

1. Helminths

Helminths

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2. helminths: case 1 slide 1

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- a 19 year female presented to her primary care physician with dysuria.
- she was otherwise well, but had noted intermittent burning upon urination for several months. she denied fever, back pain or blood in the urine.
- she was a native of Ghana but had lived in the united states for the last 10 years. she was not sexually active.

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3. helminths: case 1 slide 2

helminths: case 1 slide 2

- her examination was unremarkable.
- urinalysis revealed red blood cells, white blood cells, but no bacteria. a urine culture was negative.
- she was given a course of TMP/SMX with no improvement in her symptoms or the results of repeat UA
- similar results after several courses of ciprofloxacin

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4. helminths: case 1 slide 3

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- a voiding cystourethrogram was unremarkable
- a cystoscopy was performed and irregular “sandy” mucosal lesions were noted
- a biopsy was obtained....

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5. helminths: case 1 slide 4

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- schistosomiasis
- trematode
- *Schistosoma hematobium* (Africa-Nile River, Middle East), *S. mansoni* (Africa, Middle East, Caribbean-PR, S. America), *S. japonicum* (China, Indonesia, Phillipines)
- snail is the **intermediate** host, human is the **definitive** host
- infection is acquired through the skin while bathing in fresh water
- one of the unforeseen environmental impacts of river dams

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6. helminths: case 1 slide 5

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clinical manifestations:

- cercarial dermatitis: pruritic papular rash after **swimming**, 24 hours after exposure, "swimmer's itch"
 - acute schistosomiasis: (1-2 months): fever, chills, cough, headache, lymphadenopathy, hepatosplenomegaly = Katayama fever
 - chronic schistosomiasis: result of chronic inflammatory response to parasite eggs, granuloma of intestine, liver, GU tract
- diagnosis: stool or urine sample for eggs, serology

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7. helminths: case 1 slide 6

helminths: case 1

Bilharzia named after Theodor Bilharz who initially described the disease in 1851.

See image at
<http://www.bio.davidson.edu/people/midorcas/GISclass/GISwebsites/grayson/warningsign.jpg>

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8. helminths: case 2 slide 1

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- 42 year old man presents to the emergency room with right upper quadrant abdominal pain, fever and chills
- the pain began several weeks ago and was exacerbated by eating, fever and chills for 3 days
- he was a native of El Salvador and immigrated to the US 2 years ago

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- significant findings on examination are fever, jaundice and right upper quadrant tenderness
- laboratory findings are leukocytosis, elevated bilirubin, alkaline phosphatase and hepatic transaminases
- Could a parasite be causing his illness? What parasite is likely?

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Diagnostic imaging, such as ultrasound and MRCP might be used. These are possible findings.

dilated CBD with echogenic focus

MRCP with filling defect in CBD

See images at <http://www.eurorad.org/case.cfm?uid=1502>

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11. helminths: case 2 slide 4

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- *Ascaris lumbricoides*
- most common human helminth infection, worldwide distribution
- humans definitive host, soil reservoir
- fecal-oral, poor sanitation
- clinical manifestations: pneumonitis (weeks-months), obstructive symptoms, months to year(s)

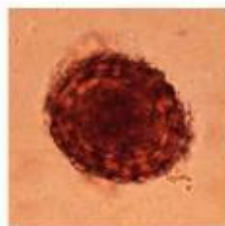
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unfertilized *Ascaris* egg



fertilized *Ascaris* egg



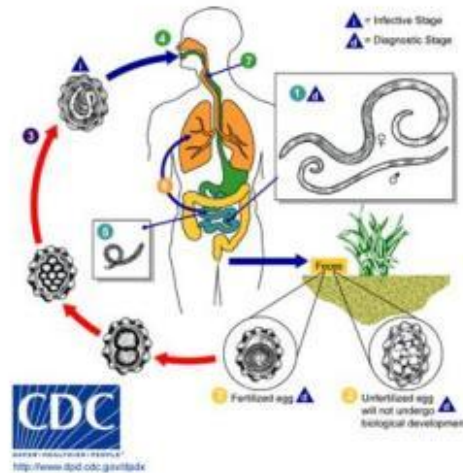
adult *Ascaris* worm

http://www.dpd.cdc.gov/dpdx/HTML/ImageLibrary/Ascariasis_il.htm

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14. helminths: case 3 slide 1

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- 50 year old male presents to his primary care physician with diffuse muscle aches, abdominal pain and fever
- approximately 3 weeks prior the patient had traveled to France and (inadvertently?) eaten horse meat
- on physical examination, there was fever and one significant finding..

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- laboratory studies were significant for elevated CPK (creatinine phosphokinase) and peripheral blood eosinophilia
- What is the likely diagnosis? How would you confirm it?

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www.dpd.cdc.gov/dpdx/HTML/Trichinellosis.htm

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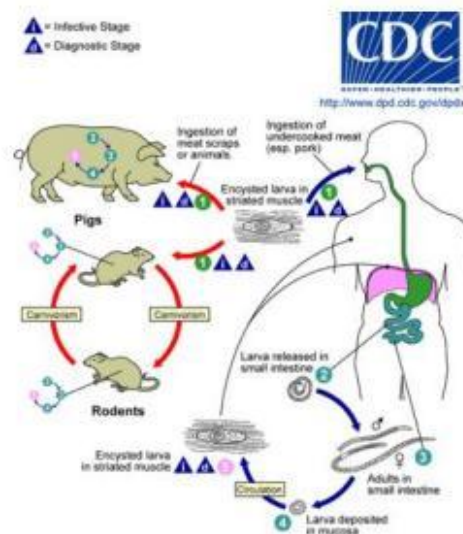
- *Trichinella spiralis*, other *Trichinella spp.*
- zoonotic nematode, endemic in carnivorous animals
- endemic in wild game, infections seen in hunters eating inadequately cooked meat
- infection acquired by eating muscle contaminated with cysts
- enteral phase 7 days after ingestion, migration of larvae into small intestine
- migration of newborn larvae into striated muscle forming nurse cell (parenteral phase)

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- a 4 year old girl recently adopted from China is found by her pediatrician to have anemia
- on evaluation she is found to have significant iron-deficiency and peripheral eosinophilia
- Which parasite is most likely causing her disease? How would you make the diagnosis?

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http://www.dpd.cdc.gov/dpdx/HTML/ImageLibrary/Hookworm_ii.htm

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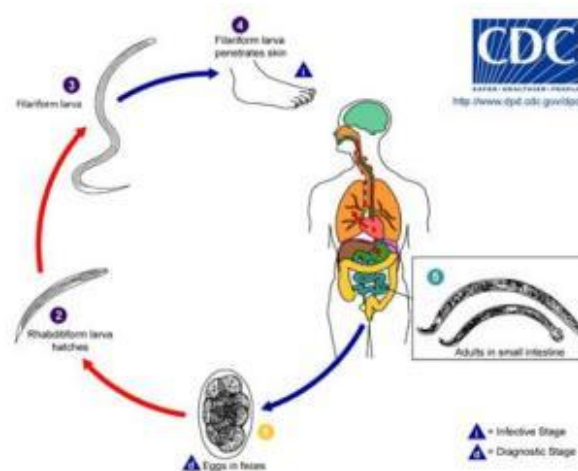
- hookworm; *Ancylostoma duodenale* and *Necator americanus*
- endemic infection in impoverished countries with temperate climates, Asia, Africa and S. America (190 million people in China alone, 44 million pregnant women)
- second most common helminth infection in humans
- significant cause of morbidity worldwide; children, pregnancy

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- filariform larvae penetrate skin, "ground itch"
- *A. duodenale* can also infect through fecal-oral route
- arrested development of *A. duodenale*
- larval migration to lungs (eosinophilic pneumonia) coughed and swallowed
- adult worm migrates to intestine, cutting apparatus, anticoagulant (factor VIIa/TF inhibitor), worm feeds on blood
- clinical manifestations: acute-abdominal pain, chronic-anemia (more severe with *A. duodenale*)

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helminths: case 5 slide 1

- 34 year old female presents to the ED with new onset of seizures
- the patient is a member of an orthodox Jewish community in New York City
- several other members of the community had recently presented with similar symptoms
- she had not traveled outside the US nor eaten (presumably) undercooked pork
- What could be an infectious cause of the patients disease? How would you make the diagnosis?

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See Abstract:

Schantz PM, Moore AC, Munoz JL, Hartman BJ, Schaefer JA, Aron AM, Persaud D, Sarti E, Wilson M, Flisser A.
Neurocysticercosis in an Orthodox Jewish community in New York City.
N Engl J Med. 1992 Sep 3;327(10):692-5.

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- neurocysticercosis
- systemic form of the pork tapeworm, *Taenia solium* (a cestode)
- worldwide distribution
- Humans are the definitive host
- ingestion of tissue cysts from inadequately cooked pork or eggs from stool or contaminated vegetation (or person-person)

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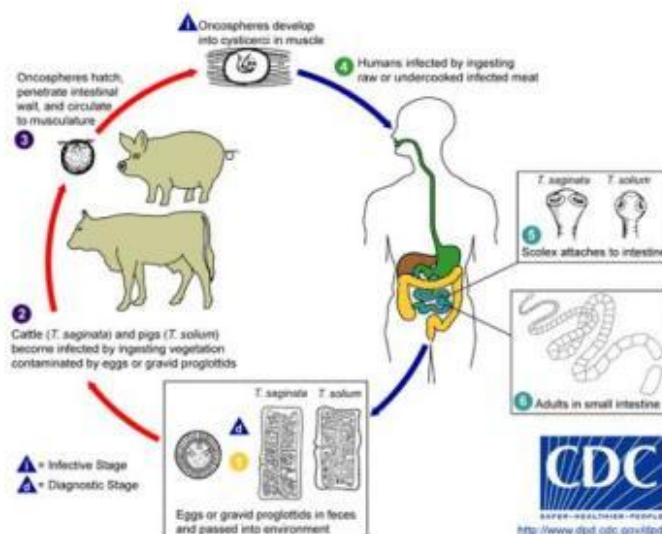
- After ingestion of the egg, oncospheres hatch and disseminate to CNS, eye, muscle
- After ingestion of the cysticerci (tissue form) the cysts evaginate and scolex attaches to intestine wall, mature worm in 1-3 months

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helminths: case 6 slide 1

- A 42 year old male presents to his primary care doctor's office because of a chronically enlarged scrotum
- The patient is a native of Indonesia and emigrated to the US 20 years ago
- the swelling is not painful
- He also notes intermittent that his urine is "milky"
- on exam he is noted to have a hydrocele

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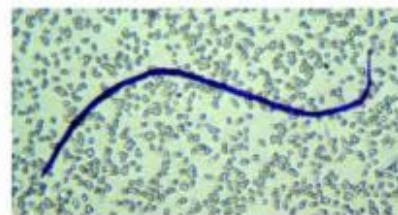
30.

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Thin smear of blood,
hematoxylin stain



Thick smear of blood,
Giemsa stain

<http://www.dpd.cdc.gov/dpdx/HTML/Filariasis.htm>

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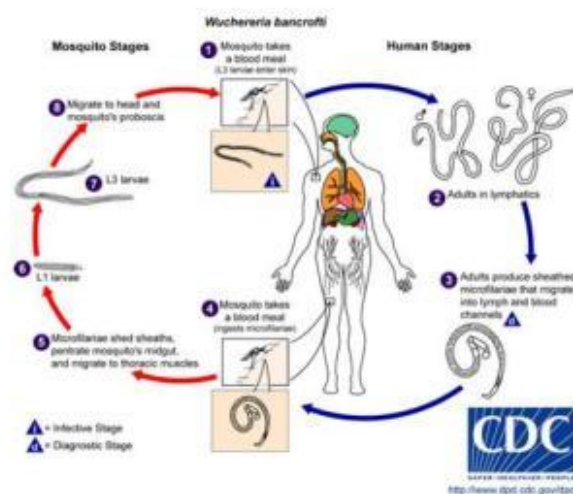
- filariasis, probably caused by *Wuchereria bancrofti*
- humans are definitive host, arthropods particularly mosquito are intermediate host (vector)
- mosquito bite inoculates host with larvae which travel to lymphatics
- larvae mature into adult worms over years, mate and release microfilariae which are taken up by mosquito

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- most infections are asymptomatic
- acute adenolymphangitis: post auricular, inguinal, with associated fever, retrograde inflammation, 24 hours after infection
- lymphedema ; chronic manifestation, upper>lower extremities, hydrocele, chyluria
- tropical pulmonary eosinophilia; chronic recurrent asthma, increased peripheral eosinophilia

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