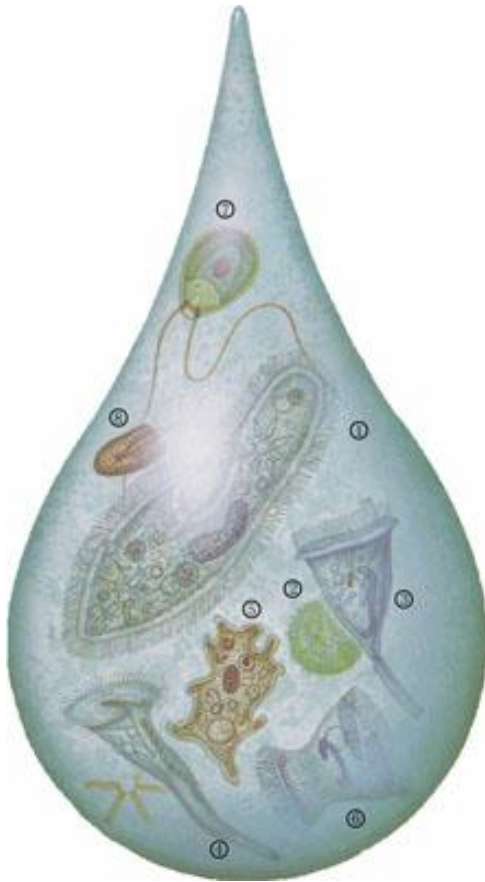




# **Entamoeba histolytica**

# protozoa



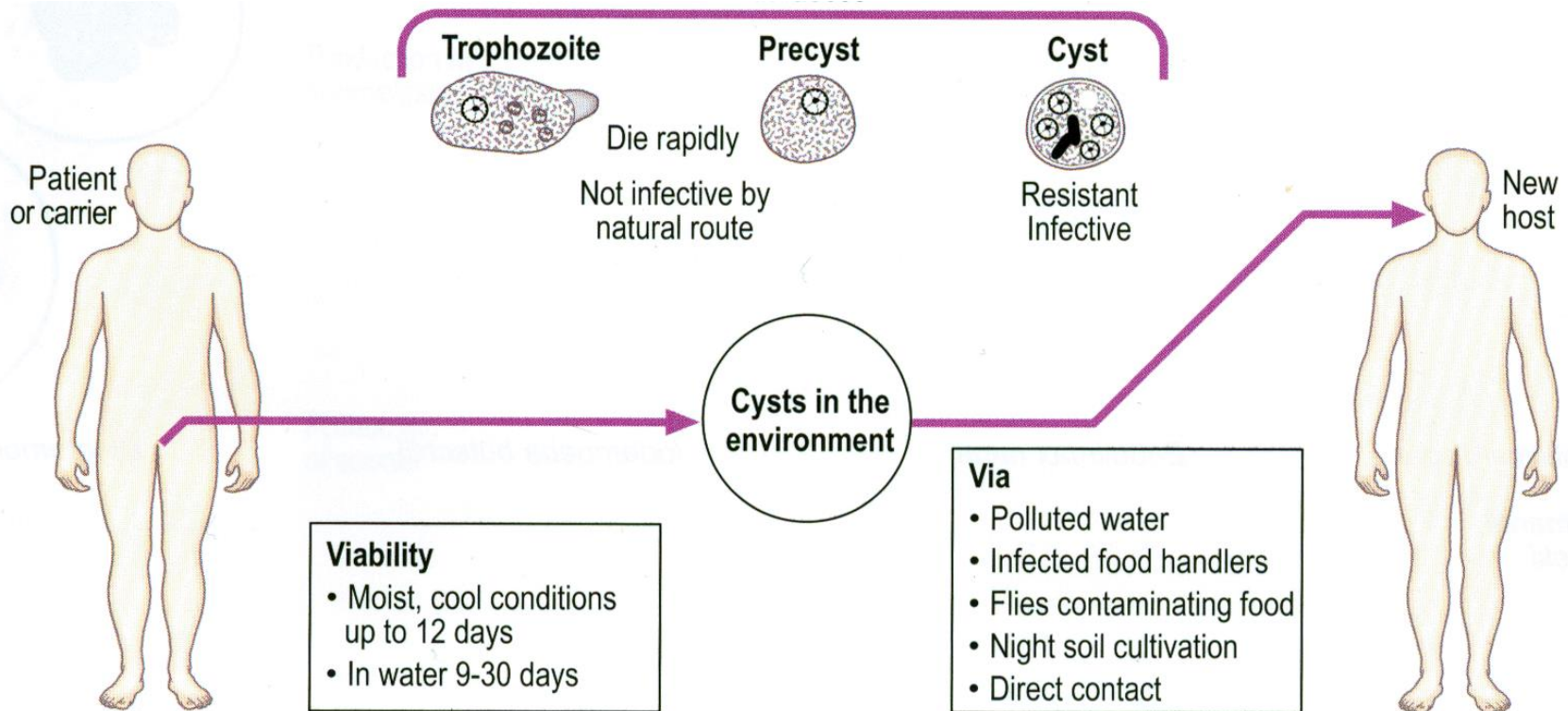
- Primary unicellular eukaryotes, often also called protists
- Many important human and veterinary pathogens
- It is important to understand that protozoa is mostly a historic grouping and not a cohesive biological group that contains closely related organisms
- A **very** diverse group with a vast variety of morphological and biochemical adaptations to almost any ecological niche

# Entamoeba histolytica



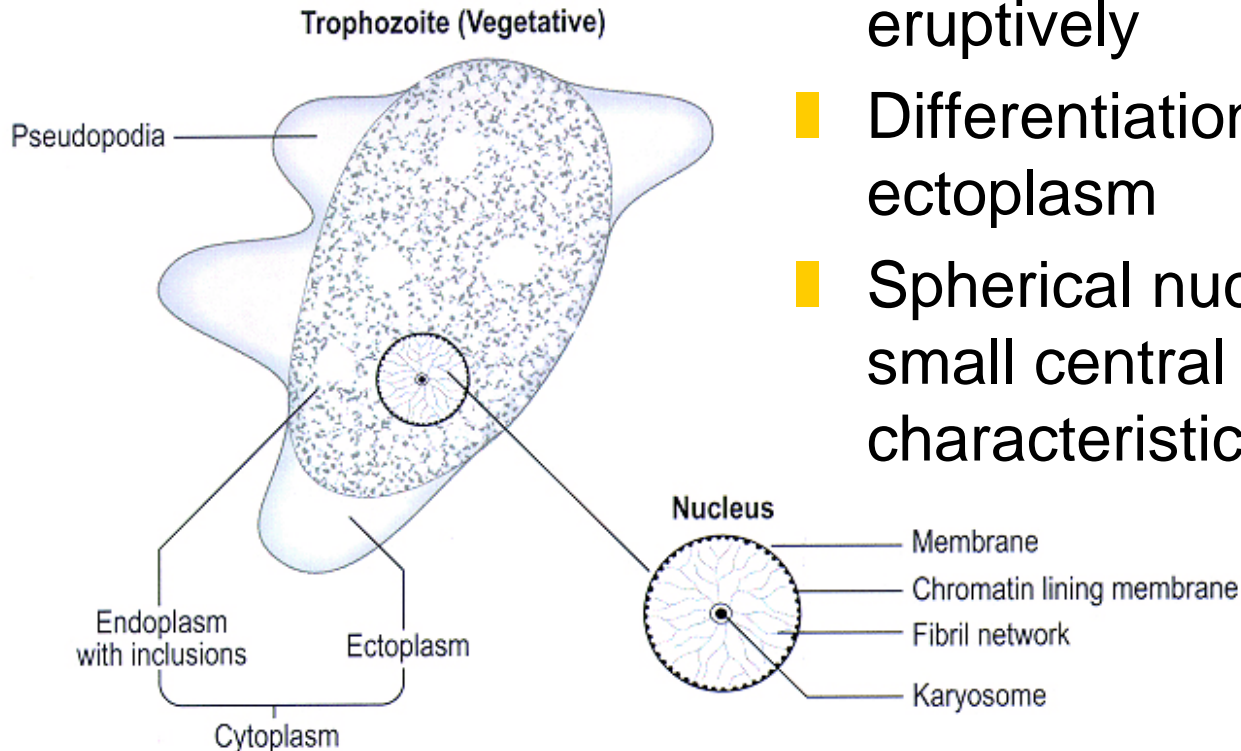
- Fedor Alexandrowitch Lösch describes amoebae associated with severe dysentery in a patient in 1873
- He transferred amoebae to a dog by rectal injection, which became ill and showed ulceration of colon
- Patient who died from infection showed similar ulcers upon autopsy

# trophozoites and cysts



# trophozoites and cysts

- multiple well defined pseudopodia often extended eruptively
- Differentiation into endo- and ectoplasm
- Spherical nucleus (4-7  $\mu\text{m}$ ) with small central nucleolus and characteristic radial spokes

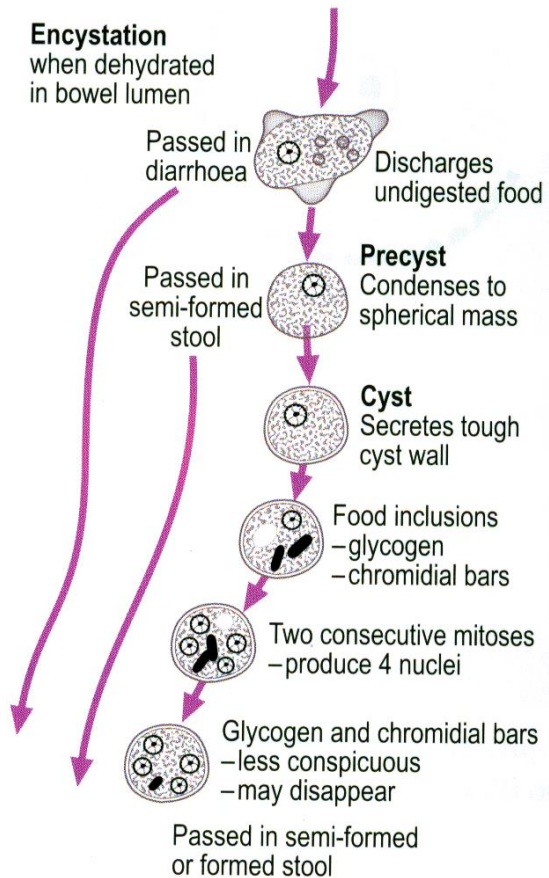


# trophozoites and cysts



- Trophozoites 20-40  $\mu\text{m}$  diameter
- Ribosomes arranged in helical patterns
- Tissue forms often contain phagocytized red blood cell

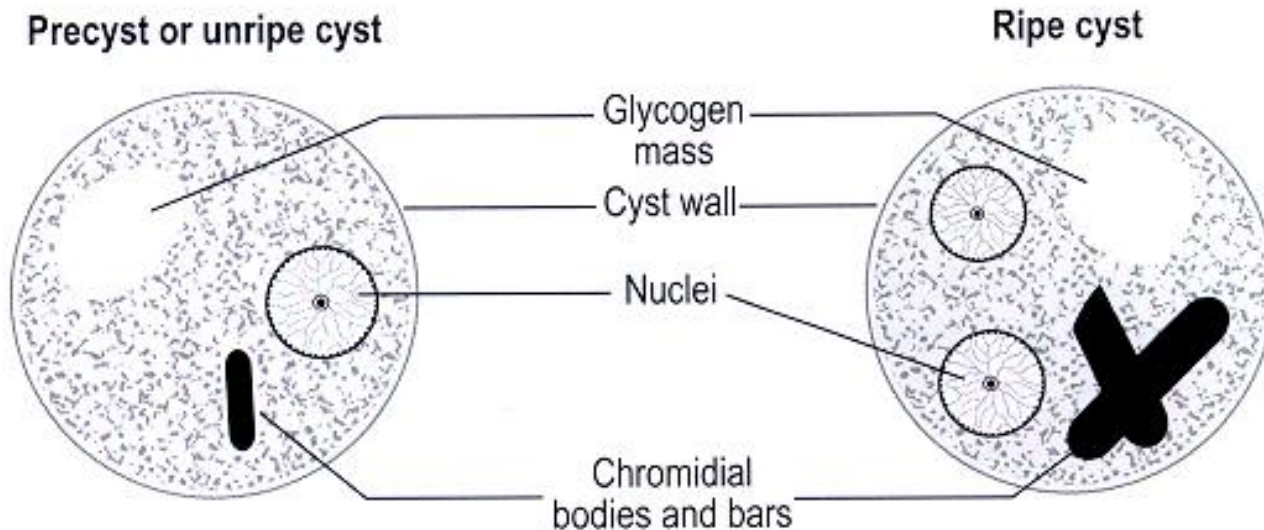
# trophozoites and cysts



- Trophozoites encyst and cysts mature as they travel through the colon
- Only mature cysts are infective

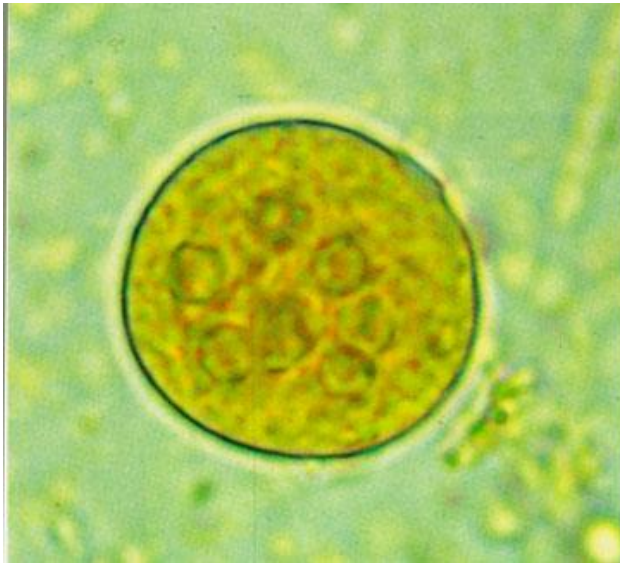
# trophozoites and cysts

- Round (10- 16  $\mu\text{m}$ ), 4 nuclei
- Chromidial bodies and bars are semicrystalline arrays of ribosomes
- 150 nm cyst wall with fibrillar structure

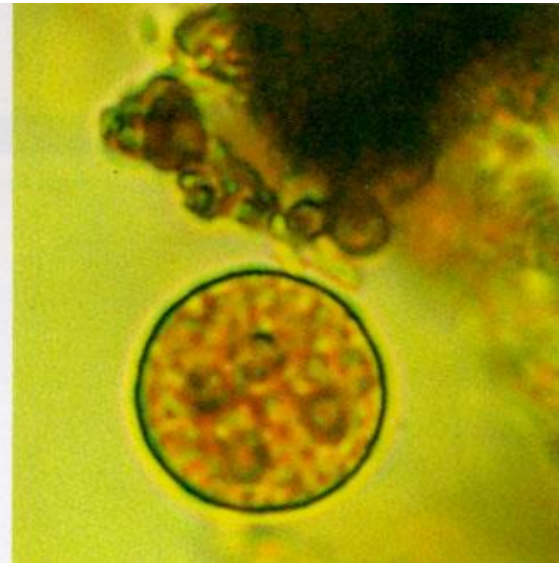




# Entamoeba cysts (light microscopy)



*E. coli*



*E. histolytica*

# Human infection



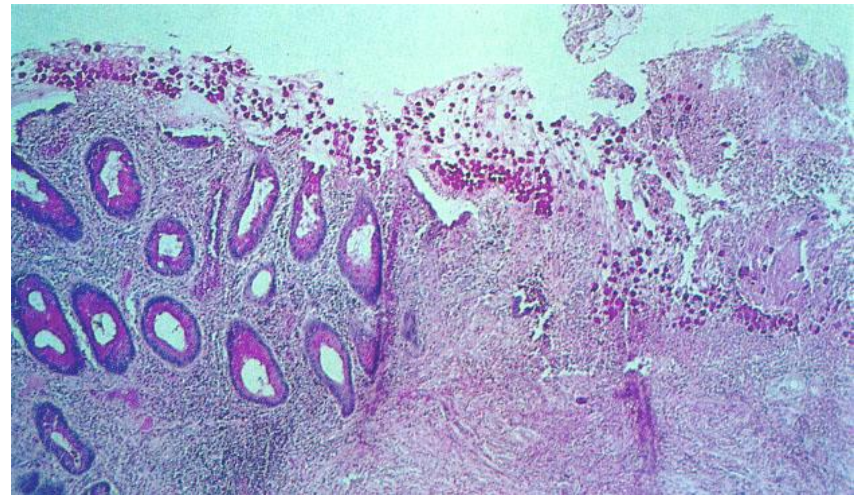
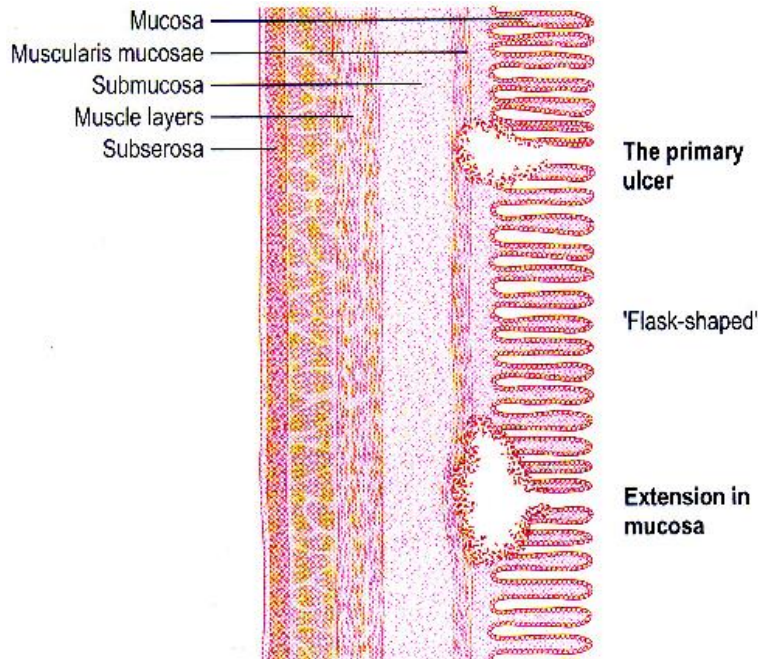
- Major sources for human infection are contamination of drinking water and vegetables (fertilization with material containing or contaminated with human feces)
- Patients without any symptoms might nevertheless shed large amounts of cysts
- If kept cool and moist (water or soil) cysts can stay infectious for up to a month
- Cysts are fairly resistant to chlorination of drinking water (10 mg/l versus 0.1 - 1.0 mg/l for enteric bacteria)

# Colitis is the most common form of disease associated with amoebae



- Gradual onset of abdominal pain, watery stools containing mucus and blood
- Some patients have only intermittent diarrhea alternating with constipation
- Fever is uncommon
- Formation of ulcers

# Colitis is the most common form of disease associated with amoebae



- Amoeba invade mucosa and erode through lamina propria causing characteristic flask shaped ulcers contained by muscularis

# Ulceration can lead to secondary infection and extraintestinal lesions

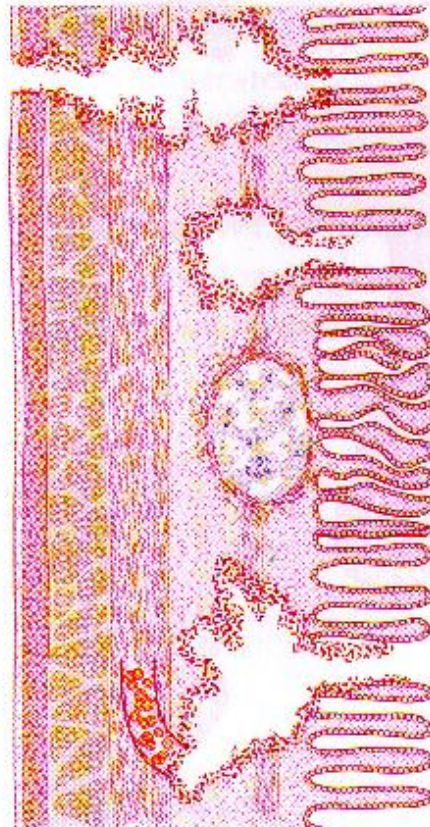
**Perforation**  
**Haemorrhage (rare)**

**Secondary infection**

**Amoeboma (rare)**  
(Clinically simulates neoplasm)  
– intussusception  
– obstruction

**Invasion of blood vessels**

**Direct extension outside bowel**



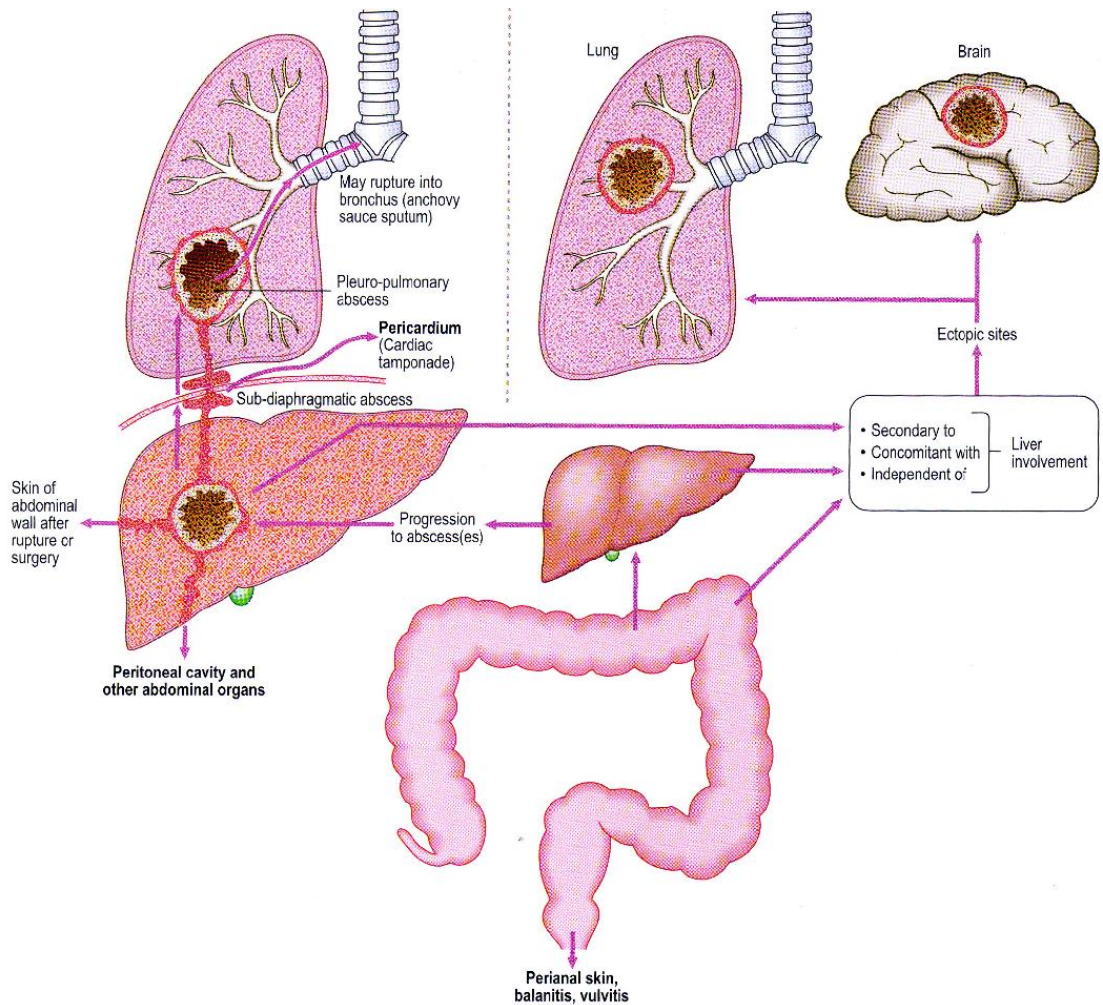
**Peritonitis**  
**Haemorrhage**

Surrounding inflammatory reaction and  
fibroblastic proliferation

A mass under oedematous mucosa with  
– internal abscesses of necrotic tissue and amoebae  
– surrounding granulomatous tissue zone with eosinophils,  
lymphocytes and fibroblasts  
– outer firm nodular fibrous tissue

**Extraintestinal lesions**-page 52

# Extraintestinal amebiasis



# Amebic liver abscess



- Most common form of extraintestinal amebiasis
- Fast growing abscess filled with debris, amoebae are found only at borders
- Acute as well as chronic illness, with gradual or sudden onset ظهور او بداية

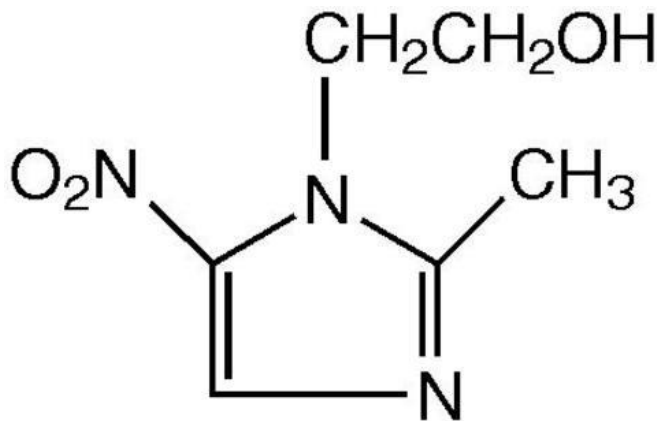
# Amebic liver abscess



- 30-50% of patients with liver abscess show also pneumonic involvement
- Rupture is again a major thread, especially rupture into the pericardium
- Draining abscesses is today only performed in extreme cases when rupture is feared
- Responds well to chemotherapy



# Metronidazole is the drug of choice for extra-intestinal amebiasis



- Several drugs are available to clear symptomatic and asymptomatic enteric (luminal) infection (e.g. dichloroacetamides which have unknown mode of action)
- Metronidazole (Flagyl) is the drug of choice for invasive amoebiasis (and should be combined with a lumen acting drug as it is not fully effective on luminal stages)
- Metronidazole is a prodrug which is activated by an enzyme involved in the microaerobic fermentation metabolism of *E. histolytica*

# Epidemiology وبائی of *Entamoeba*

- 480,000,000 people harbor *Entamoeba*
- 36,000,000 develop clinical symptoms
- 40,000 - 100,000 deaths per year

(Walsh, 1986, Rev. Infect. Dis., based on 1981 data, no significant change since then)

**Less than 10% of the people infected show disease. Several hypotheses have been put forward to explain this differential pathogenesis.**