

Ancylostoma duodenale

Eukarya

Misc CDC parasites

Overview

Brief Summary

The human hookworms include the nematode species *Ancylostoma duodenale* and *Necator americanus*. A larger group of hookworm species normally infecting non-human animals can invade and parasitize humans or can penetrate the human skin--causing cutaneous larva migrans--but do not develop any further. Hookworm is the second most common human helminthic infection (after ascariasis) and among the most common chronic infections in the world, affecting around three quarters of a billion people in the tropics and subtropics, particularly in China and sub-Saharan Africa (deSilva et al. 2003). Hookworm species are worldwide in distribution, mostly in areas with moist, warm climates. Both *N. americanus* and *A. duodenale* are found in Africa, Asia, and the Americas. *Necator americanus* predominates in the Americas and Australia, while only *A. duodenale* is found in the Middle East, North Africa, and southern Europe.

Eggs are passed in the stool and under favorable conditions (moisture, warmth, shade), larvae hatch in 1 to 2 days. The released rhabditiform larvae grow in the feces and/or the soil and after 5 to 10 days (and two molts) they become filariform (third-stage) larvae that are infective. These infective larvae can survive 3 to 4 weeks in favorable environmental conditions. On contact with the human host, the larvae penetrate the skin and are carried through the blood vessels to the heart and then to the lungs. They penetrate into the pulmonary alveoli, ascend the bronchial tree to the pharynx, and are swallowed. The larvae reach the small intestine, where they reside and mature into adults. Adult worms live in the lumen of the small intestine, where they attach to the intestinal wall with resultant blood loss by the host. Most adult worms are eliminated in 1 to 2 years, but longevity may reach several years. Some *A. duodenale* larvae, following penetration of the host skin, can become dormant (in the intestine or muscle). In addition, infection by *A. duodenale* probably also occurs by the oral and transmammary route. *Necator americanus*, however, requires a transpulmonary migration phase. Iron deficiency anemia (caused by blood loss at the site of intestinal attachment of the adult worms) is the most common symptom of hookworm infection and can be accompanied by cardiac complications. Gastrointestinal and nutritional/metabolic symptoms can also occur. In addition, local skin manifestations ("ground itch") can occur during penetration by the filariform (L3) larvae and respiratory symptoms can be observed during pulmonary migration of the larvae.

(Primary source: Centers for Disease Control Parasites and Health website)

Loukas et al. (2006) discussed the need for and prospects of developing a human hookworm vaccine. Hotez et al. (2004) provide a broad review of issues related to human hookworm infection.

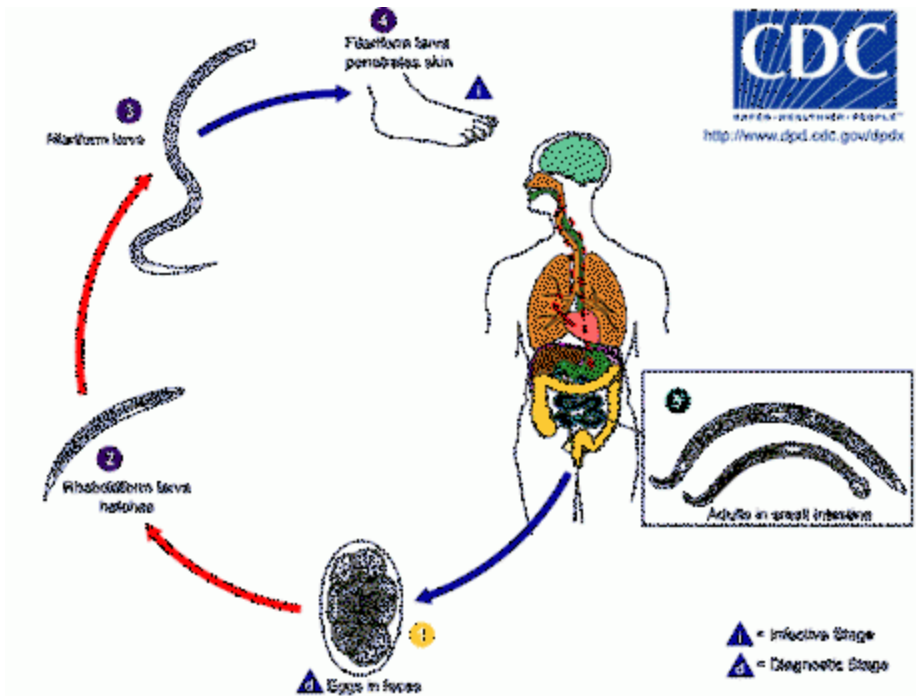
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References

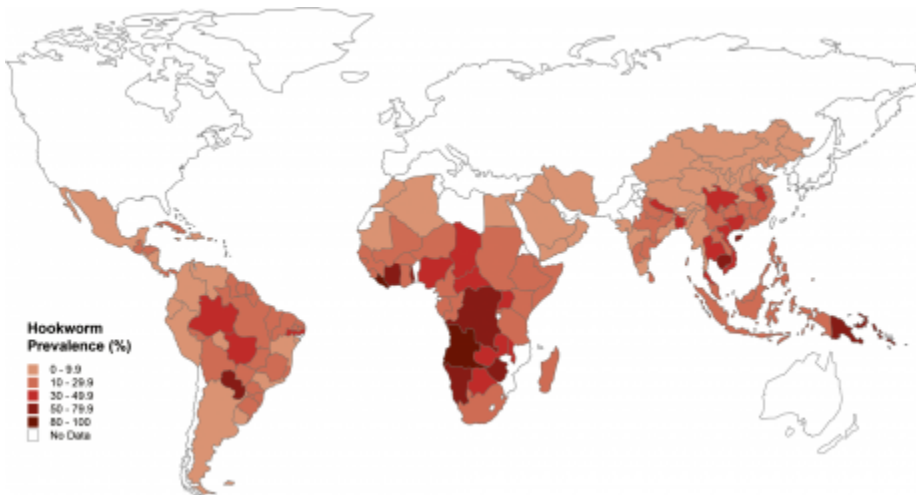
- Brooker, S. (2010). Estimating the global distribution and disease burden of intestinal nematode infections: Adding up the numbers - A review. *International Journal for Parasitology*. 40(10), 1137 - 1144.
- Chan, M. - S. (1997). The global burden of intestinal nematode infections - Fifty years on. *Parasitology Today*. 13(11), 438 - 443.
- de Silva, N. R., Brooker S., Hotez P. J., Montresor A., Engels D., & Savioli L. (2003). Soil-transmitted helminth infections: updating the global picture. *Trends in Parasitology*. 19(12), 547 - 551.
- Hotez, P. J., Brooker S., Bethony J. M., Bottazzi M E., Loukas A., & Xiao S. (2004). Hookworm Infection. *New England Journal of Medicine*. 351(8), 799 - 807.
- Loukas, A., Bethony J., Brooker S., & Hotez P. (2006). Hookworm vaccines: past, present, and future. *The Lancet Infectious Diseases*. 6(11), 733 - 741.



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Life cycle of the human hookworms *Ancylostoma duodenale* and *Necator americanus*

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Global Distribution of Human Hookworm Infection

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