



General Information

- Hookworms are parasites that live in the small intestines of many different species of animals, including humans. These small worms (usually ~ 1 cm long) have a bend in their body near the head, giving the appearance of a “hook,” which is how they get their name.
- Different species of hookworms prefer different host species:
 - The most common hookworms in dogs and cats are *Ancylostoma caninum* (dogs only), *Ancylostoma tubaeforme* (cats only), *Ancylostoma braziliense* (dogs & cats) and *Uncinaria stenocephala* (dogs & cats)
 - *Intestinal* hookworm infection in people is usually caused by different hookworm species, namely *A. duodenale* and *Necator americanus*, which do not infect pets.
- Dog and cat hookworms typically cannot live in the intestine of humans, but the immature **larvae** of some of these parasites can infect people, causing a skin disease called **cutaneous larva migrans (CLM)**.
- People can develop CLM from having direct (i.e. **bare skin**) contact with soil or sand that has been contaminated with feces from an animal with an intestinal hookworm infection.
- Although CLM is not usually severe, the condition can be quite uncomfortable, so it is a good idea to take simple steps to help avoid exposure to hookworm larvae; for example, by **wearing shoes** when walking through sand that may be contaminated with animal feces.



Adult *A. caninum* on the inside surface (mucosa) of the intestine.
(Source: CDC PHIL 5205)

What Is Cutaneous Larva Migrans (CLM)?



- ▶ CLM is a skin condition caused by the larvae of certain species of hookworms, most commonly *A. braziliense*.
- ▶ When the larvae come in contact with bare skin, they are able to penetrate and begin burrowing around in the skin.
- ▶ The migration of the larvae causes redness and itching, and the path of each migrating larva can typically be seen as a tiny red “track” that may advance a few millimetres to a few centimetres per day.
- ▶ Eventually the larvae in the skin usually die and the skin then heals, but this can take weeks to months.
- ▶ If the skin is damaged from itching, this can lead to secondary bacterial infection.
- ▶ In severe infections, there may be hundreds of larvae, and rarely they may migrate to other tissues, causing inflammation in the muscles, lung or intestine.

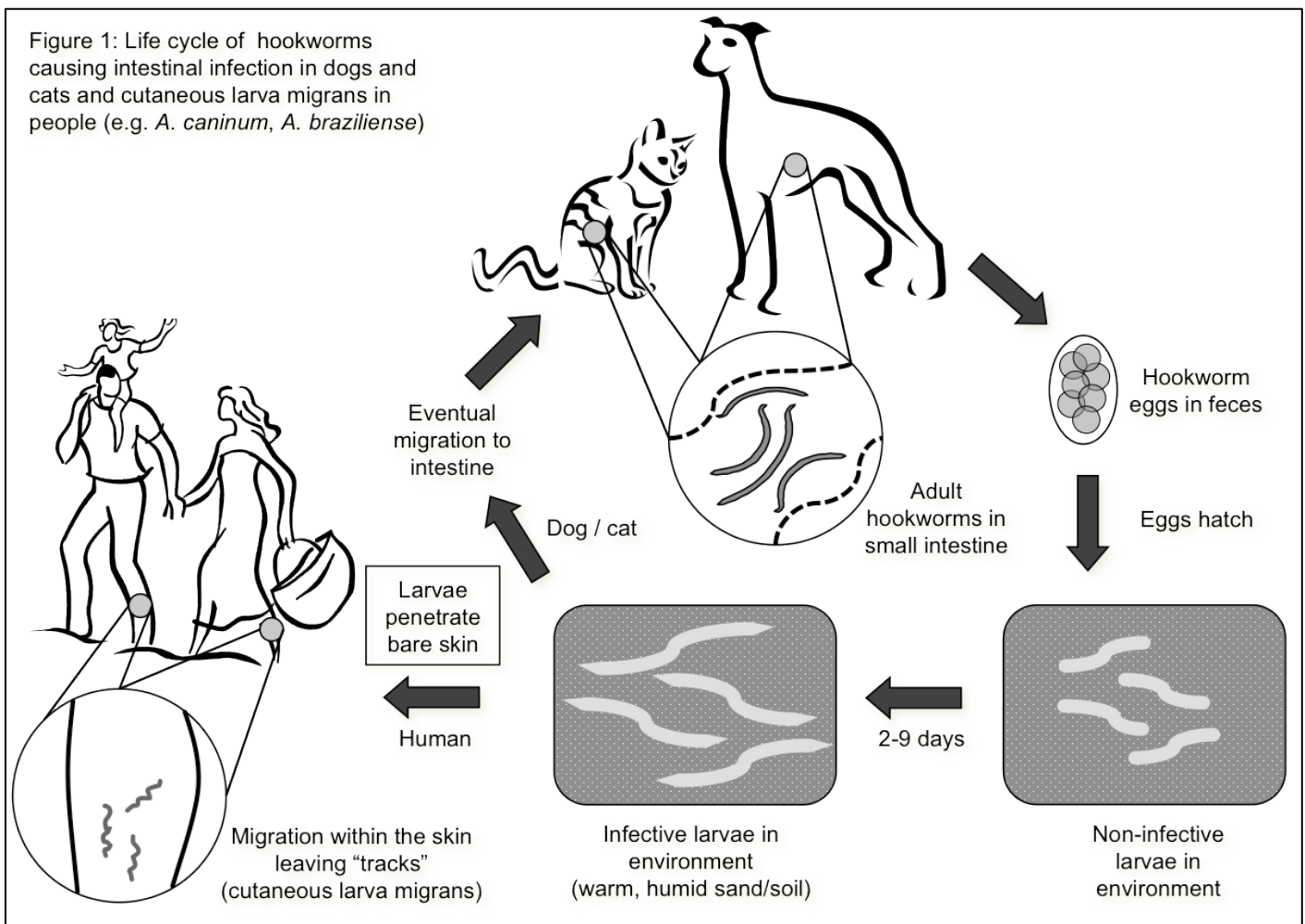
How Do I Know If My Pet Has Hookworms?

- Hookworms are a common problem in pets worldwide, especially puppies and kittens. The worms latch on to the inner wall of the intestine and feed on the blood of the animal.
 - Hookworms are more common in warmer regions, because the eggs and larvae survive well in the environment, and in areas where pets are not routinely treated with dewormers.
- Infection in adult animals is usually mild and doesn't cause apparent illness.
- Severe infections with a very large number of worms, especially in young animals, can result in significant blood loss, causing anemia, weight loss, tarry black diarrhea, and sometimes even death.
- Your veterinarian can perform a fecal test on your pet to look for eggs of hookworms (and other parasites). It is important to have this done regularly.



How Are Hookworms Spread?

- Hookworm eggs are shed in the feces of infected animals. The eggs are not infective at first, but hatch in the environment and develop into infective larvae. This can take a couple of days to more than a week, but happens faster in warm, humid conditions.
 - Contamination of the environment is likely to be highest in warm, humid regions where there are a lot of feral animals that are not regularly dewormed.
- Once sufficiently developed, the larvae infect a new host by penetrating bare skin or being swallowed.
 - In the worms' preferred host (e.g. a dog or cat depending on the species), the larvae find their way to the intestine where they grow into adults and begin laying eggs, and the cycle starts over.
 - In other hosts (e.g. humans), and sometimes in dogs and cats as well, the larvae only migrate within the skin, causing CLM, or they may migrate to other tissues where they may die or become dormant.
- Puppies can be infected by hookworms transmitted from their mothers through their milk.



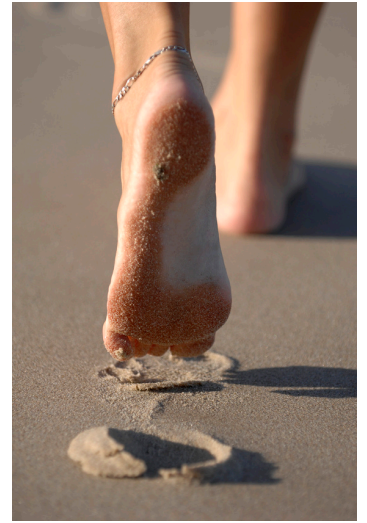
How Are Hookworm Infections In Pets Treated?

Hookworm infections in pets are easily treated with available dewormers. This should be done if your pet is infected, in order to keep it healthy and decrease contamination of places your pet goes with parasite eggs and larvae.



Can I Get Hookworms From My Pet?

- Dog and cat hookworms generally do **not** cause *intestinal* hookworm infection in humans.
- Some **dog and cat hookworms can cause CLM** in humans. For this to happen, a person's **skin** needs to come into direct contact with **feces** that are a **few days old** from an infected dog or cat.
 - If you have your pet dewormed regularly, clean up your pet's feces promptly while avoiding direct contact of feces with your skin, and practice good hand hygiene afterwards, the risk of getting CLM from your pet is extremely low.
 - People are more likely to get CLM from having extensive direct contact with soil or sand that has been contaminated with feces from infected dogs and cats, especially **stray animals** that are not regularly dewormed, and especially in **warm, humid, shady areas** where the hookworm larvae survive well.



How Is CLM Treated?

- In most cases, CLM is **self-limiting**, meaning the body will eventually clear the infection without any treatment, but this can take weeks to months and it can be very uncomfortable.
- Treatment with oral antiparasitic drugs is often used to speed up the process, and is highly effective.



How Can I Prevent Hookworm Infection In My Pet?

- The only way to prevent hookworm infection is to avoid exposure to infective hookworm larvae, but this can be difficult since the larvae can survive in the soil or be transmitted via a mother's milk to her puppies.
- **Have your veterinarian check your pet's feces** at least once a year to detect parasite eggs. Puppies and kittens should be tested more often. If eggs are detected, treatment with an **oral dewormer** is safe and usually very effective.

How Can I Prevent Cutaneous Larva Migrans In Me And My Family?

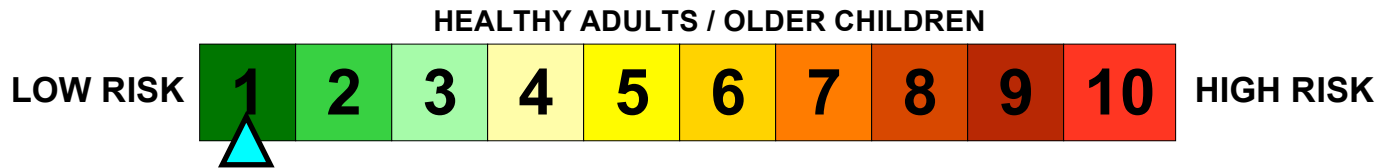
- Ensure your pet is **checked regularly** for intestinal parasites, including hookworms, and treated with an effective dewormer if parasites are detected. This is especially important for **puppies and kittens**.
- **Clean up promptly after your pet.** Remove dog feces from your yard every day or every other day, especially if children play in the same area. Scoop out your cat's litter box every day or every other day. Always avoid direct skin contact with feces, and wash your hands afterwards.
- **Cover sandboxes** when not in use to prevent cats from defecating in them.
- Avoid direct skin contact with soil and sand that may be contaminated with animal feces. **Wear socks and shoes** when walking in public parks or beaches where dogs and cats may roam, especially in warm, humid weather. **Wear gloves** when working in soil, such as out in the garden, and **wash your hands** thoroughly when you're finished.
- Be especially cautious when travelling to **tropical or subtropical areas** where soil contamination with hookworm larvae may be more common. Wear appropriate footwear and use mats or blankets to help limit skin exposure to sand and soil.



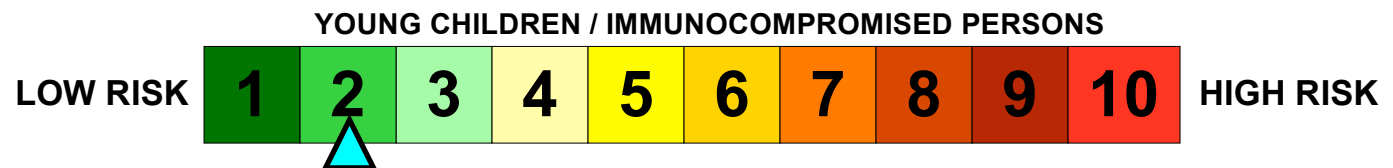


What Is The Risk?

For **healthy adults** and **older children**, the risk of getting CLM from a pet infected with hookworms is very low, but may be higher for individuals whose work or recreational activities involve direct contact with soil or sand, especially in warm, humid weather or in areas with large stray/feral animal populations. In general, for those who live in temperate regions, the risk of CLM from pets in these groups is:



Cutaneous larva migrans is more common in **young children**, possibly because they are more likely to have direct contact with contaminated soil, sand or dirt while playing. It is unknown if **people who are immunocompromised** (e.g. HIV/AIDS patients, transplant recipients, cancer patients) are more susceptible to CLM, but they are more likely to develop secondary infections or other complications because their immune systems cannot fight infections as efficiently. Nonetheless, a person is more likely to develop CLM from contact with soil contaminated by other animals than from their own pet. For these groups, living in temperate regions, the risk of CLM from pets is:



Additional Reading

CDC (2012) – Zoonotic Hookworm. Accessed March 2013. Available online at: <http://www.cdc.gov/parasites/zoonotichookworm/index.html>

Companion Animal Parasite Council (CAPC)(2012). Current advice on parasite control: Intestinal parasites - Hookworms. Accessed April 2013. Available online at: <http://www.capcvet.org/capc-recommendations/hookworms>

CDC images are all available online from the CDC Public Health Image Library at: <http://phil.cdc.gov/phil/home.asp>



Microscopic images of a hookworm egg (left) and an infective hookworm larva (right) (Source: CDC PHIL 5220, 5222)