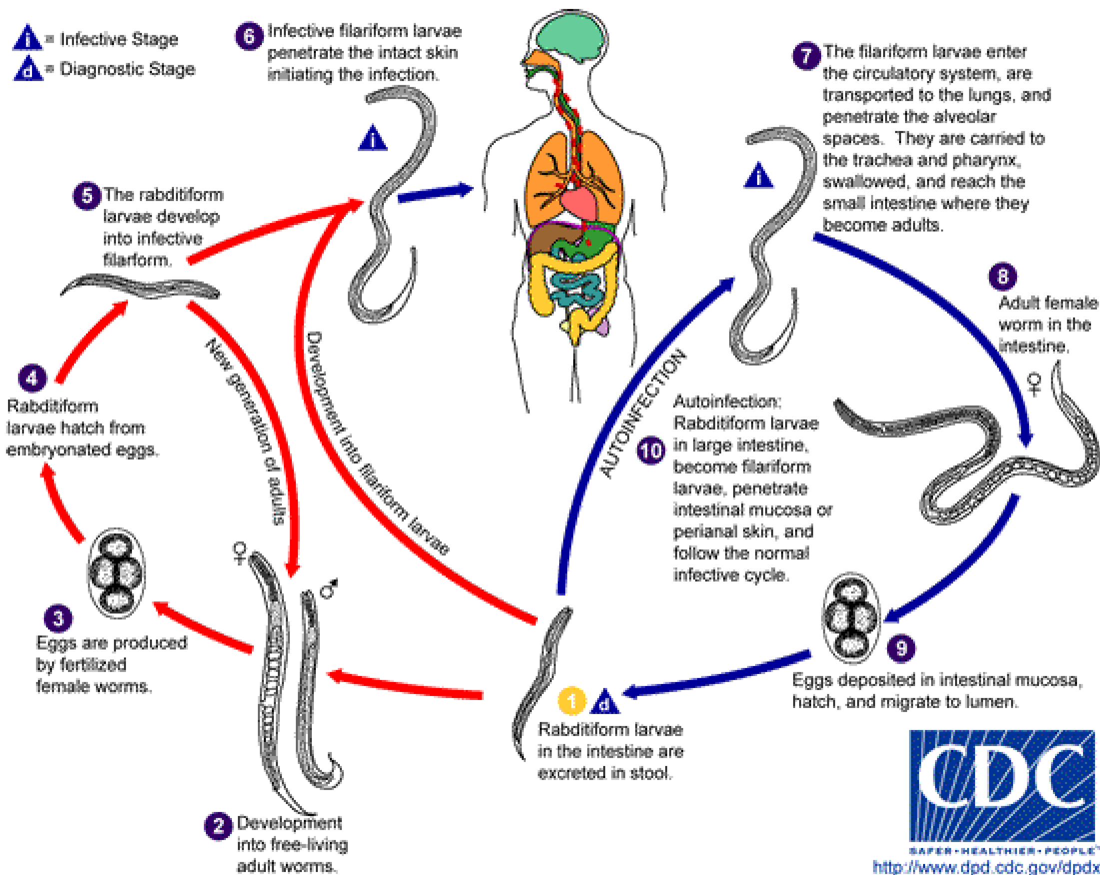
Strongyloidiasis

Causal Agent:

The nematode (roundworm) *Strongyloides stercoralis*. Other *Strongyloides* include *S. fülleborni*, which infects chimpanzees and baboons and may produce limited infections in humans.

Life Cycle:



The *Strongyloides* life cycle is more complex than that of most nematodes with its alternation between free-living and parasitic cycles, and its potential for autoinfection and multiplication within the host. Two types of cycles exist:

Free-living cycle: The rhabditiform larvae passed in the stool ❶(see "Parasitic cycle" below) can either molt twice and become infective filariform larvae (direct development) ❻or molt four times and become free living adult males and females ❷that mate and produce eggs ❸from which rhabditiform larvae hatch ❹. The latter in turn can either develop ❺into a new generation of free-living adults (as represented in ❷), or into infective filariform larvae ❻. The filariform larvae penetrate the human host skin to initiate the parasitic cycle (see below) ❻.

Parasitic cycle: Filariform larvae in contaminated soil penetrate the human skin ❻, and are transported to the lungs where they penetrate the alveolar spaces; they are carried through the bronchial tree to the pharynx, are swallowed and then reach the small intestine ❼. In the small

intestine they molt twice and become adult female worms 8. The females live threaded in the epithelium of the small intestine and by parthenogenesis produce eggs 9, which yield rhabditiform larvae. The rhabditiform larvae can either be passed in the stool 1 (see "Free-living cycle" above), or can cause autoinfection 10. In autoinfection, the rhabditiform larvae become infective filariform larvae, which can penetrate either the intestinal mucosa (internal autoinfection) or the skin of the perianal area (external autoinfection); in either case, the filariform larvae may follow the previously described route, being carried successively to the lungs, the bronchial tree, the pharynx, and the small intestine where they mature into adults; or they may disseminate widely in the body. To date, occurrence of autoinfection in humans with helminthic infections is recognized only in *Strongyloides stercoralis* and *Capillaria philippinensis* infections. In the case of *Strongyloides*, autoinfection may explain the possibility of persistent infections for many years in persons who have not been in an endemic area and of hyperinfections in immunodepressed individuals.

Geographic Distribution:

Tropical and subtropical areas, but cases also occur in temperate areas (including the South of the United States). More frequently found in rural areas, institutional settings, and lower socio-economic groups.

Clinical Features:

Frequently asymptomatic. Gastrointestinal symptoms include abdominal pain and diarrhea. Pulmonary symptoms (including Loeffler's syndrome) can occur during pulmonary migration of the filariform larvae. Dermatologic manifestations include urticarial rashes in the buttocks and waist areas. Disseminated strongyloidiasis occurs in immunosuppressed patients, can present with abdominal pain, distension, shock, pulmonary and neurologic complications and septicemia, and is potentially fatal. Blood eosinophilia is generally present during the acute and chronic stages, but may be absent with dissemination.

Laboratory Diagnosis:

Diagnosis rests on the microscopic identification of larvae (rhabditiform and occasionally filariform) in the stool or duodenal fluid. Examination of serial samples may be necessary, and not always sufficient, because stool examination is relatively insensitive.

The stool can be examined in wet mounts:

- directly
- after concentration (formalin-ethyl acetate)
- after recovery of the larvae by the Baermann funnel technique
- after culture by the Harada-Mori filter paper technique
- after culture in agar plates

The duodenal fluid can be examined using techniques such as the Enterotest string or duodenal aspiration. Larvae may be detected in sputum from patients with disseminated strongyloidiasis.

Diagnostic findings

- Microscopy
- Antibody detection
- Morphologic comparison with other intestinal parasites

Treatment:

The drug of choice for the treatment of uncomplicated strongyloidiasis is ivermectin with albendazole* as the alternative. All patients who are at risk of disseminated strongyloidiasis should be treated.

*This drug is approved by the FDA, but considered investigational for this purpose.