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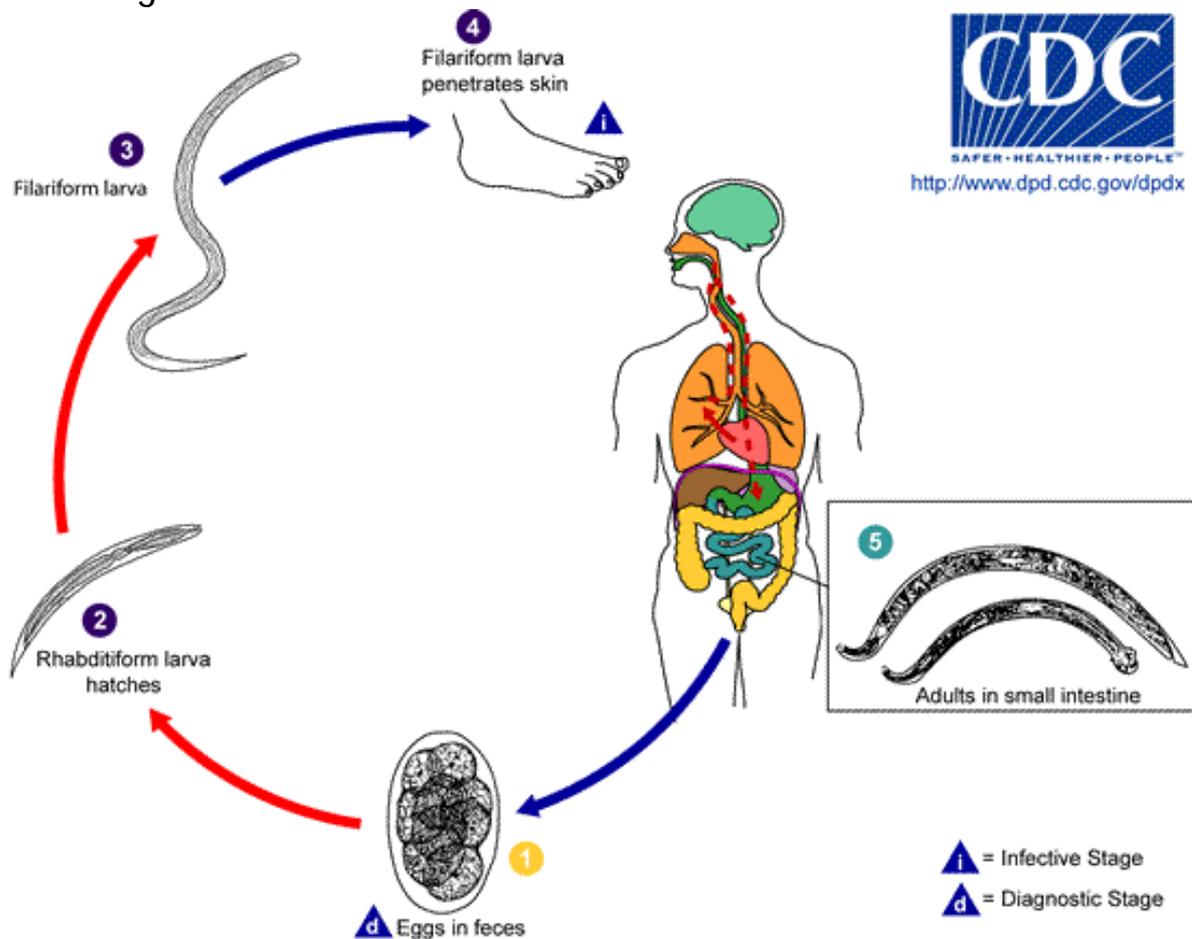
Hookworms in dogs.

The adult worms live by sucking blood from the intestine.

There are no specific symptoms or signs of hookworm infection. They give rise to a combination of intestinal inflammation and progressive iron/protein-deficiency anemia.

Diagnosis depends on finding characteristic **worm eggs on microscopic examination of the stools, although this is not possible in early infection.**

Early signs of infection in most dogs include limbular limping and anal itching.



Short introduction and summery.

Hookworms are one of the most common types of worms in dogs. There are four different veins of hookworms, but they are all essentially the same. Hookworms can infect a dog; by burrowing through the host's skin or by being ingested.

Hookworms can also infect unborn puppies through the mother's uterus or new-born puppies through the mother's milk.

Hookworms live in the small intestine and feed off the blood of the host, quickly causing anemia and stunting the growth of puppies.

As the disease progresses, your dog may experience;

Vomiting

Diarrhoea

Coughing
Pneumonia
Death.

(*Ancylostoma caninum*, *Ancylostoma braziliense*, *Uncinaria stenocephala*)

The hookworm is a common internal parasite in puppies.

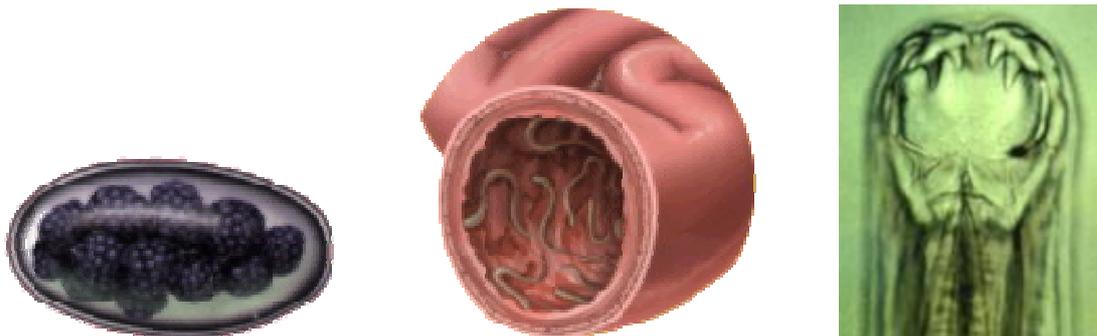
Hookworm infection has several special features that are of interest to us as the caretakers of dogs.

Hookworms (particularly *Ancylostoma caninum*) suck blood.

Hookworms can be transmitted to unborn pups.

Hookworms can infect humans.

Hookworm eggs Hookworms in intestines Adult hookworm



Life cycle of the hookworm.

How does the infection occur and the parasite lives?

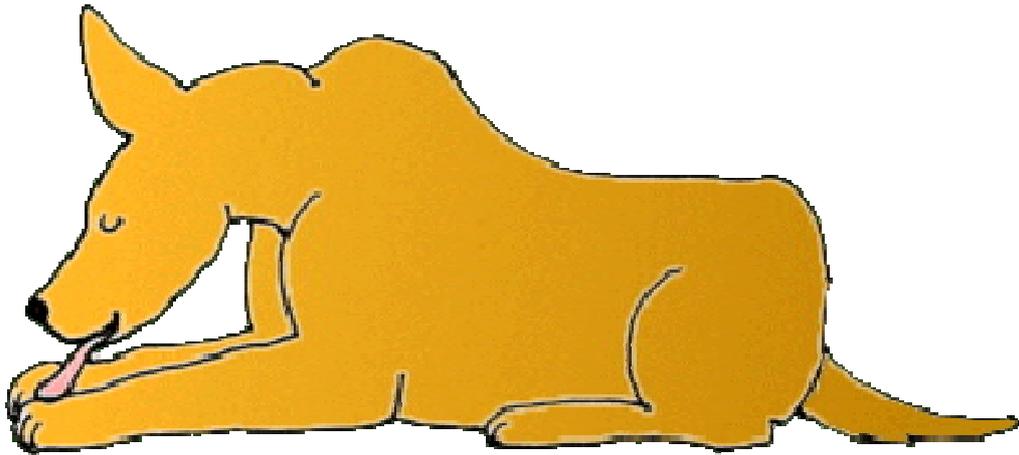
The adult hookworm lives in the small intestine of its host (the infected puppy or dog) where it hangs on to the intestinal wall using its 6 sharp teeth.

Unlike other worms that simply absorb the digested food through their skin as it passes by, the hookworm feeds by drinking its host's blood.

The adult worm lives and mates within the host's intestine and ultimately, the female worm produce eggs.

Hookworm eggs are shed with the stool of the dog.

Hookworm versus puppies and dogs.



Larvae in the soil and present on the dog's feet gain entry by the dog licking their feet.

How do dogs get infected with hookworms?

The larva can infect its new host (animal and human) in several ways. One way is to penetrate the host's skin directly through the feet or belly or whatever part of the skin is touching the ground.

Another way for the larva to gain entry to the new host is to be present in soil that is licked and swallowed by the dog as it cleans itself.

The egg shed with the dog's stool hatches in the environment and develops from a first stage larva (the hatchling) to a second stage larva and finally a third stage larva which is ready to infect a new host (animal or human).



Once the larvae are inside the host - dog, they make their way to the intestine where some worms simply stay and mature into adulthood. Other individual worms are bolder, tunnelling out of the intestine, and migrating to the lung tissue.

In the lung, the larvae develop into 4th stage larvae and when they are ready they break out of the lung, climb up the trachea (windpipe), get coughed into the throat and swallowed.

Once back in the intestine, these well-travelled worms will complete their maturation to adulthood by re-joining any friends they had that never left the intestine on a migration.

Not all the worms that begin this treacherous migration complete it. As they emerge from one tissue to move on to the next, some fall into a state of arrest where they go dormant and encyst.

These larvae remain inactive periodically emerging and continuing their migration.

The adult worms live by sucking blood from the intestine.

Their eggs are passed by the host through their stool into the environment where a new host picks them up.

The developing larvae may migrate widely through the new host's body before settling down to complete their maturation.

It is not to say that the host being infected - is always a pet.

Other vertebrates such as rodents and birds can pick up hookworm larvae from the soil.

If the pet eats an infected rodent or bird, the pet will become infected just the same as if the infection came directly from the soil.

Hookworms suck blood.

Hookworm infection is frequently lethal to young puppies.

A young puppy is growing and growth includes making enough new blood to serve not only its current oxygen needs but what is required for growth as well.

Growing requires a tremendous red blood cell production from the puppy's bone marrow, yet in the hookworm-infected puppy numerous tiny bloodsuckers within are sabotaging this process.

The puppy may be effectively bled to death.

Symptoms.

Infected puppies commonly present white gums, and or white under the eyelids and will become weak lose weight, with iron deficiencies and potbellied.

They may or may not have diarrhoea.

Treatment.

Treatment by worming the dog with one of several products: mebendazole (Telmintic[®]), fenbendazole (Panacur[®]), pyrantel pamoate (Nemex[®], Drontal[®], or Strongid T[®] or [Ivermectin](#),

Deworm and repeat again in approximately 21-30 days.

The worming product is not absorbed into the dog's body from the GI tract and can only kill the worms living within the GI tract.

The reason of the second deworming is to kill worms in the process of migration at the time of the first deworming, allowing them an additional month to complete their migration.

Worming will result in killing the worms but might not be sufficient to save the life of a severely affected puppy.

Like any other blood loss, a transfusion may be needed to keep the puppy alive until it can replace its own lost red blood cells with an iron supplement is frequently needed as well.

Hookworm are transmitted to the unborn puppies.

Typically, a hookworm infected mother dog will have encysted larvae all around her body.

Throughout the adult dog's life, some larvae will awaken, break out of their cysts, and complete their migration to the GI tract.

That is why regular worming programs for your adult dogs is so important.

The hormones of pregnancy unfortunately serve as little wake-up calls to encysted hookworm larvae, only this time the little worms migrate to the unborn puppies and to the mammary gland.

Some puppies of the litter will be born infected. Others will become infected by drinking the contaminated milk of their own mother.

If this is not enough to infect the entire litter, others will become infected from the soil of their breeding kennel, which will quickly, become contaminated with the stool of their infected littermates. It is clear why puppies are at a special risk over adult dogs when it comes to hookworms.

Worming puppies.

Deworming puppies beginning at age 2 weeks (Liquid Antizole) and continue every 2 weeks up to 6 weeks of age. From 8 weeks special treatment for hookworms is needed.

Can transmission from the mother be prevented?

Prevention is possible with daily deworming through the second half of the pregnancy and then also into the nursing period.

A regular single deworming will not be effective in protecting the litter.

Infected pregnant dog.

A special protocol using Fenbendazole (Panacur®) has been found to be effective in preventing both roundworm and hookworm infection in unborn puppies.

This should not be necessary if your adult dog has been dewormed regularly prior to breeding.

Ask your vet about this method if you are contemplating breeding an infected female dog.

Hookworms can infect humans.

Contaminated soil is an important hookworm source when it comes to a human disease called Cutaneous Larva Migrans.

Running barefoot through the park or beach may seem pleasant but if the soil has been contaminated with canine fecal matter, the eager infective larvae may be waiting to penetrate your skin.

Hookworm infection in the skin is intensely itchy but usually treatable.

With the lack of local law or municipal regulations restrictions for dogs roaming the streets and or bringing dogs to beach - and then for strict clean-up reflect concern for hookworm (and roundworm infection in people.

Humans can also become infected by eating improperly washed vegetables, which may harbour contaminated soil.

Humans have been found with actual hookworm intestinal infection. This would be a challenging diagnosis as it is not usually expected but the good news is that it is treated easily when it is discovered.

Cutaneous Larva Migrans (CLM) - occurs as red, inflamed lesions in the skin where the larvae of canine hookworms burrow under the skin.



Decontaminating the environment.

The egg shed with the dogs stool hatches in the environment and develops from a first stage larva (the hatchling) to a second stage larva and finally a third stage larva which is ready to infect a new host (animal or human).

Many people are concerned about how to decontaminate the backyard or property that has housed an infected dog.

The good news is that unlike roundworms which are extremely hardy in the environment, hookworm eggs deplete their energy reserves in a few months and die.

Further, hookworm eggs do not survive freezing temperatures.

Treatment – outside in the soil.

Bleach or swimming pool chlorite outside to clean an area, the protective egg coating is removed from the hookworm egg and the egg will become dehydrated and will die.

Borates (in powder form) raked into the soil will also kill hookworm eggs but will kill grass and vegetation as well.

Prevention.

Regular and correct worming your puppies and grown dogs. Your vet can check and will be able to tell you if a dog have hookworm.

Different products available treating worms in dogs and separate products to treat hookworm separately – ask your vet.

Because your dogs can become infected by eating an infected vertebrate host – rodent control and removing dead rodents will play an important role.