



**Medical Analysis
Department**

Balantidium coli & Trichomonas vaginalis

Parasitology (MA301)

Summer School

Lecture 3

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Balantidium coli

Case study

A 35-year-old man presented with abdominal pain, watery diarrhea, and occasional blood in the stool for 2 weeks. He worked on a farm and had frequent contact with pigs. Stool microscopy revealed large, ciliated trophozoites and characteristic cysts of **Balantidium coli**. He was treated with tetracycline and advised to improve personal hygiene and avoid contamination of food and water with animal feces, leading to complete recovery.

Introduction

Balantidium coli belongs to the Phylum Ciliophora and Family Balantiidae.

- It is the only ciliate protozoan parasite of humans.
- It is the largest protozoan parasite of humans.
- Largest protozoan parasite residing in the large intestine of human: Balantidium coli.

Mode of Transmission

- Balantidiasis is a zoonosis. Human beings acquire infection by ingestion of food and water contaminated with feces containing the cysts of *Balantidium coli*.
- Infection is acquired from pigs and other animal reservoirs or from human carriers.

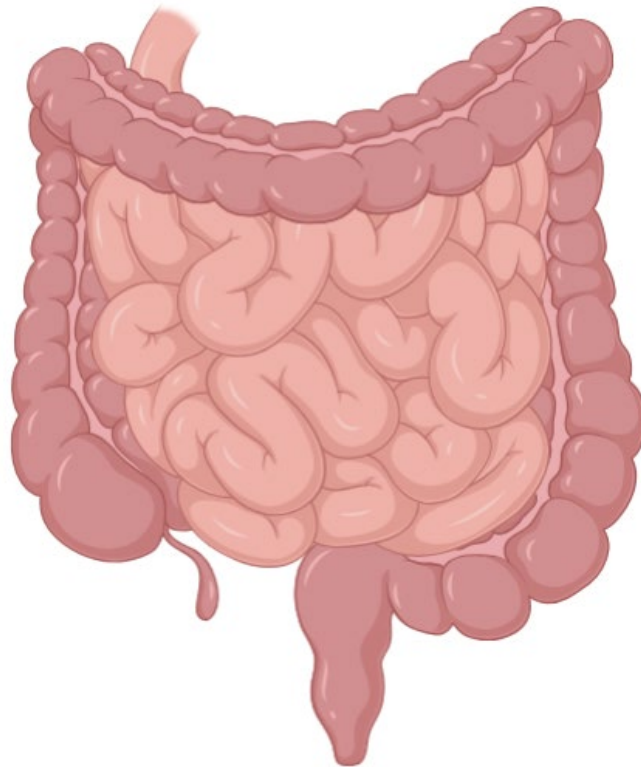
Epidemiology and prevalence

It was first described by Malmsten in 1857, in the feces of dysenteric patients.

It is present worldwide, but the prevalence of the infection is very low.

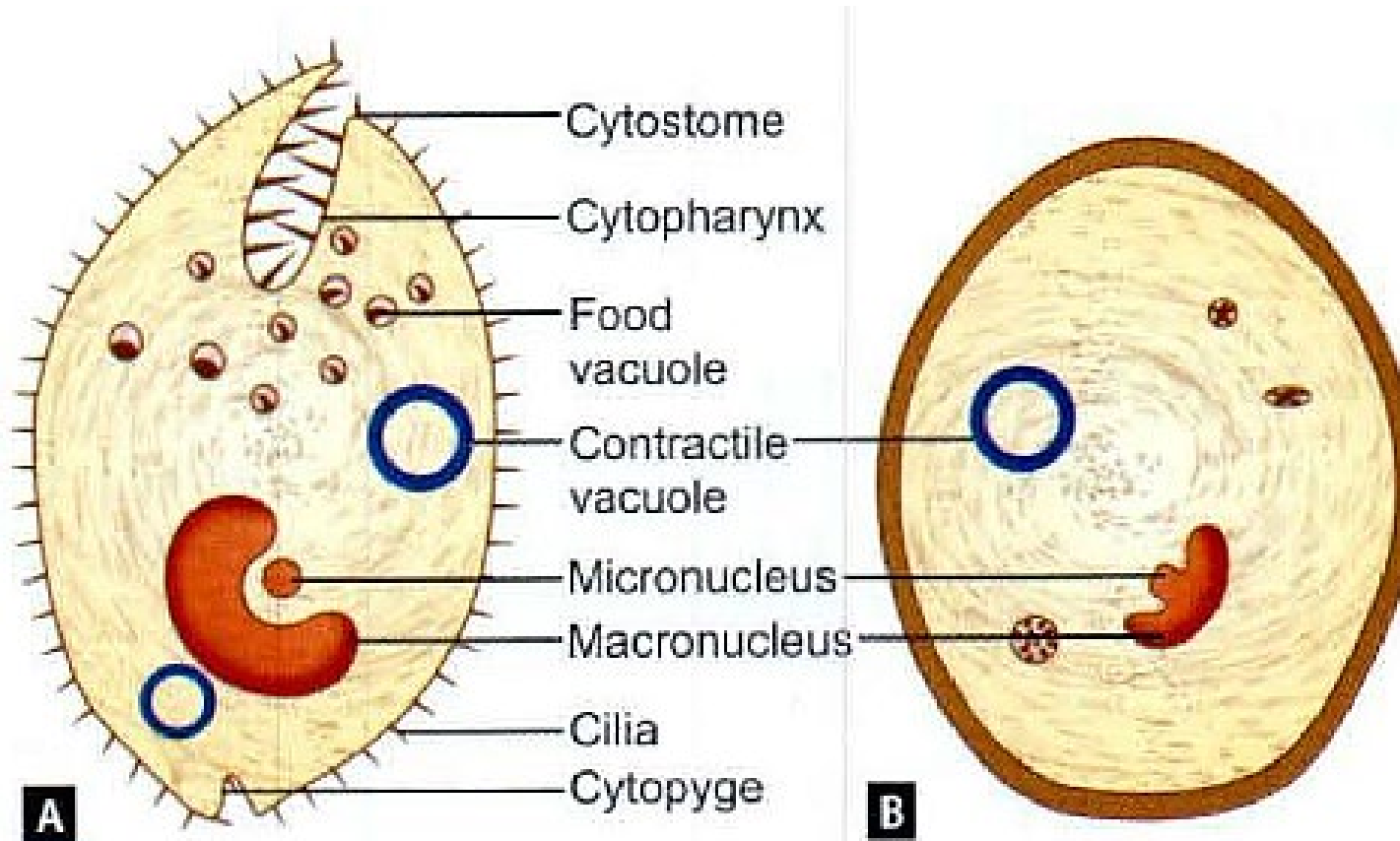
Habitat

Balantidium coli resides in the large intestine of man.



Morphology

Balantidium coli occurs in two stages: (A) trophozoite and (B) cyst



Morphology

Trophozoite

- The trophozoite is actively motile and is invasive stage of the parasite found in dysenteric stool.
- It is a large ovoid cell, and The motility of the trophozoite is due to the presence of cilia over the entire surface of the body.
- At the anterior end, there is a groove (peristome) leading to the mouth (cytostome), and a short funnel –shaped gullet (cytopharynx).
- Posteriorly, there is a small anal pore (cytopyge).
- The cilia around the mouth are larger (adoral cilia).
- The cell has two nuclei: (1) a large kidney-shaped macronucleus, and (2) lying in its concavity a small micronucleus.
- The cytoplasm has one or two contractile vacuoles and several food vacuoles.

Morphology

Cyst

- The cyst is spherical in shape and measures 40-60 μm in diameter .
- It is surrounded by a thick and transparent double-layered wall.
- The cytoplasm is granular. Macronucleus, micronucleus and vacuoles are also present in the cyst.
- The cyst is the infective stage of *Balantidium coli coli*.
- It is found in chronic cases and carriers.

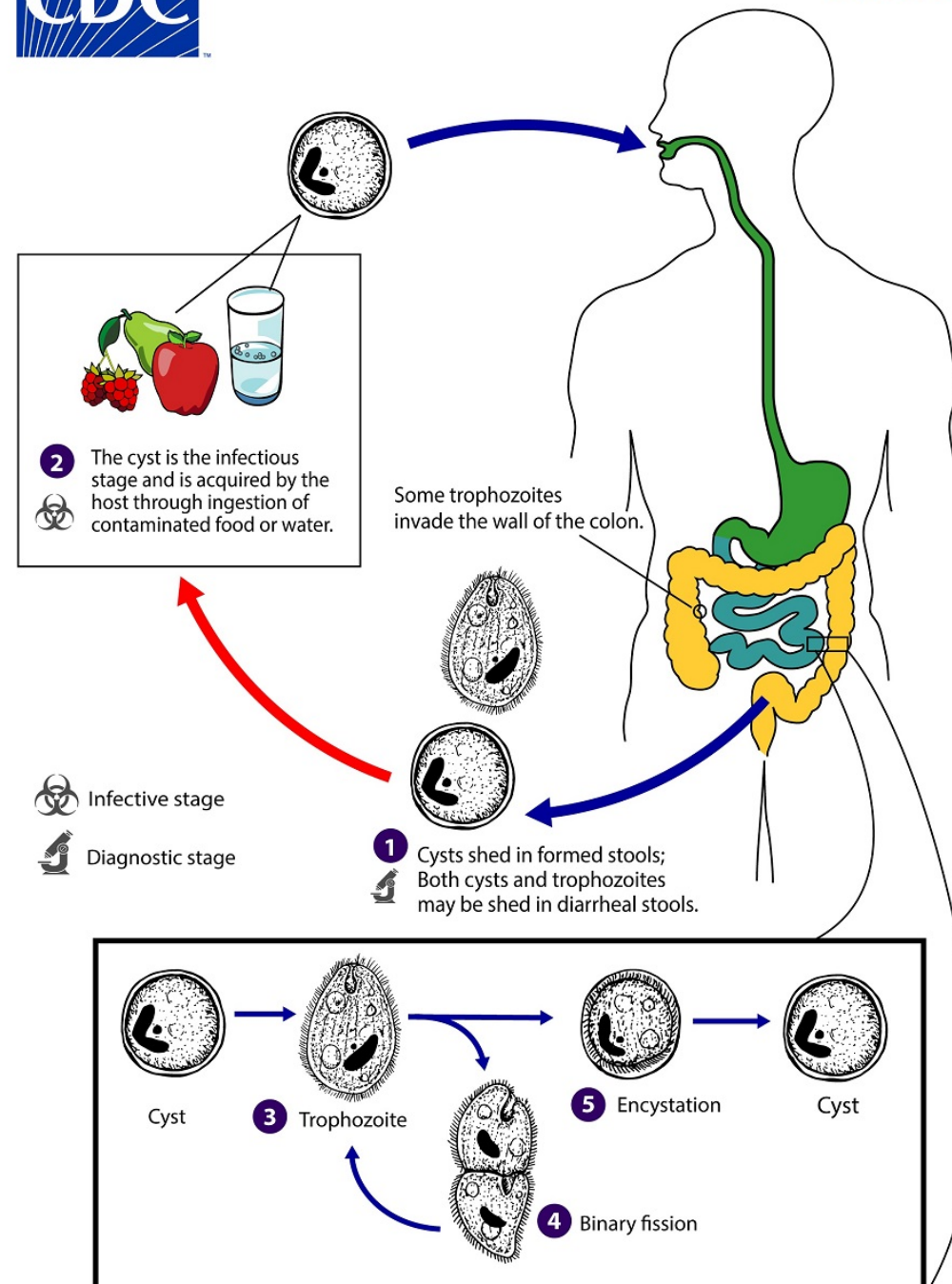
Life cycle

- Infection begins when a person ingests cysts through contaminated food or water.
- In the small intestine, the cysts undergo excystation, releasing trophozoites.
- The trophozoites migrate to the large intestine, where they multiply.
- Some trophozoites invade the intestinal wall, causing ulcers and dysentery, while others remain in the lumen.
- In the colon, trophozoites undergo encystation, forming cysts.
- Cysts are passed in feces and survive in the environment, continuing the cycle.

Life cycle



Balantidium coli



Pathogenesis

In a healthy individual, *B. coli* lives as lumen commensal and is asymptomatic.

- Clinical disease occurs only when the resistance of the host is lowered by predisposing factors such as malnourishment, alcoholism, and achlorhydria.
- Clinical disease results when the trophozoites burrow into the intestinal mucosa, set up colonies, and initiate an inflammatory reaction. This leads to mucosal ulcers and submucosal abscesses, resembling lesions in amebiasis.
- Unlike *E. histolytica*, *B. coli* does not invade the liver or any other extraintestinal sites.

Sign and symptoms

- Most infections are asymptomatic.
- Symptomatic disease or balantidiasis resembles amebiasis causing diarrhea or frank dysentery with abdominal colic, tenesmus, nausea, and vomiting.
- Balantidium ulcers may be secondarily infected by bacteria.
- Occasionally, intestinal perforation, peritonitis, and even death may occur.
- Rarely, there may be involvement of the genital and urinary tracts.
- In chronic balantidiasis, patients have diarrhea alternating with constipation.

Laboratory diagnosis

Stool Examination

Diagnosis of *B. coli* infection is established by demonstration of trophozoites and cysts in faeces.

- Motile trophozoites occur in diarrheic faeces, and cysts are found in formed stools.
- The trophozoites can be easily recognised by their large size, macronucleus, and rapid-revolving motility.
- The cysts can also be recognised in the formed stools by their round shape and presence of a large macronucleus.

Biopsy

- When stool examination is negative, biopsy specimens and scrapings from intestinal ulcers can be examined for presence of trophozoites and cysts.

Treatment

Tetracycline is the drug of choice and is given 500 mg, four times daily for 10 days. Alternatively, doxycycline can be given. Metronidazole and nitroimidazole have also been reported to be useful in some cases.

Trichomonas vaginalis

Case study

A 24-year-old woman presented with vaginal itching, irritation, and a foul-smelling, yellow-green vaginal discharge. Microscopic examination of a vaginal specimen revealed motile, flagellated trophozoites consistent with **Trichomonas vaginalis**. She was treated with metronidazole, and her sexual partner was also treated to prevent reinfection. She was advised on safer sexual practices, leading to complete resolution of symptoms.

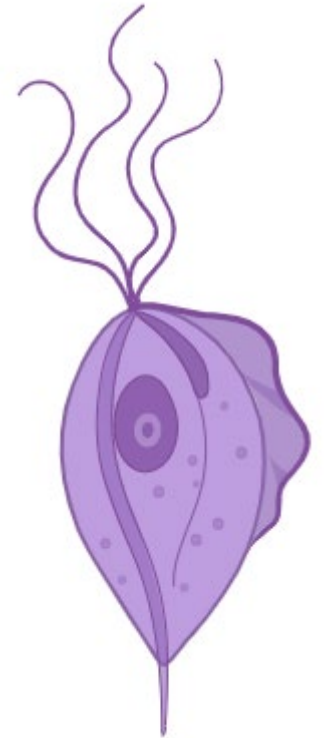
Introduction

Trichomonas differs from other flagellates, as they exist only in the trophozoite stage. The cystic stage is not seen.

The genus *Trichomonas* has three species, which occur in

humans :

1. *T. vaginalis*
2. *T. hominis*
3. *T. tenax*



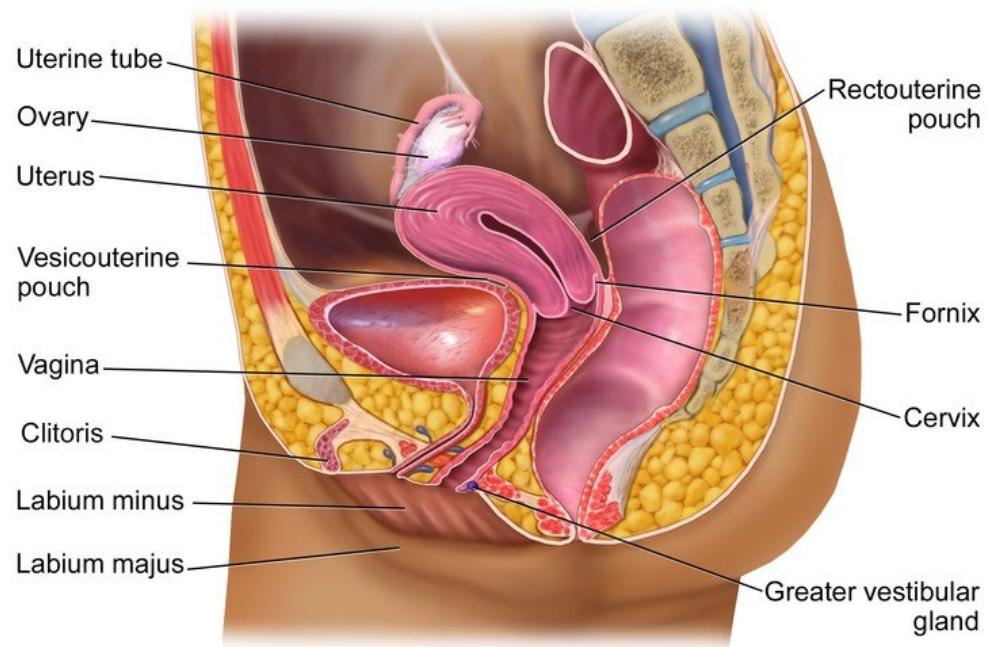
Distribution

T: vaginalis was first observed by Donne (1836) in vaginal secretion.

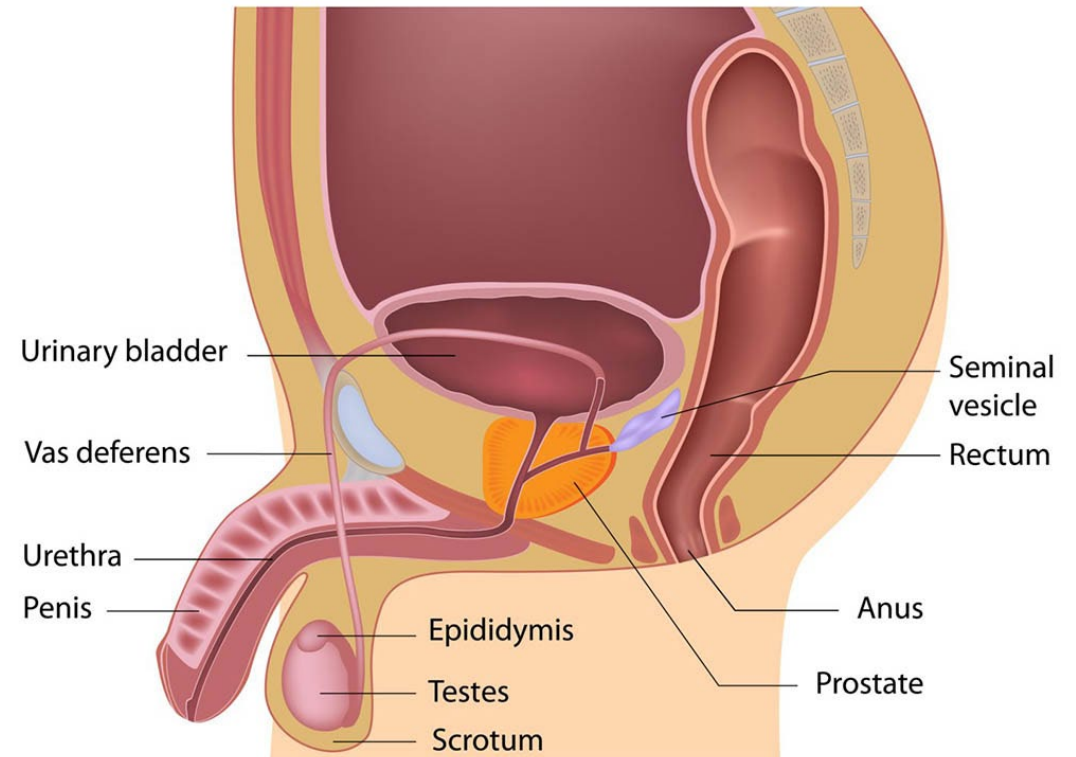
Prevalence of trichomoniasis varies from 5% patients at hospitals to 75% in sexual workers.

Habitat

In females, it lives in vagina and cervix and may also be found in Bartholin's glands, urethra and urinary bladder. In males, it occurs mainly in the anterior urethra but may also be found in the prostate and preputial sac.



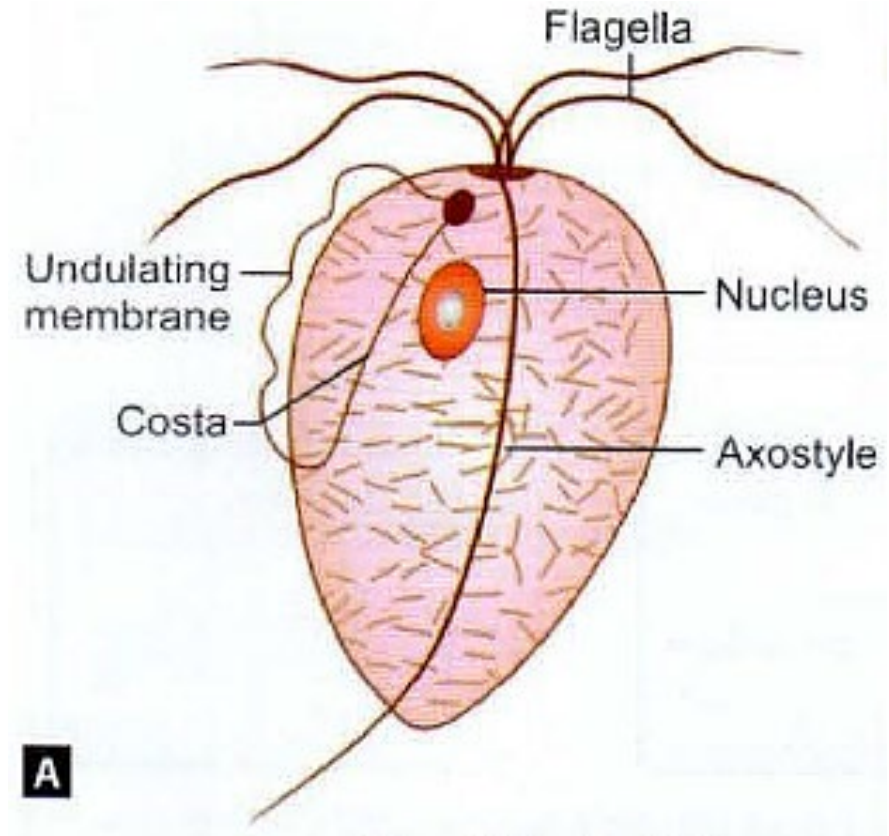
The Female Reproductive System



Morphology

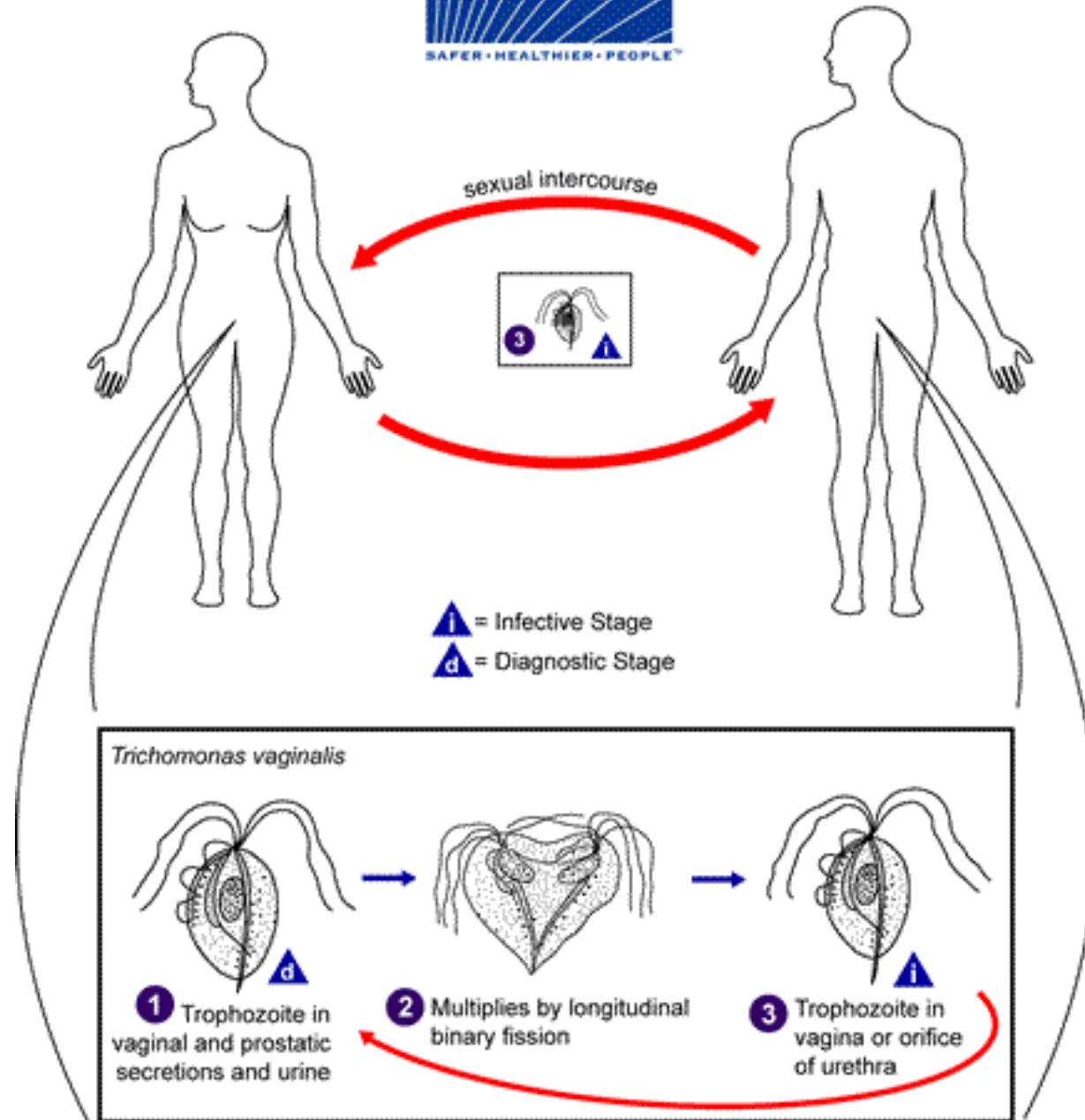
Trophozoite

- It is pear-shaped or ovoid and measures 10-30 μm in length and 5-10 μm in breadth with a short undulating membrane reaching up to the middle of the body.
- It has four anterior flagella and fifth running along the outer margin of the undulating membrane, which is supported at its base by a flexible rod, costa.
- A prominent axostyle runs throughout the length of the body and projects posteriorly like a tail.
- It is motile with a rapid jerky or twitching type movement.



Life Cycle

- Infective stage: The trophozoite (there is no cyst stage).
- Transmission occurs mainly through sexual contact; rarely by contaminated objects.
- The trophozoites colonize the urogenital tract (vagina in females, urethra/prostate in males).
- They multiply by binary fission and cause local irritation and discharge.
- The parasite is passed directly from person to person, since it cannot survive long outside the host.



Pathogenesis

- *T. vaginalis* particularly infects squamous epithelium.
- It secretes cysteine proteases, adhesins, lactic acid and acetic acid, which disrupt the glycogen levels and lower the pH of the vaginal fluid.
- It is an obligate parasite and cannot live without close association with the vaginal, urethral, or prostatic tissues.
- Parasite causes petechial hemorrhage and mucosal capillary dilation (strawberry mucosa), metaplastic changes and desquamation of the vaginal epithelium.
- Intracellular edema and so-called chicken-like epithelium, is the characteristic features of trichomoniasis.

Sign and symptoms

- Infection is often asymptomatic, particularly in males, although some may develop urethritis, epididymitis, and prostatitis.
- In females, it may produce severe pruritic vaginitis with an offensive, yellowish-green, often frothy discharge, dysuria, and dyspareunia. Cervical erosion is common. Endometritis and pyosalpingitis are infrequent complications.
- Rarely, neonatal pneumonia and conjunctivitis have been reported in infants born to infected mothers.
- The incubation period of trichomoniasis is 4 days to 4 weeks.

Laboratory Diagnosis

1. Microscopic examination

Wet mount:

Vaginal or urethral discharge is examined microscopically in a saline wet mount preparation for characteristic jerky and twitching motility and shape. In males, trophozoites may be found in urine or prostatic secretions. An abundance of leukocytes is seen.



Laboratory Diagnosis

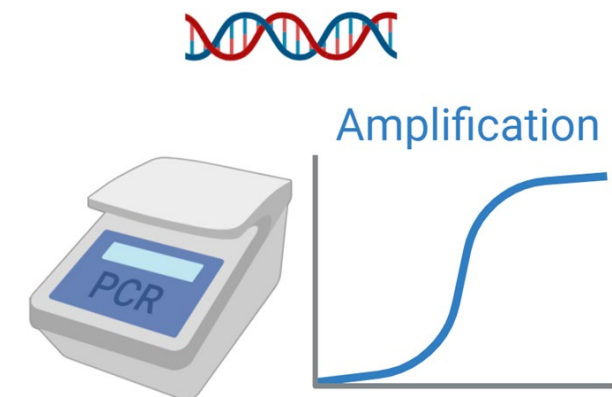
2. Serology

Enzyme-linked immunosorbent assay is used for the demonstration of *T. vagina*/is antigen in vaginal smear using a monoclonal antibody



3. Molecular method:

Deoxyribonucleic acid hybridization and PCR are also highly sensitive (97%) and specific (98%) tests for the diagnosis of trichomoniasis.



Treatment

Metronidazole (250 mg, thrice daily for 5-7 days) and Tinidazole (2 g single dose) are the drugs of choice.