Microbiology sheet

INTRODUCTION TO PROTOZOA

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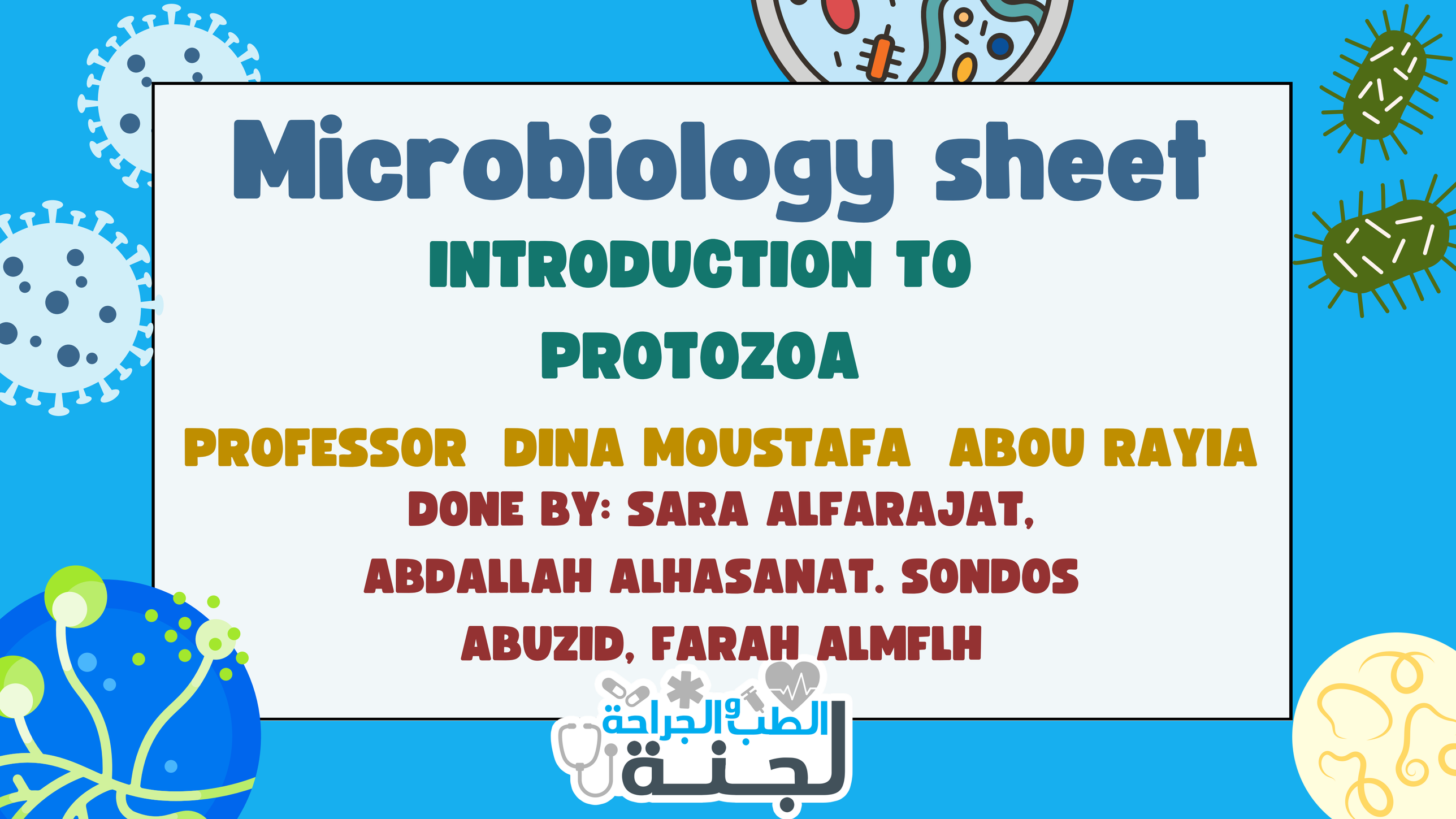

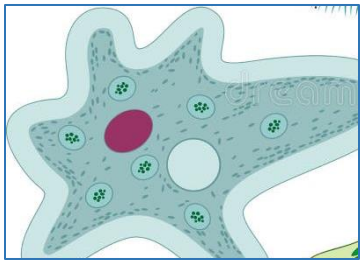

Can't see by naked eye should use microscope to watch

Introduction to Protozoa

Professor Dina Moustafa Abou Rayia

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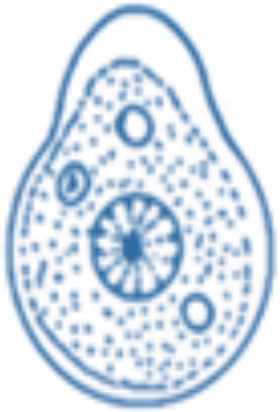
- **Definition:** Protozoa are unicellular organisms capable of performing all life functions.
- **Morphology:**



❖ **Plasma membrane.** nucleus

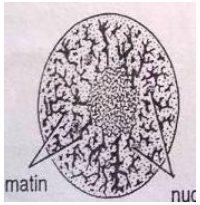
*3. Nucleoplasm : ectoplasm and endoplam

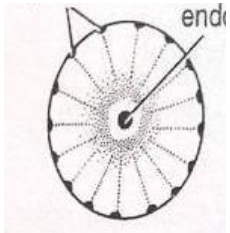
❖ **Ectoplasm:** hyaline, non-granular outer layer and responsible for locomotion, feeding, excretion and protection

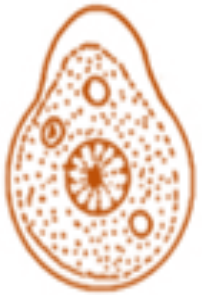
❖ **Endoplasm:** granular, responsible for Mainly metabolism. It contains food vacuoles, food reserves and contractile vacuoles + Contains nucleus

General characters:

- **Nucleus:** → different from one to another (can differention between protocor by shap of nucleus)
- One or more,, located in the endoplasm.
- Responsible for reproduction and regulates activities of the cell.
- **Consists of:**
  - Nuclear membrane.
  - Nucleoplasm.
  - Chromatin network.
  - Karyosome (endosome or nucleolus)





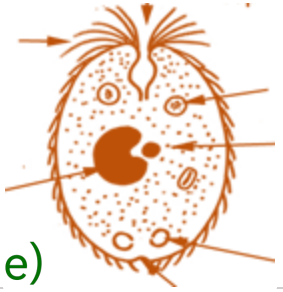


cytosome : means mouth → opening on the anterior end

Biology:

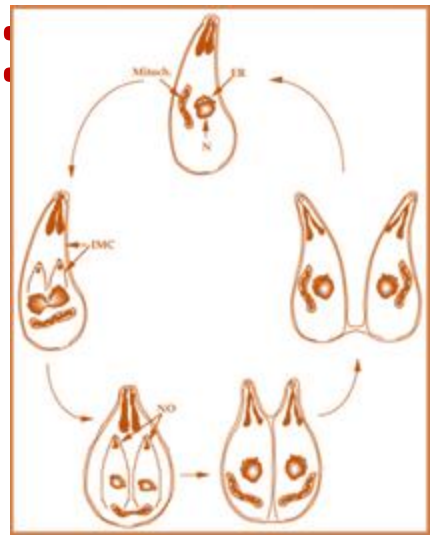
drain food particles

- **Locomotion:** by pseudopodia, flagella or cilia.
- **Nutrition:** by absorption of liquid food from the surface (saprozoic) or ingestion of solid particles (holozoic) through the cytostome or by pseudopodia. (locomotion / feeding)
- **Excretion:** by diffusion, contractile vacuoles or cytopyge. (liquid; solid; anus-like / in posterior end; rupture to release waste produets)
- **Secretion:** enzymes, toxins, and materials for cyst walls.
- **Encystation:** formation of cysts, to resist unfavourable
- conditions and facilitate transfer



* the infective stage is cyst stage
*trophozoid destroyed in external environment (weak stage)

Reproduction:

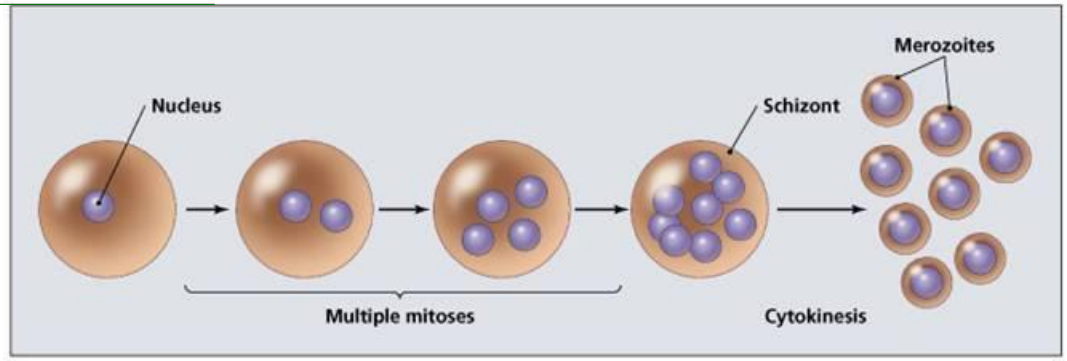


❖ **Asexual:**

internal binay fission

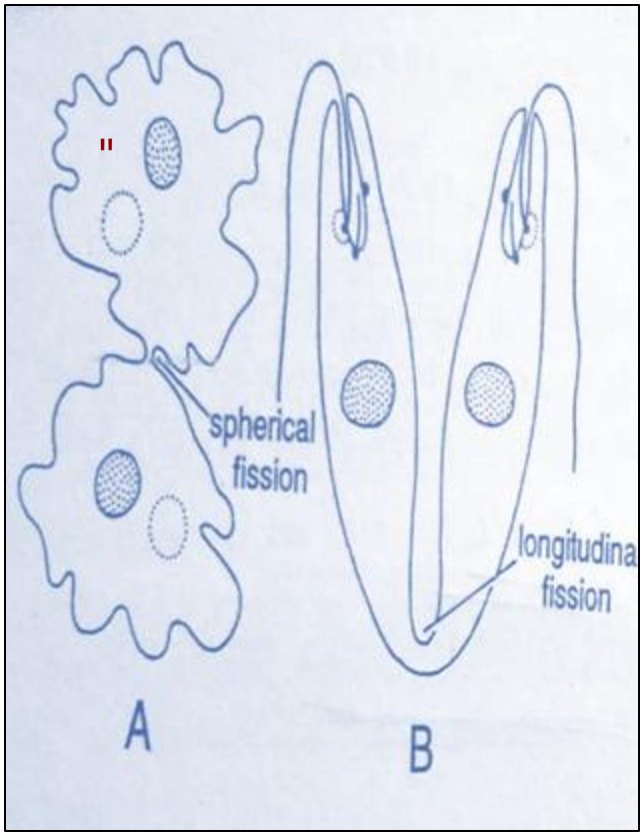
Endodyogony

occur inside mother cell rupture to release them



Multiple fission (schizogony)

- nucleus divides to multiple nuclei
- cytoplasm divides to multiple cytoplasms
- give me maltiple daughter cells



Simple binary fission

most common

- nucles divides to2.
- cytoplam divide to 2
- give me 2 daughter cells

Reproduction:

❖**Sexual:** rejuvenation → e. g: rejuvenalisation

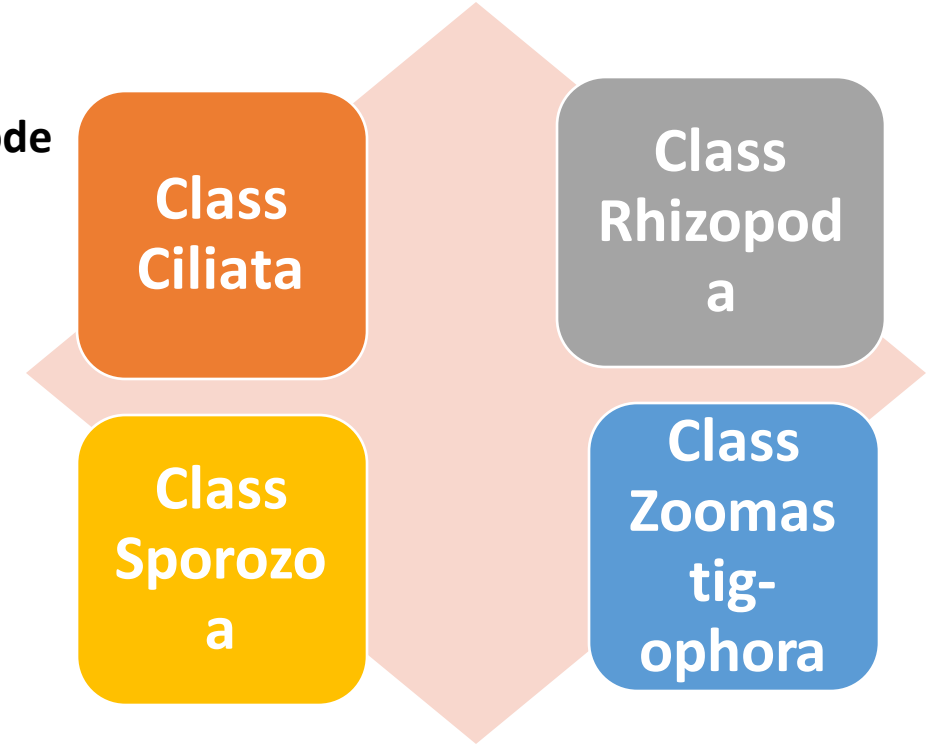
- **- Conjugation:** temporary union of two organisms for exchange of nuclear material as in *Balantidium coli*. no change in number

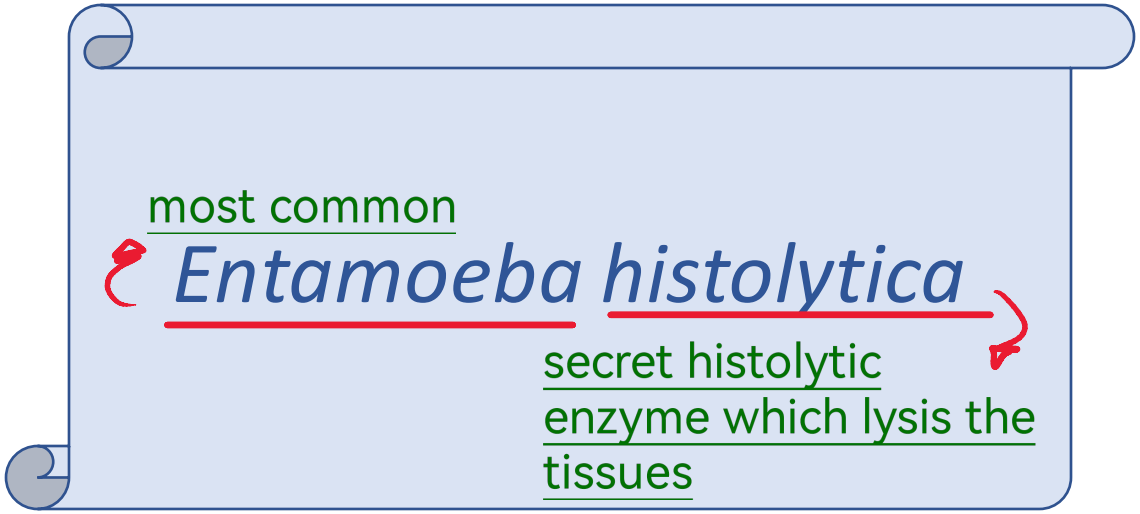
- **- Syngamy:** permanent union of gametes for formation of a zygot**.**

common

Protozoa classification

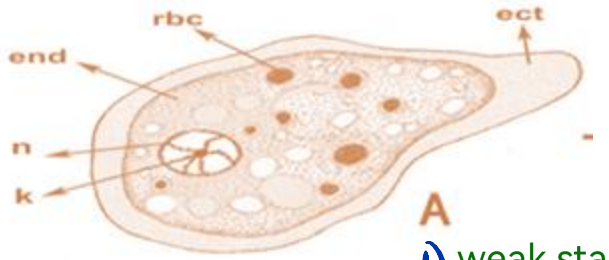
According to the mode of locomotion




most common
Entamoeba histolytica
secret histolytic enzyme which lysis the tissues

Entamoeba histolytica

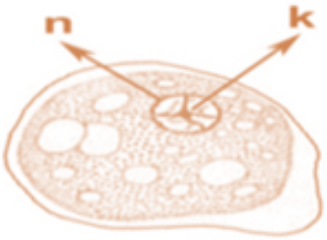
inside the bady it is the infective stage



1) weak stage
2) destroyed rapidy inexteral enviroment

Trophozoite

Zomm, pseudopodia,ectoplasm, endoplasm



single psendopadia
slower than trophozoite

smaller than trophozoite

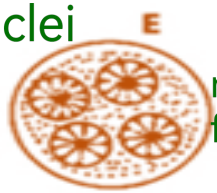
Pre-cyst

Uninucleated cyst

(2 nuclei)

Binucleated cyst

4 nuclei



no food all
food is consumed

(infective stage) Out side the body

Quadrinucleated mature cyst

nucleus → central Karyosome → chromatin network form and chromatin dots in inner surface of strides nuclear membrane (car wheel-like)

- uninucleated cyst:- single nucleus
- does not eat but reserves Food as source of energy to present at external environment

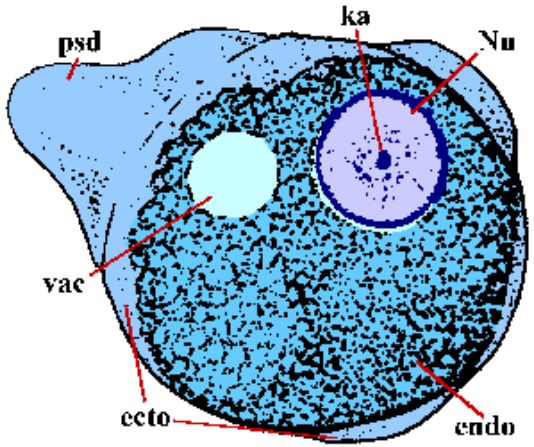
in cytoplasm there is
Food vacuoles contain RBCs
Takes its nutrients from it
- secrets histolytic enzymes (inside the body)

2 ways to reserve Food

- glycogen vacuoles
- chromatoid bodies (segar-shape)

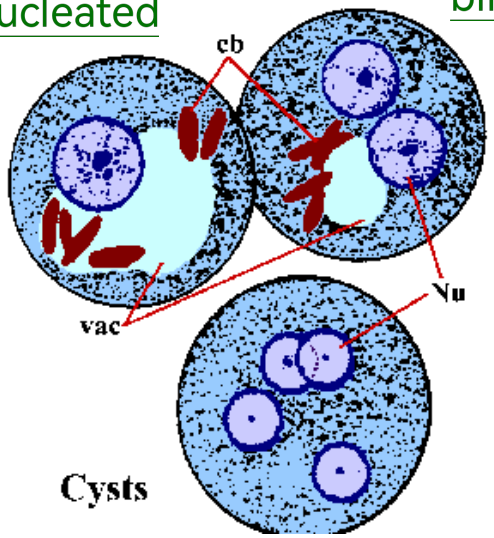
- cyst stage is not motile

Trophozoite



uninucleated

binucleated

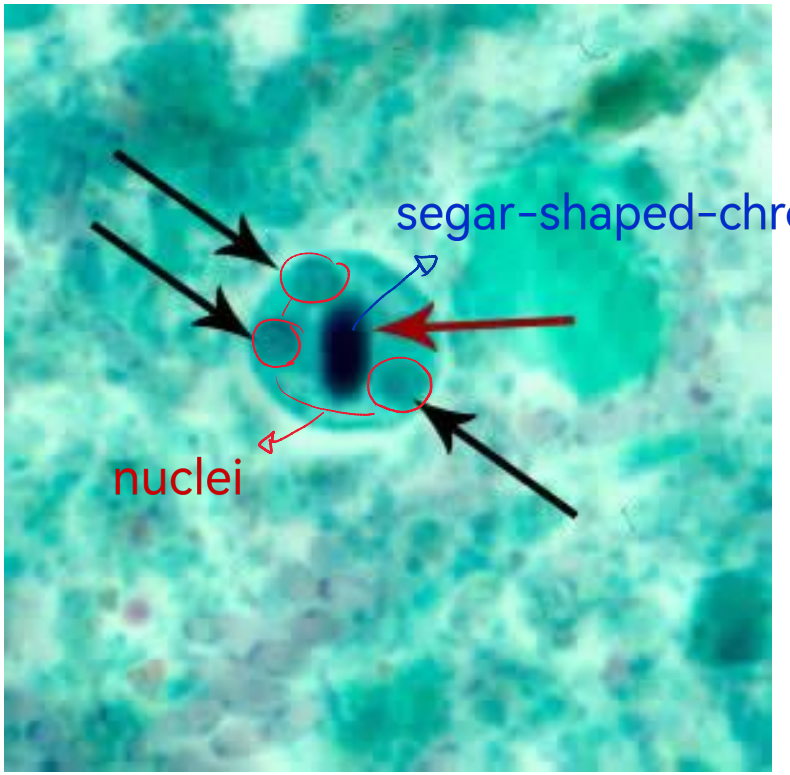


quadrinucleated

cyst

Cyst stage

(mature cyst)

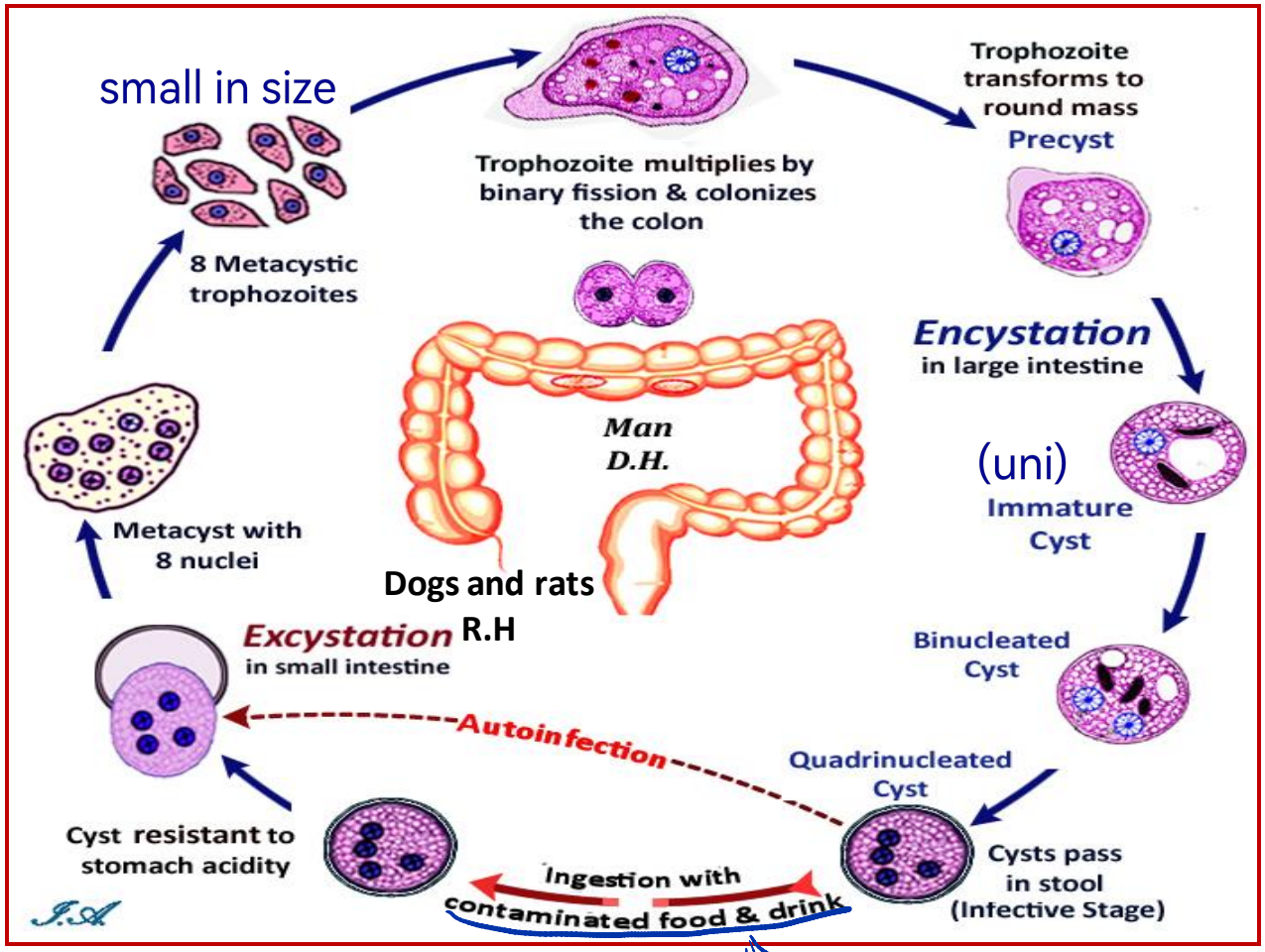


RBCs

nucleus

* all stages can normally pass in stool except in trophozoite in severe diarrhea

but the only stage that can complete the cycle after pass in stool is quadrinucleated cyst



- **Habitat** lang intestine
- **Hosts: D.H and R.H** Man Dog and rats
- **D.S** uni,bi, quadricyst → Trophozoite in sever diarrhea
- **I.S** mature quadrinucleated cyst
- **Mode of infection** fero-oral

feco-oral(hand to mouth)
External autoinfection
Contaminated hand (person to person)

depend on the immunity

↓ immunity → ↑ infection

Pathogenesis

With heavy infection and lowering of host immunity

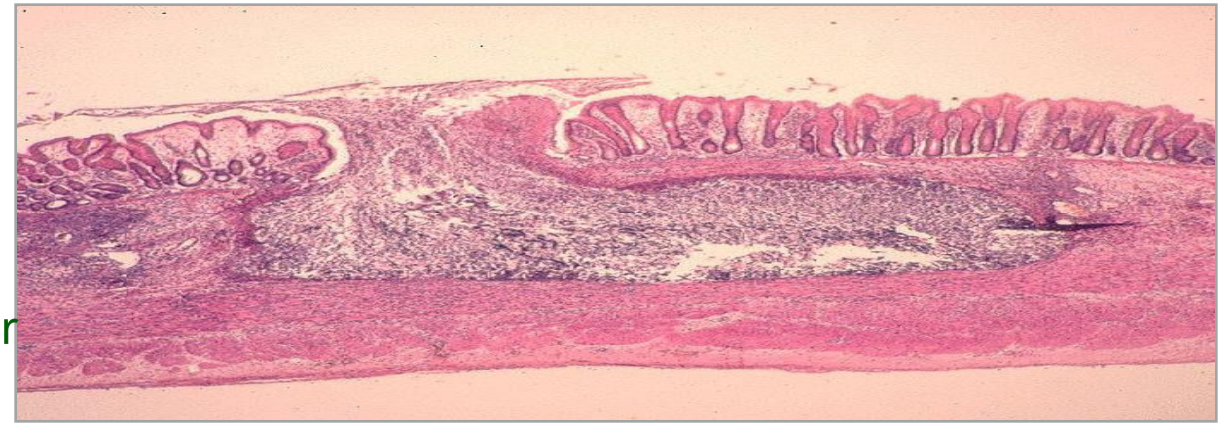
pathogenic stage

↓

Trophozoite

The trophozoites of *E. histolytica* invade the mucosa and submucosa of the large intestine by secreting lytic enzymes ➲ amoebic ulcers

The ulcer is flask- shaped with deeply undermined edges containing cytolyzed cells, mucus and trophozoites.



causes dysentery:

-mucus

-blood

-tenesmus

the feeling that you need to pass stools, even though your bowels are already empty. It may involved straining, pain and cramping

The most common sites of amoebic ulcers are caecum, colonic flexures and sigmoidorectal regions due to decrease peristalsis & slow colonic flow at these sites that help invasion.

cyst stage never present in tissue

Clinical pictures

I) Intestinal amoebiasis

should given the drug

1-Asymptomatic infection

Most common and trophozoites remain in the intestinal lumen feeding on nutrients as a commensal without tissue invasion (Asymptomatic patient known as a healthy carrier and cyst passers)

2-Symptomatic infection

a) Acute amoebic dysentery

Presented with fever, abdominal pain, tenderness, tenesmus (difficult defecation) and frequent motions of loose stool containing mucus, blood and trophozoites.

b) Chronic infection

in colon

-Occurs if acute dysentery is not properly treated.
-With low grade fever, recurrent episodes of diarrhea alternates with constipation.
- Only cysts are found in stool.

3-Complications

- Haemorrhage due to erosion of large blood vessels.
- Intestinal perforation ➲ peritonitis.
- Appendicitis.
- Amoeboma (Amoebic granuloma) around the ulcer ➲ stricture of affected area.

II) Extra-intestinal amoebiasis

Due to invasion of the blood vessels by the trophozoites in the intestinal ulcer ➲ reach the blood ➲to spread to different organs as:

→ **Liver** →

1st and most common site

pus is chocolate in colar

-Amoebic liver abscess or diffuse amoebic hepatitis.
-Affect commonly right lobe either due to spread via portal vein or extension from perforating ulcer in right colonic flexure.
-CP: include fever, hepatomegaly and pain in right hypochondrium.

→ **Lung** →

•Lung abscess ➲ pneumonitis with chest pain, cough, fever.
•Amoebic lung abscess usually occur in the lower part of the right lung due to direct spread from the liver lesions, through the diaphragm or very rarely trophozoites may reach the lung via blood.

→ **Brain** → Brain abscess ➲ encephalitis (fatal).

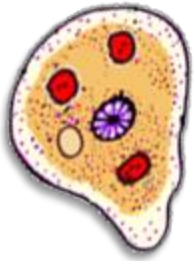
granaloma in skin around anus

→ **Skin** →

Cutaneous amoebiasis (Amoebiasis cutis):

- when the invasive amoebae escape from the large gut and stick to adjacent skin, usually the perianal and perigenital area.

Pathogenesis of amoebiasis



Cerebral amebiasis

Pleuropulmonary amebiasis

Hepatic amoebiasis

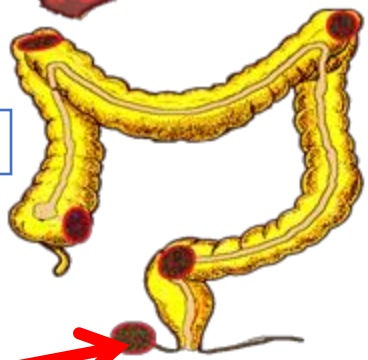
Amoebic hepatitis

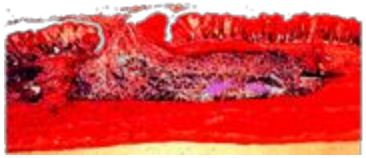
Amoebic liver abscess

Intestinal amoebiasis

Acute amoebic dysentery

Chronic intestinal amoebiasis





Flask-shaped ulcers

Coetaneous amoebiasis

Laboratory diagnosis

I)Intestinal amoebiasis

a) Direct

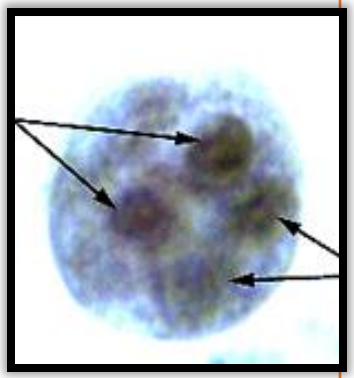
•**Macroscopic:** Offensive loose stool mixed with mucus and blood.

•**Microscopic:**

1-Stool examination: Reveals either trophozoites (in loose stool) or cysts (in formed stool) by direct smear, iodine stained & culture.

2-Sigmoidoscopy: To see the ulcer or the trophozoites in aspirate or biopsy of the ulcer.

3-X-ray after barium enema: to see the ulcer, deformities or stricture.



b) Indirect

-Copro-antigen detection in stool

-Serological tests: CFT, IHAT, IFAT, ELISA and GDPT (gel-diffusion precipitin test).

✍**N.B.** These serological tests are positive only in invasive intestinal amoebiasis but negative in asymptomatic carriers.

II)Extra- intestinal amoebiasis

According to the organ affected

a) Direct

1- X- ray:

In liver ➲ space occupying lesion.

In lung ➲pleuritis with elevation of the diaphragm

2- Ultrasonography, CT scan& MIR: (brain)

For liver abscess.

3- Aspiration of abscess content: (no cyst)

For liver abscess to detect trophozoites.

b) Indirect

(Mainly)

1- Serological tests: As intestinal amoebiasis. They are positive and can persist for years.

2- Molecular by PCR. (very rare)

3- Blood examination: Leucocytosis.

4- Liver function tests: Increased in amoebic liver abscess.

Treatment

for cyst

affect trophozoite

1) Asymptomatic intestinal carrier

↓

Luminal amoebicides

↓

Paromomycin or Diloxanide furoate

2) Intestinal amoebiasis

↓

Tissue & luminal amoebicides

↓

Metronidazol (Flagyl) **is the drug of choice** + Paromomycin or Diloxanide furoate

3)Extra-intestinal amoebiasis

↓

Tissue & luminal amoebicides

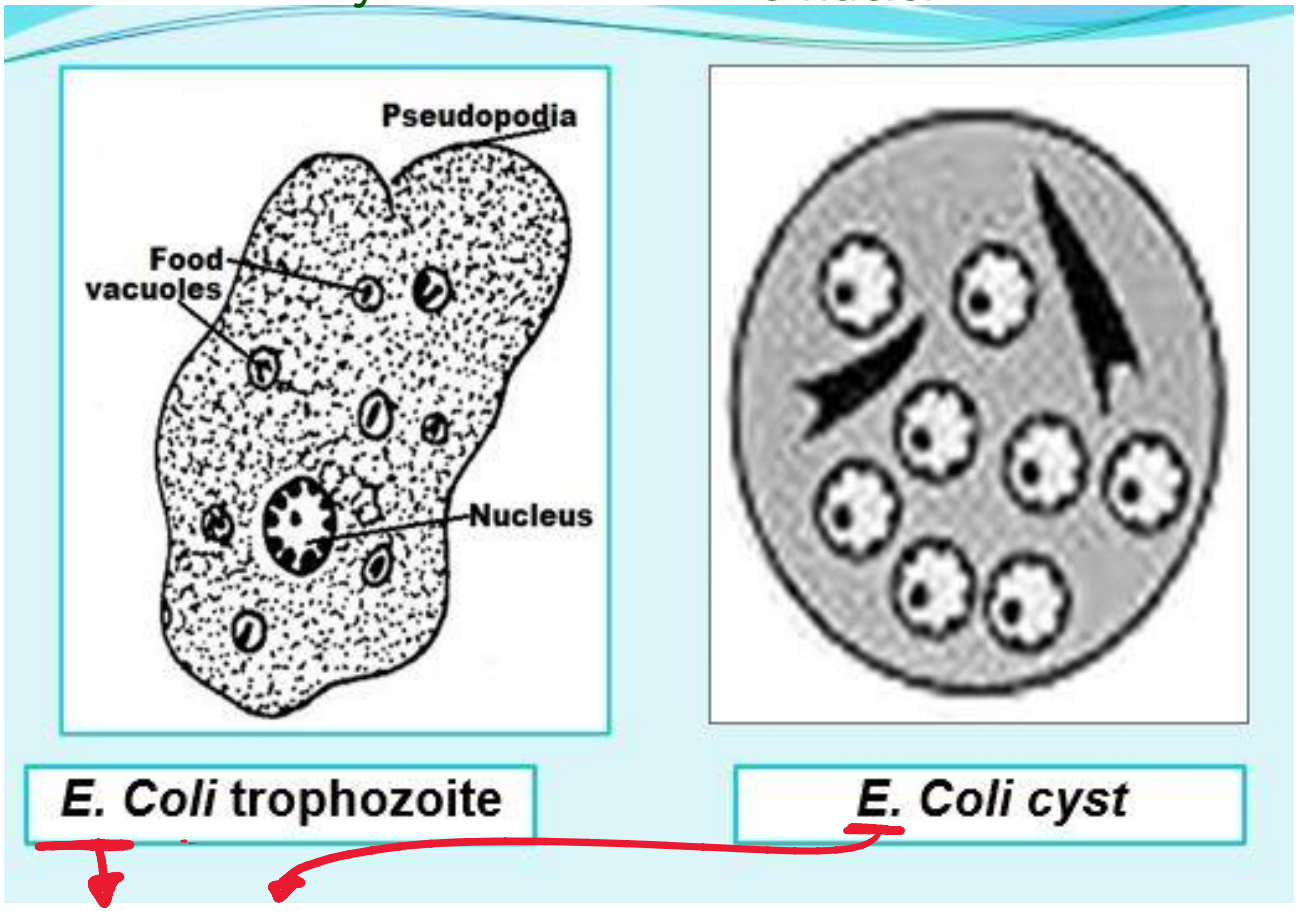
↓

Metronidazol (Flagyl) + Paromomycin or Diloxanide furoate

1. bigger in size
2. plumbed pseudpodia
3. eccentric karyosome

chromatoid bodies: splinter shape

8 nuclei



commensal : not harmful → no need to treatement

اللهم اشرح لي صدري، ويسّر لي أمري، واحلل عقدةً من لساني يفقهو قولي، واجعل محفوظي يجري على لساني جريًا، وأبعد عنّي النسيان، واهدني ووفقّني لما فيه نفعي ونفع المسلمين 💚.

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