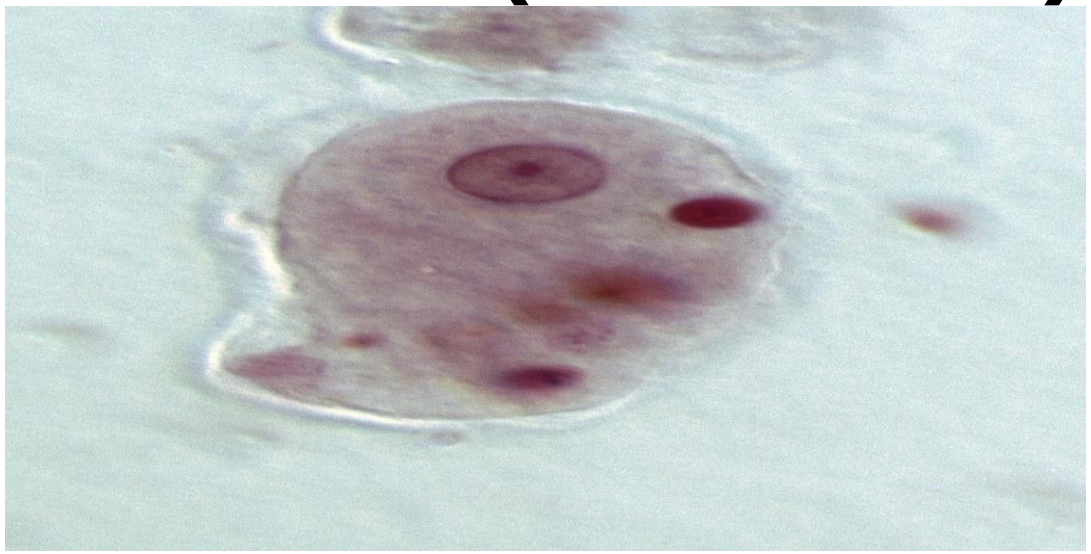
# *Entamoeba histolytica*: Amoebiasis (Sarcodina)




▶ASSISTANT LECTURER. SAWSAN S. HAMEED

▶ BIOLOGY DEPARTMENT

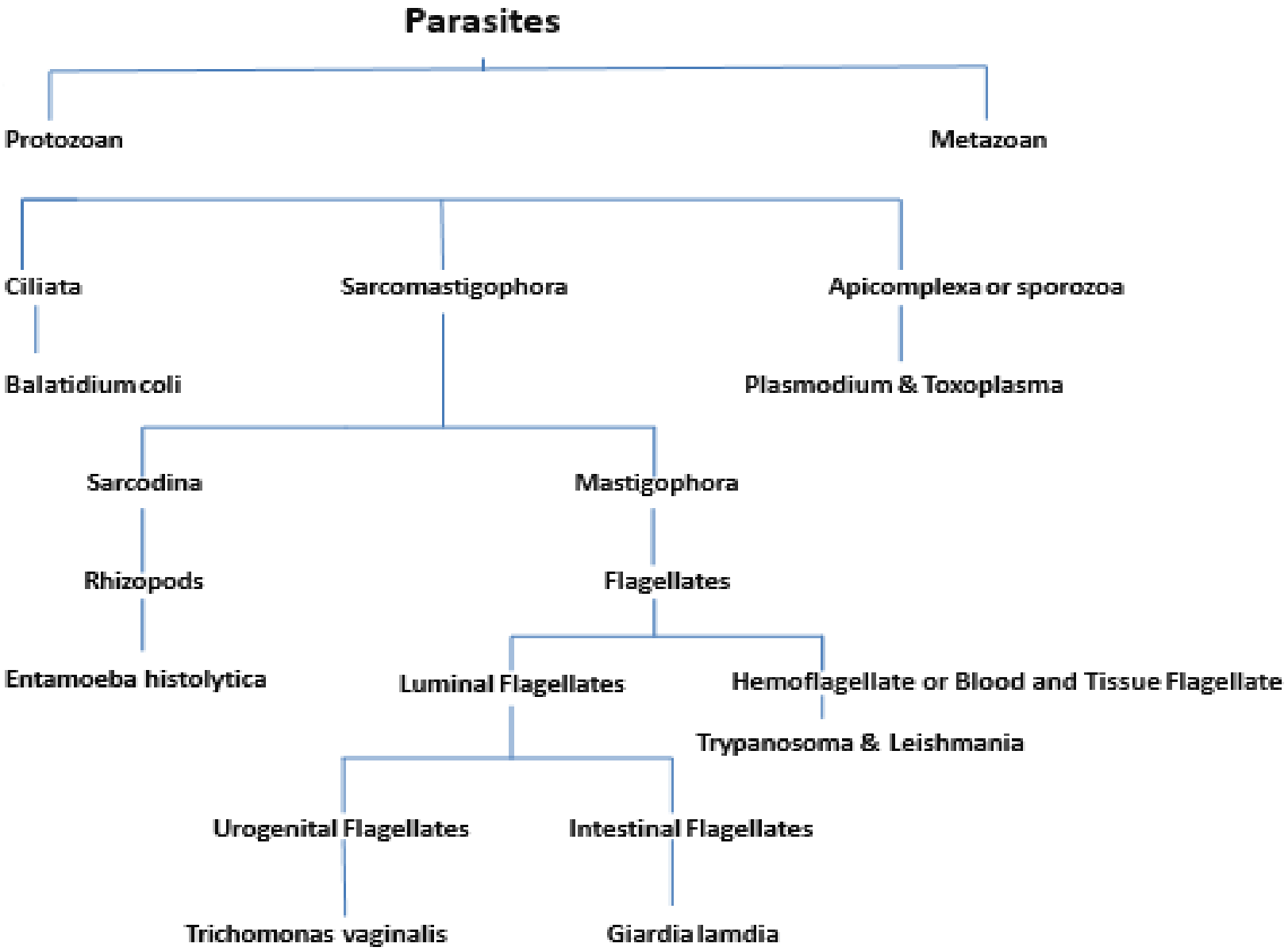
▶TIU

# *Entamoeba histolytica*

## Objective

**Students should learn the following**

- **parasite & vector**
- **spp**
- **Classification**
- **diseases**
- **life cycle**
- **Transmission of parasite**
- **Diagnosis of parasite**
- **pathology**


Parasites
Protozoan
Metazoan
Ciliata
Sarcomastigophora
Apicomplexa or sporozoa
Balatidium coli
Plasmodium & Toxoplasma
Sarcodina
Mastigophora
Rhizopods
Flagellates
Entamoeba histolytica
Luminal Flagellates
Hemoflagellate or Blood and Tissue Flagellate
Trypanosoma & Leishmania
Urogenital Flagellates
Intestinal Flagellates
Trichomonas vaginalis
Giardia lamdia

# *Entamoeba histolytica*

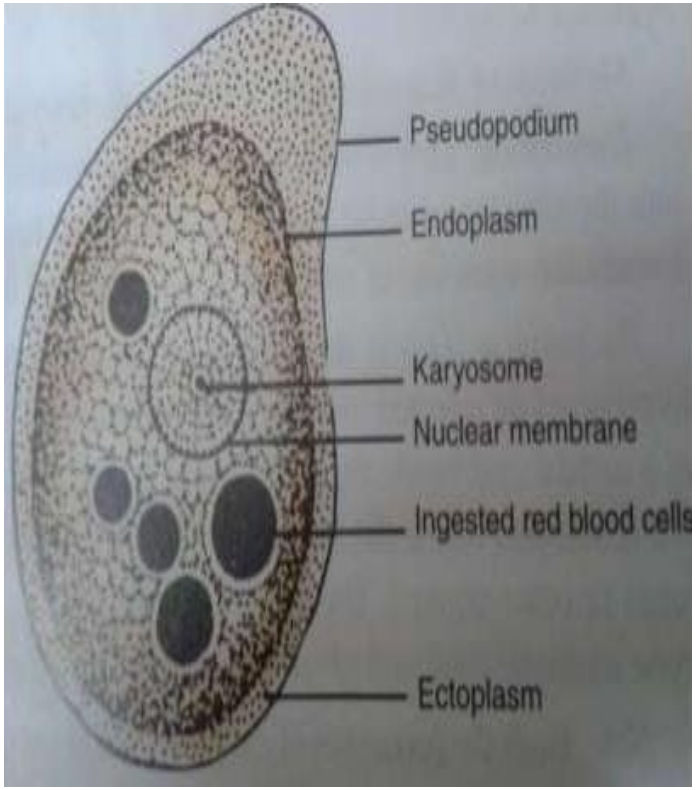
First described by **Losch in 1875** after being isolated in Russia from a patient with dysenteric stool.

- **Geographical distribution;** Worldwide
- Worldwide amoebiasis causes 40,000-1,00,000 deaths every year
- **Habitat**; Large intestine of man : Trophozoite Forms
- The parasite exists in these morphological forms:

- Trophozoite
- Cyst

# Trophozite

- Up to 60µm in diameter
- Endoplasm granular
- Food vacuoles
- Motile
- Single **Pseudopodia**
- Single Large nucleus

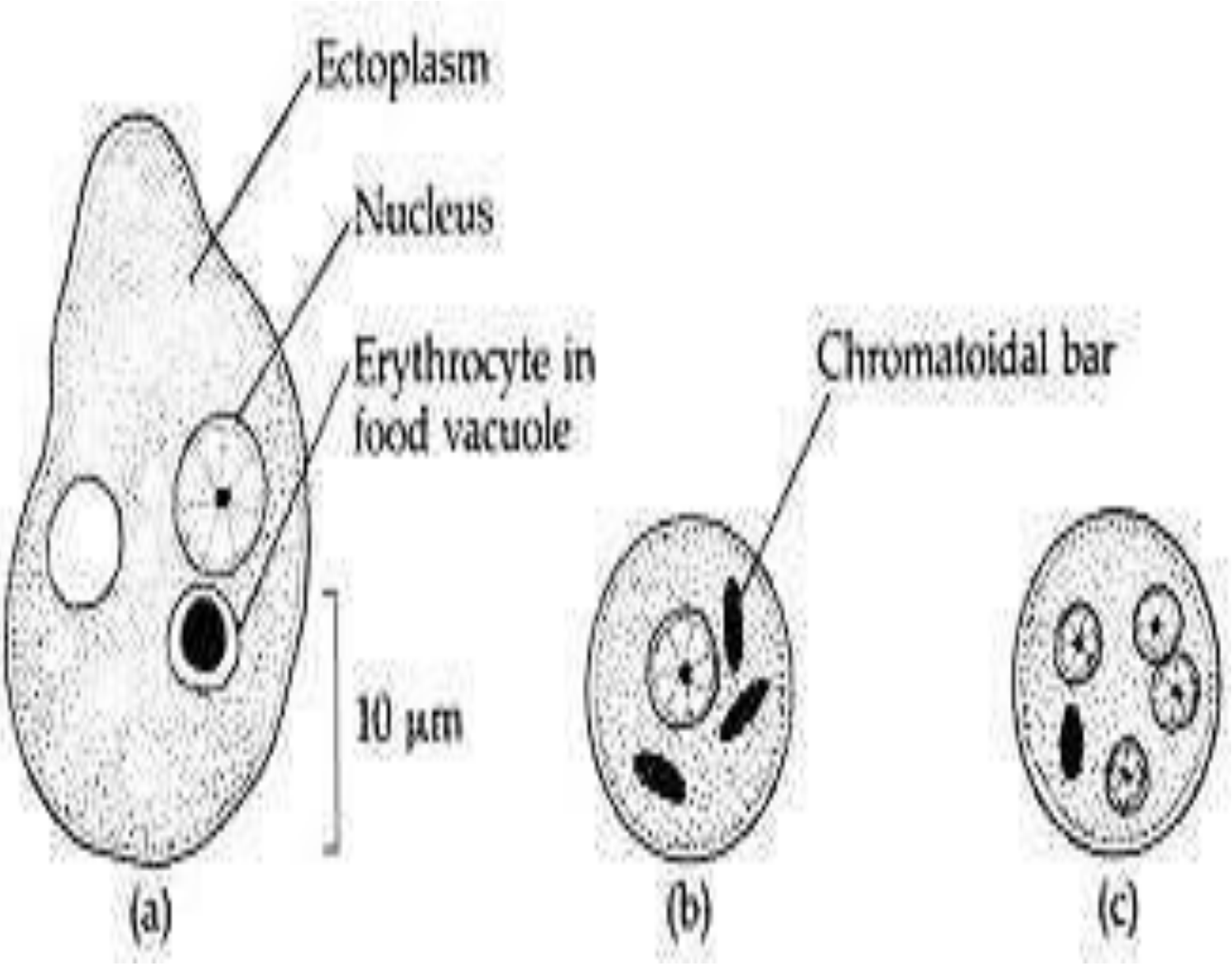



- Only Trophozite present in the tissues

# Cyst

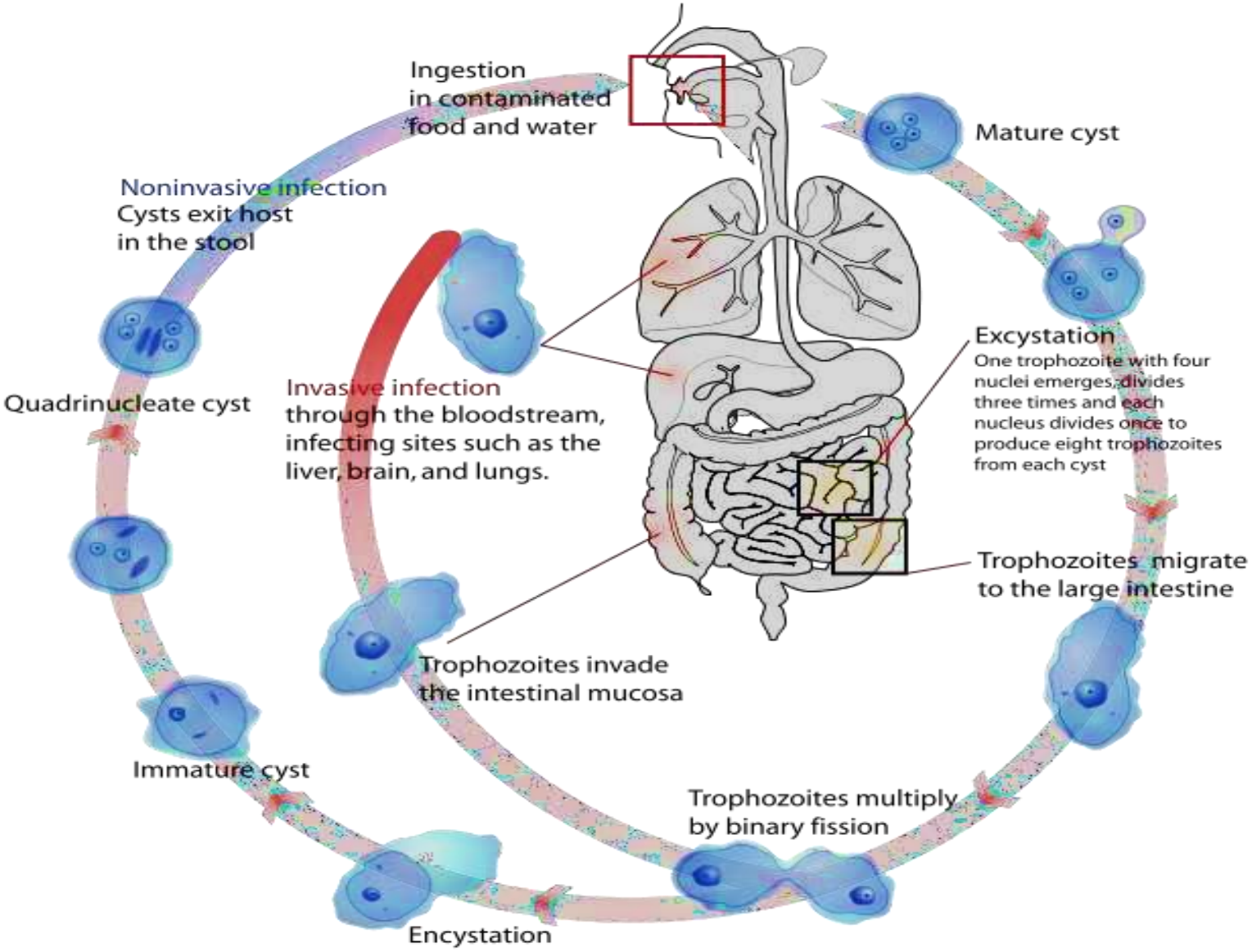
- Spherical, 1-15 µm in diameter
- Surrounded by a thick chitinous wall
- Uni nucleated, Bi nucleated, tetra nucleated.
- Cyst are present only in the

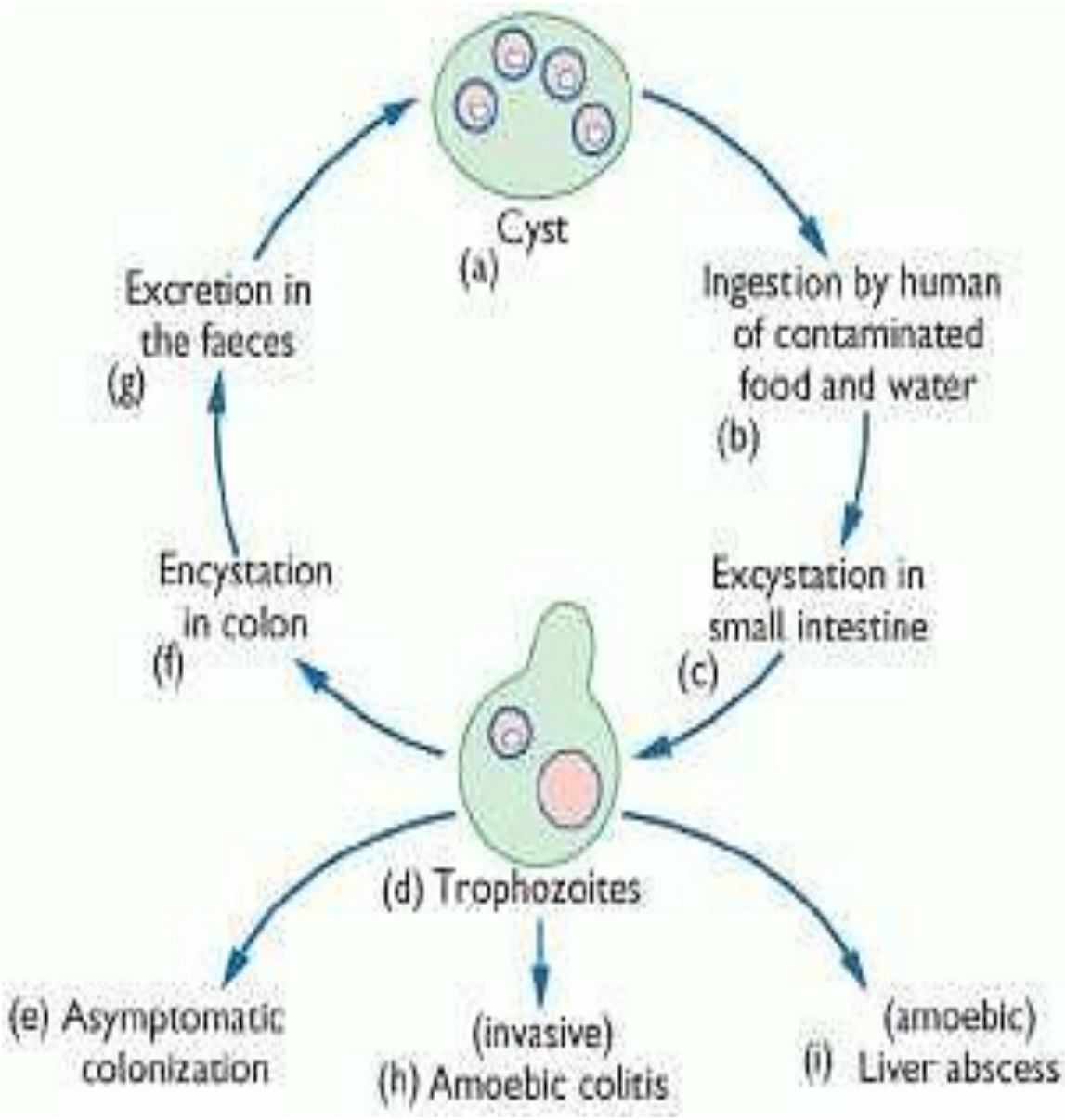
lumen of the colon and in faeces

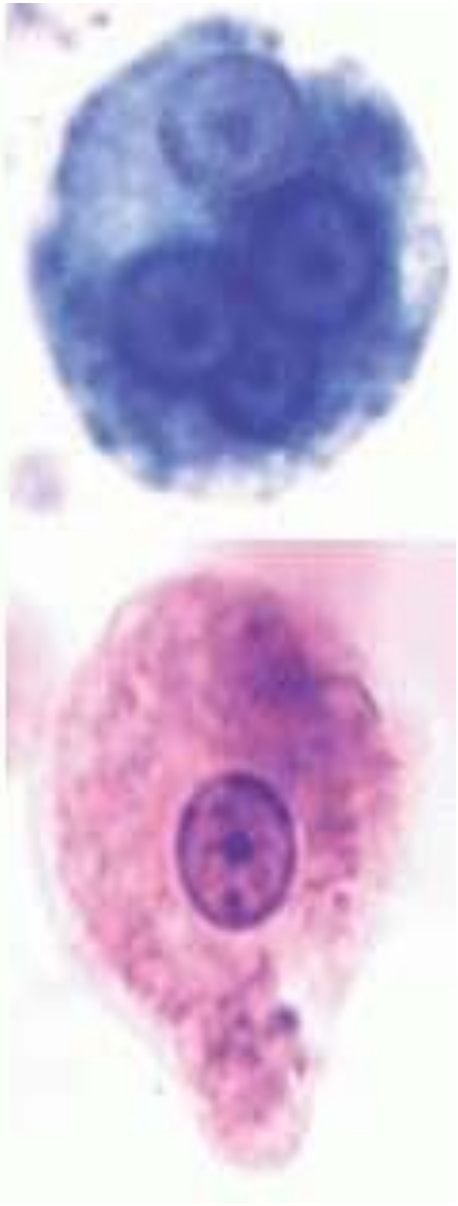



**Tropozoite** **Precyst** **Cyst**

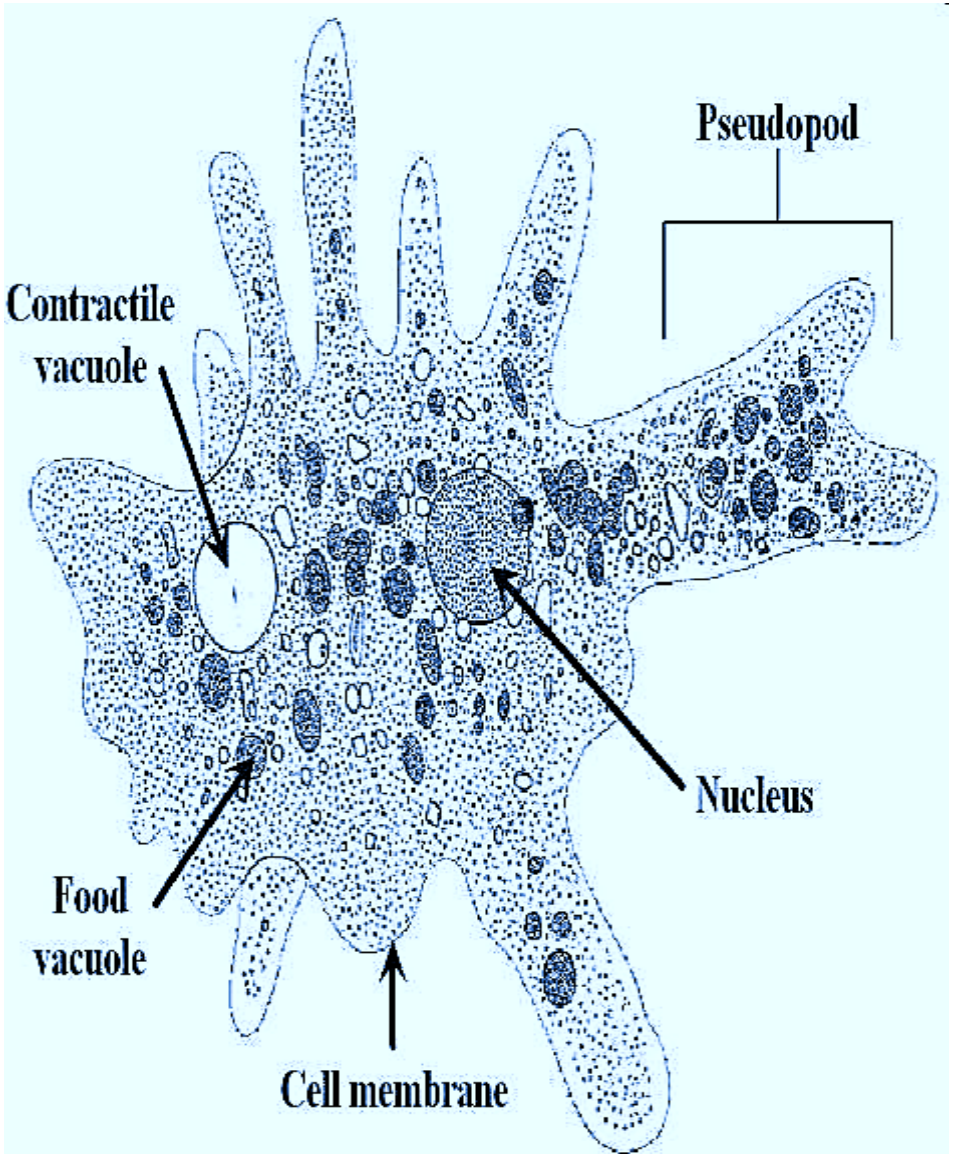
# **Life cycle:** life cycle in only one host (monogenetic) human




Cyst
(a)
Ingestion by human
of contaminated
food and water
(b)
Excystation in
small intestine
(c)
(d) Trophozoites
(e) Asymptomatic
colonization
(invasive)
(h) Amoebic colitis
(amoebic)
(i) Liver abscess
Encystation
in colon
(f)
Excretion in
the faeces
(g)



# Amoebiasis




- Amoebiasis (am-e-BI-a-sis) is a disease caused by a one-celled parasite called Entamoeba histolytica .

- **Amoebiasis**, also known **amoebic dysentery**, is an infection caused by any of the amoebae of the Entamoeba group.

  Although it is more common in people who live in tropical areas with poor sanitary conditions

# Transmission of Amebiasis

- Amoebiasis is transmitted by fecal contamination of drinking water and foods, but also by direct contact with dirty hands or objects as well as by sexual contact.
  Additionally, geophagy is a common route of infection in certain cultures.

# Host Contributions

- Several factors contribute to influence infection;

1. Stress
2. Malnutrition
3. Alcoholism
4. Corticosteriod therapy
5. Immunodeficiency
6. Alternation of Bacterial flora

# Risk Factors

- People in developing countries that have poor sanitary conditions
- Immigrants from developing countries
- Travellers to developing countries
- People who live in institutions that have poor sanitary conditions
- HIV-positive patients

# Intestinal Amoebiasis

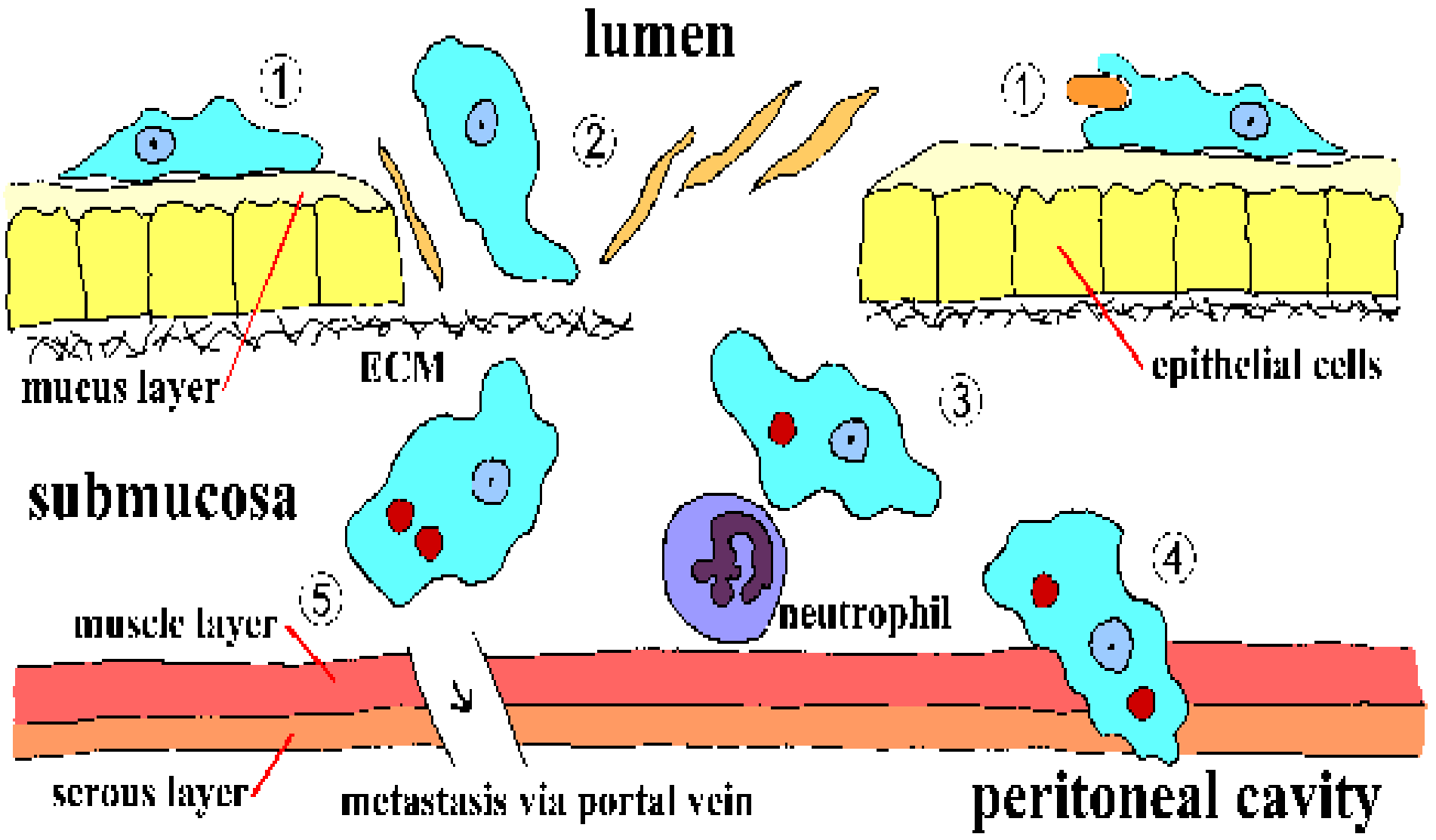
- ~ 90% of people are asymptomatic

➢ Intestinal amoebiasis indicate that organism are confined to gastrointestinal tract.

➢ Incubation period :1-4 weeks

➢ The amoebae invade the mucosa, producing characteristic ulcerative flask shaped lesions and a profuse bloody diarrhea (amoebic dysentery).


# Amoebiasis causes Epithelial damage



# Extra intestinal amoebiasis

- About 5% individuals

1. **Hepatic amoebiasis:** Acute Liver Abscess develop after 1-3 Months

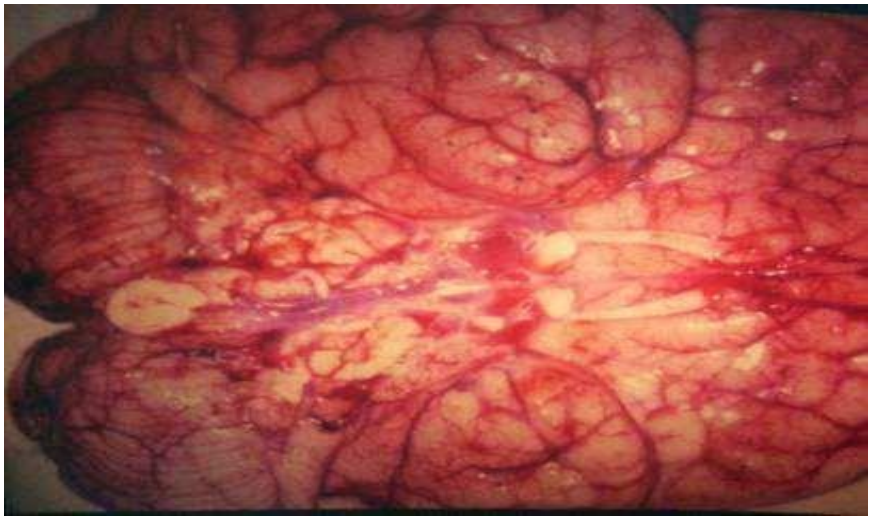
- Transmit through portal veins from intestine to Liver

- **Pus of liver abscess:** Anchovy sauce appearance and contain few Pus cells

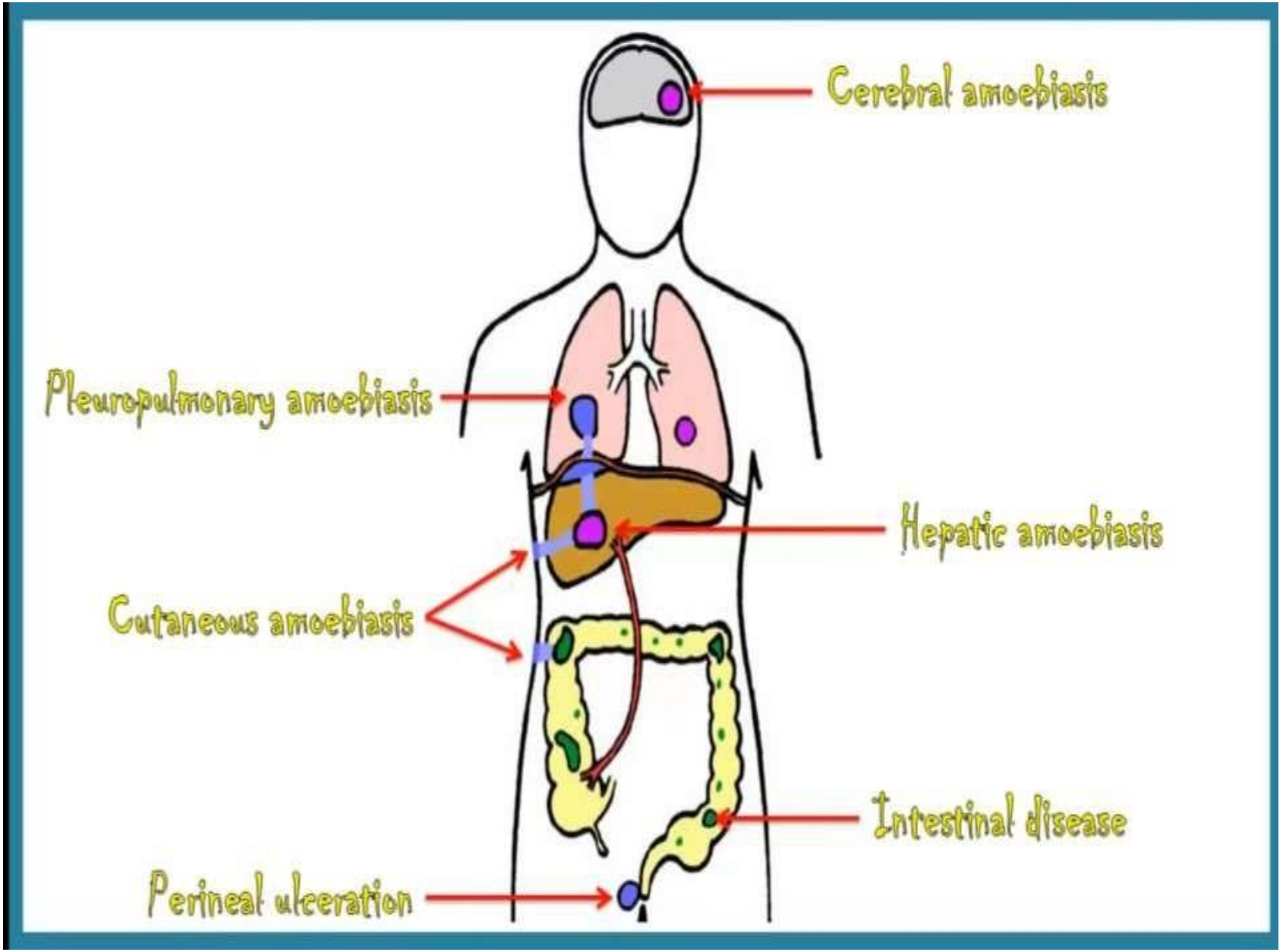

**Patient with amoebiasis liver abscess, with perforation of abscess through abdominal skin.**

2. **Pulmonary Amoebiasis:** Transmitted from Liver and develop pulmonary Lesions

3. **Cerebral Amoebiasis:** Transmitted from Liver to heart then Brain and develop cerebral lesion



**Cerebral Amoebiasis**


Cerebral amoebiasis
Pleuropulmonary amoebiasis
Hepatic amoebiasis
Cutaneous amoebiasis
Intestinal disease
Perineal ulceration

## Mild symptoms include:

- Loose stools/diarrhoea, including slimy diarrhoea with pus (which is often foul smelling) and painful passage of stools (tenesmus)
- Stomach pain
- Stomach cramps (colic)
- Nausea

## Severe symptoms include:

- Amoebic dysentery (associated with severe abdominal pain, bloody stools, and fever)
- Profuse diarrhoea (patients may pass about 10-12 stools during anacute episode, and still constantly feel an urgency to pass stools)
- Liver abscess
- Severe ulceration
- Severe gastric distention of the bowel
- Peritonitis (inflammation of the intestinal wall and its lining) or colitis (inflammation of the colon, specifically)
- Megacolon (very rare, in 0.5% of the cases)

# Laboratory diagnosis

## 1. Intestinal amoebiasis

- **Stool examination :-**In acute amoebiasis, stool or colonic scraping from ulcerated areas are examined by macroscopic and microscopic examination .
- **Blood examination :-** It shown moderate leucocytosis.

## Serological tests:-

- These are negatives in early cases however, in later stages of invasive intestinal amoebasis antibodies appear and serological testes become positive
- These test inculde indirect haemagglutination(IHA), indirect fluorescent antibody (IFA) test and enzymes –linked immunosorbent assay (ELISA)

## 2. Hepatic amoebiasis

**Diagnostic aspiration :-** Trophozoites of *E. histolytica* may be demonstrated by microscopy of the pus aspirated by puncture of amoebic liver abscess in less than 15% cases

**Liver biopsy :-**Trophozite of *E.histolytica* can be demonstrated in the specimens of liver biopsy from the cases of amoebic hepatitis or the wall of the liver abscess

## Blood examination:-

It shows leucocytosis with total leukocyte count of 15,000- 30,000µl of which 70-75% are polymorphonuclear leucocytes.

## Stool examination:-

In less than 15% cases of amoebic hepatitis , cysts of *E. histolytica* can be demonstrated in the stool. This indicates persistence of intestinal infection.

## Serological tests :-

- IHA,
- IFA,
- ELISA,
- Slide agglutination test,
- Co agglutination test.

## Molecular methods :-

- DNA probes
- PCR

# TREATMENT

Treatment of amoebiasis is based on the use of amoebicides drugs

- Di-iodohydroxyquin
- Diloxanide furoate
- Paromomycin
- Emetine
- Dehydroemetine
- **Metronidazole**
- **Nitroimidazole**

## Amoebicides effective only in the liver

- **chloroquine**

# Prevention

- The amoebic infection can be prevented by avoiding faecal contamination of food and water
- There should be proper disposal of human faces through proper drainage system
- Contamination may result from discharge of sewage into rivers. Purified water should be distributed through pipelines to avoid contamination . Boiled water is safe.

- The amount of chlorine normally used to purify water is insufficient to kill cysts , higher levels of chlorine are effective, but the water thus treated must be dechlorinated before use.
- Vegetables that are usually eaten raw should be cleaned with uncontaminated runing water and treated with 5% acetic acid before consuming

# References


. Warren Levinson & Ernest Janetz. Medical Microbiology & Immunology. 6th ed. Singapore: McGraw Hill 2000

. Pavl C. Beaver & Rodney C. Jung & Eddie W. Cupp. Clinical parasitology. 9thed. Philadelphia: Lea & Febiger, 1984.

. Kenneth J. Ryon. Medical Microbiology, an introduction to infectious disease. 3rd ed. USA: Appleton & Lange. 1994

. Michael. J. Pelczar, E.C.Schan & Nocl R. Krieg. Microbiology. 5th ed. New Delhi: Tata McGraw–Hill, 1986.

. Patrick. R. Murray, Ken. S. Rosenthal, George S. Kabayashi, Michael A. P. Faller. Medical microbiology 4th ed USA: Mosby, 2002