

Giardia lamblia

Giardia lamblia is the most common cause of intestinal parasitic infections. **Giardiasis** is the most common protozoal infection in the Czech Republic (300–400 cases / year) and its incidence increases with decreasing hygienic standards (India, Africa, Rocky Mountains) and with large crowds (kindergartens). It is an intestinal parasite that, unlike *Entamoeba histolytica* is unable to penetrate the mucosa and lives only in the lumen of the small intestine. It is transmitted in an alimentary manner by highly resistant cysts (fecal pollution of drinking water). The incubation period is 7-8 days. It manifests with diarrheal disease. It is an anthroponozoonosis. The most common host is humans, but beavers, pigs, and monkeys can also be infected and serve as a reservoir.^[1]

Morphology

Originator: *Giardia lamblia*. The first element that was seen by the human eye (Antoni van Leeuwenhoek, 17th century). In 1991 it was assumed to be the oldest eukaryotic organism, in 2003 it turned out that this was not the case. It has no mitochondria, only some remnants (no respiratory chain). Completely dependent on external sources of intestine (does not even produce bases). Bile acids are absolutely essential for it.

Trophozoite

Whip vegetative form, active form. 8 flagella, 2 nuclei, ventrally 2 suction discs to attach to enterocytes. 12–15 μm ^[1]. Trophozoites attach to the intestinal mucosa of the Duodenum and jejunum → inflammation → changes.

Cyst

Immobile, 9–12 μm large, ellipsoidal;^[1] Frost-resistant (one of the few), it can be destroyed by drying and boiling (10 min.). It has 4 nuclei, slow metabolism, thick wall (protection against CI).

Life cycle

The infection is most often spread by cyst-contaminated water. One eats a cyst that is resistant to gastric juices. It excysts in the duodenum (the signal for excystation is a change in pH from acidic to neutral) and trophozoites colonize the duodenum and jejunum, where they move freely in the intestinal lumen or attach with suction disks on the sides of the villi. At the interface of the jejunum and ileum, they encyst again, and mitosis occurs during encystation. Cysts are excreted in the feces.^[1]

Life cycle in brief:

Cyst ingestion → excystation in the duodenum → multiplication of trophozoites in the duodenum and jejunum → encystation at the interface of the jejunum and ileum → excretion of cysts in the stool.

Pathogenesis

After multiplication, the giardia cover the entire villi. The microvilli are shortened, vacuolated, damaged (damaged glycocalyx), which causes **deterioration of resorption function** to malabsorption syndrome. Giardia causes malabsorption of sugars (disaccharidases), which causes **osmotic diarrhea** and bloating. It is usually acute in immunocompetent people and chronic in children under 6 years of age. It also destroys trypsin and chymotrypsin, not lipases), resulting in **steatorrhea** and the inability to absorb fat-soluble vitamins. IgA activation (without inflammation, only slows down the multiplication of trophozoites).

The incubation period is 14 days. Bloodless stools, steatorrhea (oily appearance). It is not fatal, it **affects growth in children**. Infants are not at risk, breast milk has lipases that break down lipids. The resulting fatty acids are toxic to the giardia present, which also have nothing to feed on.

Clinical picture

The course is usually asymptomatic or subclinical (but we also find a histological finding and some malabsorption of D-xylose).

Acute phase

Associated with GIT symptoms - watery, smelly diarrhea with flatulence, nausea, anorexia, there is usually no fever. Abdominal pain, weight loss. Stools contain higher amounts of mucus and fat, they do not contain blood.

Subacute and chronic phase

Abdominal discomfort, episodes of diarrhea (foamy stools, rotting stools), flatulence, poor tolerability of fatty and dairy foods. Vitamin B₁₂, malabsorption, disaccharidase deficiency and lactose intolerance. Without treatment, chronic giardiasis develops (up to 50%).

As a result celiac disease may develop.

Diagnostics

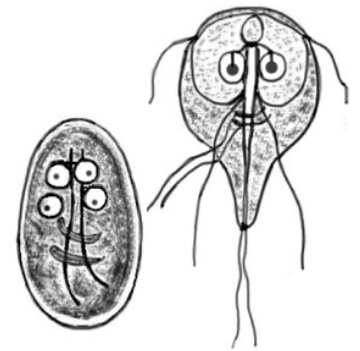
Anamnesis, clinical picture, epidemiology (prolonged diarrhea mainly in children in collective facilities, in persons from asylum institutions and returnees from abroad). Duodenal biopsy - capture of trophozoites.

General diagnosis of intestinal parasites

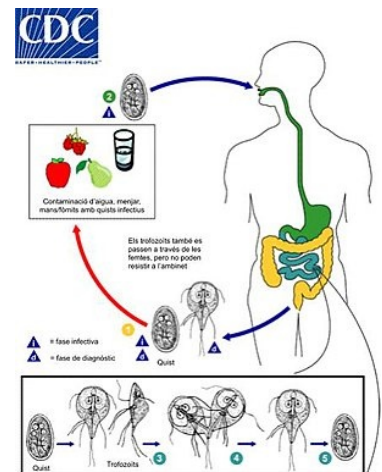
We take 3 samples from the stool, we look for cysts. Giardia makes cysts only occasionally, so we take 3 samples (greater chance of detection). The first cysts appear in the stool about 3–4 weeks after infection.

Therapy

- 5-nitroimidazoles (drug activation by reduction in the microorganism) → drugs specific for anaerobes;
- benzimidazoles (microtubular inhibitors) → flagellar inhibition;
- drugs of choice: metronidazole (Entizol 3 × 2 tablets in 7 days), tinidazole, ornidazole, mebendazole (Vermox), Endiaron;



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Life cycle of *G. lamblia*

- prevention - general - prevention of fecal contamination of food and water, education of children to hygiene.

Links

Related articles

- Gastrointestinal parasitosis

External links

- Microbiology and Immunology on-line (with many pictures) (http://www.sc.edu/study/colleges_schools/medicine/education/basic_science_departments/pathology_microbiology_and_immunology/index.php),
- Parasite Image Library (<https://www.cdc.gov/dpdx/>)
- Giardia lamblia (czech wikipedia)

Sources

- BENEŠ, Jiří. *Studijní materiály* [online]. ©2007. [cit. 2009]. <<http://www.jirben.wz.cz/>>.

Reference

1. Univesity of South Carolina, School of Medicine. *Microbiology and Immunology On-line : PARASITOLOGY* [online]. Poslední revize 2010, [cit. 2010-09-05]. <http://www.sc.edu/study/colleges_schools/medicine/education/basic_science_departments/pathology_microbiology_and_immunology/index.php>.
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