

Giardia lamblia

- ***Giardia lamblia*** (syn. *Giardia intestinalis*, *Giardia duodenalis*) is a flagellated unicellular protozoa that commonly causes diarrheal disease throughout the world. It is the most common cause of waterborne outbreaks of diarrhea in the developed countries and is occasionally seen as a cause of food-borne diarrhea.
- **Geographical distribution**
- there is a very high prevalence in developing countries, in certain areas of the world, water contaminated with *G. lamblia* cysts commonly causes travel related Giardiasis in tourists.
- Specific areas of recognized increased risk for travelers include the Soviet Union, Southeast and South Asia, tropical Africa, Mexico, and western South America.

Giardia lamblia

Risk group

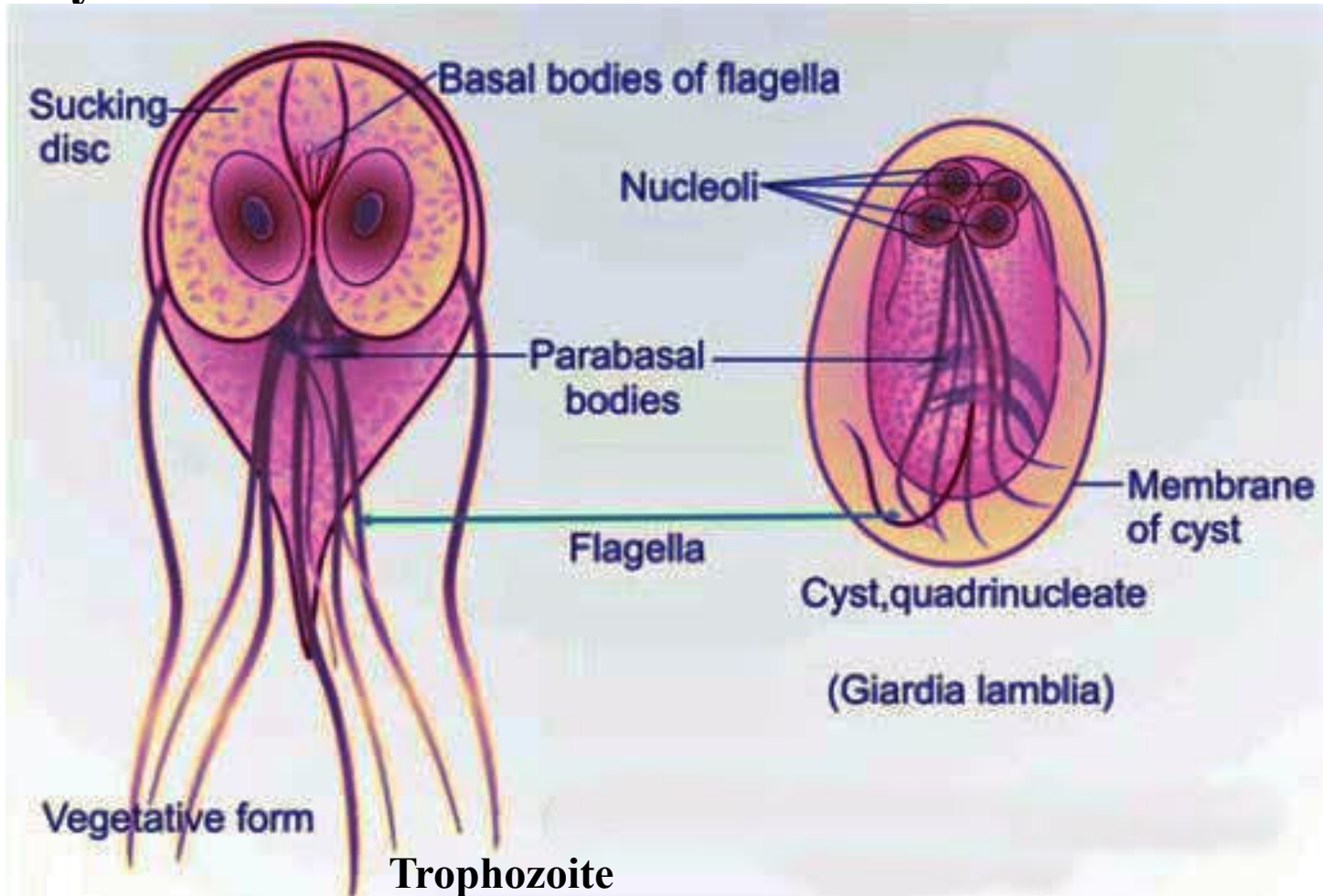
There is a significant risk for children's, travelers in contact with recreational waters used by wildlife, with unfiltered water in swimming pools or with contaminated municipal water supplies.

Transmission

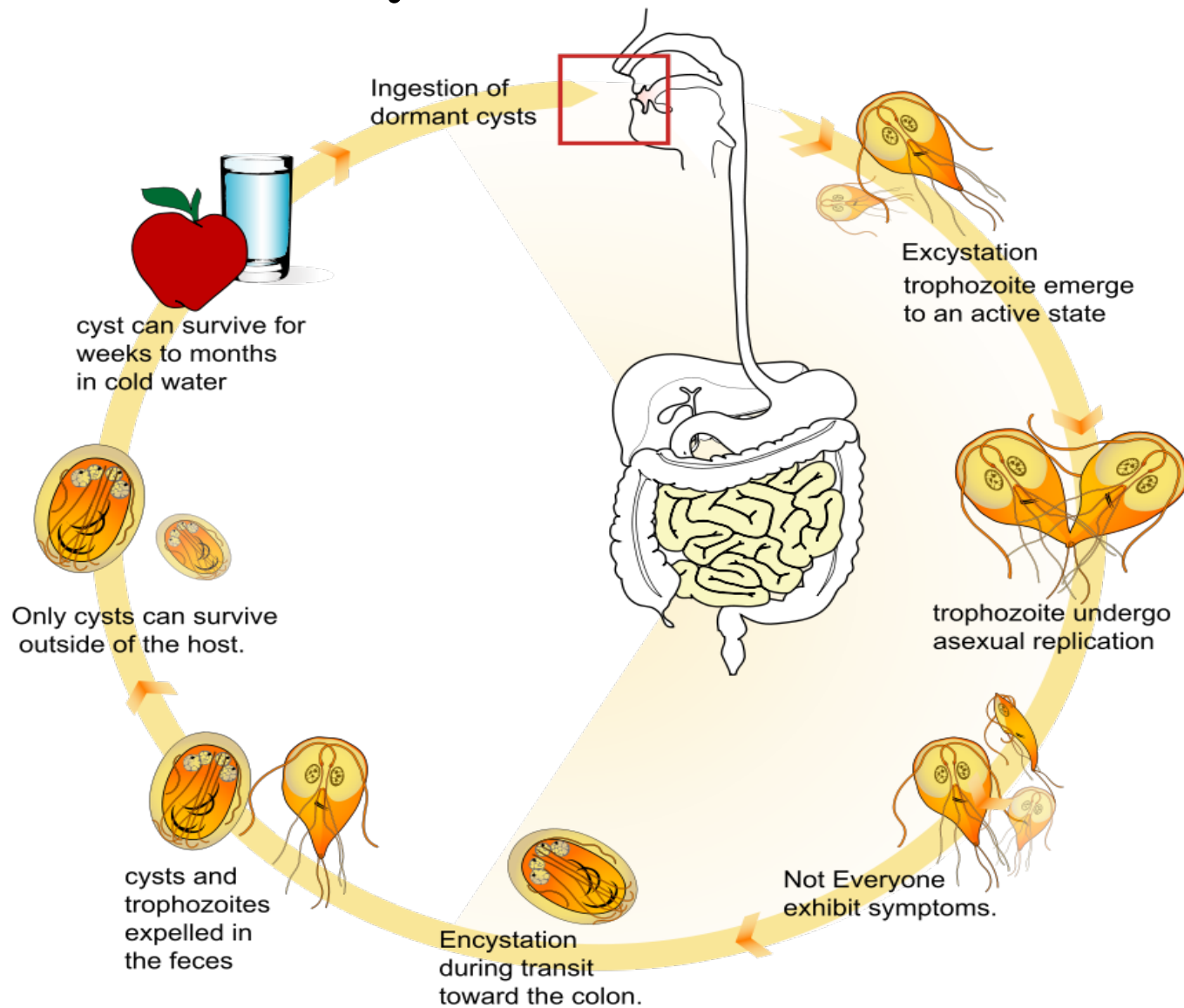
- Transmission occur through ingestion of 100 or more cysts to ensure infection in humans, but ingestion of as few as 10 cysts has resulted in infection in volunteers. Infection is spread directly from person to person by fecal-oral contamination with cysts or indirectly by transmission in water and occasionally food. Cysts also survive in water, for example in fresh water lakes and streams. Giardiasis also has occurred as outbreaks from recreational water sources such as swimming pools, water parks, and hot tubs, most likely because of an infected user rather than a source of water that was contaminated.

Morphology

- *G. lamblia* has two morphological stages: the **trophozoite** and the **cyst**.



Life cycle of *Giardia lamblia*



Life cycle of *Giardia lamblia*

- Cysts are responsible for transmission of Giardiasis. Both cysts and trophozoites can be found in the feces (diagnostic stages). The cysts are hardy and can survive several months in cold water. Infection occurs by the ingestion of cysts in contaminated water, food, or by the fecal-oral route (hands or fomites) . In the small intestine, excystation releases trophozoites (each cyst produces two trophozoites). Trophozoites multiply by longitudinal binary fission, remaining 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.
- The cyst is the stage found most commonly in nondiarrheal feces . Because the cysts are infectious when passed in the stool or shortly afterward, person-to-person transmission is possible. So, life cycle of *Giardia lamblia* continue by transmission from one person to another by consuming contaminated food and water containing cyst.

Pathogenesis

- An adhesive disk on the ventral surface of the trophozoite facilitates attachment to the mucosal surface of the duodenum and jejunum, although the trophozoite does not invade the mucosal epithelium. Trophozoites that do not adhere to the small bowel move forward to the large intestine where they revert to the infectious cyst form; conjugated bile salts appear to foster encystation. Cysts are passed back into the environment in excreted feces; in the setting of diarrhea, trophozoites can also be found in the stool.
- Since Giardia is not an invasive organism, the pathogenesis of diarrhea and malabsorption that can occur in Giardiasis is not fully understood; diarrhea may be a result of both intestinal malabsorption and hypersecretion. The small intestine is the site of the major structural and functional abnormalities associated with Giardiasis. So, due to malabsorption the deficiencies in epithelial brush border enzymes, such as lactase, may develop.

Clinical manifestations

- Symptomatology differs from person to person, depending on such factors as inoculum size, duration of infection, and individual host and perhaps parasite factors. The incubation period generally varies from 9 to 15 days.
- The acute stage usually begins with a feeling of intestinal uneasiness, followed by nausea and anorexia. Low-grade fever and chills may also be early symptoms. Subsequent symptoms may include explosive, watery, foul-smelling diarrhea; marked abdominal gurgling and distention associated with the passage of foul gas; and perhaps belching, with a foul taste.
- During the chronic phase, lassitude, headache, and myalgia may occur with continued weight loss, anorexia, and malabsorption. Chronic infection in children may present as failure to thrive. Urticaria, cholecystitis, and pancreatitis have been reported with Giardia infections.
- The duration of the asymptomatic cyst-passing state has not been determined. In patients with Giardiasis, the hemogram is usually normal and eosinophilia is rare. Malabsorption of fat, glucose, lactose, xylose, vitamin A, and vitamin B12 has been shown in some patients.
- Lactose intolerance, frequently present during infection.

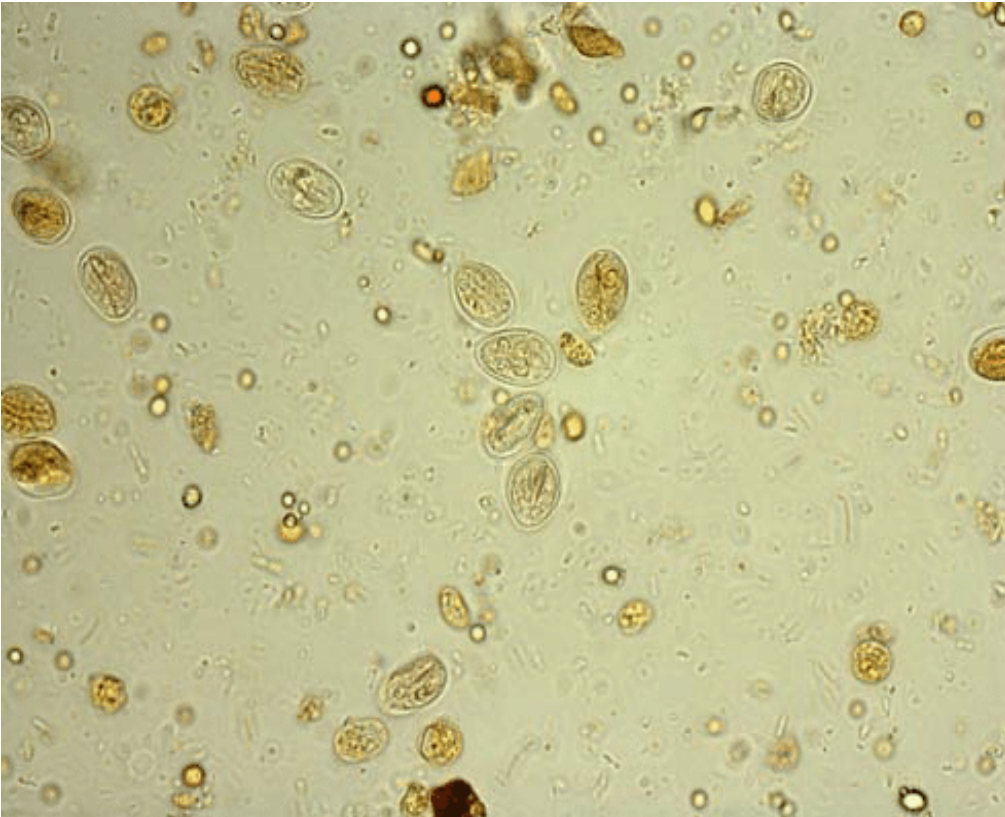
Laboratory diagnosis

- **Macroscopy:**
- Before microscopy, macroscopy study is done in which stool sample colour, odour, consistency etc. are studied.
- **Microscopy**
- Wet mount method was done for the demonstration of trophozoite in freshly collected stool specimen and iodine preparation for the demonstration of cystic form. Concentration (sedimentation and flotation) process may be used.
- Light microscopy may demonstrate no abnormalities, mild or moderate partial villous atrophy, or subtotal villous atrophy in severe cases. An increase in crypt depth may be seen, and microvilli shortening or disruption may occur.

Laboratory diagnosis

- **Antibody and Antigen Detection**
- Serological tests are more helpful for the identification of *G. lamblia* infection that have been used so far involve IHA, counter immune electrophoresis (CIE) , amoebic gel diffusion test , complement fixation (CF) , indirect fluorescence assay(IFA), latex agglutination, and ELISA. Antigen-based ELISA have several significant advantages over other methods currently used for diagnosis of *G. lamblia* .
- **Molecular technique**
- Molecular biology-based diagnosis (PCR) seems to be a modern research tool that may become the technique of choice in the future studies, because establishment of these protozoa in culture is not a routine process and is less sensitive than microscopy in detection.

Microscopy



Trophozoite

Cyst

(Source: <https://www.google.com/search?q=giardia+lambliacyst+and+trophozoites>)

Treatment

- Metronidazole - 5–7 days, Tinidazole : Single dose and Nitazoxanide: 3 days

Prevention and control

- Giardiasis mostly occurred from contaminated water (travelers to developing countries). So, individual should avoid drinking from surface water, such as rivers and streams.
- Contaminated of uncooked foods by contaminated water should be avoided when traveling.
- Boiling water is sufficient to kill Giardia cysts. So, boiling water is safe from protozoal infection.
- During cooking of food, viable cysts are killed. So, eating hot and cooked foods helps to prevent from contamination by infected water or fingers.

References

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