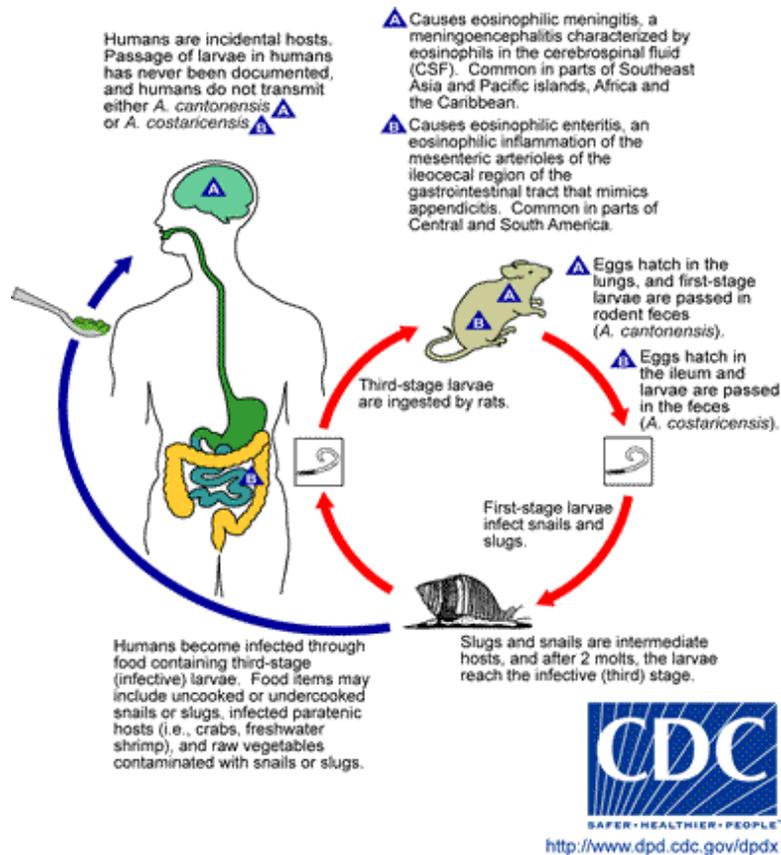


## Eosinophilic meningitis

Parasitic diseases are common among tourists returning to their own countries, immigrants from areas with highly endemic infection and immunocompromised people. Physicians and clinical laboratory personnel need to be aware of where these infections may be acquired, their clinical presentations and methods of diagnosis and should advise travelers how to prevent infection.

**ETIOLOGY:** **Eosinophilic meningitis** is a well-known disease where the rat lungworm, *Angiostrongylus cantonensis* is endemic. Its life cycle involves snails, slugs or fish as intermediate hosts and rodents as definitive hosts. Infected rats pass immature forms of the worm in their feces. Snails and slugs get infected by eating infected rat feces. The young forms of the parasite mature in snails and slugs but do not become adult worms. The life cycle of the parasite comes full circle when rats eat infected snails or slugs and the immature parasites become adult worms.

Humans are accidental hosts where the worm migrates but does not reach maturity. Infection occurs by eating poorly cooked or raw fish, slugs, snails or vegetables contaminated by infected rat.



Life-cycle of A) *Angiostrongylus cantonensis* and B) *Angiostrongylus costaricensis*

**EPIDEMIOLOGY:** *Angiostrongylus cantonensis* is a nematode parasite that inhabits the pulmonary arteries and heart of rodents. Rats are the principal host, and several species of land snails and slugs are the intermediate host. Important paratenic hosts are fresh water shrimp, crabs and fish. Modes of transmission in humans include ingestion of the intermediate hosts by man, such as raw fish, undercooked shrimp or crab, snails and fresh leafy vegetables contaminated by snail slime trails containing larvae.

*Angiostrongylus cantonensis* is endemic in the Pacific Islands, Southeast Asia (Vietnam, Thailand, Malaysia, China, Indonesia, Taiwan, the Philippines) and Central America (the Caribbean islands). Cases have also been reported in Japan, Australia and Africa, and occasionally outbreaks are observed in travelers returning to North America. ***Angiostrongylus cantonensis* is the most common cause of human eosinophilic meningoencephalitis worldwide.** The incubation period varies from 2-30 days from ingestion of an infected animal. Person to person transmission is non-existent.

**CLINICAL MANIFESTATION:** The parasitic worms are neurotropic in man, and the diagnosis should be considered in any adult or child, who presents, in endemic areas or areas with suitable intermediate hosts, with severe unrelenting headache, neck stiffness, vomiting, visual disturbances, photophobia, nuchal rigidity, hyperesthesia or paresthesia. Low-grade fever and an elevated cerebrospinal fluid (CSF) opening pressure are additional signs.

**DIAGNOSIS:** Angiostrongyliasis is diagnosed by a history of exposure, cerebrospinal fluid finding and serology. Eosinophils in the cerebral spinal fluid suggest the diagnosis. Eosinophilia (at least 10% eosinophils in the total white cell count in CSF or an eosinophil count of at least  $0.6 \times 10^9/L$  in peripheral blood) may also be observed, although not necessarily on initial laboratory testing. Blood shows pleocytosis with eosinophilia.

CSF protein is marginally elevated with normal sugar level. CT scan is usually normal. MRI may show prominence of Virchow-Robin spaces, periventricular hyperintense T2 signals and enhancing subcortical lesions. Proton beam MR spectroscopy may show decreased choline in the lesions. Diagnosis is confirmed by demonstrating the larva from central nervous system and by Western blot analysis to identify the presence of antibodies against *A. cantonensis* in either the acute or convalescent phase of the illness.

**TREATMENT:** Treatment is mainly supportive analgesics to relieve pain and repeat CSF tap to relieve symptoms of headache. Steroid therapy without specific antihelminthic therapy is effective in control of symptoms. A recent study showed that a combination of albendazole and prednisolone for two weeks was safe and effective in the treatment of eosinophilic meningitis. The prognosis is generally good. Most symptoms resolve within weeks and long term sequel is rare.

Simple analgesia is sufficient for mild cases. Those with severe headaches that do not respond to analgesics may be candidates for repeated lumbar punctures and corticosteroid treatment. Additional tests, such as CT and MRI scanning, may also be indicated.

**PREVENTION:** There is no vaccine to prevent this infection. The usual advice concerning protection against diarrheal disease should also protect travelers against *A. cantonesis*. In particular, travelers are advised to avoid eating fresh produce, such as lettuce, that may have been contaminated by snails or slugs. Thorough cleaning does not always eliminate the larvae. Undercooked or raw mollusks should also be avoided. Prawns, fish and crabs should be boiled for 3–5 minutes or frozen at  $-15^{\circ}\text{C}$  for 24 hours to kill the larvae. If you handle snails or slugs, wear gloves and wash your hands.

### **Abdominal angiostrongyliasis**

*Angiostrongylus costaricensis* (Parastrongylus) is the causal agent of abdominal, or intestinal angiostrongyliasis. *Angiostrongylus costaricensis* is endemic in Central and South America. Abdominal angiostrongyliasis has been reported from Costa Rica, and occurs most commonly in young children. Abdominal angiostrongyliasis mimics appendicitis, with eosinophilia.