

LEISHMANIA TO TAPEWORMS

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8:00-8:50 AM - Friday, September 7, 2007

LEARNING OBJECTIVES

1. For *Leishmania*, understand the difference between visceral, cutaneous and mucocutaneous disease
2. For *Schistosoma*, know the differences between *S. mansoni* and *S. haematobium*
3. Understand the difference in acquisition of the pork and beef tapeworms, and cysticercosis due to pork tapeworm

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| Required Reading: | <i>Leishmania</i> | 721-723 |
| | <i>Trichomonas</i> | 703-704 |
| | <i>Schistosoma</i> | 749-753 |
| | <i>Taenia</i> | 754-756 |

Leishmania species, Leishmaniasis

Required Reading: *Leishmania* 721-723

Leishmaniasis is typically a zoonotic disease. The reservoir hosts include rodents and dogs. *Leishmania* species reside intracellularly in macrophages of the dermis (cutaneous disease) and reticuloendothelial system (visceral disease). Host tissue destruction is due to release of toxic molecules from dying macrophages. In general there are considered to be four species complexes that correlate with geographical distribution and disease pattern –there are exceptions to the generalization. The *Leishmania donovani* group causes visceral disease in the old world; the variant *L. infantum* is dominant in young children in the Mediterranean area and South America. *L. major* group is associated with Old World cutaneous disease, and *L. mexicana* with New World cutaneous disease. *L. brasiliensis* causes cutaneous and mucocutaneous disease in the New World.

Epidemiology: Found in the Tropics. High risk includes the military (a substantial number of cases have been reported from soldiers in Iraq) and travelers.

Transmission: Sandflies (*Phlebotomus* in Old World and *Lutzomyia* in New World) are vectors of the disease. Infection is established by injection of Promastigote stage into mammalian host; transmission occurs by ingestion of amastigote stage in blood or infected macrophages.

Diagnosis: Cutaneous leishmaniasis is evident from surface lesions and travel history. Visceral leishmaniasis patients show symptoms that must be distinguished from malaria: fever, chills, sweating. Other symptoms include coughing, diarrhea, enlargement of spleen and liver, and weight loss.

Intracellular amastigotes are detected in lesion touches/biopsy or in enriched white cell populations.

Complications: *Leishmania donovani* produces a generalized immunosuppression and death often results from secondary infections. After apparent cure of *Leishmania brasiliensis* there can be reactivation of parasite in mucous membranes giving rise to Mucocutaneous leishmaniasis, which is disfiguring and can be lethal.

Prevention: Control of reservoir host hosts and insect repellants.

Treatment: Pentavalent antimonials, e.g. stibogluconate

***Trichomonas vaginalis*, Trichomoniasis, Vaginitis**

Required Reading: *Trichomonas* 703-704

Sexually-transmitted disease. Trophozoite stage is found in urogenital system, vagina and urethra in women; urethra, seminal vesicles and prostate in men (no cyst-like transmission stage). ~50% of women show symptoms – vaginitis (inflammation of epithelium), itching, discharge and painful urination. Most men are asymptomatic.

Epidemiology: 200 million infections worldwide; 2-3 million cases reported in US.

Transmission: STD

Diagnosis: Culture or smear of vaginal discharge.

Complications: Infertility; gateway to HIV infection.

Treatment: Metronidazole is usually effective, however some drug resistance is emerging.

***Schistosoma* species, Schistosomiasis/Bilharzia**

Required Reading: *Schistosoma* 749-753

Schistosomiasis is caused by infection with the blood fluke (Trematode – or flatworms that are not segmented). Adults live in the portal veins. *Schistosoma mansoni* is found in the superior mesenteric veins and *Schistosoma japonicum* in the inferior mesenteric veins. *Schistosoma hematobium* is found in the uterine plexus next to the bladder. Schistosomes lay 300-3000 eggs per day for up to 35 years. The pathology is due to host responses to eggs trapped in the host.

Epidemiology: 200 million infections worldwide in 70 countries mainly in the tropics.

Transmission: Infection by direct penetration of skin by larval stage. Eggs are passed into fresh water in feces (*Schistosoma mansoni* and *Schistosoma japonicum*) or urine (*Schistosoma hematobium*). Snails are intermediate hosts.

Diagnosis: Eggs in feces or urine. Species designation made on placement of small spine on egg.

Complications: Granulomas in intestine, liver and bladder are caused by immune reaction to trapped eggs.

Treatment: Praziquantel is effective

***Taenia* species, Tapeworms**

Required Reading: *Taenia* 754-756

Taenia saginata and *Taenia solium* are the Beef and Pork tapeworms (Cestodes – segmented worms). Adults of both live in the small intestine of the human host. They lay copious amounts of eggs that are passed in the feces, as are detached proglottids (segments).

Epidemiology: Worldwide where raw meat is eaten. *T. solium* is more prevalent in Mexico, South America, India, Southeast Asia and China. In Southern California, cysticercosis is found predominantly in immigrants from the above areas.

Transmission: Adult worms develop from larval stages present in undercooked meat. Humans are refractory to infection by ingestion of *T. saginata* eggs. In contrast ingestion of *T. solium* eggs leads to development of cyst form in human tissues.

Diagnosis: Seizures in cysticercosis stage.

Eggs look similar for both worms. Species differentiation is made on the number of uterine branches in the proglottid: *T. solium* has less (<12) than *T. saginata*. Cysticercosis is diagnosed by MRI and CT scans.

Complications: Ingested eggs of *T. solium* develop into larval cysts (Cysticercosis) in brain, eye and other organs.

Prevention: Cooking meat adequately. Good after-toilet hygiene in the case of *T. solium*.

Treatment: Praziquantel is effective against both.

Other parasites not covered:

Trematodes:

Fasciolopsis buski 744-746; intestinal fluke

Fasciola hepatica 746-747; liver fluke

Opisthorcis sinensis 746-747; liver fluke

Paragonimus westermani 747-749; lung fluke

Cestodes:

Diphyllobothrium latum 757-758; fish tapeworm

Echinococcus granulosus 759-760; dog tapeworm