THE MEDICAL ACADEMY NAMED AFTER S. I. GEORGIEVSKY OF VERNADSKY CFU

DEPARTMENT OF MEDICAL BIOLOGY

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ENTAMOEBA HISTOLYTICA

- Amoeba are structurally simple protozoan which have no fixed shape
- Phylum : Sarcomastigophora
- Subphylum :Sarcodina
- Super class :Rhizopoda
- Order : Amoebida

- **Amoeba**
  - Free living
  - Intestinal
- Entamoeba histolytica is an intestinal amoeba
- All intestinal amoebae are non pathogenic except Entamoeba histolytica
- All free living amoeba are oppurtunistic pathogens.

ENTAMOEBA HISTOLYTICA

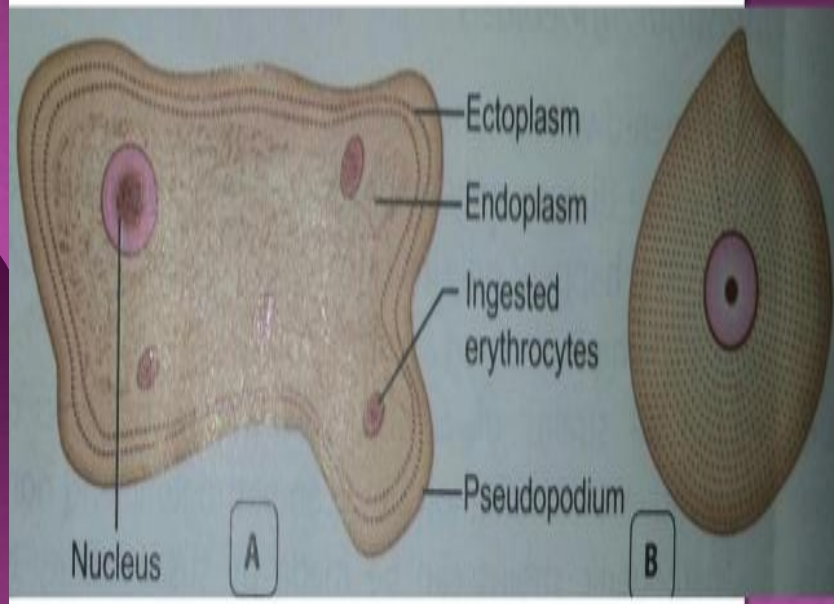
- E. histolytica was discovered by Losch in 1875
- Demonstrated the parasite in the dysenteric feces of a patient in St.Petersburg in Russia.

ENTAMOEBA HISTOLYTICA

- MORPHOLOGY
- LIFE CYCLE
- PATHOGENESIS & CLINICAL FEATURES
- LABORATORY DIAGNOSIS
- TREATMENT
- PREVENTION

MORPHOLOGY

- E.histolytica occurs in 3 forms
  - *Trophozoite*
  - *Precyst*
  - *Cyst*



TROPHOZOITE

- Vegetative or growing stage of the parasite
- Only form present in tissues
- Irregular in shape
- Size: 12-60 µm(Average 20µm)
- Large and actively motile in freshly passed dysenteric stool, while smaller in convalescents and carriers.
- In the lumen, commensal and small in size(15-20 µm)-MINUTA FORM

Cytoplasm

Outer ectoplasm-clear, transparent, refractile.

Inner endoplasm-finely granular (ground glass appearance), with

- nucleus
- food vacuoles
- erythrocytes
- leucocytes(occasionally)
- tissue debris

- ***Pseudopodia***

  Fingerlike projections formed by sudden jerky movements of ectoplasm in one direction, followed by the streaming in of the whole endoplasm

- Typical amoeboid motility is a **Crawling or Gliding**
- Pseudopodia formation and motility are inhibited at low temperature

ucleus

It is spherical 4-6µm in size

contains central karyosome,surrounded by clear halo and anchored to the nuclear membrane by fine radiating fibrils called the **Linin network , g**iving a ***cartwheel appearance***

Nuclear membrane is lined by a rim of chromatin distributed evenly as small granules

PRECYSTIC STAGE

- Trophozoites undergo encystment in the lumen
- Before encystment,the trophozoites extrudesits food vacuoles and become round or oval,10-20µm in size-precyst
- Contains a large glycogen vacuole and two chromatid bars
- It then secretes a highly retractile cyst wall around it and become cyst

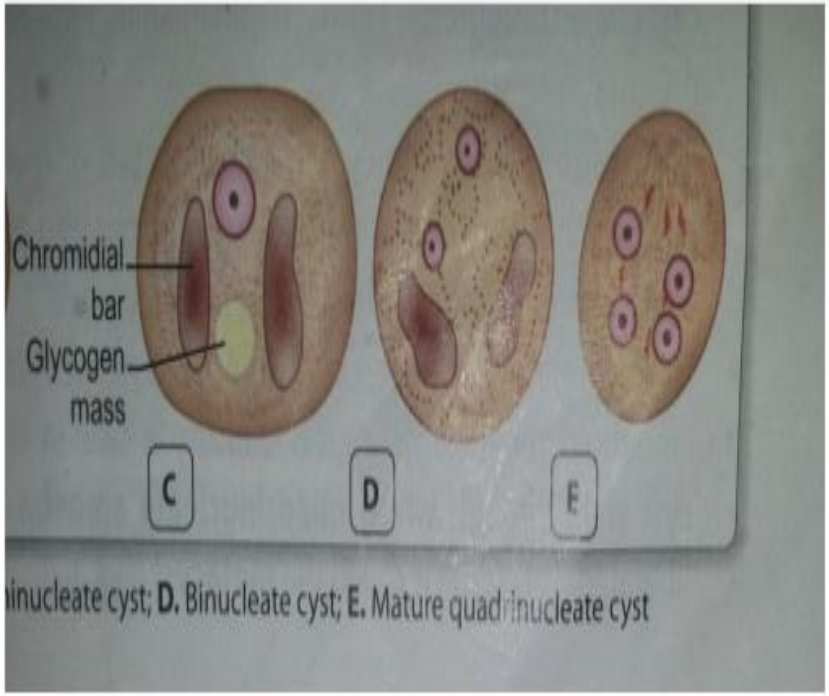
- Trophozoites from acute dysentric stools often contain phagocytosed erythrocytes-diagnostic feature ,these are not found in any other commensal intestinal amoeba
- These divided by binary fission in every 8 hours
- These are killed by drying, heat ,and chemical sterilization
- Infections are not transmitted by these-destroyed in stomach and cannot initiate infection

CYSTIC STAGE

- Spherical ,10-20µm
- 3 types of cyst
  - Early cyst
  - Binucleate cyst
  - mature quadrinucleate cyst

Early cyst

contains a single nucleus and two other structures-a mass of glycogen and 1-4 chromatid bodies or chromadial bars

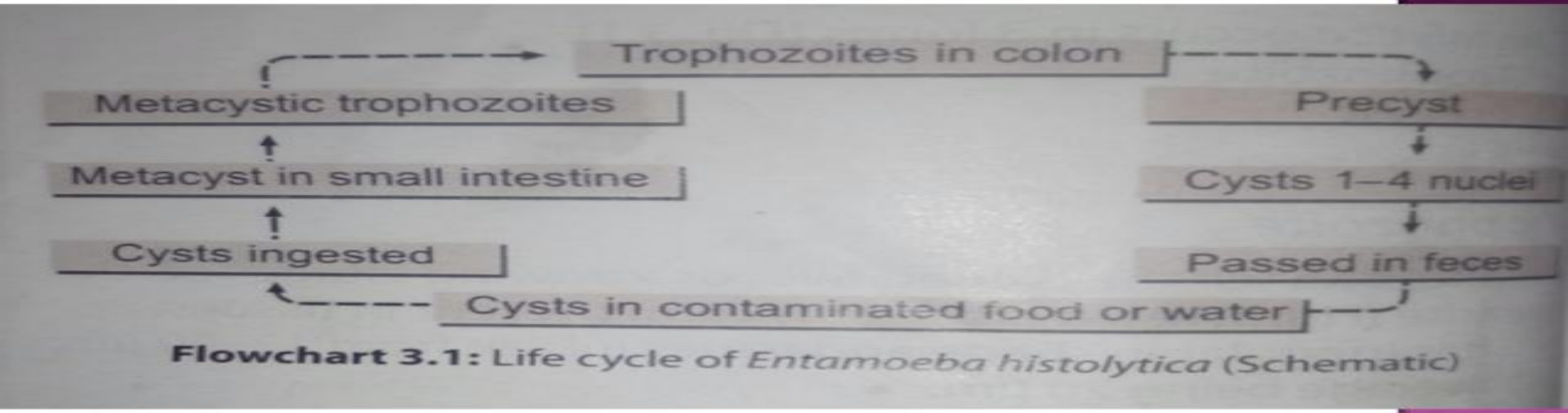


inucleate cyst; **D.** Binucleate cyst; **E.** Mature quadrinucleate cyst

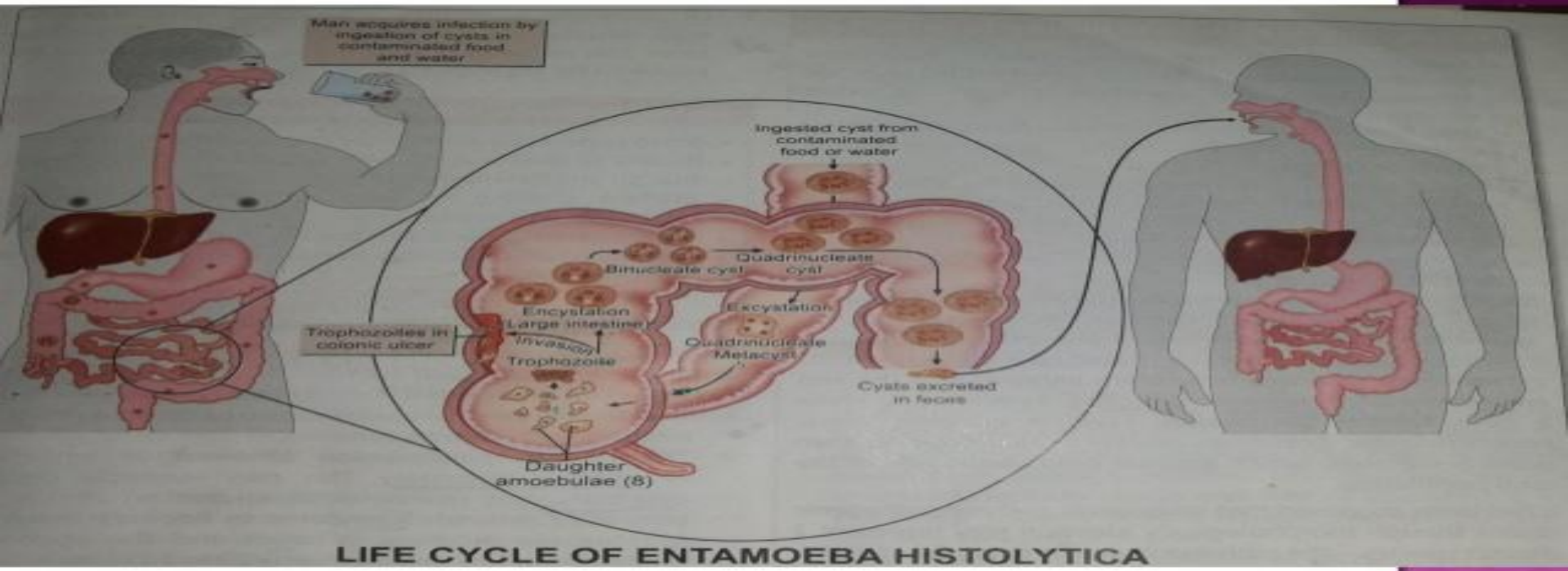
- As the cyst mature, the glycogen mass and chromidial bars disappear and the nucleus undergoes 2 succesive mitotic divisions to form 2 and then 4 nuclei .
- The cyst wall is a highly resistant to gastric juice and unfavorable environmental conditions

LIFE CYCLE

- Infective form :mature quadrinucleate cyst passed in feces of convalscents and carriers
- Mode of transmission :man acquires infection by swallowing food and water contaminated with cyst .
- Stomach -cyst wall is resistant to gastric juice
- Exystation :cyst reaches the caecum or lower part of ileum ,due to alkaline medium ,cyst wall damaged by trypsin ,leading to exystation



Flowchart 3.1: Life cycle of *Entamoeba histolytica* (Schematic)



LIFE CYCLE OF ENTAMOEBA HISTOLYTICA

PATHOGENESIS AND CLINICAL FEATURES

- E.histolytica causes **intestinal** and **extra intestinal** amoebiasis

  Intestinal amoebiasis -***PATHOGENESIS***

  Lumen *dwelling amoeba do not cause any illness .They causes disease only when they invade the intestinal tissues .*

  10 % -symptomatic

  90% -asymptomatic

- Not all strains of E.histolytica are pathogenic or invasive .
- Differentiation between pathogenic and non pathogenic strains can be made by
  - susceptibility to complement-mediated lysis
  - Phagocytic activity
  - by the use of genetic markers
  - monoclonal antibodies
  - Zymodeme analysis

- The metacystic trophozoites penetrate the columnar epithelial cells of **crypts of Liberkuhn**
- Penetration is facilitated by

  motility of the trophozoites

  tissue lytic enzyme -***histolysin***

  amoebic lectin -mediate adherence
- Mucosal penetration by amoeba produce discrete ulcers with pinhead center and raised edges .
- Sometimes invasion remains superficial and heal spontaneously.
- More often, the amoeba penetrates to submucosal layer and multiplies rapidly- lytic necrosis- abscess- ulcer

- Ulcer appear initially on the mucosa as raised nodules with pouting edges .
- They breakdown discharging brownish necrotic material contains large numbers of trophozoites.
- The typical amoebic ulcer –flask shaped
- Multiple ulcers may coalesce to form large necrotic lesions with ragged and undermined edges,covered with brownish slough

LESIONS IN CHRONIC INTESTINAL AMOEBIASIS

- Small superficial ulcers involving only the mucosa
- Round or oval shaped with ragged and undermined margin and flask-shaped in cross section
- Marked scarring of intestinal wall with thining ,dilatation ,and sacculation
- Extensive adhesions with neighboring viscera
- Formation of tumor-like masses of granulation tissue amoeba

HEPATIC AMOEBIASIS

- Most common extra intestinal amoebiasis .
- The history of amoebic dysentry is absent in more than 50% cases
- Several patients with amoebic colitis develop an enlarged tender liver without detectable impairment of liver function or fever.
- This acute hepatic involvement (amoebic hepatitis) may be due to repeated invasion by amoeba from an active colonic infection or to toxic substance from the colon reaching the liver.

PULMONARY AMOEBIASIS

- It may occure by direct hematogenous spread from colon bypassing the liver,but it most often follows extension of hepatic abscess through the diaphragm
- Hepatobronchial fistula usually results with expectoration of chocolate brown sputum
- Patient presents with

  severe pleuritic chest pain

  dyspnea

  non-productive cough

Fig. 3.3: Intestinal amoebiasis: Specimen showing amoebic ulcer in colon

METASTATIC AMOEBIASIS

- Involvement of distant organs is by hematogenous spread and through lymphatics
- Abscess in

  Kidney

  Brain

  Spleen

  Adrenals

Spread to brain leads to severe destruction of brain tissues and is fatal

THANK YOU