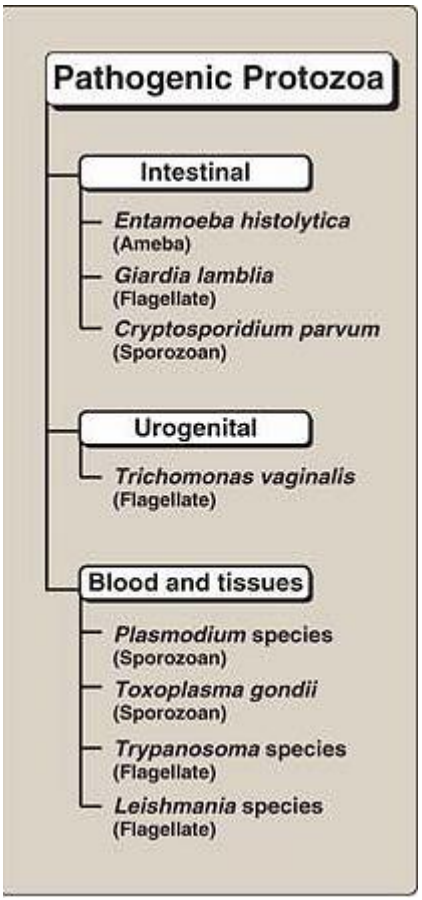
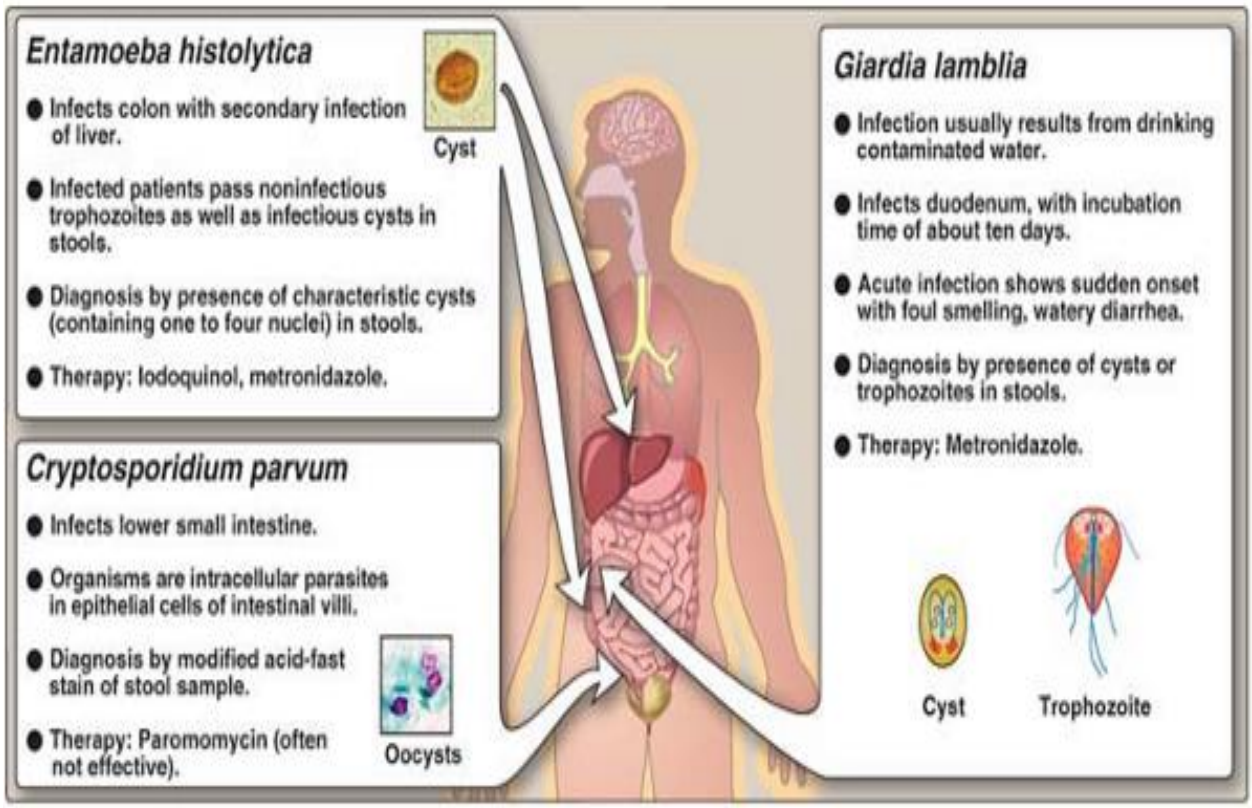
Pathogenic protozoa



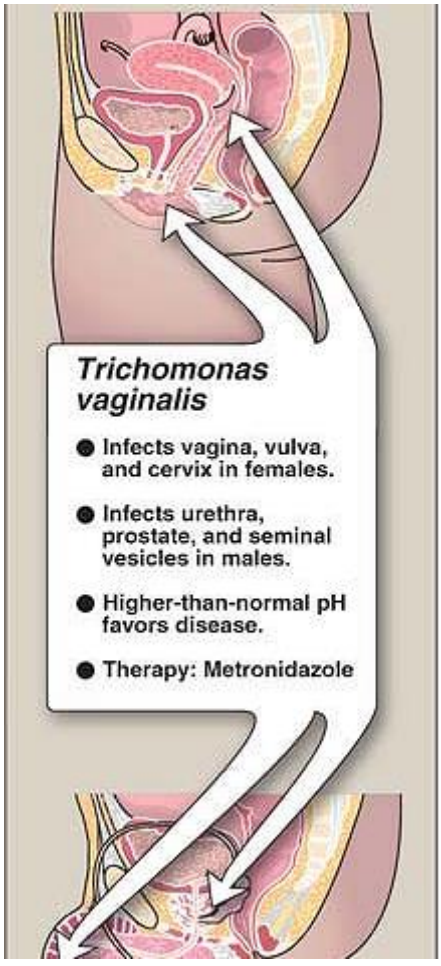


A. **Amebic dysentery (Entamoeba histolytica**)

Ingested cysts from contaminated food or water form trophozoites in the small intestine. These pass to the colon, where they feed on intestinal bacteria, and may invade the epithelium, potentially inducing ulceration. The parasite can further spread to the liver and cause abscesses. In the colon, trophozoites form cysts that pass in the feces (amebic cysts are resistant to chlorine concentrations used in most water treatment facilities). Diagnosis is made by examination of fecal samples for motile trophozoites or cysts. Serologic test kits are useful when microscopic examination is negative. Liver abscesses should be biopsied from the abscess edge where the active amebas accumulate. Mild cases of luminal amebic dysentery are treated with iodoquinol, paramomycin, or diloxanide furoate. More severe cases, including liver infections, are treated with metronidazole (which also has antibacterial activity) in combination with chloroquine and/or diloxamide furoate or emetine.

B. Giardiasis (Giardia lamblia)
Giardia lamblia is the causative agent of Giardiasis. Giardia infections are often clinically mild, although in some individuals, massive infection may inflame and damage the duodenal mucosa. Because the Giardia parasite preferentially inhabits the duodenum, fecal examination may be negative. A commercial immunologic ELISA test to measure Giardia antigen in fecal material has proven useful. Metronidazole is an effective treatment.

C. Cryptosporidiosis (Cryptosporidium species)
Cryptosporidium is an intracellular parasite that inhabits the epithelial cells of the villi of the lower small intestine. The source of infection is often the feces of domestic animals, and farm run-off has been implicated as a source of Cryptosporidium contamination of drinking water. Asymptomatic to mild cases are common, and if the immune system of the patient is normal, the disease usually resolves without therapy. However, in immunocompromised individuals (for example, those with AIDS), infection may be severe and intractable, although paromomycin has provided some improvement. Diagnosis is made by acid-fast staining of the tiny oocysts in fresh stool samples



Urogenital Tract Infections

Trichomoniasis (T. vaginalis)

T. vaginalis is responsible for the most common form of human trichomoniasis In females, it causes inflammation of the mucosal tissue of the vagina, vulva, and cervix, accompanied by a copious, yellowish, malodorous discharge. Less commonly, it infects the male urethra, prostate, and seminal vesicles, producing a white discharge. The optimum pH for growth of this organism is about 6.0; therefore, T. vaginalis does not thrive in the normal, acidic vagina, which has a pH of about 4.0. Abnormal alkalinity of the vagina thus favors acquisition of the disease. Diagnosis is made by detection of motile trophozoites in vaginal or urethral secretions. If the concentration of parasites is too low to be observed directly, laboratory culture can be used to obtain observable organisms. Effective treatment is afforded by metronidazole.

Blood and Tissue Protozoal Infections

Malaria

Malaria is an acute infectious disease of the blood, caused by one of four species of the protozoal genus, Plasmodium. a sporozoan. P. falciparum accounts for some fifteen percent of all malaria cases, and P. vivax for eighty percent of malarial cases.
The plasmodial parasite is transmitted to humans through the bite of a female Anopheles mosquito, or by an infected, blood-contaminated, needle.

Diagnosis and treatment: Diagnosis depends on detection of the parasite inside red blood cells Thick blood smears stained with Giemsa stain provide the most sensitive visual test. [Note: Serologic tests are usually too slow for diagnosis of acute disease.

Drug treatment depends on the stage of infection. Primaquine is effective against the exoerythrocytic forms in the liver and bloodstream and also against the gametocytic form, but inactive against parasites in red blood cells. Therefore, for the erythrocytic form, primaquine is administered in conjunction with a blood schizontocide such as chloroquine, quinine, artemisinin, mefloquine, or pyrimethamine. All species may develop drug resistance

Toxoplasmosis

Toxoplasma gondii is a sporozoan, distributed worldwide, that infects all vertebrate species, although the definitive host is the cat. Humans can become infected by the accidental ingestion of oocysts present in cat feces, by eating raw or undercooked meat, congenitally from an infected mother, or from a blood transfusion.

Infections of normal human hosts are common and usually asymptomatic. However, they can be very severe in immunocompromised individuals, who may also suffer relapse of the infection. Congenital infections can also be severe, resulting in stillbirths, brain lesions, and hydrocephaly, and they are a major cause of blindness in newborns.

Diagnosis and treatment: The initial diagnostic approach involves detection of parasites in tissue specimens, but this may often be inconclusive. With the recent availability of commercial diagnostic kits, serologic tests to identify toxoplasma are now routinely used. These include tests for Toxoplasma-specific IgG and IgM. The treatment of choice for this infection is the antifolate drug pyrimethamine, given in combination with sulfadiazine.

Trypanosomiasis

Trypanosomiasis refers to two chronic, eventually fatal, diseases (African sleeping sickness and American trypanosomiasis) caused by several trypanosome species.

- African sleeping sickness is caused by the closely related flagellates, Trypanosoma brucei gambiense or Trypanosoma brucei rhodesiense . These parasites are injected into humans by the bite of the tsetse fly, producing a primary lesion or chancre. The organism then spreads to lymphoid tissue and reproduces extracellularly in the blood. Later, the parasite invades the central nervous system (CNS), causing inflammation of the brain and spinal cord, mediated by released toxins. This inflammation produces the characteristic lethargy and, eventually, continuous sleep and death
- American trypanosomiasis (Chagas disease), caused by Trypanosoma cruzi, occurs in Central and South America. Unlike African forms of the disease, infection is not transmitted by insect bite, but rather by insect feces contaminating the conjunctiva or a break in the skin.

Diagnosis and treatment: Diagnosis of African trypanosomiasis is made primarily by detection of motile trypanosomes in Giemsa-stained smears of body fluids (for example, blood, cerebrospinal fluid, and lymph node aspirates). Highly specific serologic tests are also available, that are often used for diagnostic confirmation. Early-stage African trypanosomiasis is treated with suramin or pentamidine. Melarsoprol is used in late-stage disease when the CNS is involved. American trypanosomiasis is treated with nifurtimox, but the drug's effectiveness is limited.

Leishmaniasis

Leishmaniasis refers to a group of infections caused by the flagellate protozoa of the genus Leishmania. About half a million new cases are reported each year, and it is estimated that 12,000,000 people are currently infected with this parasite. There are three clinical types of leishmaniasis: cutaneous, mucocutaneous, and visceral.

Transmission to humans is by the bite of a sandfly of the genus Phlebotomus or Lutzomyia.

Cutaneous leishmaniasis (local name, oriental sore): This disease is caused by *Leishmania tropica* in north and west Africa, Iran, and Iraq. The cutaneous form of the disease is characterized by ulcerating single or multiple skin sores.

Mucocutaneous leishmaniasis (local name, espundia): This disease is caused by *Leishmania viannia* brasiliensis in Central and South America, especially the Amazon regions. In this form of the disease, the parasite attacks tissue at the mucosal-dermal junctions of the nose and mouth, producing multiple lesions. Extensive spreading into mucosal tissue can obliterate the nasal septum and the buccal cavity, ending in death from secondary infection.

Visceral leishmaniasis (local name, kala-azar): This disease is caused by Leishmania donovani in India, East Africa, and China. In the visceral disease, the parasite initially infects macrophages, which, in turn, migrate to the spleen, liver, and bone marrow, where the parasite rapidly multiplies. The spleen and liver enlarge, and jaundice may develop. Most individuals have only minor symptoms, and the disease may resolve spontaneously. However, in some cases, complications resulting from secondary infection and emaciation result in death

Diagnosis and treatment: Diagnosis is made by examination of Giemsa-stained tissue and fluid samples for the nonflagellated form (amastigote), which is the only form of the organism that occurs in humans and other mammals.. The treatment of leishmaniasis is difficult because the available drugs have considerable toxicity and high failure rates. Pentavalent antimonials, such as sodium stibogluconate, are the conventional therapy, with pentamidine and amphotericin B as second-line agents.