**Micro Protozoa Review**

**Entamoeba Histolytica.** EH is an ameboid protozoa that effects the GI tract causing a **bloody, dysentery diarrhea.** It is transmitted fecal-oral or oral-anal. The **cyst form is ingested** which activates to the **trophozoite form,** reproduces, and shed cysts into feces. They infect the colon forming **flask-shaped abscesses** leading to blood and mucus in the diarrhea. Cysts have **8 nuclei** and can often be seen **containing Red Blood Cells** on a wet mount of the stool. If the trophozoites penetrate the GI barrier, they can go systemic and infect lungs, heart, and liver, most often forming liver abscesses. Treat this with metronidazole and iodoquinol.

**Naegleria Fowleri.** Not a Tulane organism. This causes encephalitis. It crawls in through your nose while you are swimming in fresh water ponds, penetrates the CNS via the cribiform plate, and is highly fatal. Ponds and Lakes close very year due to Naegleria related deaths. It is highly fatal, but scanty infectious. You will try Amphotericin B, but it probably won’t work.

**Giardia Lamblia.** This is a **flagellated protozoa** that effects the GI tract. It is transmitted fecal-oral, oral-anal, or with contaminated water supplies. For a Board Question Stem, it almost always involves a hiking trip and drinking without treating the water from stream or lake. It is a **pear-shaped organism with a pair of nuclei** and a **suction disk.** That disk adheres to the mucosal surface of the small intestine, preventing absorption, particularly of fat. This causes an **osmotic diarrhea** resulting in a **foul smelling fatty diarrhea.** Treat this with metronidazole and quinacrine hydrochloride.

**Trichomonas Vaginalis.** This is a **urogenital flagellated protozoa** that has **no cyst form.** Because it has no cyst form, it is vulnerable to the environment. Therefore, it is transmitted only as an **STD** or during the birthing process. It is an **oval shaped organism with 4 anterior flagella** exhibiting jerky movements on wet mount. It causes a foul-smelling **watery greenish-yellow vaginal discharge,** sometimes with itching and burning. It is generally asymptomatic in men, but may cause prostatitis or urethritis. Treatment is metronidazole for **both symptomatic partner and asymptomatic partner.**
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**Balantidium Coli.** Not a Tulane organism.. Targets colon, causes ulceration, leads to bloody diarrhea. Treat this with tetracycline or iodoquinol.

**Cryptosporidium Parvum.** This is a sporozoan protozoan that effects the GI tract. It causes a self-limiting watery diarrhea in immunocompetent patients. In immunocompromised patients it can cause massive fluid loss warranting fluid replacement. This organism is used to highlight life cycles. The oocyst is ingested, which activates in the stomach, forming trophozoites. These trophozoites colonize the epithelium, wrap themselves in a fusion of epithelium, coated in a double-membrane but remain extracytoplasmic (outside the cell but outside the external environment and NOT in an endosome). There they divide to become merozoites. Merozoites are released and infect more cells, forming more merozoites. Soetimes merozoites become gametozoites which initiate sexual reproduction. Fertilized zygotes become oocysts that are excreted in the stool, completing the life cycle. There is no treatment except for fluid replacement, though paromycin may help the diarrhea.

**Leishmania.** There are four different species of Leishmania, a sporozoan protozoan that effects tissue and blood. All forms are transmitted by the sandfly with many animals serving as reservoirs. *L. Donovanii* is the worst kind of leishmania and is referred to as visceral leishmanias where, after invasion of macrophages that carried to visceral organs, L Donovanii causes nausea, vomiting, chills, fever, and hepatosplenomegaly. *L. Braziliensis* (from Brazil) causes a deforming mucocutaneous disease deforming the nose and palate. *L. Tropica* and *L. Mexicana* are fairly benign, causing an ulceration at the bite site. Treat with sodium stibogluconate and don’t get bit by a sandfly!

**Trypanosoma Brucel.** There are two forms of this flagella that effects tissue and blood. They are the cause of West and East African Sleeping Sickness. “Rodhesia is in the east, Gambia is in the west.” *Rhodesiense* strain is in the west and central Africa, and is not nearly as acute or rapidly progressive as the eastern, or *Gambiense* strain. Both strains are transmitted by the tsetse fly. They cause African Sleeping Sickness characterized by an ulcer at the bite site with a cyclic fever (early sign), and posterior cervical lymph node enlargement. The disease can lead to demyelinating encephalitis which can lead to coma and death. The only parasitic form in humans is the flagellated trypomastigote (*trypo* “flagellated” mastigote “protozoan” bizarre terminology). Treatment for the disease is suramin or pentamidine.

**Trypanosoma Cruzi.** The American form of trypanosoma is not nearly as deadly as the African species. It is also a flagellated protozoa that infects tissue and blood, but is spread by the kissing bug, reduviid bug. It causes trypanosomiasis (Chagas Disease) which is characterized by an erythmatous chagoma on the face or around the eyes where the bite occurred. Patient will experience chills, fever, lymphadenopathy, and hepatosplenomegaly. In severe cases, it progresses to Myocarditis, megacolon, or megaesophagus. Treat with nifurtimox. Both the amastigote (unflagellated) and trypomastigote (flagellated) can cause infection.

**Toxoplasma Gondii.** This is a sporozoan that effects the blood and tissue. Transmission occurs through eating undercooked meat containing cysts, through cat feces, or placental spread. This is why pregnant moms should avoid litter boxes, especially in their immunocompromised 3rd trimester. Most infections are asymptomatic. *Acute Disease resembles mono. Congenital disease* ranges from CNS
abnormalities to stillbirth. Treat with Pyrimethamine and Sulfadiazine to treat reactivation and congenital disease. Once infected, macrophages allow dissemination and colonization that may remain for years.

**Plasmodium Species.** Causes Malaria. It is a Sporozoa that affects tissue and blood. The *definitive vector* is the *Anopheles Mosquito*. The sexual cycle (called sporogony) occurs in the mosquito host while the asexual cycle (called schizogony) occurs in the human intermediate host. When the mosquito bites you, the plasmodium is injected into the bloodstream and gets into hepatocytes. There a *schizont* (shiz-ohnt) is formed that releases thousands of merozoites into the bloodstream, where the merozoites infect RBCs. Certain species of plasmodium can form *hypnozoites* that remain *latent in the liver for years*. Malaria is a cyclic disease with three stages. (1) Shaking Chills, (2) Fever, (3) Sweats. Other symptoms include hepatosplenomegaly and anemia. The symptoms, or *paroxysms*, are caused by red blood cell lysis and subsequent release of more merozoites.

There are four species that are annoyingly similar to one another. Know that Vivax and Ovale can remain latent and affect reticulocytes (baby RBCs). Also know that Falciparum is the worst form of the disease, effects all RBCs, and requires the addition of Primaquine because of Chloroquine resistance. Malariae is in the middle.