

## *GIARDIA LAMBLIA*

### History and Distribution

This flagellate was observed by Leeuwenhoek (1681) in his own stools and was thus one of the earliest of protozoan parasites to have been recorded. It is named Giardia after Professor Giard of Paris and lamblia after Professor Lambl of Prague who gave a detailed description of the parasite. Worldwide in distribution, it is the most common intestinal protozoan pathogen. Infection may be asymptomatic or cause diarrhoea

### Flagellates

### Morphology and Life Cycle

*G. lamblia* lives in the duodenum and upper jejunum and is the only protozoan parasite found in the lumen of the human small intestine. It occurs in the vegetative and cystic forms

The vegetative form or trophozoite is rounded anteriorly and pointed posteriorly about 15  $\mu\text{m}$  long, 9  $\mu\text{m}$  wide and 4  $\mu\text{m}$  thick. It has been described variously as pyriform, heart-shaped or racket-shaped. Dorsally it is convex and ventrally it has a concave sucking disc which occupies almost the entire anterior half of the body

It is bilaterally symmetrical and possesses 2 nuclei, one on either side of the midline

two axostyles running along the midline, 4 pairs of flagella and 2 sausage shaped parabasal or median bodies lying transversely posterior to the sucking disc (Fig. 4.1) The trophozoite is motile, with a slow oscillation about its long axis, which has

been likened to the motion of a 'falling leaf.' It divides by longitudinal binary fission. It lives in the duodenum and upper part of the jejunum attached by means of the sucking disc to the epithelial cells of the villi and crypts feeding by pinocytosis. Encystation occurs in the colon. The trophozoite retracts its flagella into the axonemes which remain as curved bristles in the cyst. The cyst is ovoid  $\mu\text{m}$  by 8  $\mu\text{m}$  in size and surrounded by a tough hyaline cyst wall. The young cyst contains two and the mature cyst four nuclei situated at one end. Cysts

are passed in stools and remain viable in soil and water for several weeks. There may be up to 2,00,000 cysts present per gram of faeces. In diarrhoeic stools trophozoites also may be present, but they die outside and are not infectious

.Infection is acquired by the ingestion of cysts in contaminated food and water

Infectivity is high, as few as 10 cysts being capable of initiating infection. Within half an hour of ingestion, the cyst hatches out into two trophozoites which multiply successively by binary fission and colonise the duodenum. The trophozoites as they pass down the colon develop into cysts

### **Pathogenesis and Clinical Features**

.G. lamblia is seen typically within the crypts in the duodenum. It does not invade tissues, but remains tightly attached by means of the sucking disc to the epithelial surface in the duodenum and jejunum. This may cause abnormalities of villous architecture. Often no clinical illness results, but in some it may lead to mucus diarrhoea dull epigastric pain and flatulence. The diarrhoea in some cases may be steatorrheic

with excess mucus and fat, but no blood. Children may develop chronic diarrhoea malabsorption, weight loss and a sprue-like syndrome. It has been suggested that enormous numbers of the parasite adhering to the mucosal surface of the small intestine may interfere with absorption. Increased bacterial colonisation of the small intestine has been observed in subjects with giardiasis and steatorrhea. Occasionally giardia may colonise the gallbladder, causing biliary colic and jaundice. The incubation period is variable, but is usually about 2 weeks

### **Diagnosis**

The cysts and trophozoites can be found in diarrhoeal stools. Only the cysts are seen in asymptomatic carriers. Concentration by formalin ethyl acetate or zinc sulphate centrifugal floatation is useful when the cysts are sparse. Duodenal aspiration

may sometimes be necessary to demonstrate the parasite in cases in which biliary symptoms predominate. A useful method for obtaining duodenal specimens is the

enterotest, which uses a coiled thread inside a small weighted gelatin capsule. This is swallowed after attaching the free end of the thread to the cheek. The capsule passes through the stomach to the duodenum. After 2 hours, the thread is withdrawn placed in saline and mechanically shaken. The centrifuged deposit of the saline is examined for giardia ELISA and immunochromatographic strip tests have been developed for detection of giardia antigens in faeces, but are not in routine use. Antibody demonstration is not useful in diagnosis

### **Epidemiology**

The infection is worldwide, especially in children. Endemicity is very high in some areas. Visitors to such places, frequently develop traveller's diarrhoea caused by giardiasis, through contaminated water. Epidemics of giardiasis have been reported on a number of occasions. While ingestion of food and water contaminated with the cysts is the most common mode of infection, direct person-to-person transmission may also occur in children, male homosexuals and the mentally-ill. Enhanced susceptibility to giardiasis is associated with blood group A, achlorhydria, use of cannabis, chronic pancreatitis, malnutrition and immune defects such as IgA deficiency and hypogammaglobulinaemia. HIV infection has not apparently been associated with increased risk of giardiasis

Cats, dogs, cattle, sheep and many wild animals have been found naturally infected

While they are not considered to be responsible for human infection ordinarily instances of giardiasis observed in some remote areas have been claimed to be due to water sources contaminated by such animals. Giardia species infecting birds amphibians and mice can be differentiated from G. lamblia by morphological features

### **Prophylaxis**

Prevention is as for other faecal-oral infections by better personal hygiene and prevention of food and water contamination. Iodine is effective in disinfecting drinking water

## Treatment

Metronidazole and tinidazole are the drugs of choice. Furazolidone is slower in action, but is preferred in children as it has fewer adverse effects. Only cases need treatment symptomatic

## TRICHOMONAS VAGINALIS

### History

*Trichomonas vaginalis* was first observed by Donne (1836) in vaginal secretion

### Morphology and Life Cycle

*T. vaginalis* occurs only as the trophozoite, there being no cystic form in trichomonas

The trophozoite is ovoid or pear-shaped, about 10 to 30  $\mu\text{m}$  long and 5 to 10  $\mu\text{m}$  broad, with a short undulating membrane reaching up to the middle of the body

It has 4 anterior flagella and a fifth running along the outer margin of the undulating

membrane, which is supported at its base by a flexible rod, the costa. A prominent axostyle runs throughout the length of the body and projects posteriorly. The cytoplasm

shows prominent granules which are most numerous alongside the axostyle and costa (Fig. 4.2

It lives in the vagina and cervix in the female, and may also be found in the Bartholin's glands, urethra and even the urinary bladder. In males, it occurs mainly in the anterior urethra, but it may also be found in the prostate and preputial sac

It is motile, with a jerky rapid movement. It divides by binary fission. As cysts are not formed, the trophozoite itself is the infective form

### Culture

It can be grown in a variety of solid and liquid media, in tissue culture and in eggs

.CPLM (cysteine, peptone, liver, maltose) medium is often used

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Pathogenesis

*T.vaginalis* infects selectively squamous and not columnar epithelium. Infection is often

asymptomatic, particularly in the male. In females, it may produce severe pruritic vaginitis with an offensive, yellowish, often frothy discharge. Cervical erosion is common, with endometritis and pyosalpinx as infrequent complications. Dysuria in women is often due to trichomoniasis. Rarely neonatal pneumonia and conjunctivitis have been reported in infants born to infected mothers. In males it may produce urethritis (one type of nongonococcal urethritis). The incubation period is 4 days to 4 weeks

### **Diagnosis**

The trichomonad may be found in sedimented urine and vaginal secretions, in wet films or Papanicolaou smears. Specimens collected on cotton swabs through a vaginal speculum and left for some time in a tube containing 5 per cent glucose saline show better shape and motility on examination. Prostatic massage may sometimes be necessary for detection of the parasite in males. Serological tests like indirect haemagglutination and gel diffusion are available for antibody detection

### **Epidemiology**

*T.vaginalis* infection occurs worldwide, with an annual estimated incidence of 170 million. The trophozoite cannot survive outside the body and so infection has to be transmitted directly from person-to-person. Sexual transmission is the usual mode of infection. Trichomoniasis often coexists with other STDs—candidiasis, gonorrhoea syphilis or HIV infection. Babies may get infected during birth. Fomites such as towels have been implicated in transmission. Prevention is as for other sexually transmitted diseases

### *Treatment*

Metronidazole is the drug of choice. Simultaneous treatment of the sexual partner .is necessary for cure

### *TRICHOMONAS TENAX*

Also known as *T.buccalis*, this is smaller (5 to 10  $\mu\text{m}$ ) than *T.vaginalis*. It is a harmless commensal which lives in the mouth. in the periodontal pockets, carious tooth cavities and less often in tonsillar crypts. It is transmitted by kissing, salivary .droplets and fomites

### *TRICHOMONAS HOMINIS*

This measures 8 to 12  $\mu\text{m}$  and carries 5 anterior flagella and an undulating membrane that extends the full length of the body. It is a very common harmless .commensal of the caecum

### *CHILOMASTIX MESNILI*

This occurs as trophozoites and cysts. The trophozoite is pear-shaped and asymmetric

due to a spiral groove running through the middle of the body. The cysts are lemon shaped. It is a harmless commensal of the caecum

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