L1:- Parasitology

prof. Dr. Nada Khazal

Definitions

Parasitology: is the science dealing with the study of protozoa & pathogenic effects.

Medical Parasitology: is the science that studies of parasites which infect human.

Parasite: an organism that live in or on anther organisms (host) and obtains its food from host.

Host: an organism which harbors parasite.

Reservoir: is the host that stores the parasite (usually animals).

Infection: is the process of living parasites in the hosts' body

Infestation: is the process of living parasites only on the surface of the hosts' body without penetrating the tissue. Example: Lice , ticks

Zoonosis: is defined as those diseases and infections, which are naturally transmitted from animals to human.

Pathogens: Are those organisms which causing diseases as bacteria, parasites, fungi, virus.

Pathogenesis: is defined as development of a disease (How disease starts, develops and resolves).

Pathogenicity: is defined as ability to cause disease

Pathogenic stage: is a stage of parasite life cycle that causing disease with in host.

Diagnostic stage: is a stage of parasite life cycle which use for diagnosis the parasitic infection and its disease

Infective stage: is a stage of the parasite life cycle which have ability to infect the host.

Some terms in Epidemiology

Endemic: constant presence of a disease or infectious agent within a given geographic area or population group

Epidemic: is (outbreak) or occurrence of one specific disease from a single source, in a group population, community, or geographical area.

Pandemic: is an epidemic usually affecting a large number of populations, occurring over a wide geographic area such as the entire nation, a continent or the worldwide.

Sporadic: Sporadic means scattered of infected individual, occur from time to time, The infected individuals or cases are so few and separated widely in space and time, and no recognizable common source of infection

Incidence: number of new cases of specific disease during a given geographic area at a given period of time

Prevalence: Number of current case or infected person (old and new) with a disease at a given geographic area at a specified point or period of time

Different kinds of parasites

1. **Microparasite**: small, unicellular and multiplies within its vertebrate host, often inside cells. Protozoa are microparasites.
2. **Macroparasite**: large, multicellular and has no direct reproduction within its vertebrate host. This category includes helminths. On the basis of their location, parasites may be divided into
3. **Ectoparasites**: a parasitic organism that lives on the outer surface of its host, e.g. lice, ticks, mites
4. **Endoparasites**: parasites that live inside the body of their host, e.g. *Entamoeba histolytica*.This group can be further subdivided into the following types:
5. **Obligate parasites**: This parasite is completely dependent on the host during a segment or all of its life cycle, e.g.(*Plasmodium* and Toxoplasma gondii).
6. **Facultative parasites**: an organism that exhibits both parasitic and non-parasitic modes of living and hence does not absolutely depend on the parasitic way of life, but is capable of adapting to it if placed on a host. Facultative parasite as a commensal, but may become parasitic. E.g. *Naegleria*.
7. **Accidental parasites**: organisms that attack an unusual host e.g. Echinococcus
8. **Aberrant parasites**: organisms that attack a host where they cannot live or develop further e.g. Toxocara canis in man.
9. **Opportunistic parasite:** that particularly those take advantage of certain situations.
10. **Free-living**: it describes the nonparasitic stages of existence which are live independently of a host, e.g. hookworms have active free-living stages in the soil.

The Vector

Vector: is an agent usually arthropod (insect) that transmits the parasite to the host and may be

1. Mechanical vector: the term used to describe a vector which assists in the transfer of parasitic forms between hosts but is not essential in the life cycle of the parasite, e.g. a housefly and Cockroaches in the case of Entamoeba which transfers the cysts of the parasite from the infected feces to food that is eaten by humans.
2. Biological vector: in which the pathogenic develops and multiplies before being transmitted to the next host, therefore, it is essential in the life cycle of the parasite. The vector is only helping in the transfer of the pathogen to complete its life cycle, while intermediate host existence is essential for the completion of some parts of the life cycle (asexual only).

Three essential characteristics that are examined to study the causes for disease in epidemiological study are:

1- Host 2- Agent 3- Environment

Epidemiology is identify:

1- source of infection,

2- mode of infection and spread

3- Susceptible host

4- Etiological factor

5- recommend control measures

Different kinds of hosts

1• **Definitive host**: a host that harbors a parasite in the adult stage or where the parasite undergoes a **sexual method of reproduction**.

2• **Intermediate host**: harbors the larval stages of the parasite or an **asexual cycle** of development takes place. In some cases, larval development is completed in two different intermediate hosts, referred to as first and second intermediate hosts.

3.Reservoir host: a host that makes the parasite available for the transmission to another host and is usually not affected by the infection.

4.**Natural host**: a host that is naturally infected with certain species of parasite.

5• **Accidental host**: a host that is under normal circumstances not infected with the parasite.

6. **Compromised host**: it is the one in whom normal defense mechanisms are impaired e.g. AIDS

7.Paratenic host: it is a host in which the larval stage of a parasite survives but does not develop further. It is often not a necessary part of the life cycle.

Types of parasite- host relationships are:

- **Phoresis:** the parasite transport through the host with mechanism. *E. histolytica*
- **Commensalism:** this relation positive for parasite while neutralized for host.
- **Mutualism:** positive for parasite and host.
- **Parasitism:** positive for parasite and negative for host**.**

Symbiosis: "living together"; a close association between two organisms.

Source of the infection

Patient: persons who have parasites in their body and show clinical symptoms.

Carrier: persons who have parasites in their body, not show symptoms.

Reservoir host: animals that harbor the same species of parasites as man, the parasites in animals sometimes can be transmitted into human.

Routes of transmission
modes or portals of entry the host:
ingestion, inoculation, inhalation, congenital, venereal, and other.

portals of exit from host:
respiratory tract, gastrointestinal tract, genital tract, biting insect, and allergy.

- **Congenital transmission**: from mother to infant , e.g., toxoplasmosis
- **Contact transmission**: direct contact or indirect contact with patients or infected animals, e.g., *Trichomonas vaginalis*
- **Food transmission**: the infectious stage of parasites contaminated food / the meat of the intermediate hosts containing infectious stage of parasites , e.g., *Clonorchiasis*
- **Water transmission**: drink or contact the water contaminated the infectious stage of parasites, e.g., *schistosome*, *Entamoeba histolytica*
- **Soil transmission**: soil contaminated by feces containing the certain stage of parasites which can develop into infective stage, e.g., *Ascaris lumbricoides* .
- **Arthropod transmission**: vectors of certain parasitic diseases, e.g., *plasmodium*

Prevention measures of parasitic diseases

Controlling the source of the infection: treatment of the patients, carriers and reservoir hosts

Blocking the routes of transmission: managing feces and water resource, controlling or eliminating vectors and intermediate hosts

Protecting the susceptible hosts: paying attention to health education/ personal hygiene, changing bad working/ eating habit, *etc*.

The infected phases of parasites:

1- ovum.

2- larva.

3- cyst.

4- adult phase (worm).

The parasites of medical importance fall into kingdom:

Protista and animalia.

The parasites are classified as four phyla which are:

phylum: **protozoa**

phylum: **platyhelminthus (cestoda)**

phylum: **nematoda**

phylum: **trematoda**

Protozoa is single organism microscopic (belong to Protista). In contrast**, Helminthes** are multicellular organism or worm, macroscopic (belong to Animalia). It possessing well differentiated tissues & organ system. The length of worm vary from less than millimeter to more than meter.

Classes of Protozoa:

Type of locomotion organelle have been used to divide these into four major classes:

Rhizopods (Sarcodina): organelle of locomotion are pseudopodia and the mode of reproduce by binary fission. Such as *E. histolytica*

Ciliaphora: organelle of locomotion are cilia and the mode of reproduce by binary fission. Such as *Blantidium coli*

Mastigophora or flagellated : organelle of locomotion are flagella and the mode of reproduce by binary fission.

Sporozoa or Apicomplexa : is non motile and reproduce by sporogony\schizogony. Such as ***Plasmodium*** species**.**

General characteristic of Protozoa:

1.Protozoa (singular, protozoan), from the Greek ‘protos’ and ‘zoon’ meaning first animal

2.Morphology of protozoa: They are made up of:

A.Protoplasm: (cytoplasm and nucleus).

B.The cytoplasm :consists of an outer layer of hyaline ectoplasm and an inner granular endoplasm.

C.The ectoplasm functions in protection, locomotion, and ingestion of food, excretion, and respiration.

D. In the endoplasm there are: - Nucleus: (nuclear membrane and chromatin).

E. Chromatin may be condensed in a single mass (karyosome)

F.The nucleus also functions in reproduction and maintaining life.

3.Protozoa may secrete Toxin. Lytic enzymes. Digestive enzymes. Antigenic substances.

4.General Morphology: Most of intestinal protozoa have the following features in general

A-Trophozoite stage:(Trophos: nourishment) It is active, motile, feeding stage of parasite and reproducing stage . It derives nutrition from the environment by diffusion, pinocytosis, and phagocytosis. It is the pathogenic stage of parasite. It is the diagnostic stage in case of acute infection, and in case if the parasite has only trophzoit stage

B-cyst stage: It is non-motile, non-feeding, non-active stage, It is the infective stage , Survives in adverse environmental conditions, Low nutrients supply, and even anaerobic enclosed in a cyst coat resistant to an unfavorable environment-medical importance of infection

5.Transmitted to the human by food and water contamination.

6.Some parasites have only trophozoite without cyst stage, this trophozoite is the pathogenic, infective and diagnostic stage, ex: *Enatmoeba gingivalis* (live in mouth)

Reproduction

Binary fission, the most common form of reproduction among medical protozoa, is asexual;

Multiple asexual division occurs in some forms;

Sexual reproduction: takes place within the definitive host and usually results in the formation of a zygote;

Both sexual and asexual reproduction occur in the Apicomplexa.

1. Class: Rhizopods (amoebae): *Entamoeba histolytica* & *E. coli*

Morphology

E. histolytica & *E. coli* living in intestinal. The live cycle consists of two stage: trophozoite & cyst. The morphology of cyst & troph. of *E. Histolytica* & *E. coli* as shown in following table.

a protozoa, that infects predominantly humans and other mammals such as dogs and cats can become infected (the environmental survival form of the organism) with their feces. The active (trophozoite) stage exists only in the host and in fresh feces; cysts survive outside the host in water and soils and on foods, especially under moist conditions on the latter. When swallowed they cause infections by excysting (to the troph. stage) in the digestive tract.

excysting (cyst To trophozoite stage)

encysting (trophozoite To cyst stage)

Life cycle

Once the infective stage is ingested, excystation occurs in the small intestine. As a result of the nuclear division, a single cyst produces eight motile trophozoites. These motile amebae settle in the lumen of the large intestine, where they replicate by binary fission and feed on living host cells. On occasion, trophzoites migrate to other organs in the body, such as the liver, and may cause abscess formation. Encystation occurs in the intestinal lumen, and cyst formation is complete when four nuclei are present. These infective cysts are passed out into the environment in human feces and are resistant to a variety of physical conditions. Survival in a feces contaminated environment for up to a month is common.

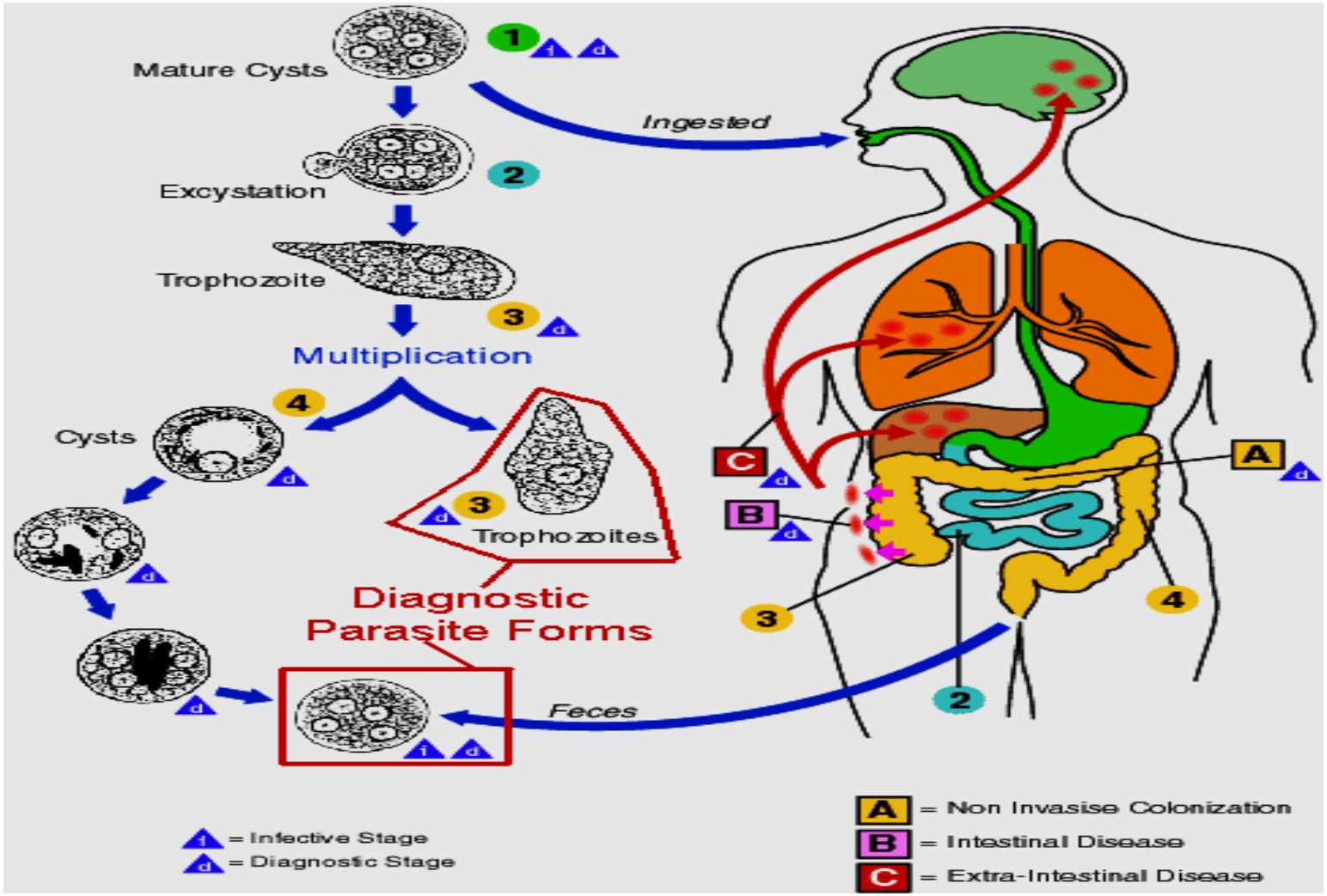

Mature Cysts
1
i
d
Ingested
Excystation
2
Trophozoite
3
d
Multiplication
4
Cysts
d
3
d
Trophozoites
Diagnostic
Parasite Forms
C
d
B
d
A
d
3
4
2
Feces
i
d
i = Infective Stage
d = Diagnostic Stage
A = Non Invasise Colonization
B = Intestinal Disease
C = Extra-Intestinal Disease

Table showing the comparison between trophozoite of E. histolytica & E. coli

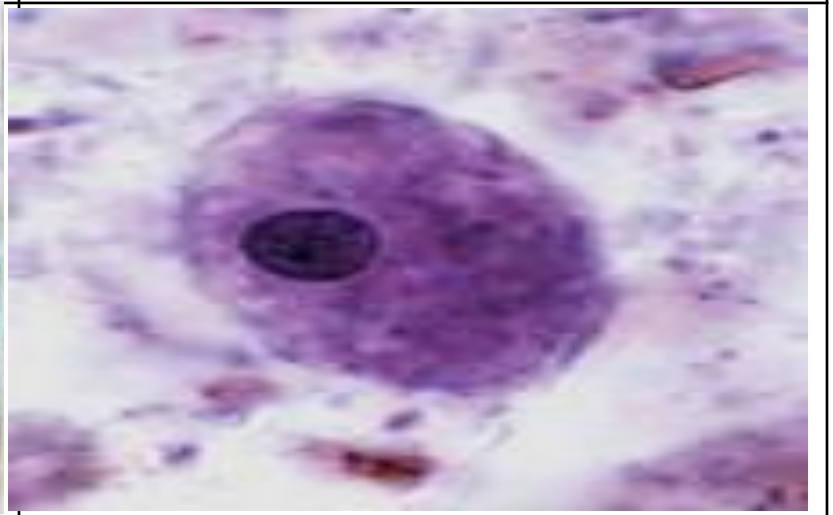
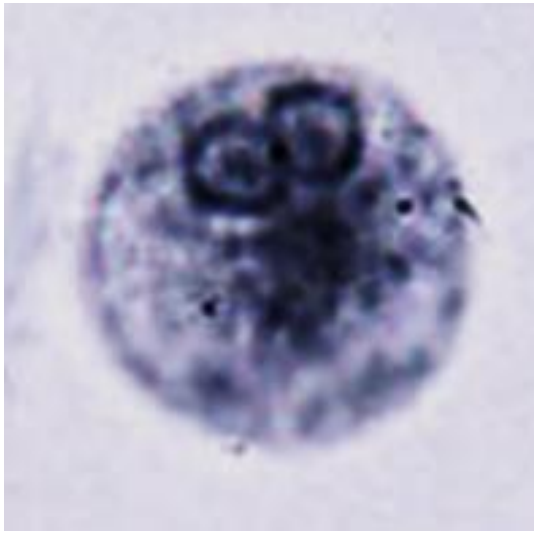
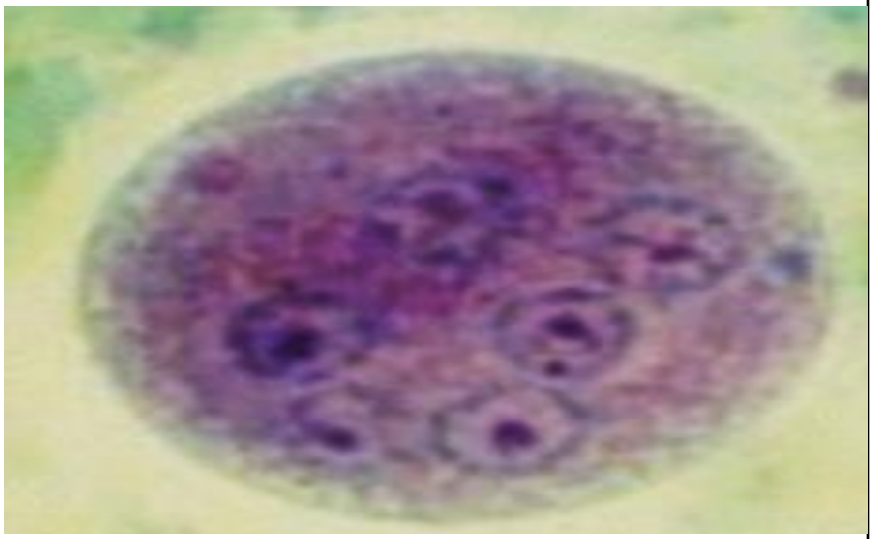
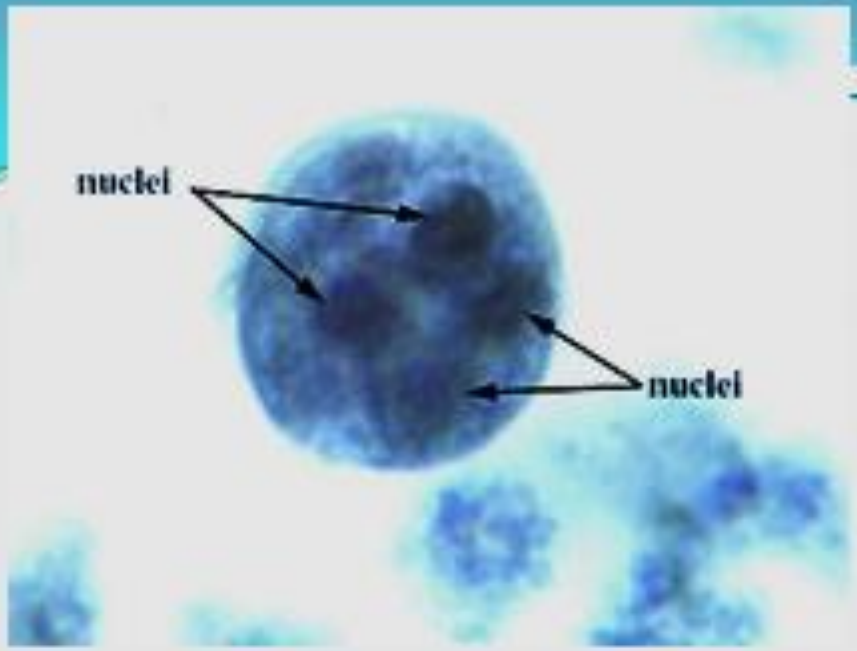
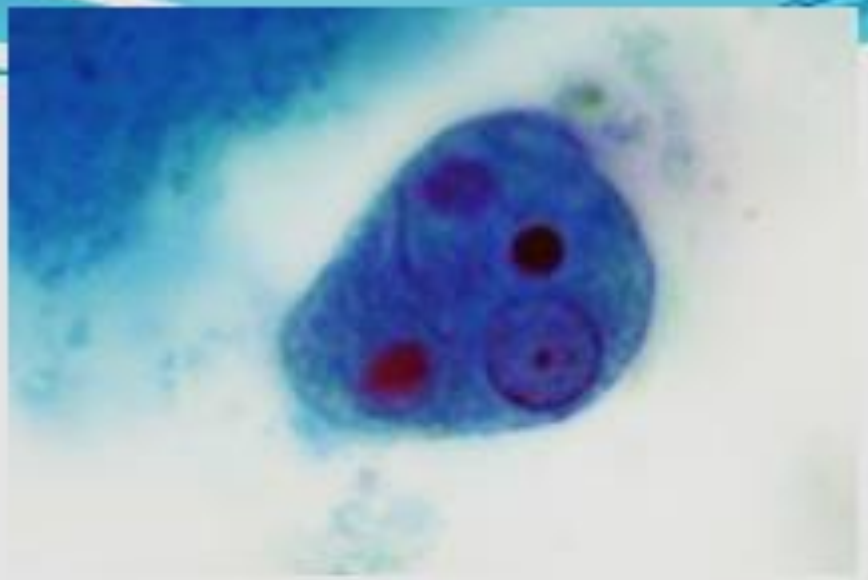
characteristic	**Troph.** of *E. histolytica* *pathogenic stage*	**Troph.** of *E. coli*
Size	8-65µm	12-55µm
No. of nuclei	One	one
Karyosome	Small & **centeral**	Large irregular shape, **eccentric**
Peripheral chromatin	Fine& evenly distributed	Coarse & unevenly distributed
Cytoplasm	Finely granular	Coarse& often vacuolated
Cytoplasmic inclusion	**Ingested RBC in food vacuoles**	Bacteria, other debris
Motility	Progressive, finger like pseudopodia	Non Progressive, blunt pseudopodia
Trophozoite Figure		

Table showing the comparison between cyst of *E. Histolytica* & *E. coli*

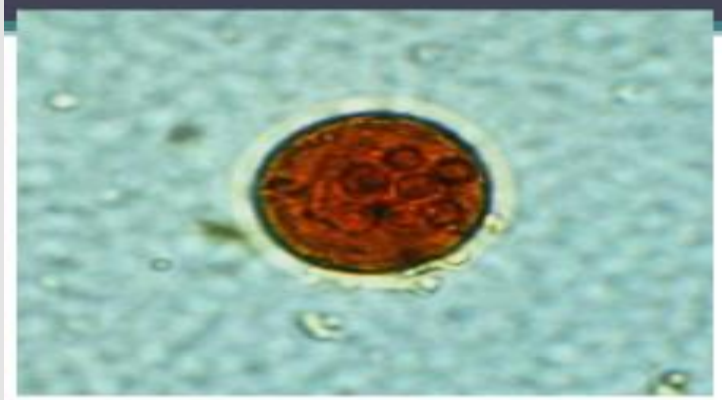
characteristic	cyst of *E. histolytica*	cyst of *E. coli*
Size	8-22µm	8-35µm
shape	Spherical to round	Spherical to round
No. of nuclei	One to four	One to eight
Karyosome	Small & centeral	Large irregular shape, eccentric
Peripheral chromatin	Fine& evenly distributed	Coarse
Cytoplasm	Finely granular	granular
Cytoplasmic inclusion	Chromatoid bars, rounded ends, diffuse glycogen mass	Chromatoid bars, rounded with pointed ends, diffuse glycogen mass
Cyst Figure		

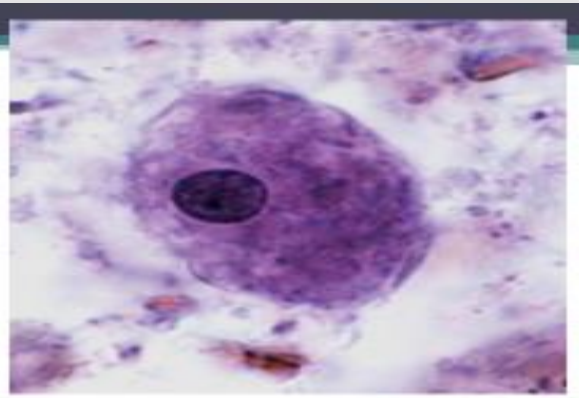


entamoeba histolytica cyst



entamoeba histolytica troph





E.coli cyst &troph

Amebiasis (or amoebiasis) or amebic dysentery is the name of the infection caused by *E. histolytica*. In addition to infection of the large intestine , the organism invasive infection, may invade other internal organ such as the lung , liver, skin and brain. The development of a disease and the chain of events leading to that disease is pathogenicity

Signs and symptoms amebic dysentery:

In severe cases of intestinal amebiasis, the organism invades the lining of the intestine, producing sores (Flasks shape ulcer appears when the host infected with bloody diarrhea), severe abdominal cramps, vomiting, chills, and fevers as high (40°C). In addition, a case of acute amebic dysentery may cause complications, including inflammation of the appendix, a tear in the intestinal wall (perforation), or a sudden, severe inflammation of the colon (fulminating colitis).

Extraintestinal amoebiasis: About 5-10% of individuals with intestinal amoebiasis develop hepatic amoebiasis after 1-3 months of the disappearance of dysentery. In this case, the trophozoites are carried from the ulcer in the large intestine and multiply in the liver, lead to cytolytic action then small abscesses merge to form big liver abscesses and a disease called hepatic amebiasis which causes liver dysfunction. The abscesses may grow in various locations if the parasite enters into general circulation. For instance, it may reach the lungs and causes pulmonary amebiasis and pneumonitis, or it can reach the brain and causes encephalitis or to the spleen, heart, joints, bones, muscles, urogenital system and even the skin.

Nonpathogenic Amoebae

A number of species of the genus Entamoeba are of worldwide distribution but do not appear to cause disease. The species is of value in differentiating the harmless commensals from potentially pathogenic E. histolytica.

1.Entamoeba coli **2. Entamoeba gingivalis** **3. Entamoeba hartmanni**

4. Endolimax nana **5.Entamoeba dispar** **6.Iodamoeba butschlii**

1.Entamoeba coli: Its life cycle is similar to that of *E. histolytica* but it does not have an invasive stage and does not ingest red blood cells. the large intestine is the normal habitat of *E.coli*. **The relationship between the host and *E. coli* is Commensalism.**

2. Entamoeba gingivalis It is a parasite of the mouth of man and other mammals, (monkeys, dogs and cats). It commensal, commonly found in the tartar and debris associated with the gingival tissues of the mouth. It lives in/on the teeth, gum and sometimes tonsils, particularly if there is suppuration (purulence), as in pyorrhoea alveolaris

Laboratory diagnosis of amebiasis is made by stool examination.

The infective stage is cyst of *E. histolytica* & *E. coli*

The diagnostic stages are troph & cyst of *E. histolytica* & *E. Coli* or both in diarrhea stool.

Prevention and Control of ***E. histolytica*** = hygiene, Avoid taken contaminated food and water Improvement of water supply and sewage and Good health education.

Treatment of ***E. histolytica*** = Metronidazole

Opportunistic free-living amoebae

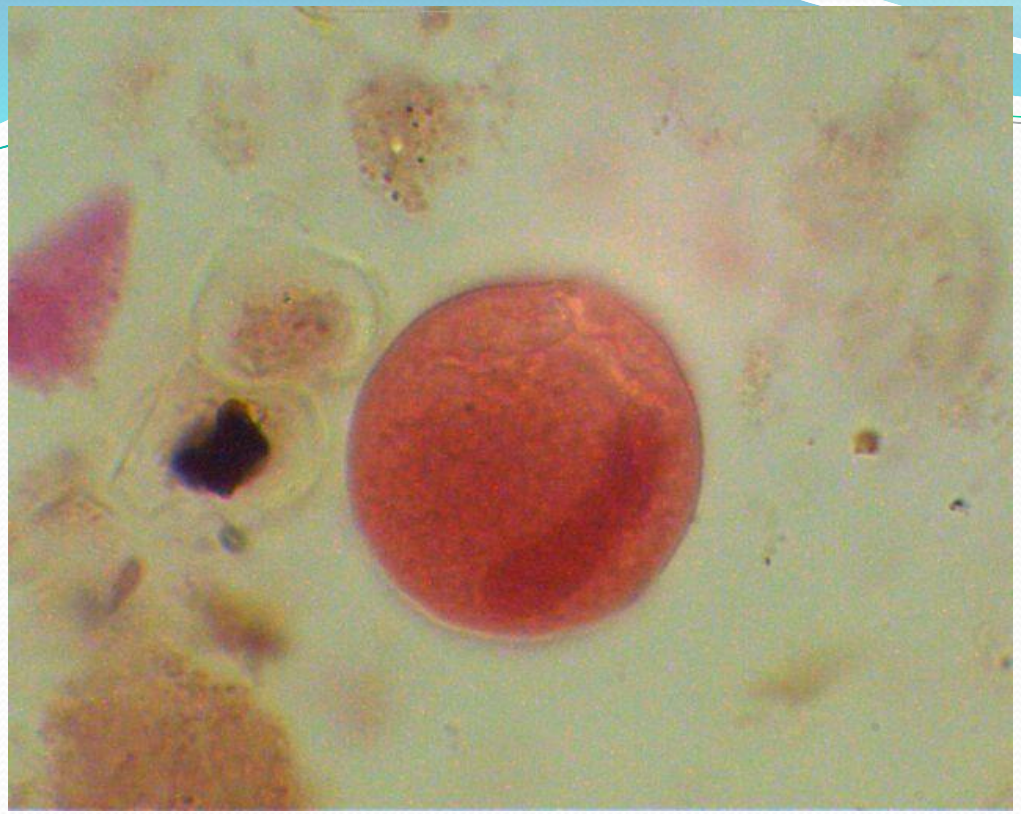
Naegleria, Acanthamoeba and Balamuthia are facultative parasites of man. They are found commonly in soil and water (swimming pools, tap water, and heating and air-conditioning units) where they feed on bacteria, they are known as opportunistic amoebae, they may produce serious infection of the central nervous system and eye

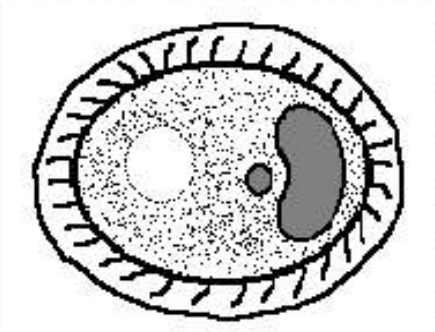
Man acquires the **Naegleria fowleri** infection by nasal contamination during swimming in freshwater lakes, swimming pools containing the infective cyst. Infection may also be acquired by inhalation of dust containing infective forms. cysts of N. fowleri could enter the nose. However, since the amoeboid form is the invasive stage of the parasite, The amoeboid forms invade the nasal mucosa, cribriform plate and travel along the olfactory nerves to the brain. They first invade olfactory bulbs and then spread to the more posterior regions of the brain leading to a rapidly fatal infection known as primary amoebic meningoencephalitis (PAM). **Symptoms** The patient develops a severe frontal headache, fever (39°-40°C), anorexia, nausea, vomiting and signs of meningeal irritation

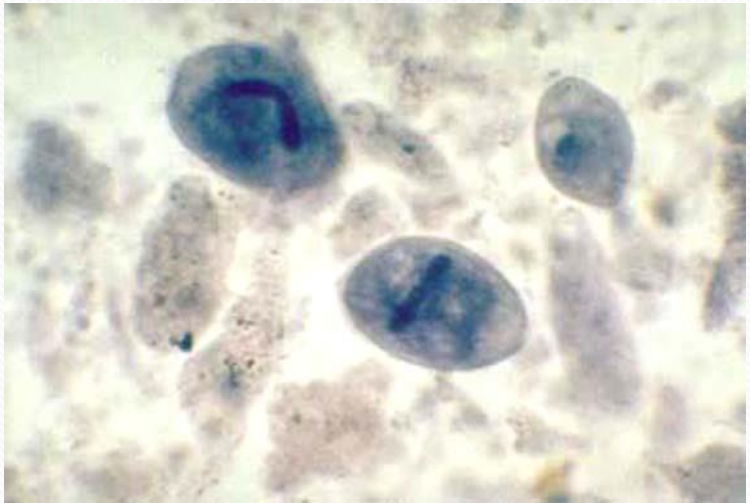
Involvement of olfactory lobes may lead to disturbances in smell or taste. The patient may also develop visual

2. Class: Ciliaphora: *Blantidium coli*

- *B. coli* has two types of nuclei: **macronucleus** that responsible for all activities of parasite except the reproduction, while **micronucleus** that responsible for the reproduction only.
- *B. coli* live in digestive system. It cause blantidiasis similar ameobiasis but differ from *E. histolytica* that invade the liver. It has two phases: troph. & cyst.
- Troph.: found in large intestine is consider **largest parasite of protozoa**, ovule shape, covered with equal long cilia have two nuclei **macronucleus** (kidney shape) & **micronucleus** (vascular shape). It has two contracted vacuoles & many vacuoles contain bacteria or RBC in the acute infection with this parasite.
- Cyst: spherical shape has thick cell wall but difficult to diagnostic nuclei.

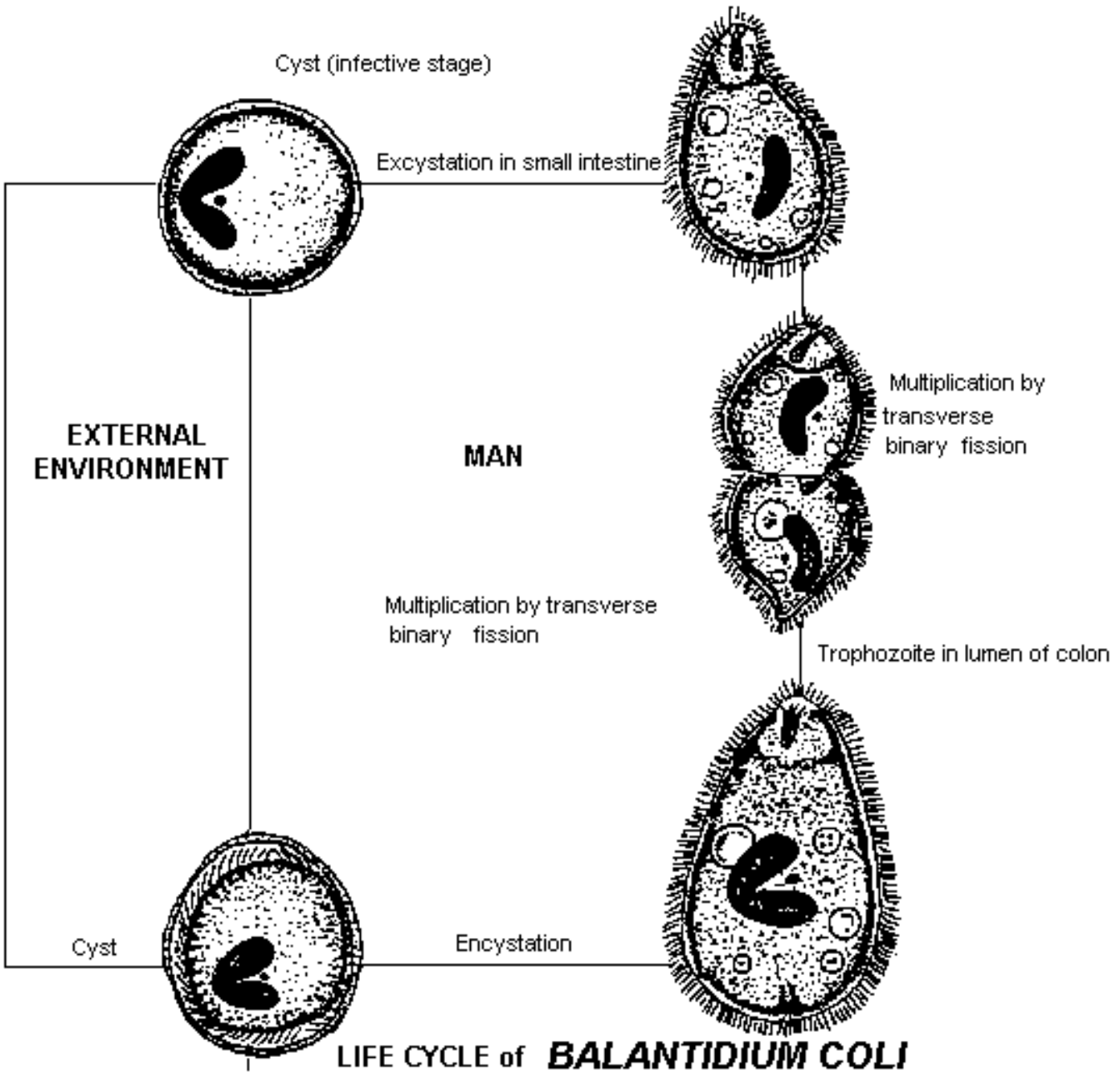


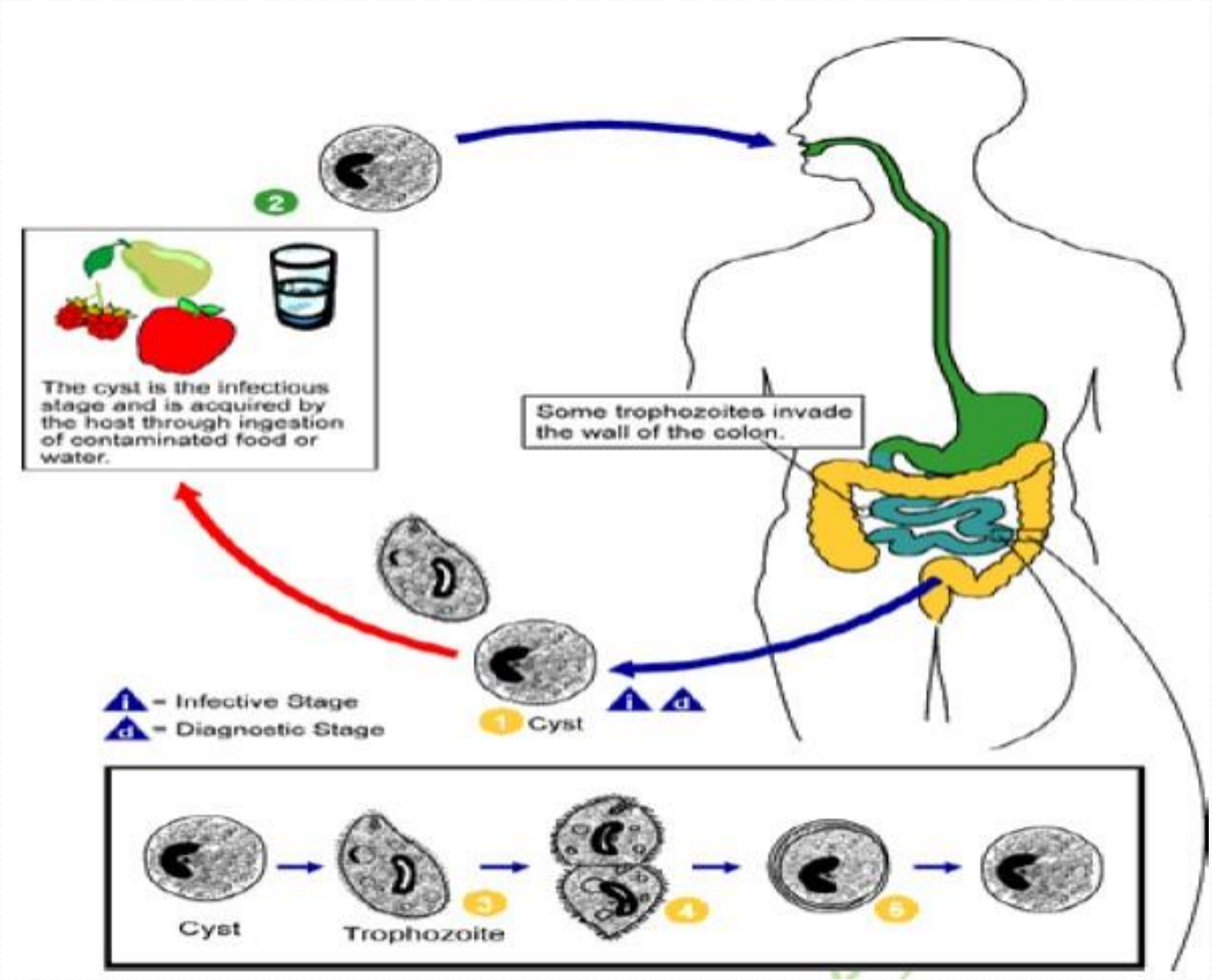




Balantidium coli cyst & troph

- **Life cycle**
- Human infection with *B. coli* is initiated upon ingestion of infective cysts in contaminated food or water, unlike that of *E. histolytica* , multiplication of the *B. coli* nuclei does not occur in the cyst phase, following excystation in the small intestine, the resulting trophozoites take up residence and feed primarily in the cecal region and terminal portion of the ileum, as well as in the lumen, mucosa, and submucosa of the large intestine. The multiplication of each trophozoite occurs by transverse binary fission, from which two young trophozoites emerge. The *B. coli* trophozoites are delicate and do not survive in the outside environment. Encystation occurs in the lumen. The resulting cysts mature and ultimately become the infective form for transmission into a new host. These cysts may survive for weeks in the outside environment. The natural host of Balantidium coli is pigs. Balantidium coli is the only ciliate known to parasitize humans and inhabit in Large intestine


Cyst (infective stage)
Excystation in small intestine
EXTERNAL ENVIRONMENT
MAN
Multiplication by transverse binary fission
Multiplication by transverse binary fission
Trophozoite in lumen of colon
Cyst
Encystation
LIFE CYCLE of BALANTIDIUM COLI


2
The cyst is the infectious stage and is acquired by the host through ingestion of contaminated food or water.
Some trophozoites invade the wall of the colon.
i = Infective Stage
d = Diagnostic Stage
1 Cyst
i d
Cyst
3
Trophozoite
4
5

- **Clinical symptoms**

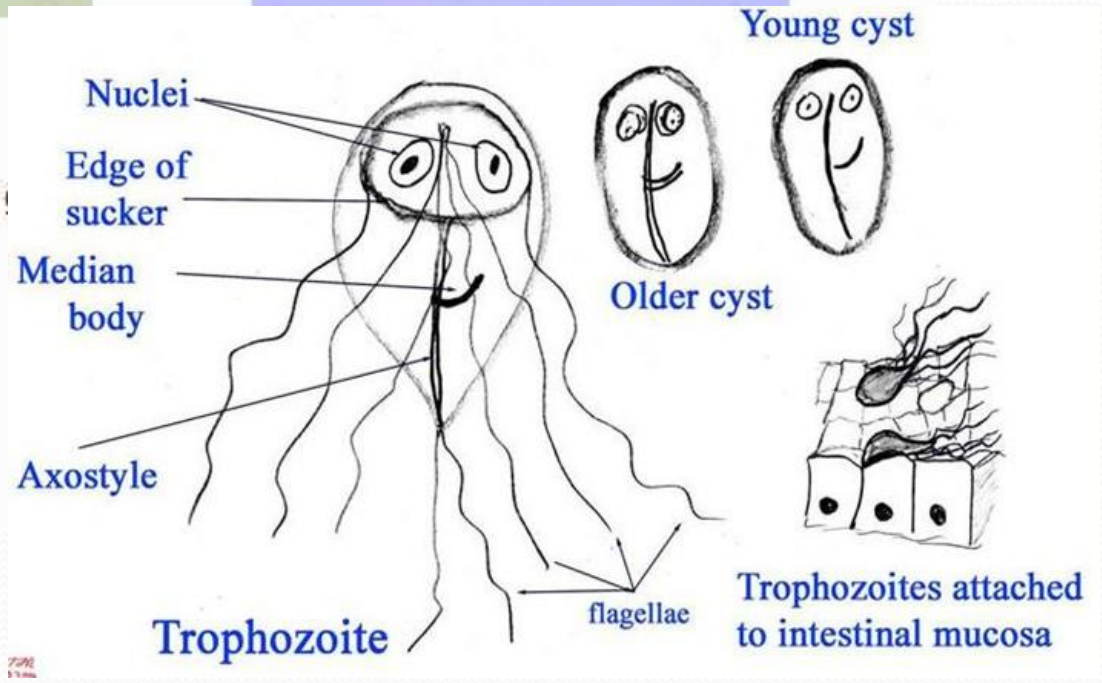
Balantidiasis. Symptomatic patients may experience a variety of discomforts, ranging from mild colitis and diarrhea to full – blown clinical balantidiasis, which may often resemble amebic dysentery. In this case, abscesses and ulcers may form in the mucosa and submucosa of the large intestine followed by secondary bacterial infection. Acute infections are characterized by up to 15 liquid stools per day containing pus mucus, and blood. Patients who suffer from chronic infections may develop a tender colon, anemia, cachexia, and occasional diarrhea, alternating with constipation. *Balantidium coli* has been known to invade areas other than the intestine, such as the liver, lungs, pleura, mesenteric nodes, and urogenital tract.

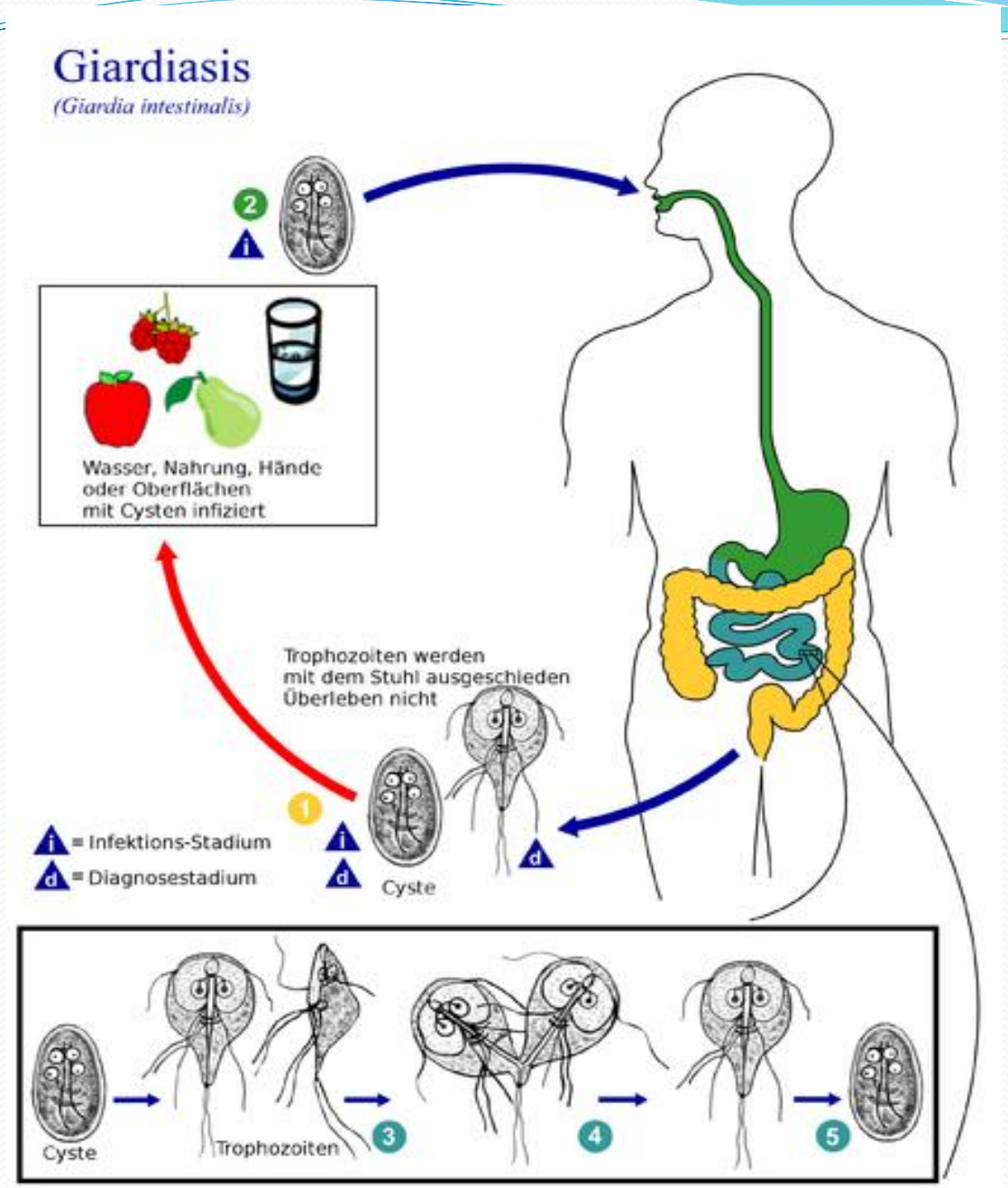
- Prevention and Control

control of ***B. coli*** = hygiene, Improvement of water supply and sewage and Good health education

Treatment of ***B. coli*** = Metronidazol

- **3. A:Class: Mastigophara (Flagellates)**
- 1. *Giardia lamblia*
- ***Giardia lamblia*** causes *giardiasis*, living in duodenum. The live cycle consists of two stage: trophozoite & cyste
- **1.Trophozoite:** is pear-shaped (symmetric organism),length 9-21µ,with two nuclei, four pairs of flagella,two axostylels and a suction disk which it attaches to the intestinal wall.
- **2.Cyst** is ellipsoid or oval cyst is thick walled with four nuclei and several internal fibers, length 8-12 µ. Each cyst gives rise to two troph. during excystation in the intestinal tract. cyct is the dormant stage of Giardia lamblia


Young cyst
Nuclei
Edge of sucker
Median body
Axostyle
Older cyst
flagellae
Trophozoite
Trophozoites attached to intestinal mucosa


Giardiasis
(Giardia intestinalis)
2
i
Wasser, Nahrung, Hände
oder Oberflächen
mit Cysten infiziert
Trophozoiten werden
mit dem Stuhl ausgeschieden
Überleben nicht
1
i = Infektions-Stadium
d = Diagnosestadium
i
d
Cyste
d
Cyste
Trophozoiten
3
4
5

- **-Pathogenesis:** transmission occurs by ingestion of the cyst in focally contaminated food and water. **Excystation takes place in the duodenum**. Where the troph. attaches to the gut wall but does not invade. Troph. **Causes inflammation of the duodenum mucosa, leading to malabsorption of protein and fat.**

-Clinical finding:

Giardiasis ("Traveler's Diarrhea"). Symptomatic infections with Giardia lamblia may be characterized by a wide variety of clinical symptoms, ranging from mild diarrhea (watery, non bloody, foul smelling diarrhea (semi solid: and **greasy or fatty**), abdominal cramps, anorexia, and flatulence to tenderness of the epigastric region steatorrhea, and malabsorption syndrome. Patients suffering from a severe case of giardiasis produce light – colored stools with a light fat content that may be caused by secretions produced by the irritated mucosal lining. Fat soluble vitamin deficiencies, folic acid deficiencies, hypoproteinemia with hypogammaglobulinemia, and structural changes of the intestinal villa may also be observed in such cases.

- **-Diagnosis :**
- 1. by finding troph. Or cyst or both in diarrhea stool
- 2. using ELISA test
- 3.string test
- **- diagnostic stages are troph. Or cyst or both in diarrhea stool. The infective stage is cyst.**

- **Prevention and Control**
- **control** of ***Giardia lamblia*** = hygiene, Improvement of water supply and sewage and Good health education
- Treatment of ***Giardia lamblia*** = Metronidazole or Tinidazole

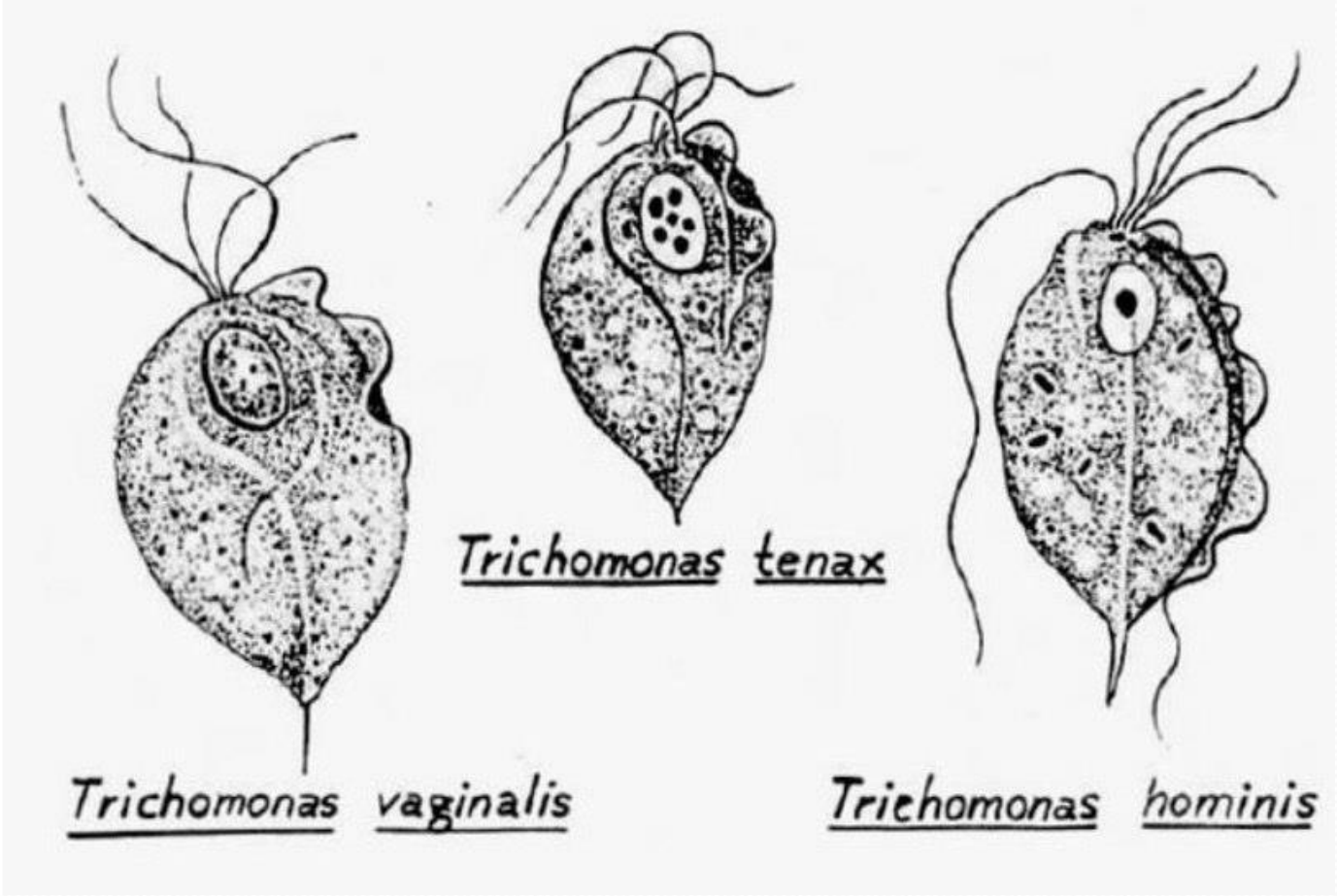
- **2. Trichomonas vaginalis, Trichomonas hominies and *Trichomonas tenax***
- **Trichomonas vaginalis**

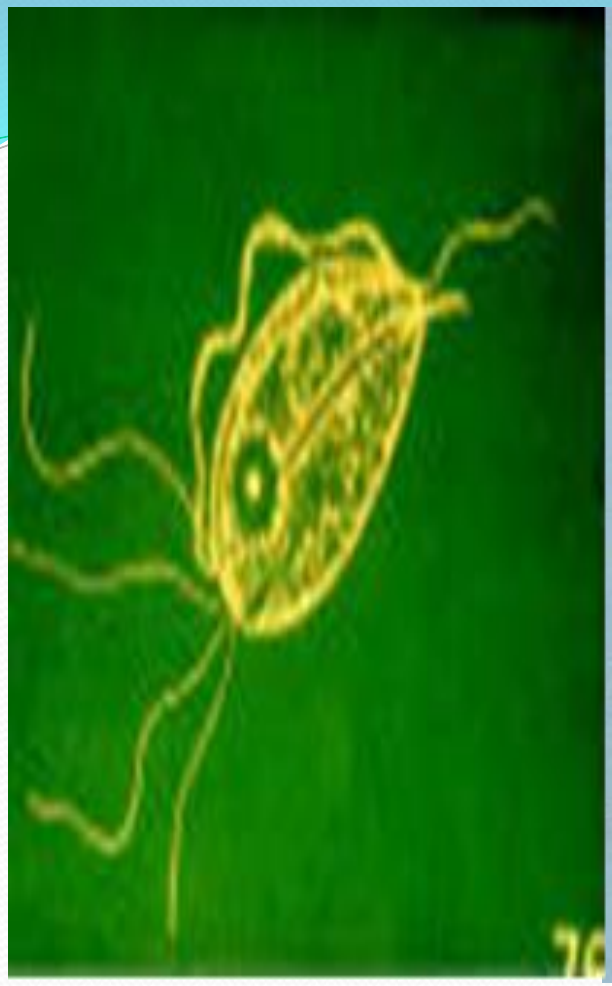
1. Pathogenic to human &causes vaginitis (trichomoniasis).
2. **troph**. Is round or pear like in shape, contains 4-6 flagella, all originating from anterior end & only one extend posteriorly. The motility is rapid & jerky.

The **undulating membrane extending half of the body length**. Prominent axostyle that often curves around the nucleus & granules may be seen along in the axostyle. **The nucleus is oval shape & only one. No cyst is seen**.

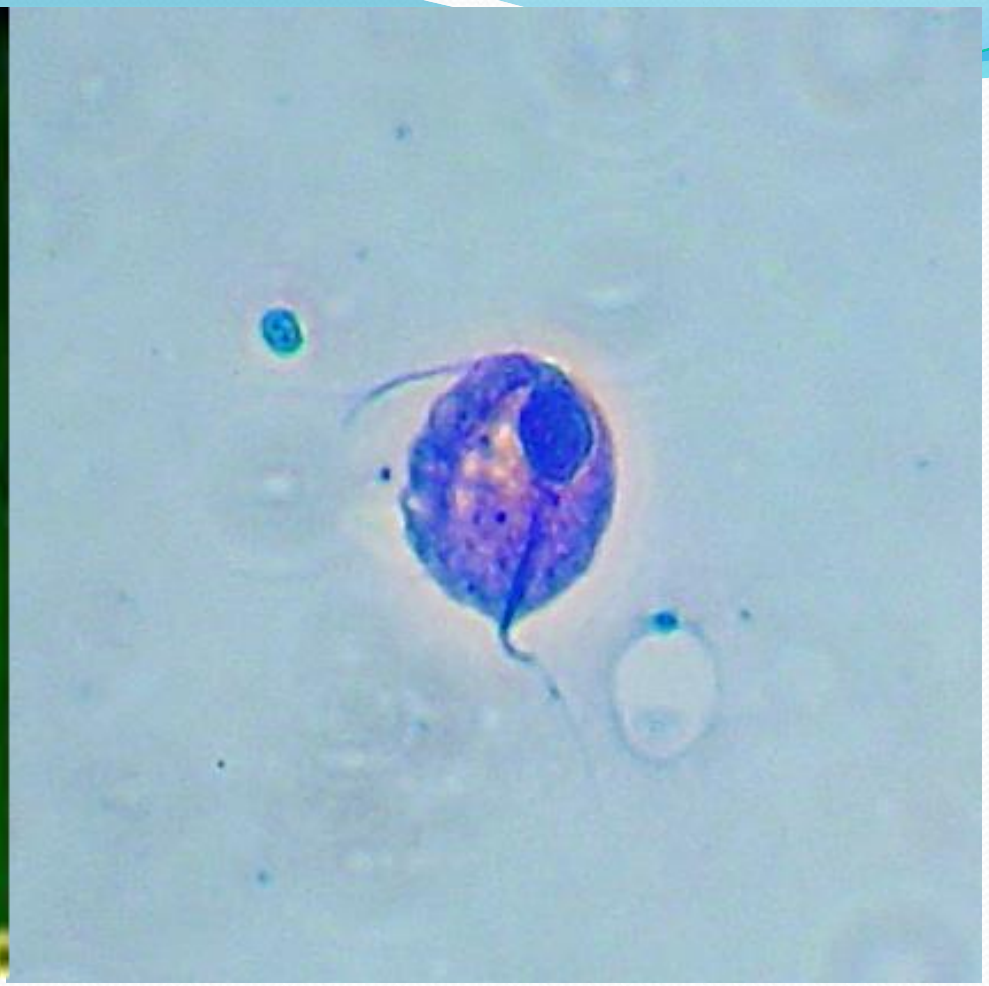
Clinical symptoms

1. *T. vaginalis* reside on the mucosal surface of the vagina in infected women.
2. The most common sites in male is the prostate gland region & the epithelium of the urethra.
3. **Vaginitis** may be found in infected women. It is characterized by foul smelling, greenish-yellow, vaginal discharge, burning & itching may also present. Red lesions may be seen in vaginal mucosa. Urethral involvement, dysuria & increased frequency of urination are among the most commonly symptoms. Cystitis is rare occur.
4. The main mechanism of *T. vaginalis* pathogenicity is cell to cell adherence & hemolysis and secreting soluble proteinases in both males and females human host


Trichomonas tenax
Trichomonas vaginalis
Trichomonas hominis



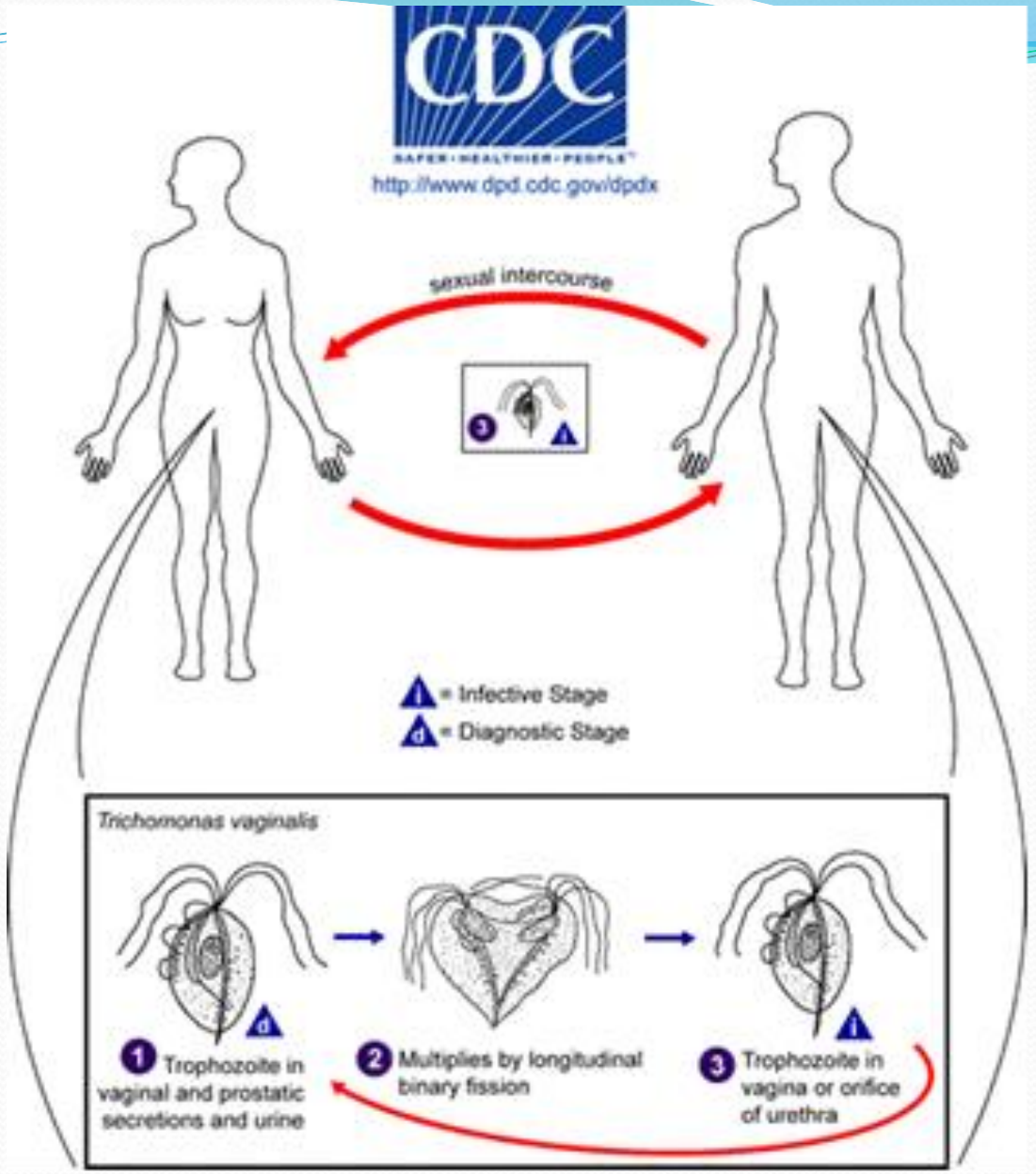
Trichomonas tenax



Trichomonas vaginalis

- **Life cycle**
- *Trichomonas vaginalis* trophozoites reside on the mucosal surface of the vagina in infected women. The growing trophozoites multiply by longitudinal binary fission and feed on local bacteria and leukocytes. The *Trichomonas vaginalis* trophozoites thrive in a slightly alkaline or slightly acid PH environment, such as that commonly seen in an unhealthy vagina. The most common infection site of *T. vaginalis* in males is the prostate gland region and the epithelium of the urethra. The detailed life cycle in the male host is unknown.

Infective and diagnostic stage is trophozoites


CDC
SAFER·HEALTHIER·PEOPLE™
http://www.dpd.cdc.gov/dpdx
sexual intercourse
= Infective Stage
= Diagnostic Stage
Trichomonas vaginalis
1 Trophozoite in vaginal and prostatic secretions and urine
2 Multiplies by longitudinal binary fission
3 Trophozoite in vagina or orifice of urethra

Control and Prevention

- **control of Trichomonas vaginalis** = Condom use remains the best and most reliable protection against STIs. However, due to religious or cultural reasons, condom use may be limited, particularly in some developing countries. Concurrent treatment of sexual partners is recommended to prevent reinfection. However, systemic administration of chemotherapeutics to prevent infection results in increased incidences of nitroimidazole-refractory strains

- Treatment of **Trichomonas vaginalis** = Metronidazole

3.Trichomonas hominis

- It is pyriform, considered a **nonpathogenic** inhabitant of the large intestine. Trophozoites of this may be observed in fresh smears of both normal and diarrheic fecal samples.

It inhabits the caecum of man and several other primate species and feeds on enteric bacteria. It does not invade the intestinal mucosa.

- Though it has occasionally been found in the diarrhoeic stools, its pathogenicity is yet to be established. In freshly passed specimens, particularly in unformed stools, the motility may be visible. In wet preparation, look for the flagellar movement, undulating membrane and the presence of the axostyle

- ***4.Trichomonas tenax***
- **Trophzoite**: Oval to pear in Shape. Have one nuclei, vesicular filled with chromatin granules. Have five flagella, all originating anteriorly, four extends anteriorly, one extends posteriorly. **Undulating membrane extending 2/3** of body length. Thick axostyle and Small anterior cytosome opposite undulating membrane. There is a known **cyst**
- **Life cycle**
- *Trichomonas tenax* trophozoites survive in the body as mouth scavengers that feed primarily on local microorganisms. Located in the tartar between the teeth, tonsillar crypts pyorrheal pockets, and gingival margin around the gums, *T. tenax* trophozoites multiply by longitudinal binary fission. These trophozoites are unable to survive the digestive process.
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- **Clinical symptoms**
- The typical *Trichomonas tenax* infection does not produce any notable symptoms. On a rare occasion, *T. tenax* has been known to invade the respiratory tract, but this appears to have mainly occurred in patients with underlying thoracic or lung abscesses of pleural exudates.

5.Chilomastix mesnili

is a common flagellate living as a harmless commensal in the caecum and colon of man. It has a cosmopolitan distribution but is more prevalent in warm than in cool climates. It has well-defined trophozoite and cystic stages.

DPDx

Chilomastix mesnili