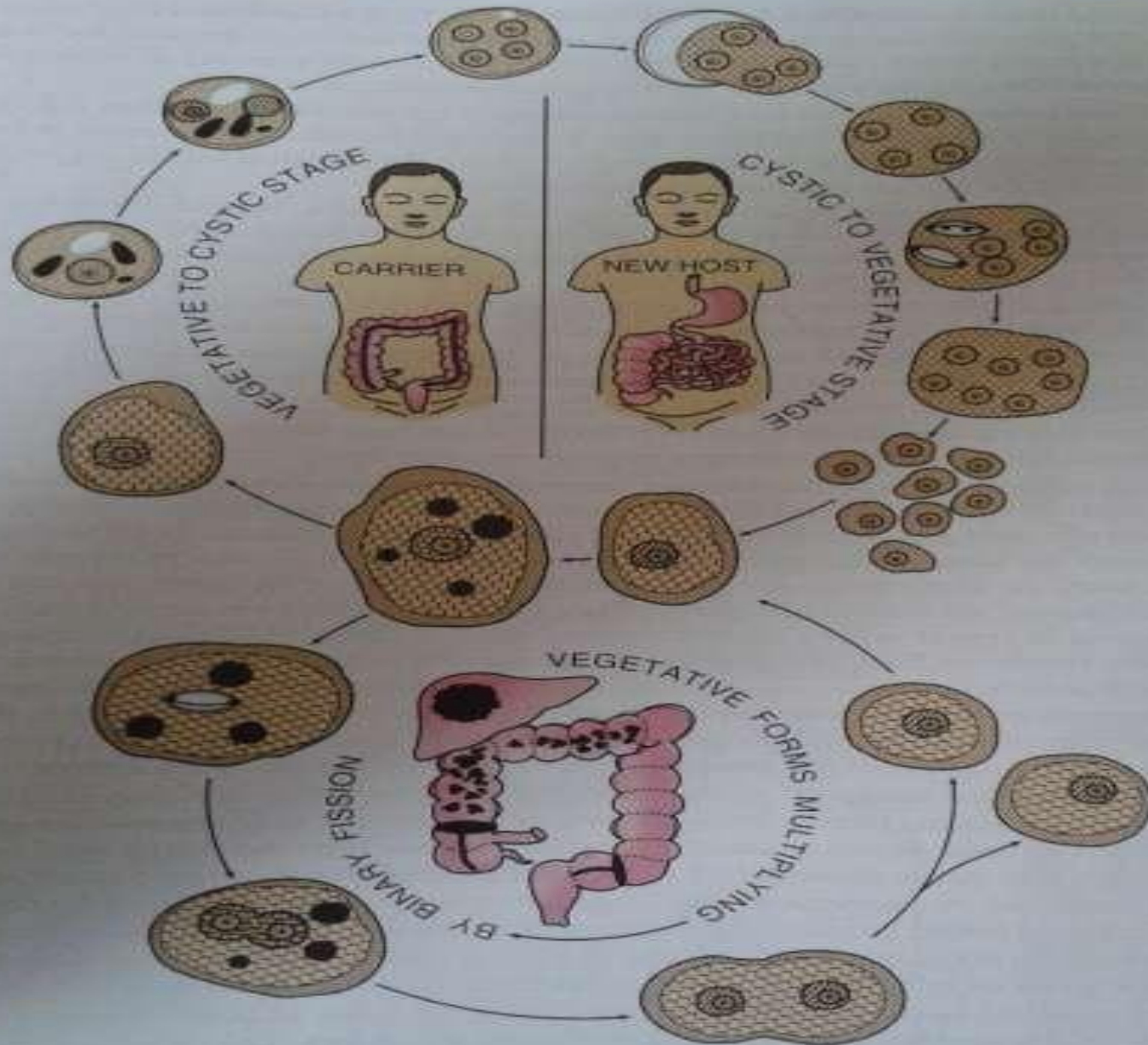


Fig. 8 — Methods of reproduction of *Entamoeba histolytica*

# LIFE CYCLE

- *E. histolytica* passes its life cycle only in one host, man.
- Quadrinucleate cysts are the infective forms of the parasite
- Trophozoite phase of the parasite is responsible for producing the characteristic lesions of amoebiasis.

LIFE CYCLE OF ENTAMOEBIA HISTOLYTICA

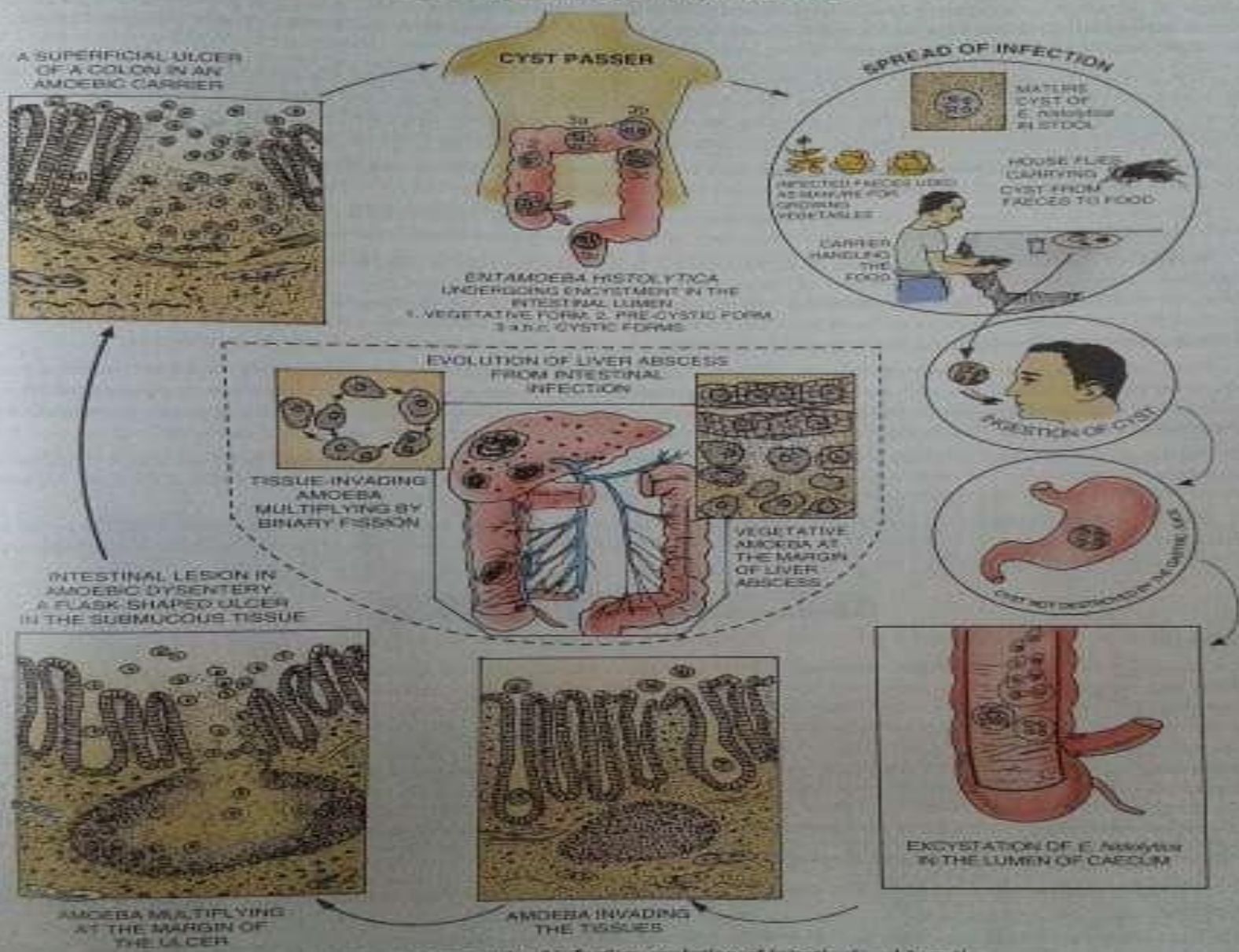


Fig. 9 — Showing the mode of infection, evolution of intestinal and hepatic lesions and development of carrier state.

# PATHOGENICITY

- **Incubation period**- 4-5 days.
- **Symptomatology**-term **AMOEBIASIS** is used to denote all those conditions which are produced in the human host by infection with *E.histolytica* at different areas of its invasion.
- **AMOEBIC DYSENTERY** is a condition in which the infection is confined to the intestinal canal and is characterized by the passage of blood and mucus in the stool.
- Dysentery is a symptom characteristic of extensive intestinal ulcerations representing only a part of the clinical picture of intestinal amoebiasis.
- Clinical picture vary from acute colitis to chronic colitis and asymptomatic carrier state.



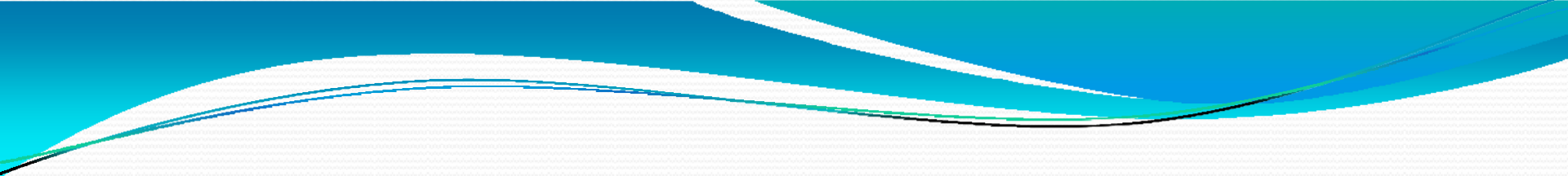
# PATHOGENIC LESIONS

- 1.) **Primary or intestinal Lesions**—The infection is limited entirely to the large intestine, the initial site of location of the parasite.
- 2.) **Secondary or Metastatic Lesions**—The extra colonic areas where the trophozoites of *E. histolytica* can migrate and produce lesions include liver, lungs, and brain.

# INTESTINAL LESIONS

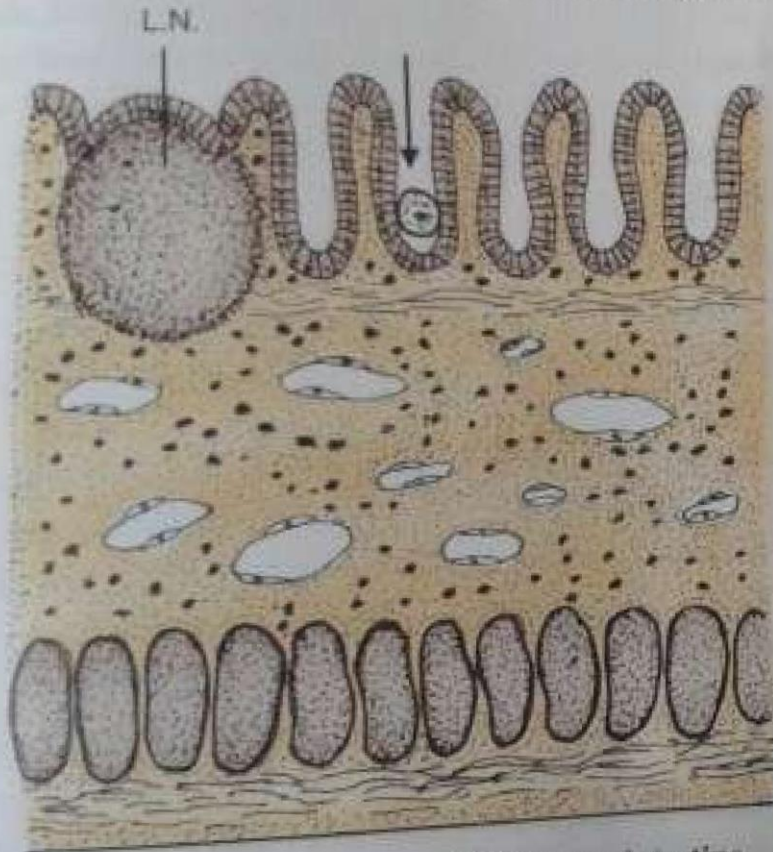
- **GENESIS----**

- . The metastatic trophozoite liberated after excystation enter through the crypts of lieberkuhn .
- .By their amoeboid movement they penetrate directly through the columnar epithelium of the mucus membrane.
- .By the proteolytic ferment (histolysin) they secrete, they dissolve the intestinal epithelial cells.
- .By continuous lysis of tissue cells they reach the submucous coat.
- .The amoeba rapidly multiply and increase in no. , form colonies, destroy the tissues in their vicinity and utilize the cytolysed material as their food.

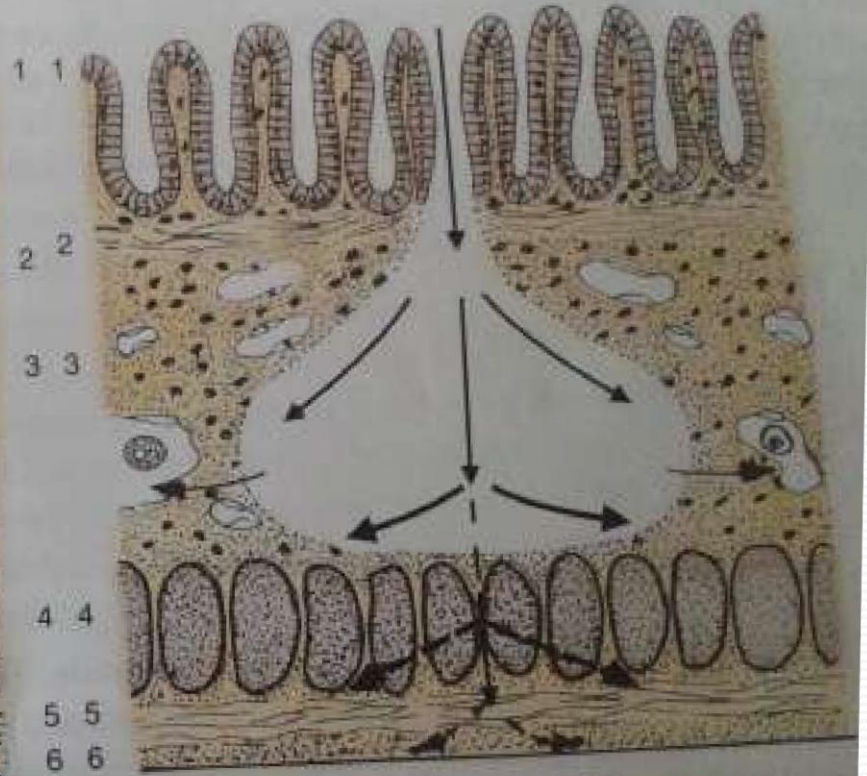
- 
- . A considerable area of the submucosa is destroyed, undermining the mucous membrane above.
  - .The invasion of the tissues by this protozoal parasite leads to coagulative necrosis and the formation of abscess which finally breaks down, leading to the development of ulcers.

As a rule, the preponderance of lesion in the region (a) is found to be

**Character of Ulcers.** The sites of amoebic ulcers are not easily detected externally (from the peritoneal surface) unless they are deep and extensive. The characteristic appearance of the ulcers is best seen from the mucous surface. The ulcers are discrete and a healthy mucous membrane always intervenes between the ulcers even when they are



**Fig. 10—Microscopic anatomy of the large intestine.**  
 1, crypts of Lieberkühn; 2, muscularis mucosae; 3, submucosa;  
 4, circular muscles; 5, longitudinal muscles; 6, peritoneum.  
 L.N., solitary lymph node.



**Fig. 11—Invasion of *E. histolytica* through the intestine.**  
 Flask-shaped clear area represents the process of tissue destruction.  
 Continuous lines indicate the usual progress and dotted lines indicate occasional approach.

*E. histolytica* which may live superficially in the crypts of Lieberkühn's glands and secrete mucus as food. At this stage, it metabolises anaerobically.

# Intestinal lesions in Acute Amoebic Dysentery

- **Distribution of Ulcers**—strictly confined to large gut.  
The lesions may be-----
  - a.) **Generalised**---The whole length of the large gut as far down as the internal anal sphincter is involved.
  - b.) **Localised**--- Two levels of involvement
    - i) **Ileo-caecal region**--- caecum , ascending colon, ileocaecal valve and appendix are involved.
    - ii) **Sigmoido-rectal region**—sigmoid colon and rectum are involved

- **Character of ulcers**---- A typical amoebic ulcer has the following peculiarities :
  - a.) **Size**– Pin's head to one inch or more in dia..
  - b.) **Shape**- Round or oval ; transverse in large coalescing.
  - c.) **Margin**—Ragged and undermined, being formed by the overhanging mucous membrane. On vertical section, has the appearance of a flask (flask- shaped ulcer).
  - d.) **Base**-formed by the muscular coat and filled up by the necrotic material , yellowish or blackish slough.

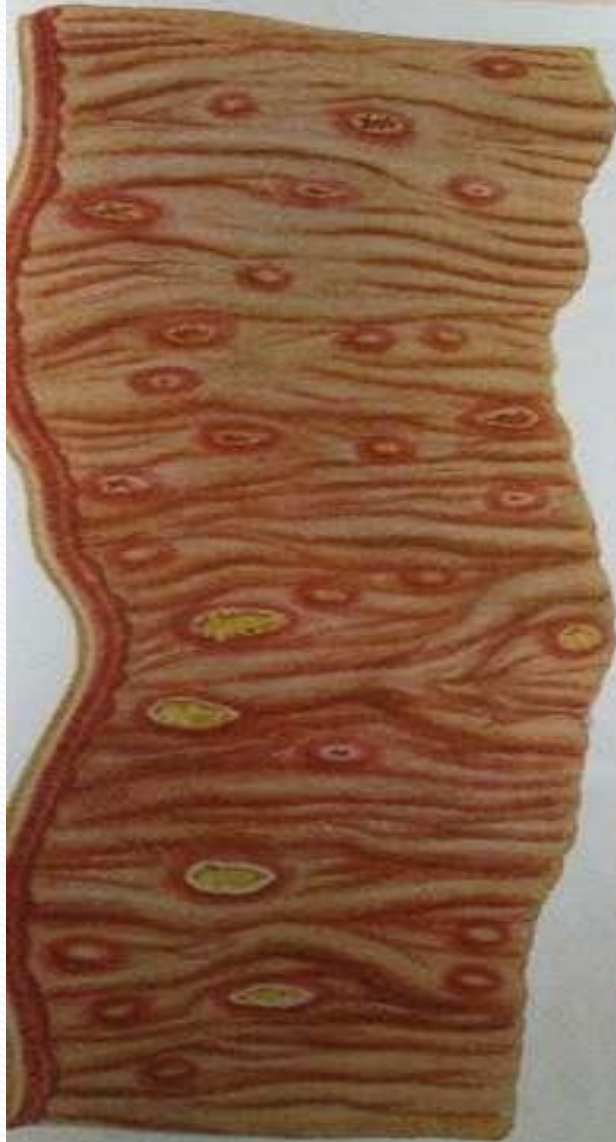


Fig. 12—Early intestinal lesions in acute amoebic dysentery, showing the nodular elevations and ulcerations.

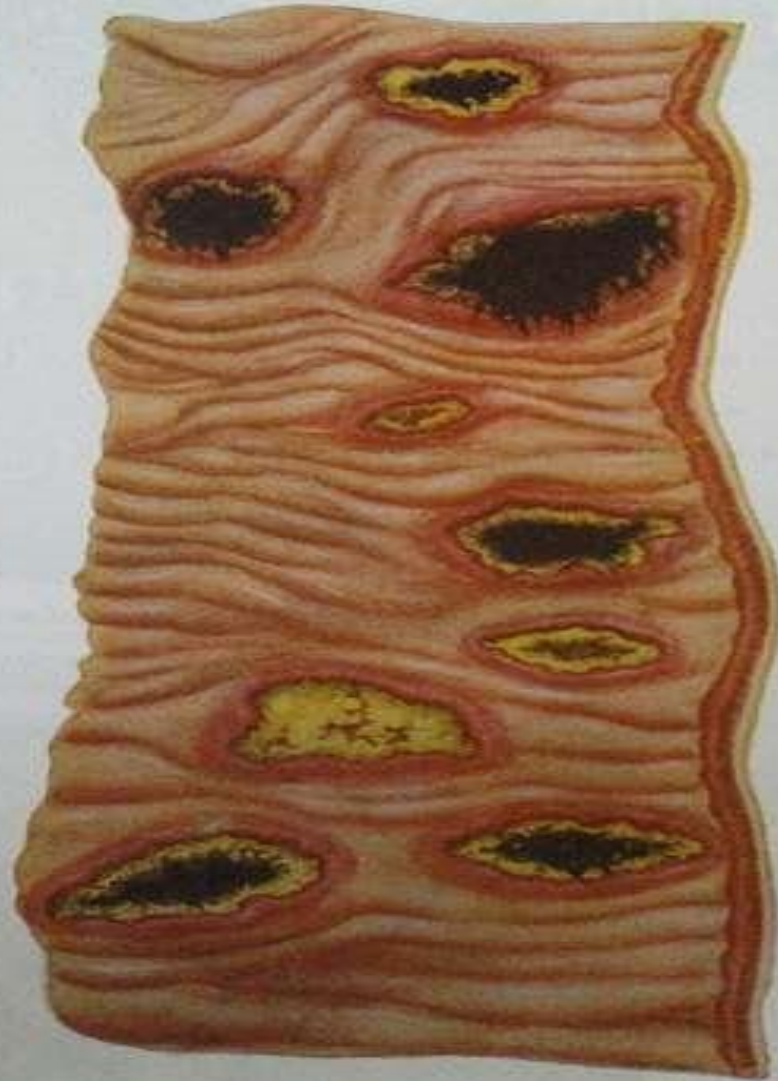


Fig. 13—Intestine of acute amoebic dysentery, showing advanced lesions. The base of most of the ulcers is filled with blackish slough and a hyperaemic zone surrounds each of these ulcers.



- **Extension of ulcers----**

- . **Superficial ulcers** do not extend beyond the muscularis mucosae.

- . **Deep ulcers** are limited to the submucous coat and extend laterally to communicate with adjacent ulcers.

- . When the destruction extends deeper into the muscular and serous layers, the following complications may arise—local peritonitis, haemorrhage, perforation and generalised peritonitis, pericaecal or pericolic abscess, sloughing and gangrene of the large gut.





- **Healing of ulcers—**

after the separation of slough, granulation tissue begins to form on the floor of the ulcerated area.

.**Small superficial ulcers-** scar tissue is not formed and mucous membrane is completely restored over the area.

.**Large and deep ulcers—**healing is associated with the formation of scar tissue over which the epithelium of the mucous membrane does not grow and these areas can later be detected as smooth depressed scars, the centres of which may or may not be pigmented.

# MICROSCOPIC PATHOLOGY

- If the section is made through middle of an early ulcer, the findings are—
  - a.) In the centre, an area of necrosed tissue in which the cells are in various stages, of degeneration.
  - b.) Towards the periphery, amoeba (trophozoite forms) are to be found in large no. lying singly or in groups, with no cellular infiltration.

# INTESTINAL LESIONS IN CHRONIC INTESTINAL AMOEBIASIS.

- Small ulcers involving only the mucosa.
- Extensive superficial ulcers with hyperaemia.
- Marked scarring of intestinal wall with thinning, dilatation and sacculation.
- Extensive adhesions with the neighboring viscera.
- Localized thickening of the intestinal wall leading to a narrowing of the lumen of the bowel.
- Generalized thickening of the bowel wall rendering it palpable.
- Formation of tumour like masses of granulation tissue (amoebic granuloma or amoeboma).

# AMOEBIC DYSENTRY AND BACILLARY DYSENTRY

- Clinically amoebic dysentery presents with a feature of slow onset with localised abdominal tenderness.
- Bacillary dysentery clinically presents with acute onset, associated with fever, generalised abdominal tenderness and tenesmus.

## AMOEBIIC DYSENTERY

## BACILLARY DYSENTERY

### Macroscopic:

NUMBER:	6 to 8 motions a day.
AMOUNT:	Relatively copious.
ODOUR:	Offensive.
COLOUR:	Dark red.
NATURE:	Blood and mucus mixed with faeces.
REACTION:	Acid.
CONSISTENCY:	Fluid mucus not adherent to the container.

Over 10 motions a day.
Small.
Odourless.
Bright red.
Blood and mucus; no faeces.
Alkaline.
Viscid mucus adherent to the bottom of the container.

### Microscopic (Figs. 16 & 17):

R.B.C.	In clumps; reddish-yellow in colour.
PUS CELLS:	Scanty.
MACROPHAGES:	Very few.
EOSINOPHILS:	Present.
PKNOTIC BODIES:	Very common.
GHOST CELLS:	Nil.
PARASITE:	Trophozoites of <i>E. histolytica</i> .
BACTERIA:	Many motile bacteria.
C.L. CRYSTALS:	Present.

Discrete or in rouleaux; bright red in colour.
Numerous.
Large and numerous; many of them contain R.B.C. hence mistaken for <i>E. histolytica</i> .
Scarce.
Nil.
Numerous.
Nil.
Nil.
Nil.

## METASTATIC LESIONS IN LIVER

### Hepatic Amoebiasis (Amoebic Liver Abscess)

**Incidence of Liver Abscess.** In the tropics about 2 to 10 per cent (average 5 per cent) of the individuals with *E. histolytica* suffer from hepatic complications. The incidence of liver abscess is less common in women. In India, it is more than 50 per cent.

# LABORATORY DIAGNOSIS:

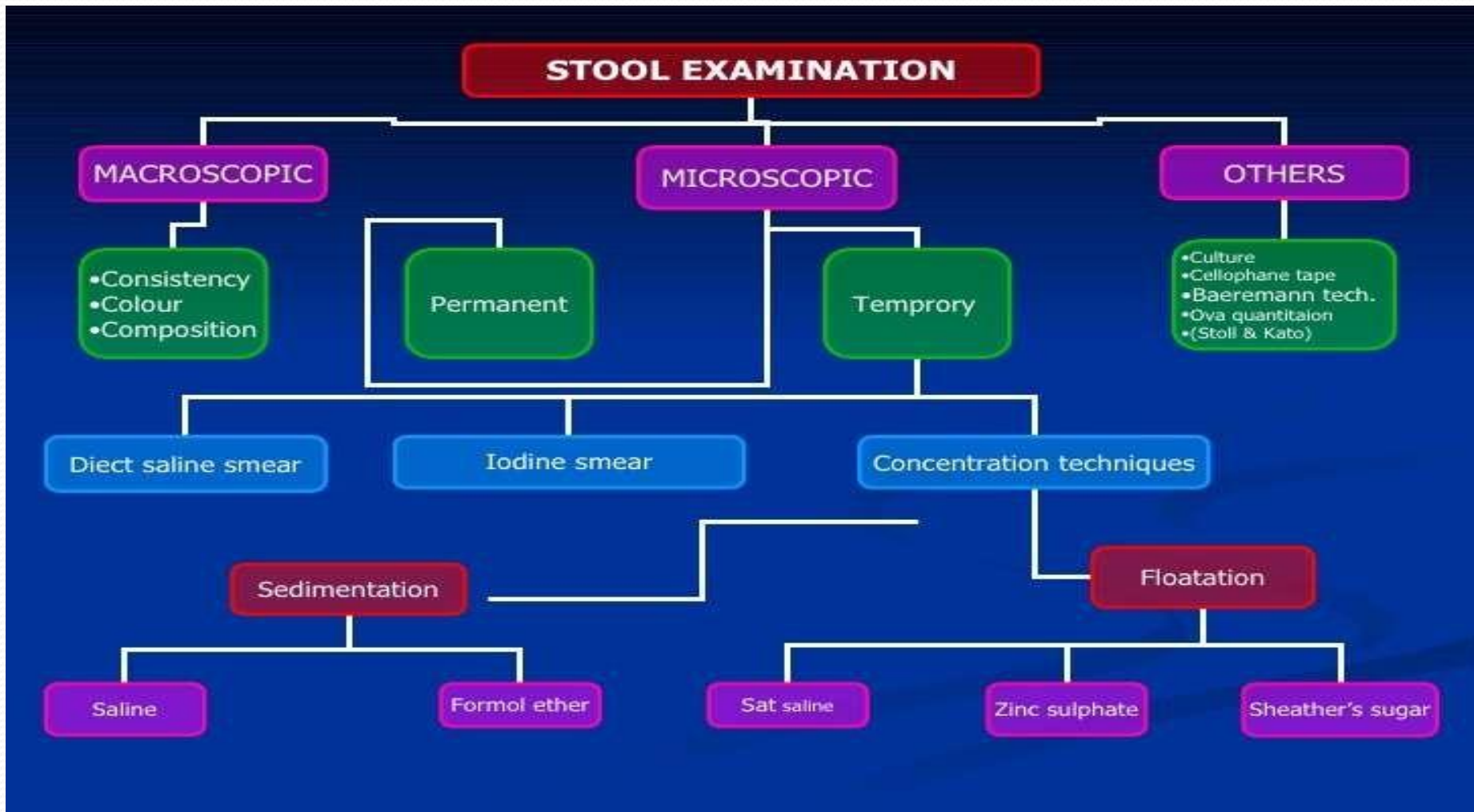
Lab diagnosis is include,

- Parasitic diagnosis
- Sero diagnosis
- Biochemical diagnosis
- Radio imaging diagnosis



# PARASITIC DIAGNOSIS:

- It includes stool examination



# STOOL EXAMINATION

## MACROSCOPIC EXAMINATION

### COLOUR

Pale=Steatorrhea  
(G.I)

### CONSISTENCY

- Liquid (Troph)
- Formed (Cyst)
- Semi formed (Cyst)

### COMPOSITION

Blood ?? Mucus ??  
(dysentry)



## STOOL EXAMINATION:

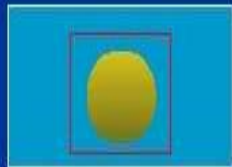
(Formed stools contain cysts & diarrheal stools contain trophozoites)

- ▶ Wet mount in saline, Iodine-stained, or fixed trichrome stained preparation
- ▶ For motile trophozoites, stools should be examined within 1 hour. Trophozoite of *E. histolytica* is differentiated from other amoeba (*E.coli*) by:
  - i. Nucleus of trophozoite  
For cysts, at least 3 samples should be collected.
  - ii. Size of cyst & number of its nuclei. (Newly formed cyst has 2 nuclei, glycogen mass & chromidial bars)

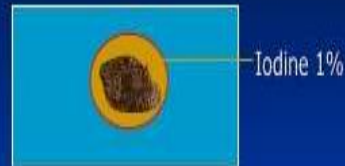
# STOOL EXAMINATION

## Temporary

### Saline smear



### Iodine smear



Huge number of:

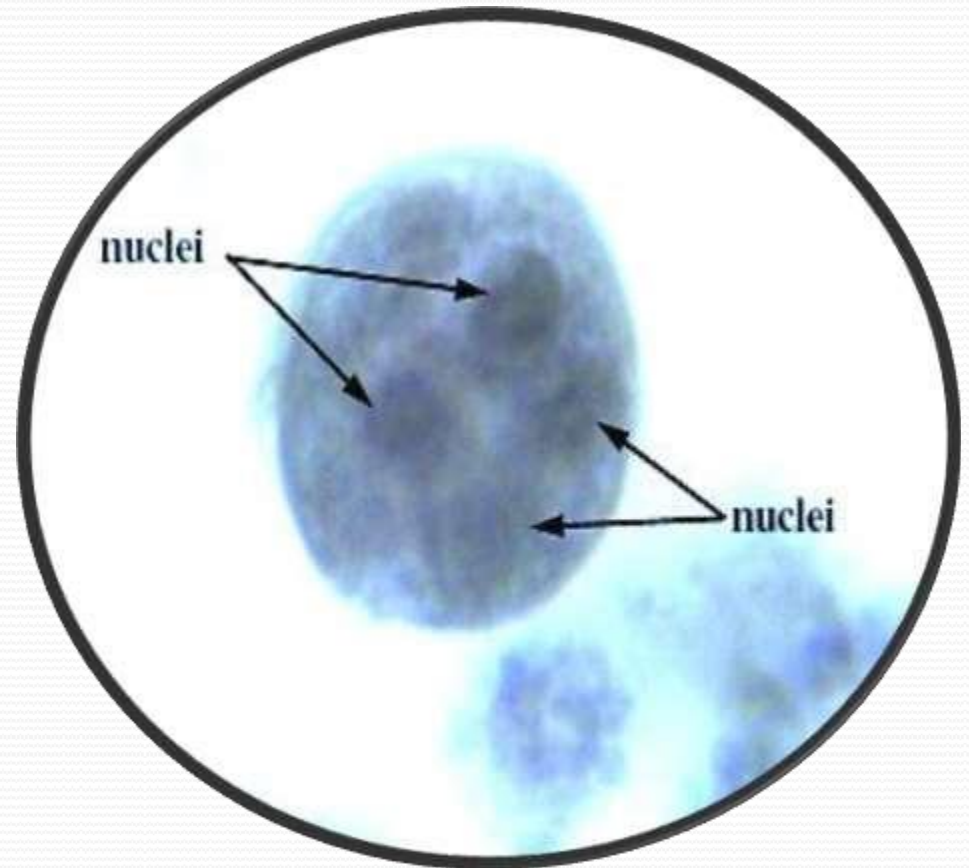
- Eggs
- Protozoal troph. Motility  
(Amoeb, flagellates)

Huge number of:

- Cyst morphological details



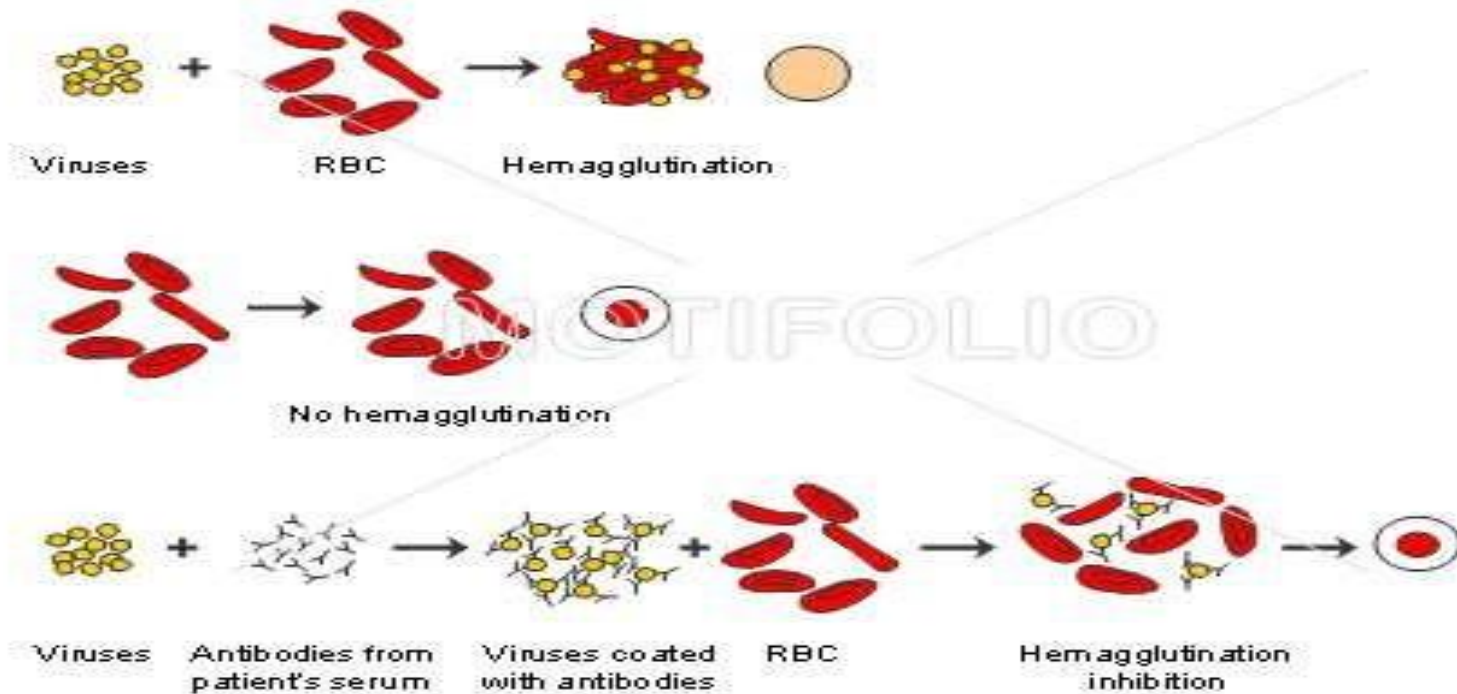
# OBSERVATION



# SERO DIAGNOSIS:

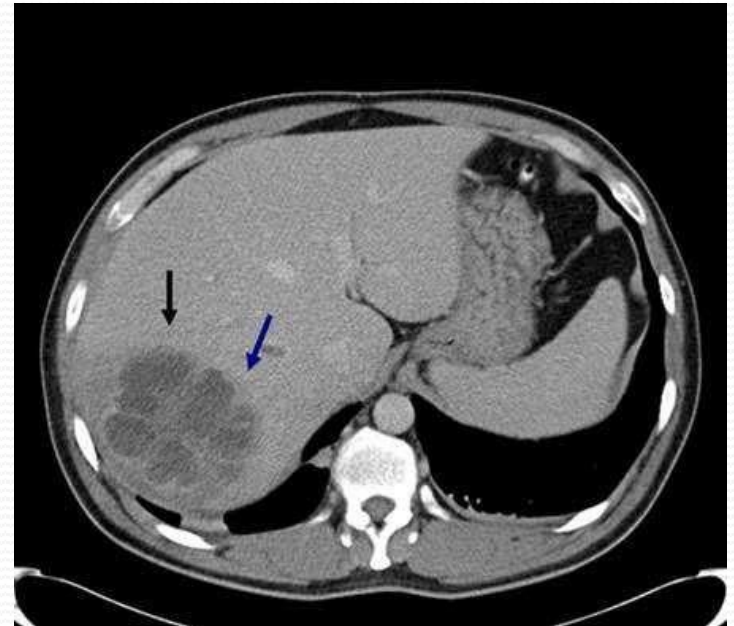
- Sero diagnosis by indirect hemagglutination [IHA], indirect fluorescent agglutination [IFA], [ELISA]

## Hemagglutination and hemagglutination-inhibition test



# Radio imaging Diagnosis

- It's by **ultrasound** **CT**, Scan



## TREATMENT OF AMEBIASIS:-

- Eradication of amoeba by use of **amoebicide** on the basis of **amoebic site**





***Thank You***