

Giardiasis

Giardia lamblia

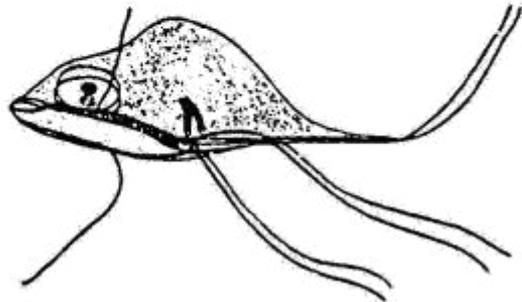
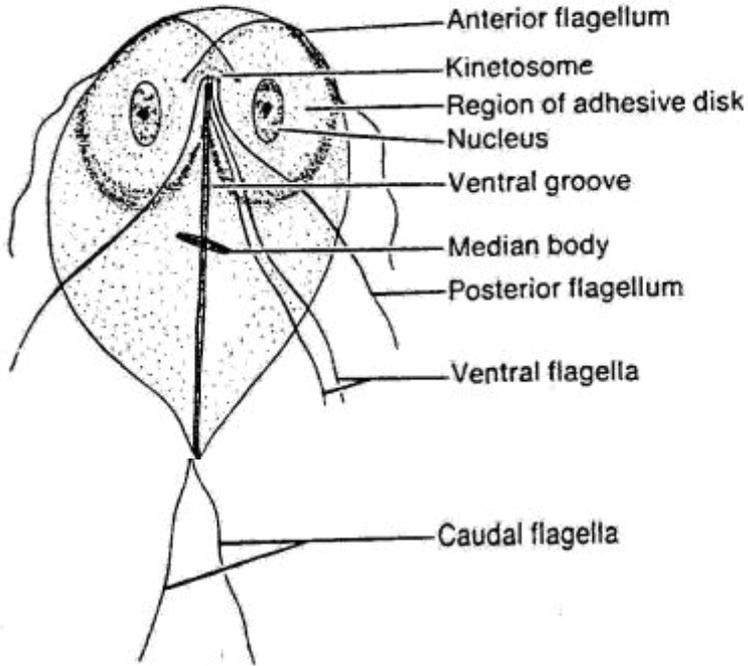
Giardia intestinalis

Giardiasis

- Most common causative agent of epidemic & endemic **diarrhoea** throughout the world
- Prevalence - 2-5% in industrialised countries
20-30% in developing countries
- Reported from through out India
- Caused by *Giardia intestinalis/ Giardia lamblia*
- Man is the main reservoir
- Inhabit duodenum, jejunum & upper ileum
- *G. intestinalis* exists in 2 stages –
trophozoite & cyst

Morphology of *Giardia lamblia* trophozoite

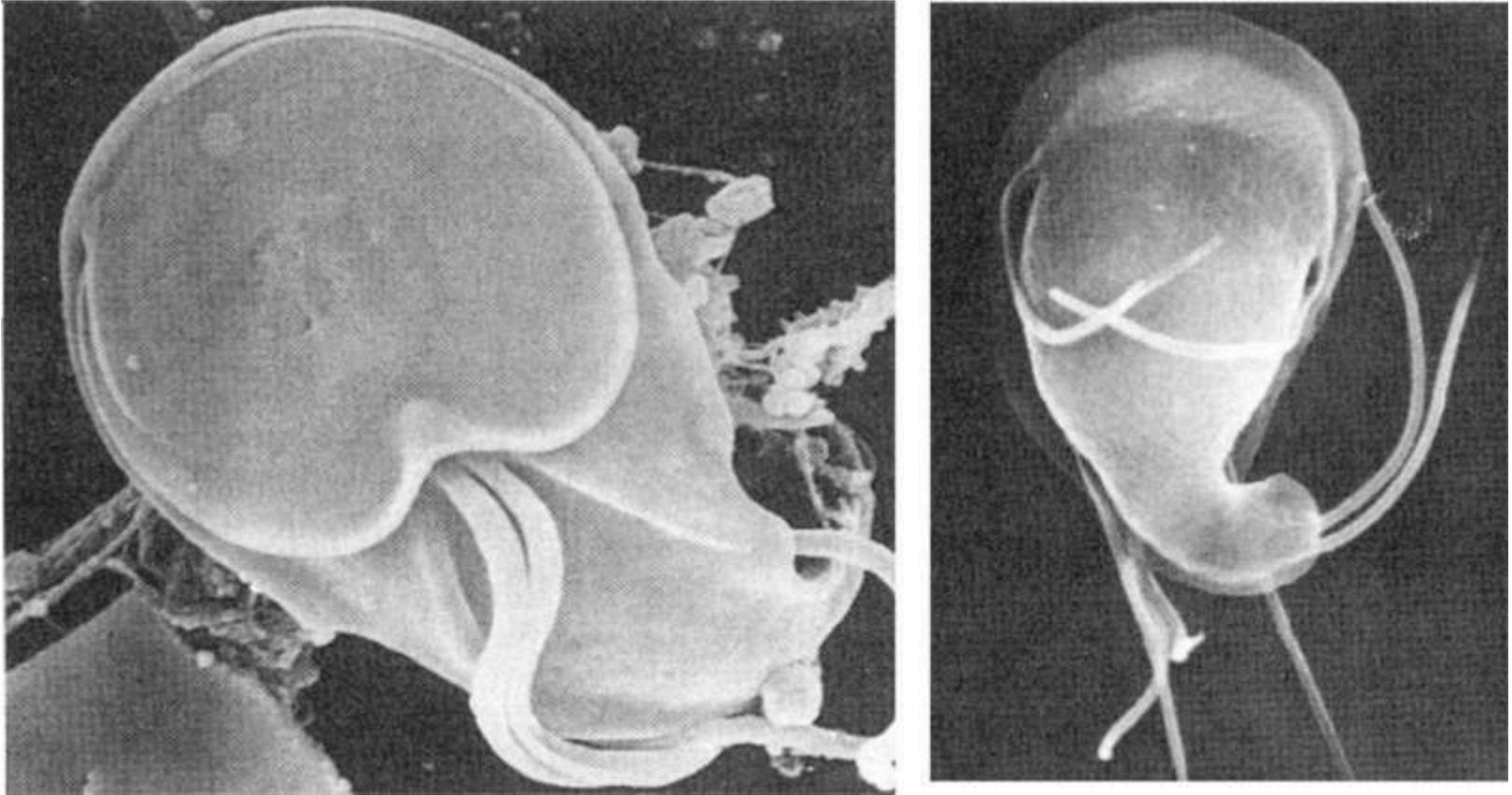
Trophozoite, ventral view



Trophozoite, lateral view

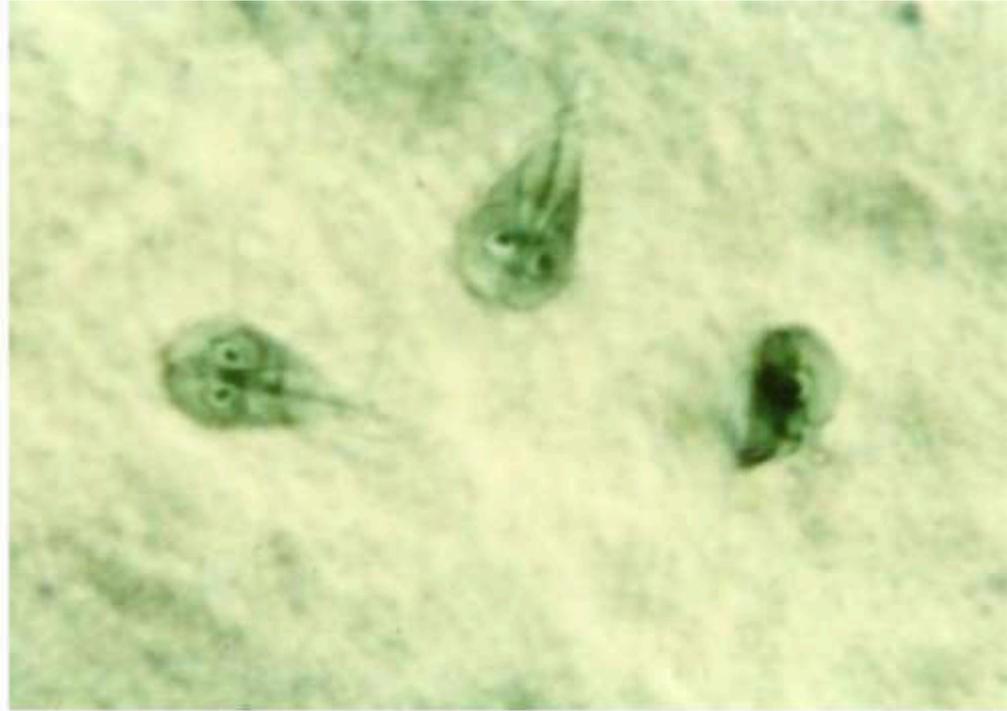
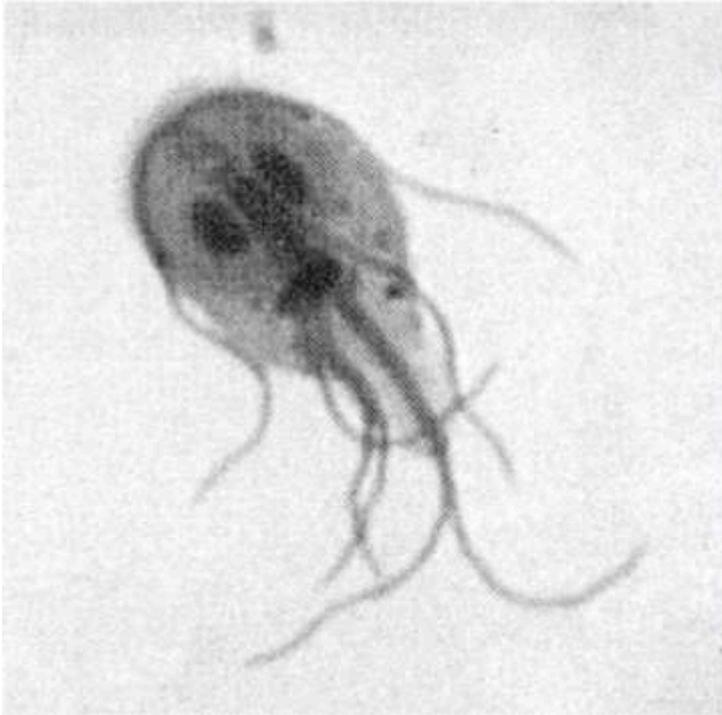
- Pear shaped, rounded anterior end, posterior end pointed (looks like monkey face)
- Size: 12 to 15 μm long x 5 to 9 μm wide
- Dorsal surface convex, ventral surface concave
- Ventral surface bears **sucking disk** to adhere to surface of intestinal cell
- Bilaterally symmetrical: 2 **nuclei**, 2 **axostyles** , 4 pairs of **flagella** (2 anterior, 2 posterior, 2 ventral, and 2 caudal)
- actively moving and feeding stage
- Habitat: small intestine
- May invade the common bile duct.

Morphology of *Giardia lamblia* trophozoite



Scanning EM view of trophozoite surface showing the adhesive disk)

Morphology of *Giardia lamblia* trophozoite

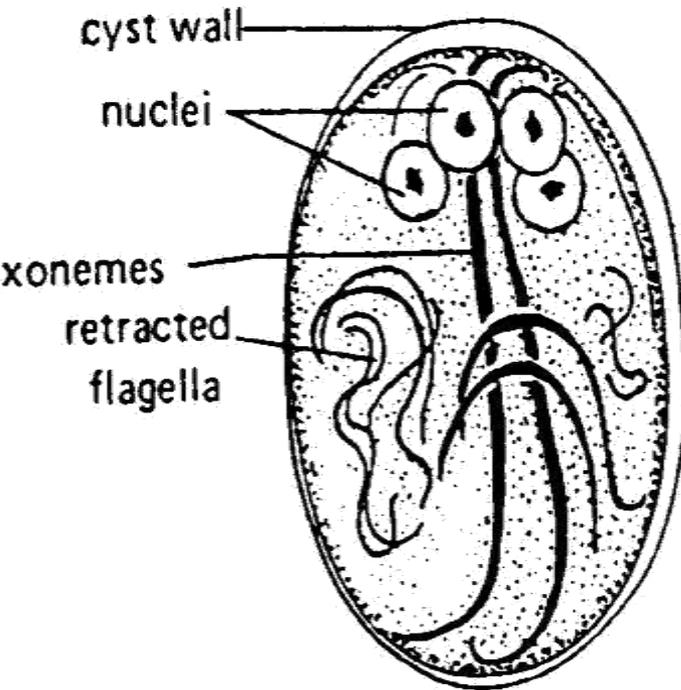


Light microscope photos of trophozoites

Morphology of *Giardia lamblia* cyst

ovoid in shape , 8-12 μm long x 7-10 μm wide , thick cyst wall

4 **nuclei** present, either clustered at one end or present in pairs at opposite ends

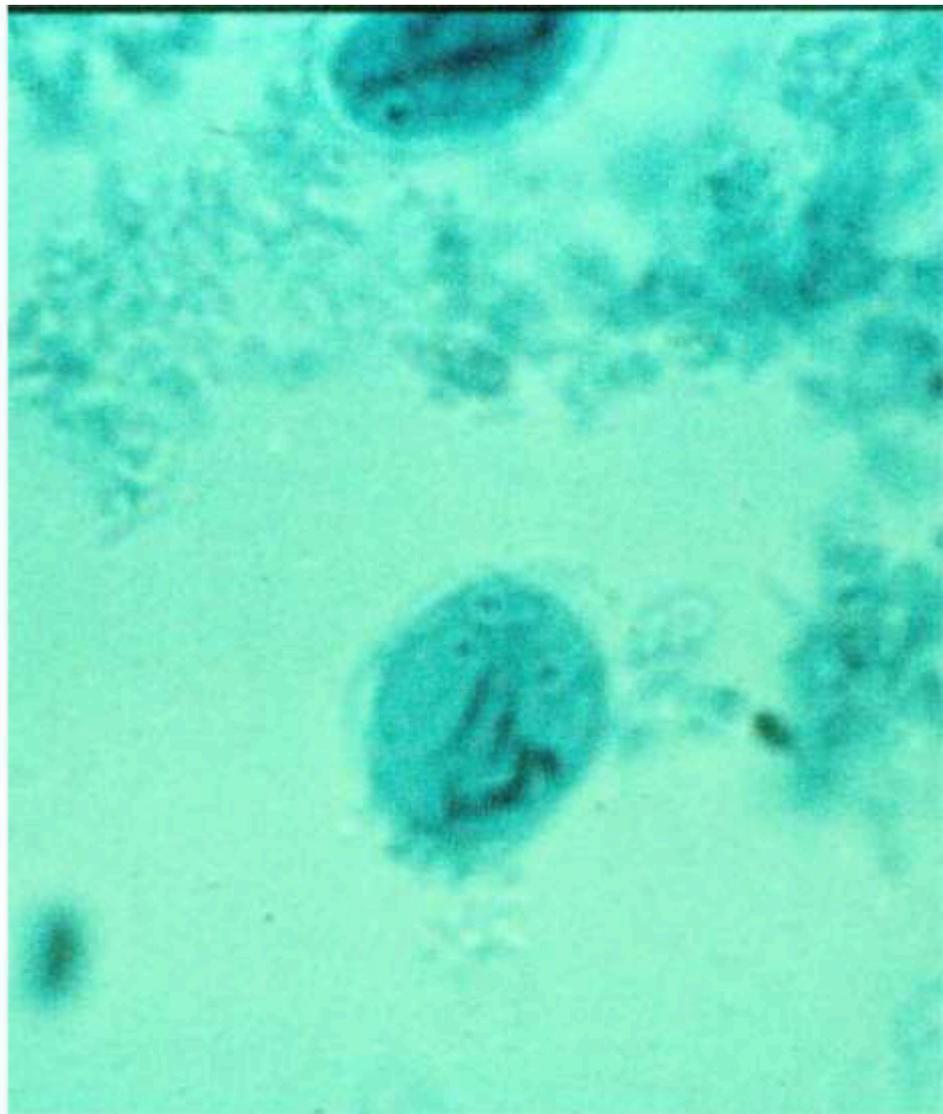
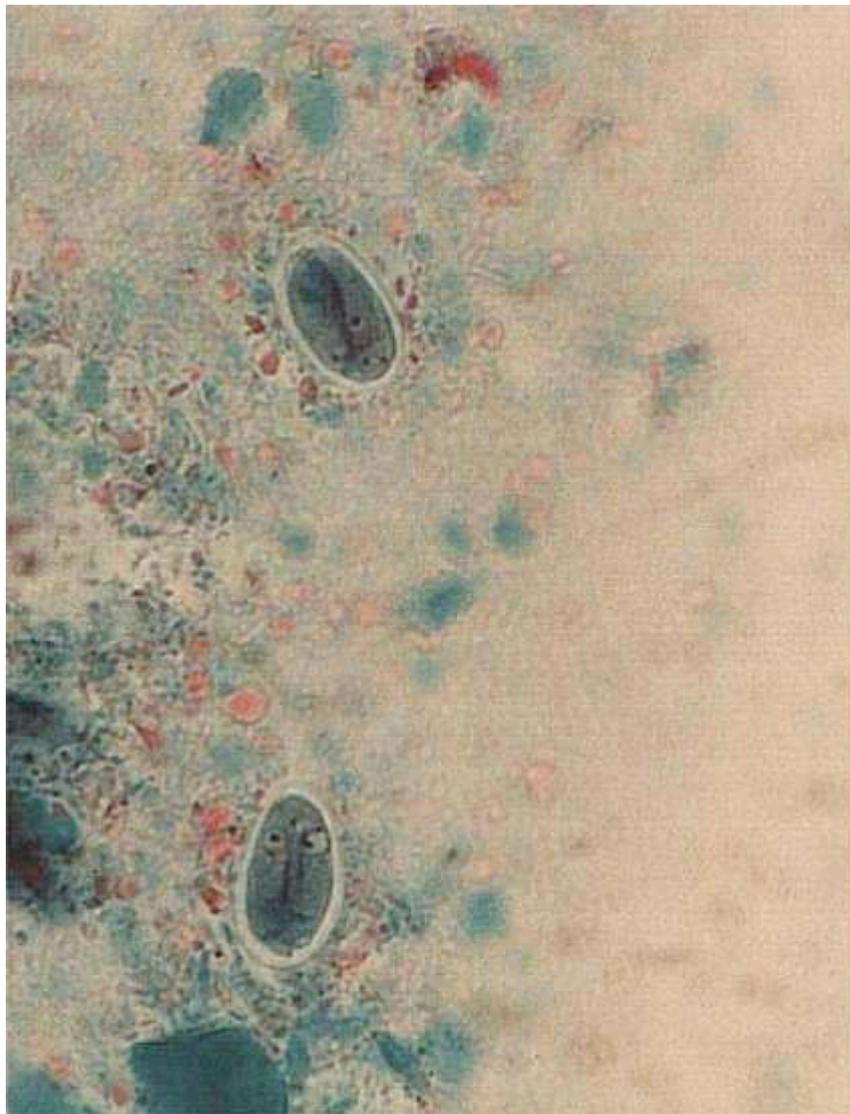


Axostyle runs diagonally through the cyst
flagella shorten and are retracted within cyst – provide internal support

The cyst forms as trophozoites become dehydrated when they pass through the large intestine

Cyst may remain viable in the external environment (usually water) for many months.

Giardia lamblia cyst

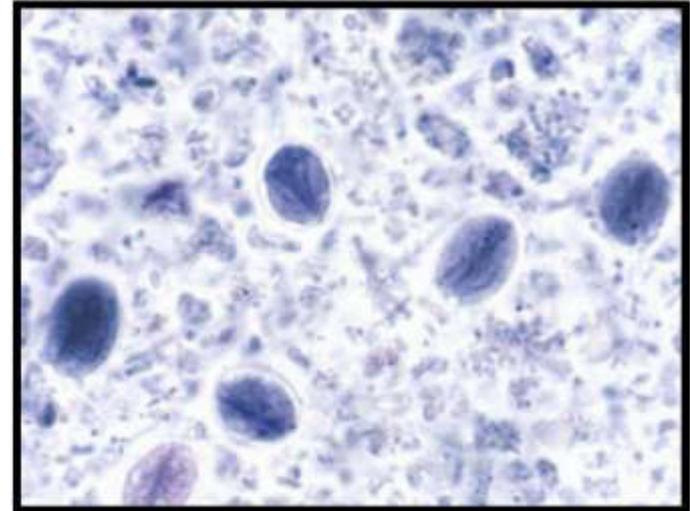


Giardiasis

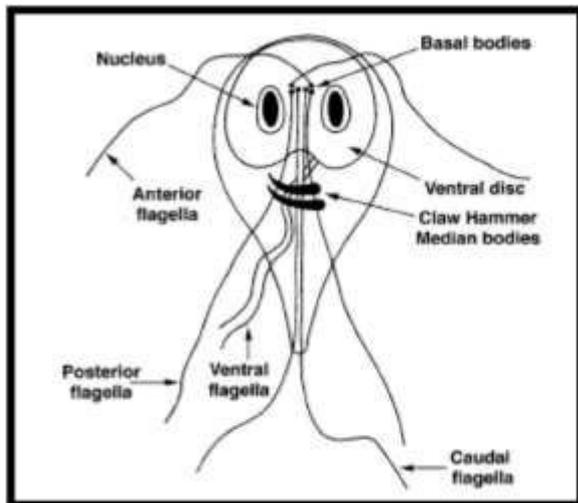
Giardia intestinalis =(lamblia)



Trophozoites



Cysts

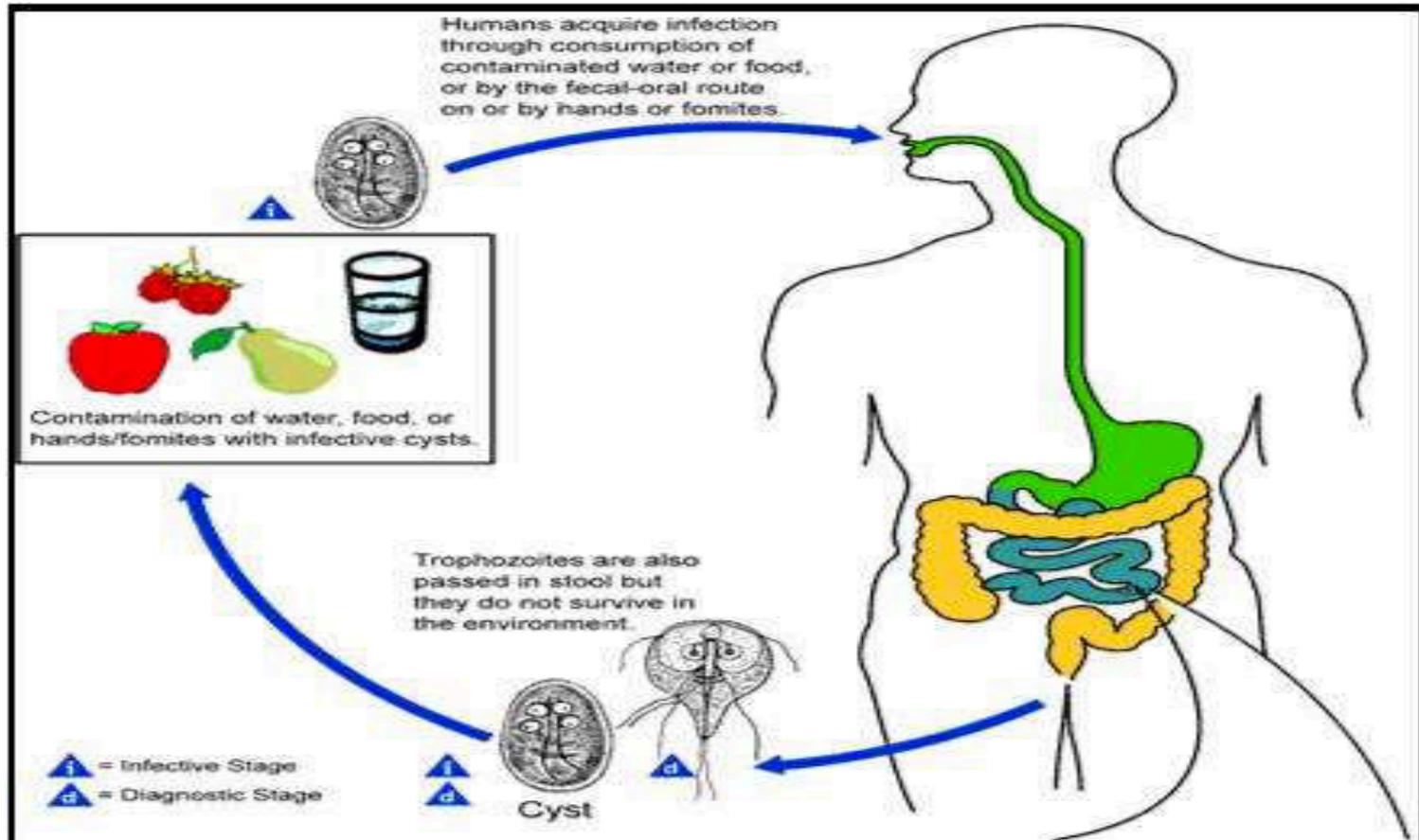


- Infective form – **mature cyst** passed in feces of man
- Routes of transmission
 - Feco-oral
 - ingestion of contaminated water – most important
 - ingestion of contaminated food
 - Person to person – day care, nursing homes, mental asylums (poor hygiene)
 - Sexual – sexually active homosexual males

Life Cycle

- Acquire infection – ingestion of mature cysts
- **Excystation** occurs in stomach & duodenum within 30 minutes
- **2 trophozoites** hatch from one cyst
- Trophozoites multiply by binary fission & colonize in duodenum & upper jejunum
- Trophozoites adhere to enterocytes by ventral suckers
- **Encystation** occurs in transit down the colon
- Axonemes retract, cytoplasm condense & thin tough hyaline wall is secreted
- Encysted trophozoite undergo nuclear division – mature **quadrinucleate cyst**

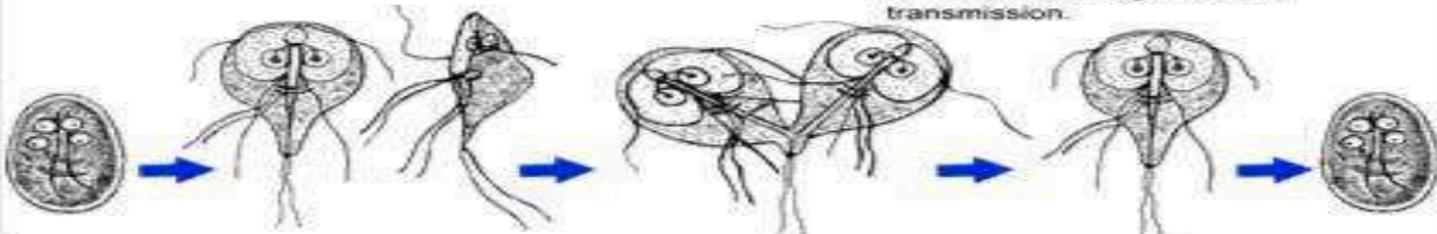
Giardia – Life cycle



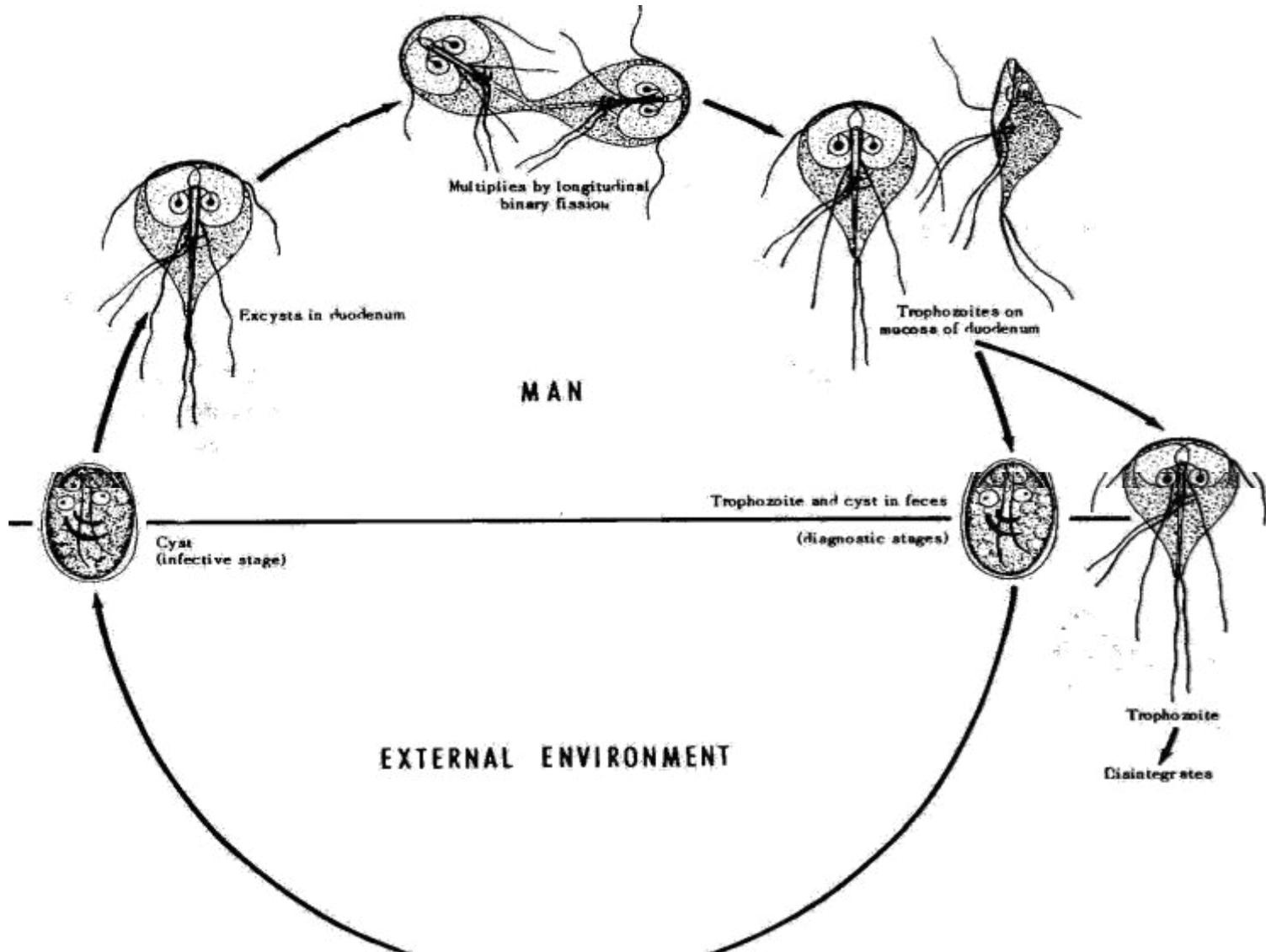
Excystation occurs in the small intestine. Two trophozoites are released from each cyst.

The trophozoites multiply by longitudinal binary fission. They remain in the lumen of the proximal small bowel where they can be free or attached to the mucosa by a ventral sucking disk.

Encystation occurs as the parasites transit toward the colon. Both cysts and trophozoites can be found in the feces (diagnostic stages). The cyst is the stage found most commonly in non-diarrheal feces. Cysts are resistant forms and are responsible for transmission.



Giardia lamblia life cycle



Pathology

- Do not invade tissues
- Feed on mucous secretions
- May localise in **biliary tract** to avoid the acidity of duodenum
- Cause inflammation of duodenum & jejunum
- Cause **malabsorption** as the parasite coats the mucosa & damage epithelial brush border
- Stool contains large amounts of mucous & fat but no blood

Giardiasis: The Disease

- Asymptomatic : largest group
- Acute : self-limiting infection, acute watery **diarrhoea**, abdominal cramps, bloating, flatulence
- Stool is profuse & watery in earlier disease
- Voluminous, foul smelling & greasy (**steatorrhoea**) later
- Chronic : chronic diarrhoea with **malabsorption** syndrome, steatorrhoea

Laboratory Diagnosis

Parasitic Diagnosis

Samples

- Stool
- Duodenal contents
 - Duodenal fluid(Entero test)
 - Duodenal/ jejunal biopsy

Entero test – gelatin capsule containing a nylon string with a weight is swallowed by the patient. Free end of the string is fixed to the mouth. Capsule dissolves & the string is released in the duodenum. After overnight string is removed & bile stained mucus collected.

Parasitic Diagnosis Microscopy

Microscopy

Direct Wet Mount

- Trophozoite with **falling leaf motility** in saline mount
- Cyst in iodine mount

Stained stool smears

- Trichrome
- Iron haematoxylin

Laboratory Diagnosis

Parasitic Diagnosis

Antigen detection (Coproantigen)

- ELISA
- Sensitivity & specificity high

Culture

- Not done routinely
- Diamonds medium

Laboratory Diagnosis

Serodiagnosis

- ELISA
- Epidemiological purpose

Molecular diagnosis

- DNA probes &
- PCR for research purpose

Prevention

- Avoid food & water that might be contaminated
 - filtration of water (be sure filter is fine enough to trap the cysts)
 - boiling water
 - addition of a tincture of iodine are effective in killing cysts (chlorination of water does not effect the cysts)
- Practice good hygiene
 - Wash hands thoroughly with soap and water
 - after using the toilet
 - before handling or eating food

Treatment

- Nitroimidazole derivatives
 - Metronidazole
 - Tinidazole
 - drugs of choice
- Acridine dye
 - Quinacrine
- Nitrofurans
 - Furazolidone