

# *Giardia lamblia*

**Causes :** Giardiasis in man especially children.

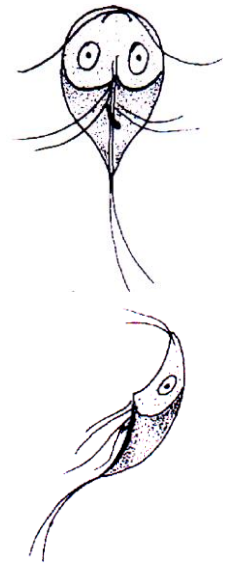
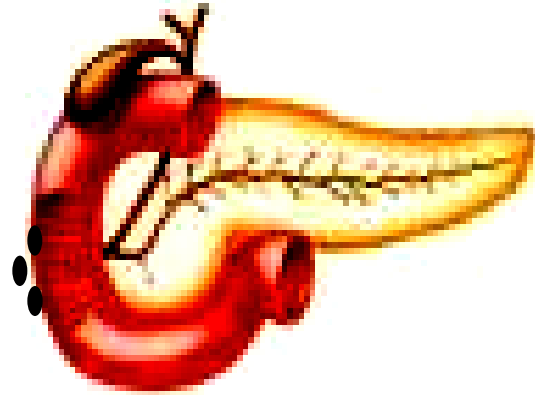
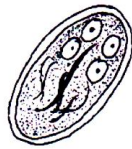
**Geog.Distribution:** cosmopolitan.

**Habitat :** duodenum, upper part of small intestine, bile ducts and gall bladder **as trophozoites attached to the mucosa.**

**D.H:** man     **R.H:** animals

**Infective stage :** the cyst.

Cyst



Trophozoite

**Mode of infection :**

Contaminated food or water.

Flies and food handlers. **Heteroinfection**

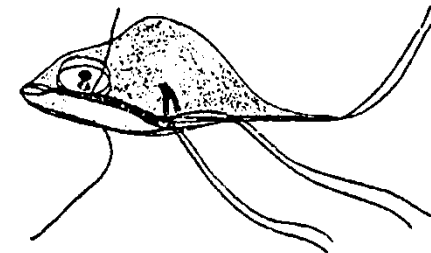
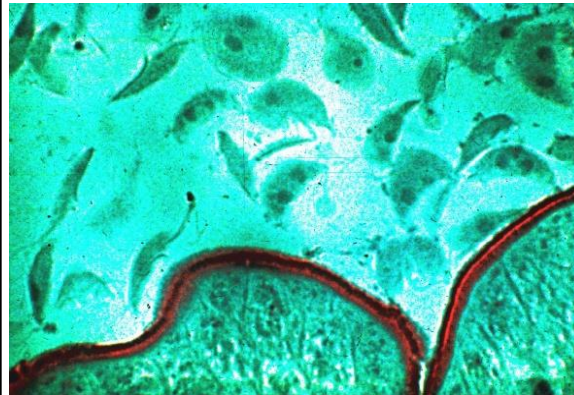
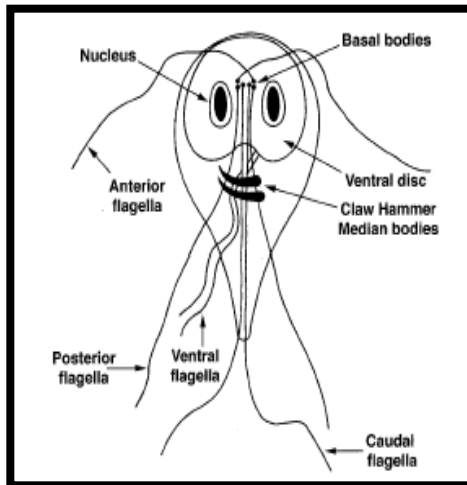
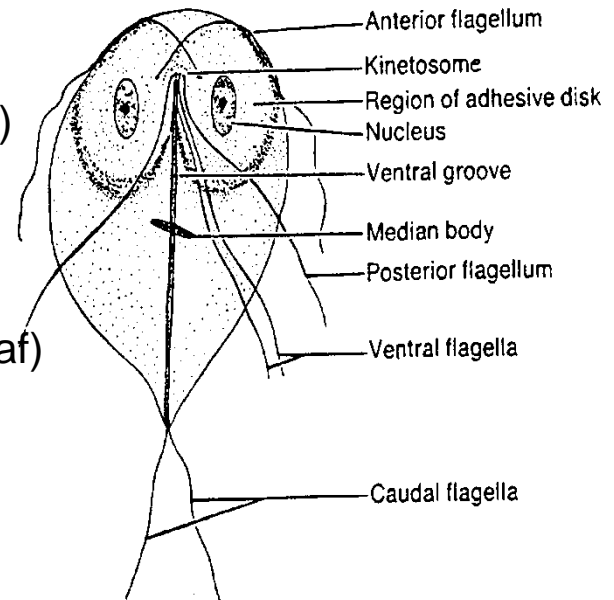
Faeco-oral. **Autoinfection**

# *Giardia lamblia*

## Morphology of Trophozoite stage:

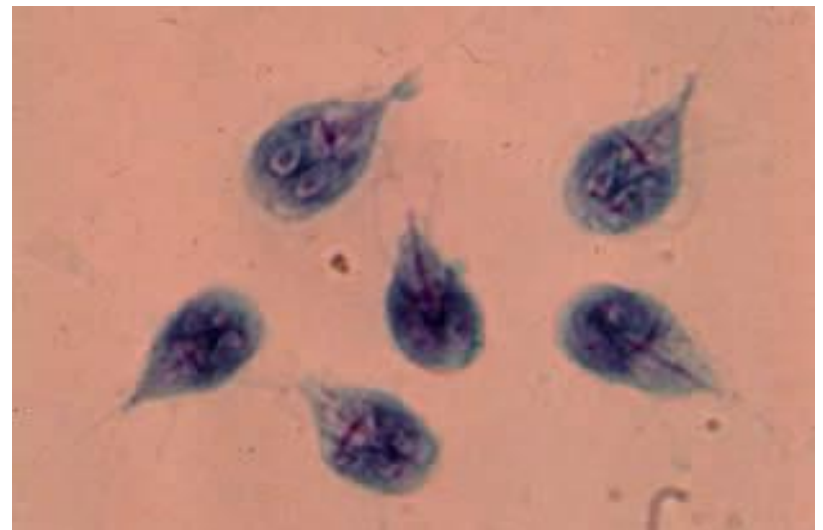
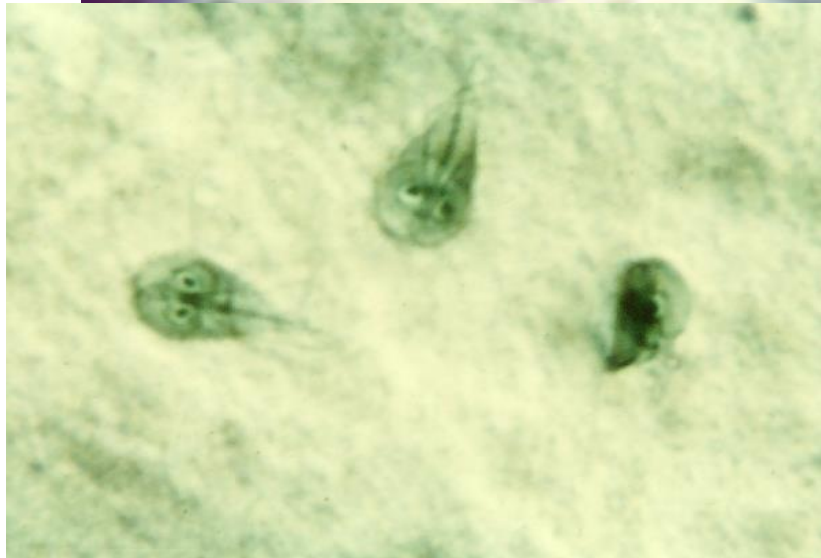
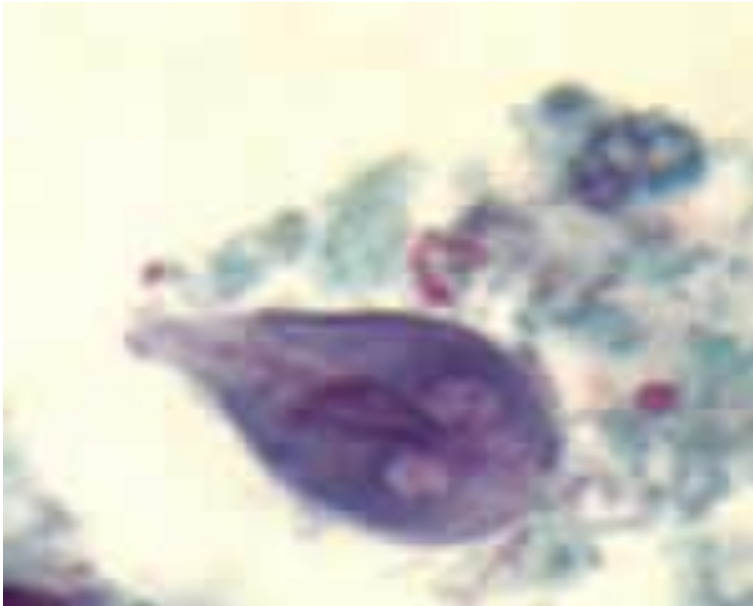
- \* Average size 15 X 8  $\mu$
- \* Pear shaped (broad anteriorly –tapering posteriorly)
- \* Convex dorsally –flat ventrally with bilobed anterior concavity (sucking discs) for attachment.
- \* Motility by 4 pairs of flagellae (similar to a falling leaf)
- \* Two oval nuclei with central karyosome.
- \* Two axostyle traversing the body
- \* Two rod-shaped parabasal bodies across the axostyle

Trophozoite, ventral view



Trophozoite, lateral view

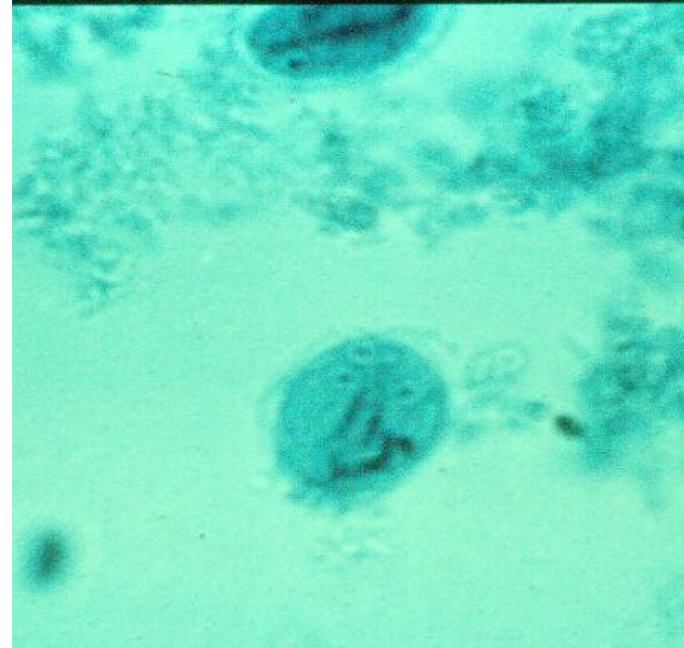
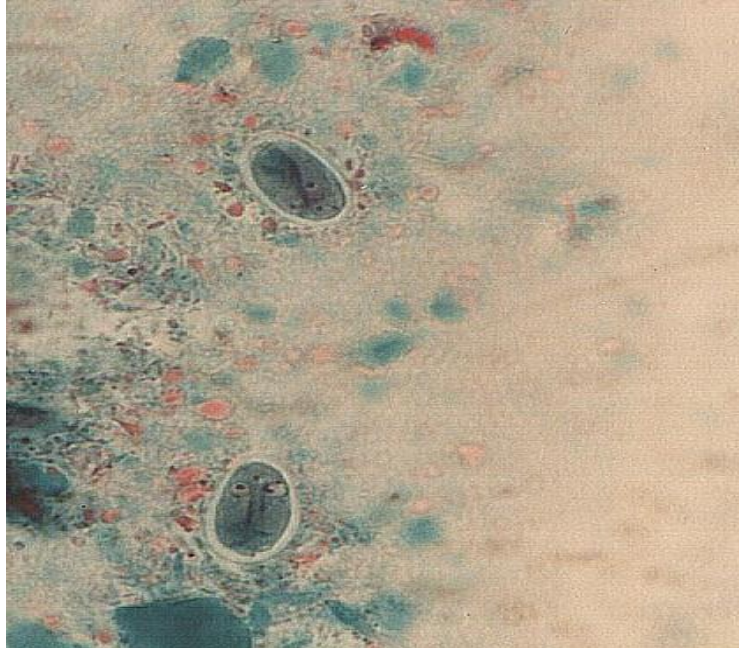
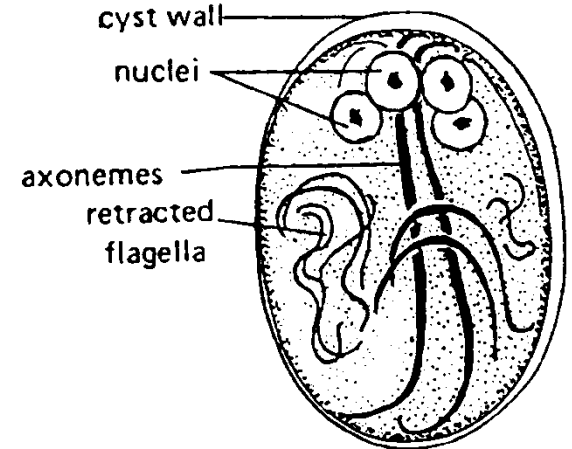
# *Giardia lamblia*



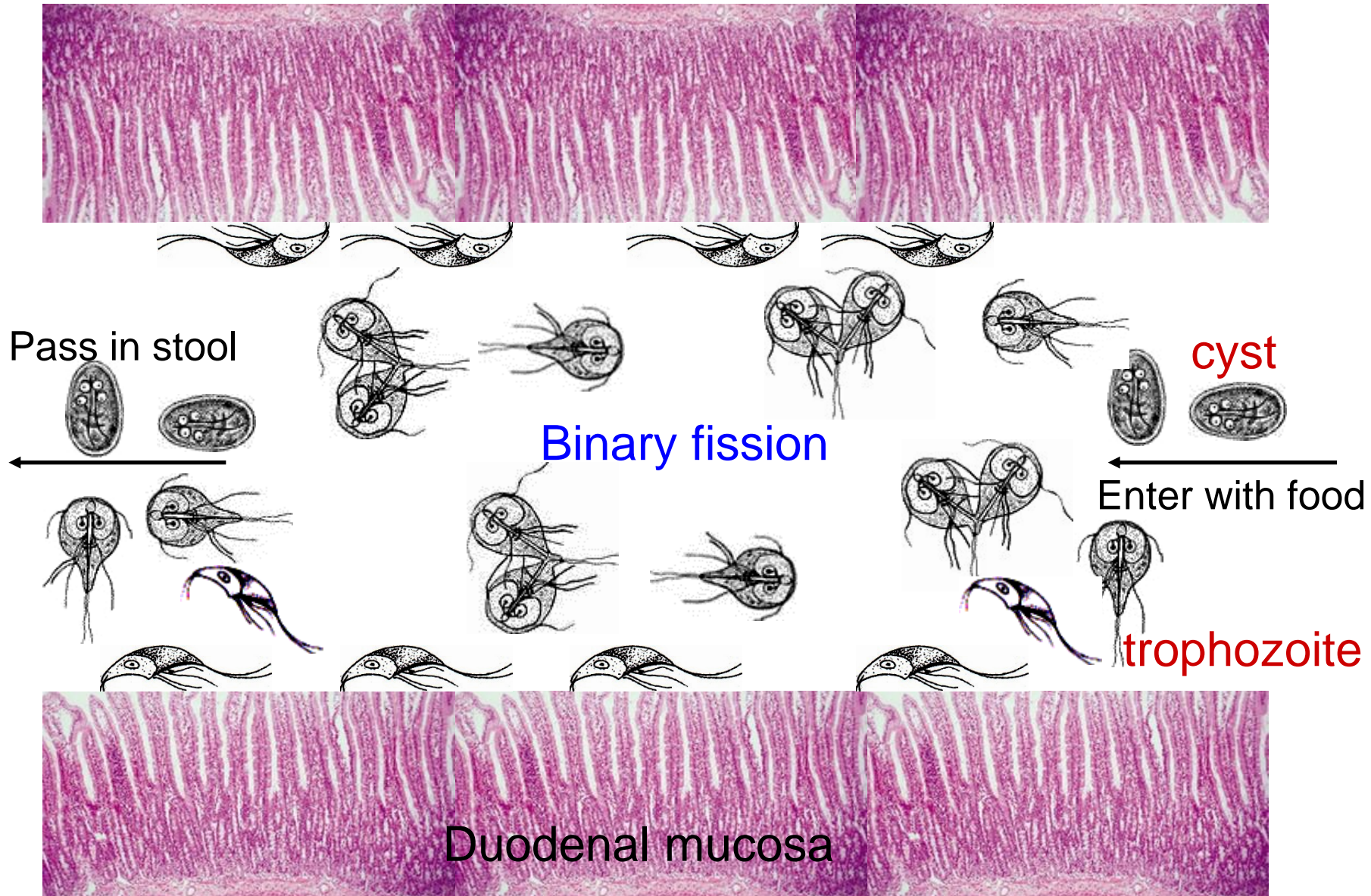
# *Giardia lamblia*

## Morphology of Cyst stage:

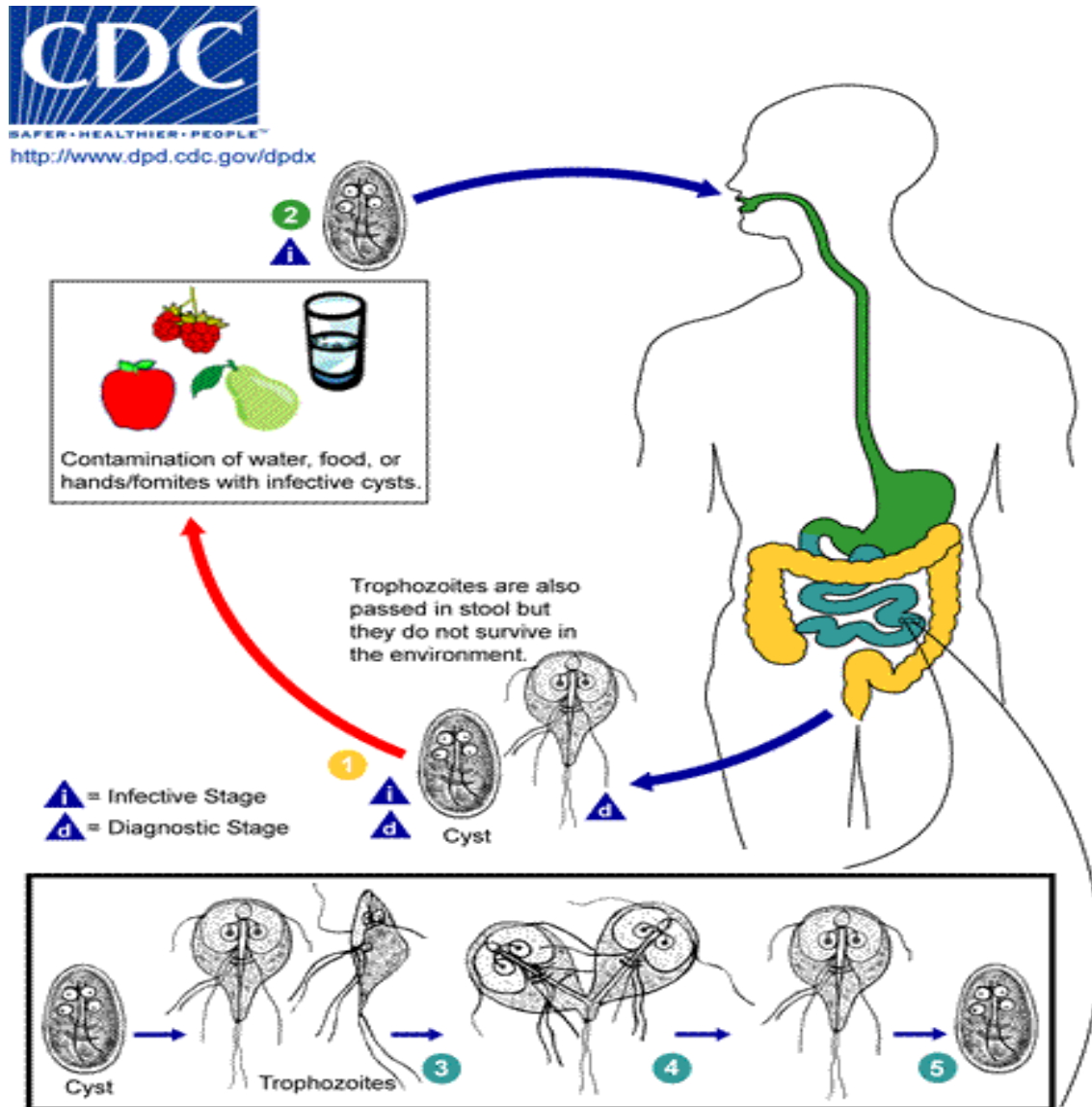
- \* Average size 12 X 7  $\mu$
- \* Oval with well defined cyst wall
- \* Four nuclei present usually at one pole.
- \* Includes: axostyle – parabasal bodies – remnants of flagella



# Life Cycle of *Giardia* inside human body



# Life Cycle of *Giardia* inside human body



# Pathogenesis

Pathogenesis is determined by: **Strain virulence**    **Host's susceptibility**

**Predisposing Factors:** that determine disease severity

- 1- Hypogammaglobulinaemia.
- 2- Achlorhydria.

**Pathogenicity:** is directly related to

**Attachment of Trophozoite & Surface area affected**

**Mechanism of Disease development:-**

- 1- **Mechanical irritation** → Hyperemia / inflammation “Duodenitis” (mild illness)
- 2- **Enterotoxin** → stimulate cytokine production → inflammatory response  
↑Permeability / hypermotility / hypersecretion (play an important role in production of Inflammation & Diarrhea that may be mild or severe)
- 3- **Blunting of brush border** → **Atrophy of villi** → related to immunodeficiency      **secretory IgA**
- 4- **Malabsorption syndrome** → **Malnourishment** (due to interference with absorption – Atrophy of the villi)      **Leads to:**
  - \* Fat Malabsorption---- greasy stool    \*Folic acid & fat soluble vitamin def.
  - \* Lactose intolerance      \*Carbohydrate fermentation by bacterial flora ---- gas prod.
  - \*Accumulation of electrolytes ----- increase water content in intest. lumen



Source: Gallery of histology Woods and Ellis2000

Giardia Lamblia clinging to the wall of a duodenal villus.



# Pathogenesis and Clinical Picture

- Trophozoites feed on mucus

↓  
**no symptoms.**

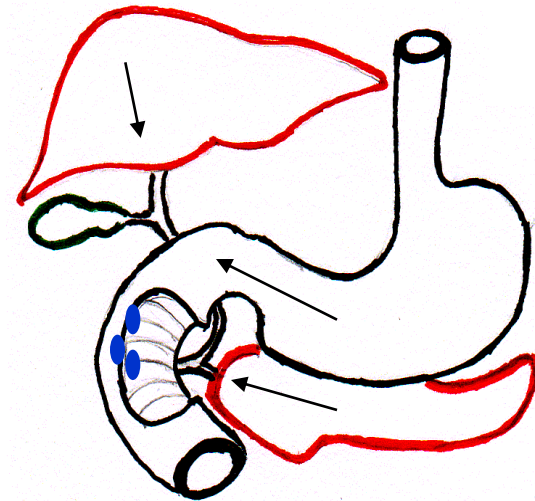
(Asymptomatic carrier – cyst passer)



- Trophozoites cause hyperaemia and inflammation of duodenal wall (Duodenitis)

↓  
**symptoms as:**

Epigastric pain, digestive disturbances,  
Steatorrhoea (fatty diarrhea- Stool is  
light-coloured and greasy  
and flatulence.



# Pathogenesis and Clinical Picture

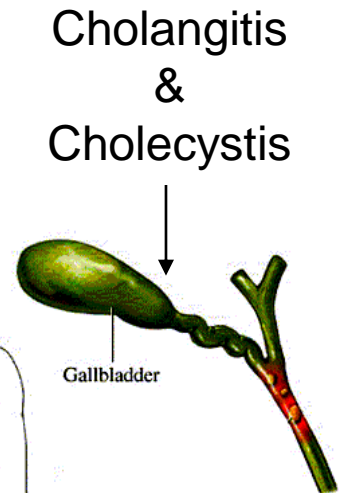
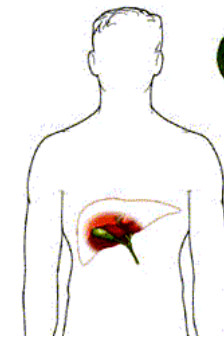
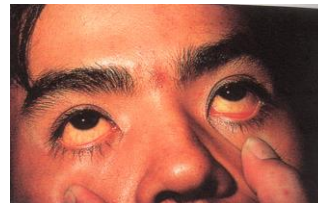
- In patients with impaired immunity as:
  - a- Hypogammaglobulinaemia.
  - b- Diminished secretory IgA in small intestine.
  - c- Diminished gastric acidity or achlorohydria.

↓  
**Severe symptoms as**  
↓

**Persistent diarrhea, steatorrhoea,  
Malabsorption, Anemia.**

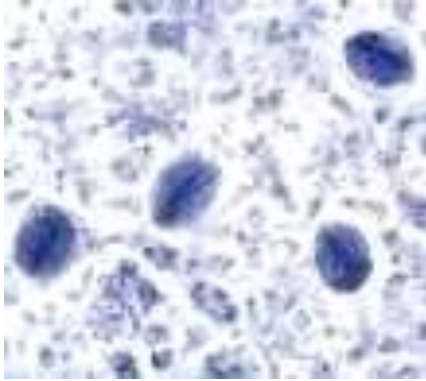
**Hypoproteinemia, fat-soluble vitamin  
deficiency.**

**Jaundice and biliary colic.**



# Diagnosis

- Direct stool examination



**Cysts in formed stool**



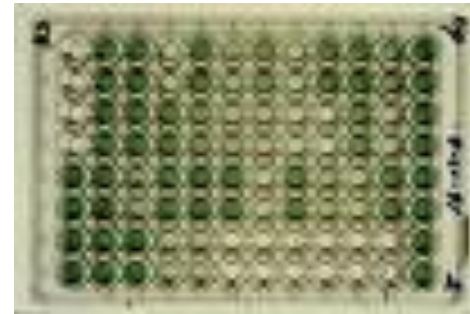
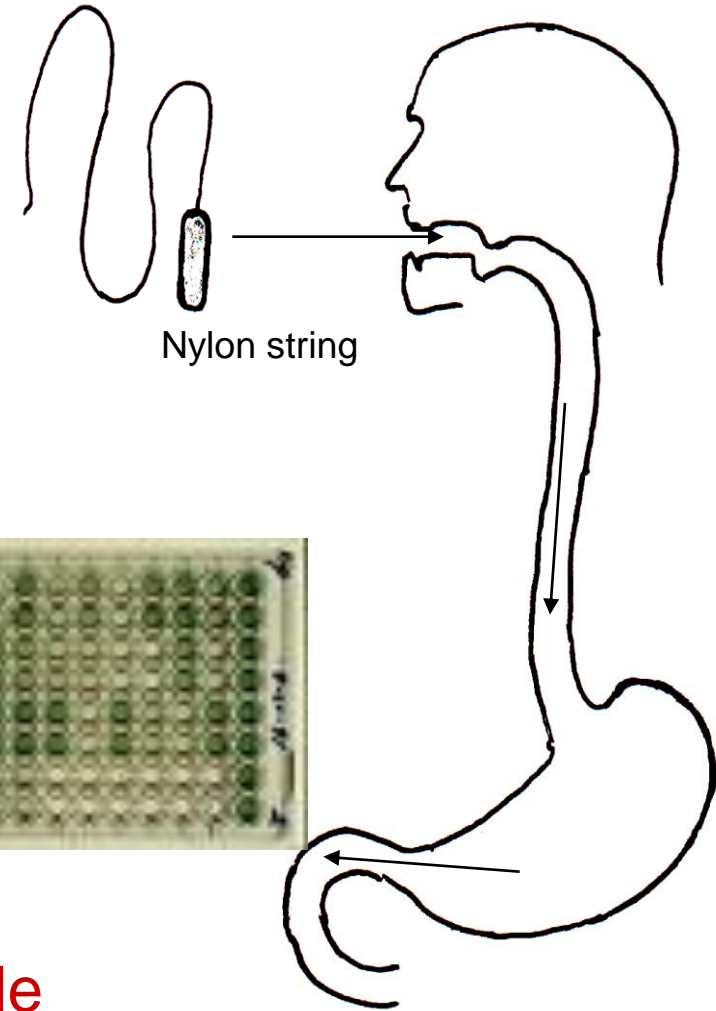
**Trophozoite in diarrhoeic stool**

N.B: Negative stool samples is strongly suspected cases (Excretion is irregular) – must repeated

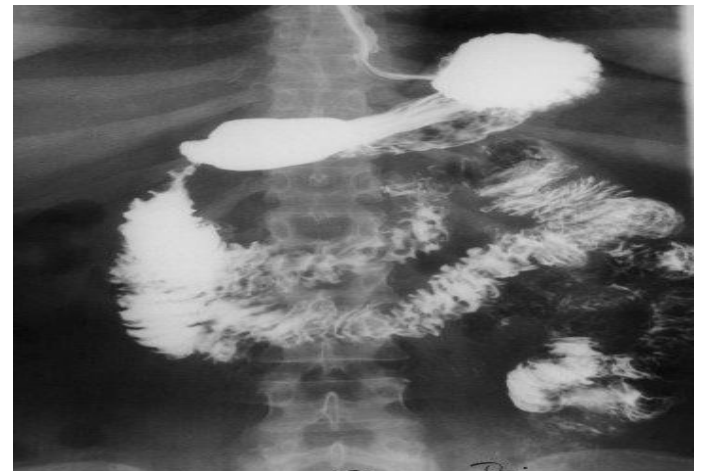
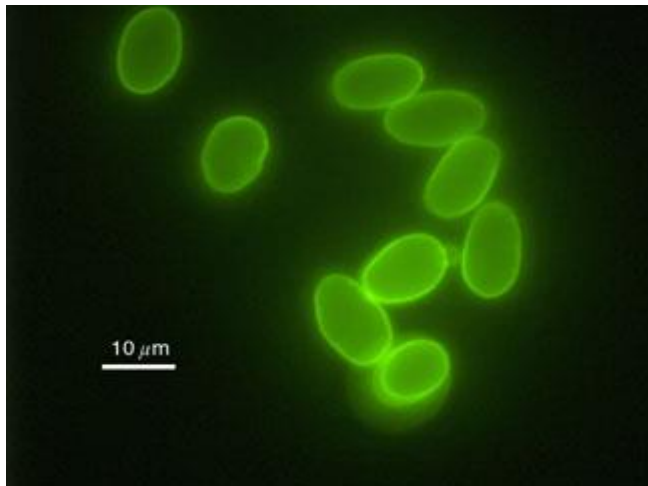
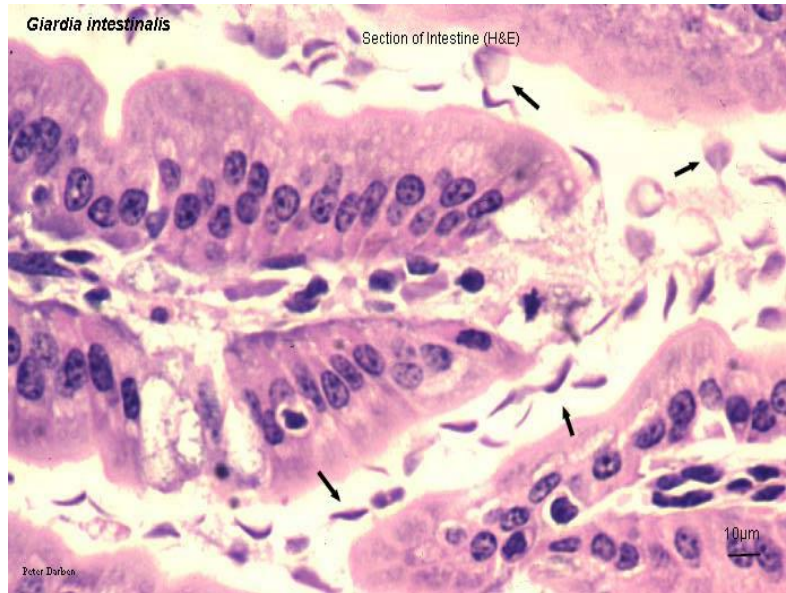
- String test (Enterotest).
- Serological tests:  
Coproantigen detection.

Treatment: **Metronidazole OR Tinidazole**  
**Recently Albendazole.**

Control: **As Amoebiasis.**



# *Giardia lamblia*



# Check for understanding

State True or False

- *G.lamblia* infection is common in children. T
- *G.lamblia* trophozoites are attached to caecal mucosa. F
- *G.lamblia* trophozoites are attached to duodenal mucosa.
- Stool of *Giardia* infected patients contains mucus tinged with blood. Stool is light-coloured and greasy. F
- *Giardia* infected patients complain of diarrhoea and flatulence. T
- Both trophozoites and cysts of *Giardia* are infective to man. Only *Giardia* cysts are infective to man. F

# Case

A young youth took a sandwich in a restaurant. Later, he complained of sudden abdominal pain together with anorexia and **diarrhoea**. Stool analysis revealed protozoan parasite.

a- What are the protozoa that may cause such condition?

*G. lamblia, C.parvum, C.cyaetenensis, I.belli*

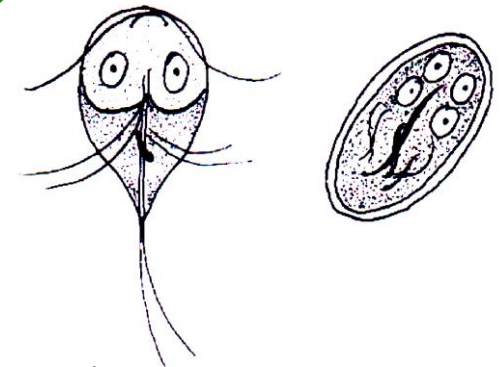
b- If the patient noticed that his stool became light-coloured and greasy, what is the probable causative protozoa?

*Giardia lamblia.*

c- Name the habitat of the parasite in this condition?

Duodenum and upper part of small intestine  
also bile duct and gall bladder.

d- Draw the diagnostic and infective stages?



## *Chilomastix mesnili*

commensal or non pathogenic flagellate of the intestinal tract .

Is cosmopolitan in distribution although found more frequently in warm climates. It is thought to be non-pathogenic although the trophozoite has been associated with **diarrhoeic** stool .

## *Chilomastix mesnili*

This is the largest flagellate found in man with an incidence of 1 %-being in the **large intestine**. this species is approximately the same size as *G. lamblia* **but** has only one nucleus in both the cyst and trophozoite stage .



# Morphology of the Trophozoite

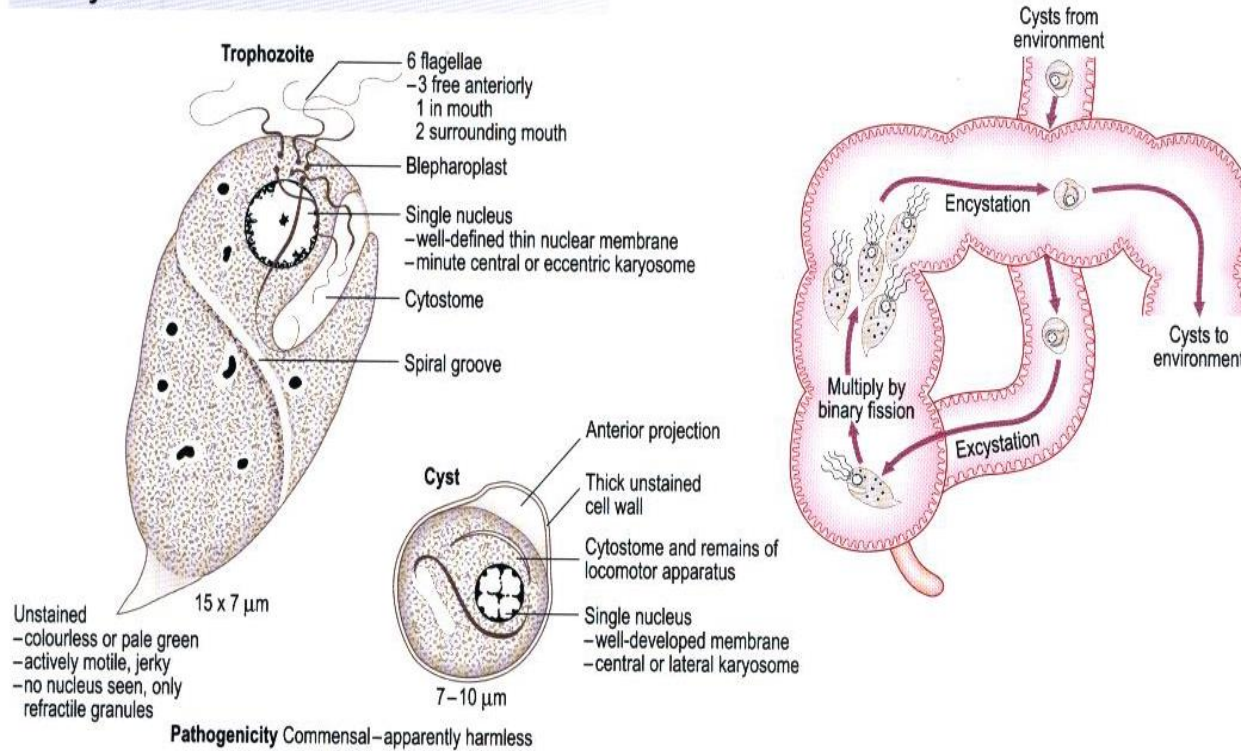
The trophozoites of *C. mesnili* are pear shaped  
. They have large nucleus with a small karyosome  
and flagella that extend from the nucleus at the  
.anterior end of the parasite

-A distinct oral **groove or cytosome** can be seen near the nucleus with its sides being supported by two .filaments

The presence of spiral groove results in a curved posture at the posterior end.They are known to .move in a rotating manner

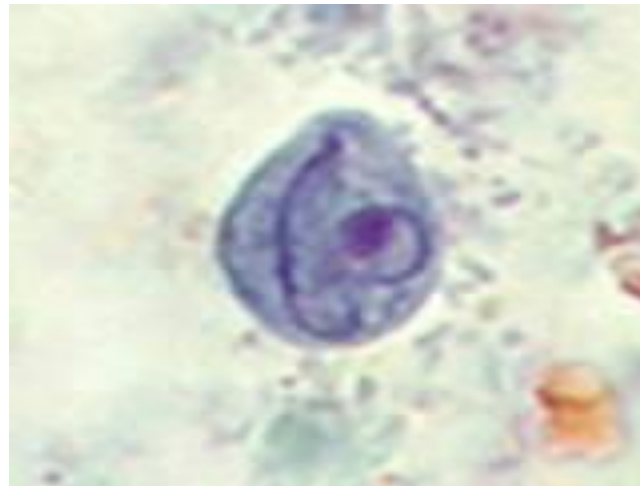
# *Chilomastix mesnili*

## Life cycle



# Cysts Morphology

The cysts are long, they have a large single nucleus with a large karyosome. They also have a prominent side knob giving it a characteristic **lemon** shape. It also has a characteristically coiled filament which when stained is .darker in colour



# Laboratory diagnosis

Routine stool examinations are normally recommended for the recovery and identification of intestinal protozoa. However, in the case of *C. mesnili*, because the organisms are small, a series of several stools may be examined without recovering the organisms. Although cysts characteristic lemon shaped can often be identified on the wet stool preparation

# Treatment

Since *C. mesnili* is nonpathogenic, there would be no treatment. However, if the patient remains symptomatic, it would be important to do additional testing for other possible pathogenic parasites, as well as other causes. In this particular case, the patient's symptoms are probably related to some other cause OR a true parasitic pathogen may be present and has not yet been identified (Example: *Giardia lamblia* .(or *Dientamoeba fragilis*

## ***Dientamoeba fragilis***

Dientamoeba fragilis is a pathogenic protozoan parasite with a world-wide distribution, its a single celled parasite that lives in the large intestine of humans. .In some people it causes gastrointestinal upset while in others it .does not

.

**Di** refers to the two nuclei in the trophozoites. **Ent** ))  
refers to the enteric environment in which the organism  
.is found

The species name **fragilis** refers to the fact that the  
trophozoite stages are fragile; they do not survive long  
.in the stool after leaving the body of the human host

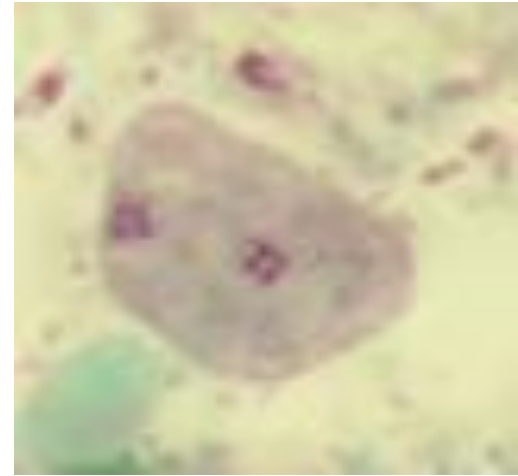
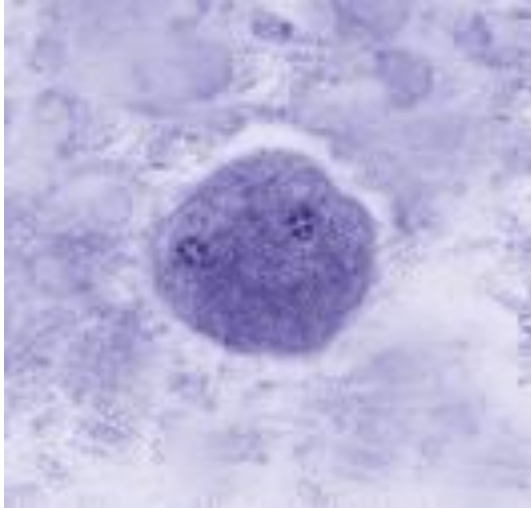
[Dientamoebiasis](#) Infection with *D. fragilis*

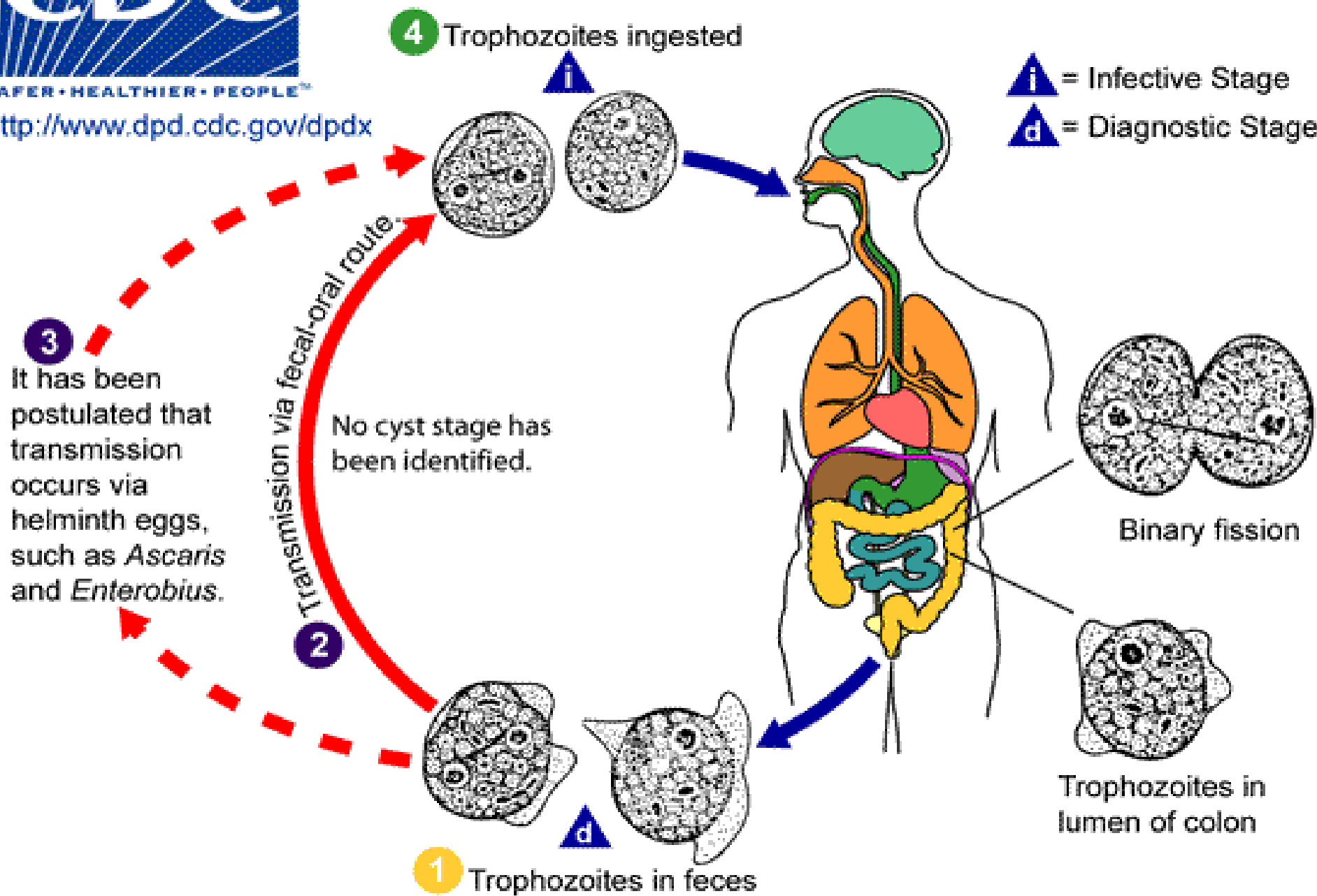


*D. fragilis* is a type of. (Trichomonads are flagellated organisms) but *D. fragilis* lacks flagella, Thus, it is an amoeba of flagellate ancestry.. Although originally described as an amoeboid organism, it has been reclassified as a flagellate, on the basis of a number of electron microscopic and immunological findings. Except for its lack of a flagellum, *D. fragilis* closely resembles *Trichomonas*. a resistant cyst stage has not been demonstrated and it is unlikely that its trophozoites can survive successfully outside ..the human host

◦ Trophozoites of *D. fragilis* have characteristically one or two nuclei  
*fragilis* feeds by .phagocytosis.and moves by pseudopoda, replicates by  
phagocytosis  
that contain vacuoles The cytoplasm typically contains numerous food .  
ingested debris, including bacteria. Waste materials are eliminated  
exocytosis from the cell through digestive vacuoles by

# trophozoite





## **clinical symptoms**

Many infected people do not have any symptoms. The most common symptoms are diarrhea, stomach pain, and stomach cramping. Loss of appetite and weight, nausea, and fatigue also are common. The infection does not spread .from the intestines to other parts of the body

# Treatment

Safe and effective drugs are available. The drug of choice is iodoquinol. Paromomycin, tetracycline, or metronidazole can also be used