



## ZOONOTIC PARASITES

Whether you own a fish, amphibian, reptile, bird or mammal you can promote your pet's health along with your own by being alert to possible problems. Even if you don't own a pet or come into contact with one, you should be aware that many animals, vertebrates and invertebrates (e.g., snails), living or dead, could have an effect on your health by way of zoonotic diseases.

Zoonotic diseases are diseases of animals that can be transmitted to humans. Some of the best known zoonotic diseases include the plague—fleas bite infected rats then pass the disease on when the flea bites a human—rabies, and Lyme disease.

### Sources of Zoonotic Diseases

As long as you're in the immediate environment of animals or untreated animal products, you're at risk of contracting a disease or infection that can be traced to them. Sometimes toxins or poisons linked to animals are transmitted to us through the environment.

A wide range of health problems may be linked to animals. Some common sources of disease-causing organisms include contaminated meat or milk food such as fruits, vegetables and other produce such as mushrooms that are contaminated with animal waste or product direct contact with a living animal that causes you an injury or transfers a bacterium, virus, fungus or parasite to you contaminated materials such as soil and water that have come in contact with animals, animal by-products or animal waste.

### How Humans Contract Zoonotic Diseases

The nose, ears, eyes and mouth serve as easy points of entry for viruses, bacteria and parasites. This means that air, water, food, soil and direct contact with an animal play a part in assisting disease-causing organisms or infectious agents to enter your body. Of course, cuts and scrapes in the skin can provide entry points as well.

The most common way humans are infected with a zoonotic disease is through indirect transmission. Pets are most likely to transmit an external parasite such as a flea or tick, which is infected with the virus. Once the external parasite bites the human, the disease is transmitted. Viruses and bacteria are also transmitted through nasal droplets and feces. Feces may also contain other internal parasites such as roundworms.

Sometimes a disease-causing agent in an animal is disease-causing in humans as well. Diseased cattle and swine have had to be destroyed because eating the meat, even when cooked, would have meant that the disease-causing agent would infect white blood cells in humans. Sheep, mink, mule, deer and elk have also been implicated in the transfer of a disease-causing agent. Consumption of deer and elk meat has been implicated in a number of cases of chronic wasting disease, a member of the family that also includes bovine spongiform encephalopathy (a.k.a. mad cow disease).

What is important to remember, however, is that an infected animal may exhibit no symptoms of having a disease.

### People at Risk of Zoonotic Diseases

Everyone is at risk, but these groups of people are much more susceptible to contracting a zoonotic disease:

**infants and small children** — their immune systems are not yet fully developed.

**pregnant women** — their immune systems may be weakened.

**the elderly** — they may have impaired immune systems.

#### Preventing Zoonotic Diseases

There are no guarantees that an individual will or will not contract a disease, but avoiding certain behaviors and practices helps minimize the risk. Of course you'll need to keep up the "pro-active" behaviors such as washing hands with soap and water.

Many common practices can help minimize the transfer of harmful bacteria, viruses and parasites to humans and human food. These include:

- 1. - Have your pet tested thoroughly from your Vet**
- 2. - Feed your pets commercial or home-cooked food**
- 3. - careful disposal of all pet waste**
- 4. - preventing cross contamination from raw to cooked food through surfaces such as cutting boards, knives, utensils and human hands thoroughly washing all vegetables cooking meat thoroughly.**

Ascarids (*Toxocara canis*, *T. cati*) and hookworms (*Ancylostoma* spp.) are common intestinal parasites of dogs and cats (referred to here as pets). Not only can ascarids and hookworms cause disease in their respective hosts, they are also well-known causes of larva migrans syndromes in humans, especially children. While ascarids and hookworms are most commonly diagnosed in puppies and kittens, infections can occur in dogs and cats of all ages. Dogs can also become infected with *Baylisascaris procyonis*, the common raccoon ascarid, which can cause serious disease in other animals and humans.

**Ascarids** — Because of the occurrence of both transplacental and transmammary transmission of *T. canis*, puppies are usually born with or acquire ascarid infections early in life. Kittens do not become infected in utero, but like puppies, can acquire ascarids (*T. cati*) through the queen's milk. The tissue-migrating and early intestinal stages of these worms may cause severe, sometimes life-threatening, disease in the first few weeks of life. Patent intestinal infections can develop within the first 2½ - 3 weeks of life. Left untreated, this can lead to widespread contamination of the environment with infective eggs.

**Hookworms** — Both puppies and kittens acquire hookworm infections (*A. caninum*, *A. braziliense*, and *A. tubaeforme*) through ingestion of or skin penetration by infective larvae, or from infective larvae passed in their dam's milk (*A. caninum*). Hookworms suck large amounts of blood from their hosts and while infected animals may look healthy in the first week of life, they can develop a rapidly severe, often fatal, anemia. Patent intestinal infections can occur as early as 2- (dogs) to 3- (cats) weeks of age, leading to environmental contamination with infective larvae.

The prevalence of these infections varies with climatic conditions; however, they are present in all parts of the United States and must be viewed as a potential public health hazard.

#### **Zoonotic Transmission and Human Disease**

The growing popularity of dogs and cats in the United States, together with high rates of ascarid and hookworm infections, has resulted in widespread contamination of the soil with infective eggs and larvae. Epidemiologic studies have implicated the presence of dogs, particularly puppies, in a household, and pica (dirt eating) as the principal risk factors for human disease. Children's play habits and their attraction to pets put them at higher risk for infection than adults.

Humans become infected with ascarids (*Toxocara* spp., *Baylisascaris* spp.) through ingestion of infective eggs in the environment. When a human ingests infective eggs, the eggs hatch and release larvae that can migrate anywhere in the body, a condition known as visceral larva migrans. The signs and symptoms seen in humans are determined by the tissues or organs damaged during larval migration. Organs commonly affected are the eye, brain, liver, and lung, where infections can cause permanent visual, neurologic, or other tissue damage. The common dog ascarid, *T. canis*, has long been recognized as a cause of larva migrans syndromes in children. The cat ascarid, *T. cati*, can also cause disease in humans, although for reasons partly related to the defecation habits of cats, it does so less frequently. The raccoon ascarid, *B. procyonis*, is increasingly being recognized as a cause of

human disease.

Humans can become infected with hookworms through ingestion of infective larvae or through direct penetration of the skin.<sup>7</sup> When infective larvae penetrate the skin, they undergo a prolonged migration that causes a condition known as cutaneous larva migrans. These larval migrations are characterized by the appearance of progressive, intensely pruritic, linear eruptive lesions, which are usually more extensive with *A. braziliense* infections. *A. caninum* larvae may also penetrate into deeper tissues and induce symptoms of visceral larva migrans, or migrate to the intestine and induce an eosinophilic enteritis.

### **The Public Health Problem**

Larva migrans syndromes are not reportable in the United States, so the actual number of human cases is unknown. However, many human cases continue to be diagnosed and a recent national survey of shelters revealed that almost 36% of dogs nationwide, and 52% of dogs from southeastern states harbored helminths capable of causing human disease. Every year at least 3,000-4,000 serum specimens from patients with presumptive diagnoses of toxocariasis are sent to the Centers for Disease Control and Prevention (CDC), state public health laboratories, or private laboratories for serodiagnostic confirmation. Zoonotic hookworm infections are more geographically restricted than toxocariasis, with most cutaneous larva migrans and other hookworm-associated syndromes diagnosed in southeastern and Gulf Coast states. Persons likely to come in contact with larvae-contaminated soil include electricians, plumbers, and other workers who crawl beneath raised buildings, sunbathers who recline on larvae-contaminated sand, — as well as children who play in contaminated areas. While most hookworm infections are self-limiting, massive infections can lead to infection of deeper tissues.

### **Veterinarians Can Help Prevent Human Disease**

Most cases of human ascarid and hookworm infections can be prevented by practicing good personal hygiene, eliminating intestinal parasites from pets through regular deworming, and making potentially contaminated environments, such as unprotected sand boxes, off limits to children. It is also important to clean up pet feces on a regular basis to remove potentially infective eggs before they become disseminated in the environment via rain, insects, or the active migration of the larvae. Hookworm eggs can develop into infective stage larvae in the soil in as little as 5 days, and ascarid eggs within 2 weeks, depending on temperature and humidity. To illustrate the extent of environmental contamination that can occur as the result of one infected puppy, a single female ascarid can produce more than 100,000 eggs/day, resulting in millions of potentially infective ascarid eggs per day spread throughout the area the puppy is allowed to roam.<sup>10</sup> Once the eggs become infective, they can remain infective in the environment for years.

Most pet owners do not know that their pets may carry worms capable of infecting people. Therefore, practicing veterinarians can provide an important public service by recommending regular fecal examinations, providing well-timed anthelmintic treatments, counseling clients on potential public health hazards, and advising them on any precautionary measures that may be undertaken. Veterinarians are in an ideal position to provide pet owners with this service because of their access to the pet-owning public, their knowledge and training, and their role in the human-animal bond