

Tikrit University

College of Nursing

Basic Nursing Sciences



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Microbiology

(Entamoeba histolytica)

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Entamoeba histolytica **(pathogenic Ameoba)**

E. histolytica is anaerobic parasitic amoebozoan, part of the genus *Entamoeba*.^[1] Predominantly infecting humans and other primates causing amoebiasis, *E. histolytica* is estimated to infect about 35-50 million people worldwide. *E. histolytica* is the only pathogenic amoeba among all intestinal amoebae, infecting perhaps 10% of world's population.

I. Morphology

1. Trophozoite, active form

The size averages 20 ~40 μm . It can actively move by the Pseudopodium when living. The difference between endoplasm and ectoplasm is distinct. Ingested RBC can be found in the endoplasm. The nucleus, vesicular type, can be clearly seen in the specimen stained with hematoxylin; nucleus membrane is delicate but distinct line; peripheral chromatin granules are fine and well-distributed on the inner surface of the nuclear membrane. The karyosome is small and centrally located. *The characteristics of the nucleus of *E. histolytica* are useful in differentiation of the pathogenic amoeba from other nonpathogenic amoebae.

2. Cyst, non-motile form

(1) Immature cyst is spherical in shape, about 10 ~20 μm , and has one or two nuclei.

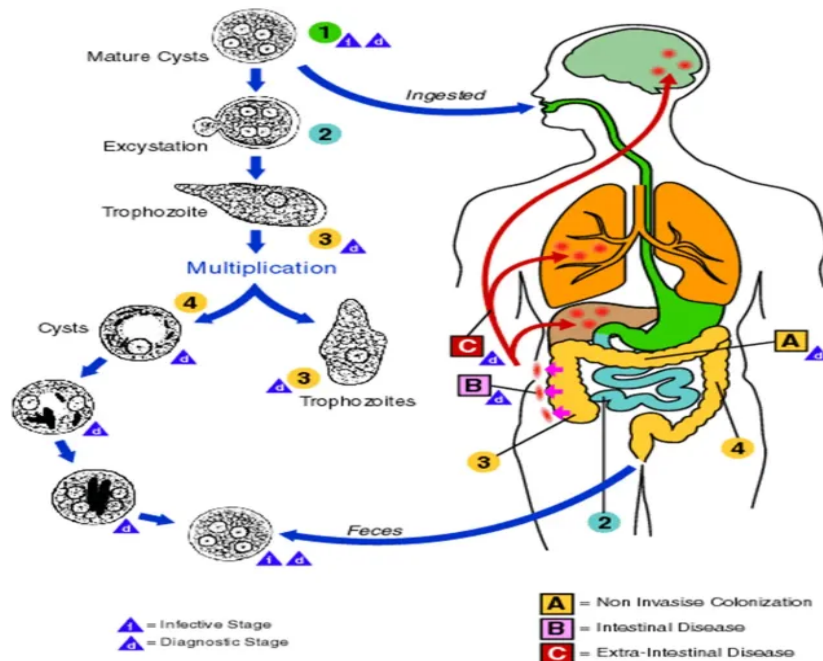
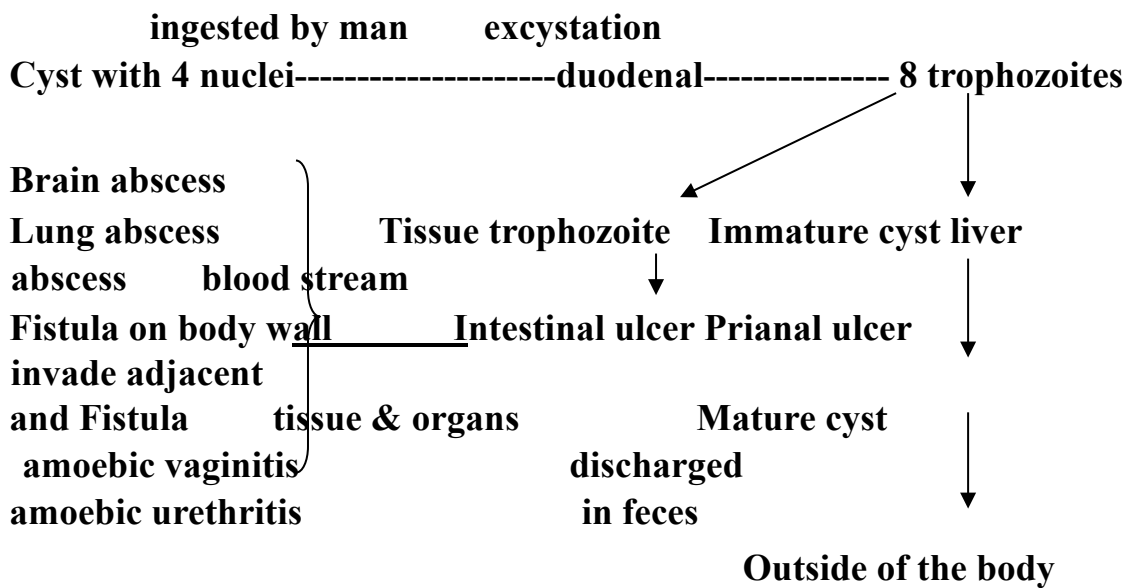
(2) Mature cyst: the shape and size is same as the immature cyst, but it has 4 nuclei.

The characteristics of the cyst nucleus are similar to that of the trophozoite. The other two morphological features are the glycogen vacuole and the chromatoid body (or bar). The chromatoid bar has two round and smooth ends. the glycogen vacuole is the food reservoir. Both glycogen vacuole and the chromatoid bar become smaller and smaller as the cyst ages.

II. Life cycle

1. definitive host: man .
2. infective stage : cyst with 4 nuclei .

3. infective route: by mouth .
4. site of inhabitation : intestine, excystation in duodenum , encystation in colon .
5. multiplication : binary fission .
6. normal life cycle : cyst ----- trophozoite ----- cyst .
7. the action of trophozoite in the intestinal lumen is different from that in the tissue .



III. Pathology and symptomatology

1. Pathogenic mechanism

The pathogenic materials of *E. histolytica* include lectin, amoebic pore forming and protein dissolving enzyme. The lectin guides the trophozoite to adhere to the intestinal epithelia, neutrophils and red blood cells. These pathogenic materials destroy the host's tissues. The trophozoites will then ingest these dead cells. This damage to the epithelial cell layer attracts human immune cells and these in turn can be lysed by the trophozoite, which releases the immune cell's own lytic enzymes into the surrounding tissue, creating a type of chain reaction and leading to tissue destruction. This destruction manifests itself in the form of an 'ulcer' in the tissue, typically described as flask-shaped because of its appearance in transverse section. The trophozoite invades the mucosa by producing tiny pinpoint lesions at the site of entry, spread into the submucosa and produce typical flask-shaped ulcer. The open of the ulcer toward intestinal lumen looks like a crater.

This tissue destruction can also involve blood vessels leading to bloody diarrhea, amoebic dysentery. Occasionally, trophozoites enter the bloodstream where they are transported typically to the liver via the portal system. In the liver a similar pathological sequence ensues, leading to amoebic liver abscesses. The trophozoites can also end up in other organs, sometimes via the bloodstream, sometimes via liver abscess rupture or fistulas. Similarly, when the trophozoites travel to the brain, they can cause amoebic brain abscess.^[23]

2. Clinical Manifestation

(1) Intestinal amoebiasis

- a. Amoebic dysentery is the most common form of amoebiasis. The acute case discharges unformed feces several times per day with the pain in right inferior part of the abdomen, nausea, low fever around 38°C, and fatigue. The jam-like stool with foul smell, in which there are great number of trophozoites and Charcot-Leyden crystals.
- b. Chronic amoebic colitis manifests vague abdominal discomfort, alternation of constipation and diarrhea, stool with mucus and foul smell, nausea, anorexia, fatigue, weight loss.

(2) Extra-intestinal amoebiasis or complications of intestinal amoebiasis

* **The most common extra-intestinal amoebiasis are:**

- a-** the liver abscess due to the parasite getting into the liver through the portal vein system .
- b.** Amoebic abscess of pulmonary : chest pain, cough, jam-like sputum, the shadow of the abscess can be seen on X-ray .
- c.** Intestinal perforation : acute abdominal pain, high fever, septic shock .
- d.** Amoebic abscess of brain : headache, nausea, vomiting, delirium, coma .
- e.** Amoebic vaginitis ; burning sensation, foul leucorrhoea
- f.** Amoebic urethritis : irritability of the bladder--frequent micturition, urodynia .
- g.** Skin fistulas of anus or liver portion .

IV. Diagnosis

1. Stool examination

- Living trophozoite in unformed feces: direct fecal smear with normal saline .
- Before the patient taking medicine the stool specimen should be collected .
- The container must be clean and free of salt, acid and alkaline .
- Trophozoites should be examined soon after they have been passed .
- keep the specimen warm in order to keep the trophozoite's activity .
- Select the bloody and mucous portion for examination .
- If Charcot-leyden crystals are found the stool must be carefully examined for the trophozoite .
- Cyst in formed feces: iodine stain for the chronic case or carrier (haemotoxylin stain for teaching) .

2. Immunological test : for reference

3. X-ray for lung amoebic abscess

- 4. Biopsy of rectum and sigmoid by rectoscope or sigmoidoscope , for diagnosis of intestinal amoebiasis and differential diagnosis from other intestinal diseases such as rectal cancer or sigmoid cancer.**
- 5. Computed tomograph (CT) and nuclear magnetic resonance (NMR) for the brain abscess.**