

Giardia and Cryptosporidium as emerging infections in pets



Alain Villeneuve, DVM, PhD

University of Montreal, Faculty of Veterinary Medicine, Saint-Hyacinthe, Quebec, Canada

Dr. Villeneuve received his DVM in 1978 and PhD in Parasitology in 1990 from the University of Montreal, Quebec, Canada. He is currently Professeur agrégé at the Department of Pathology and Microbiology, Faculty of Veterinary Medicine, University of Montreal. Alain Villeneuve is a member of many professional affiliations, including the World Association for the Advancement of Veterinary Parasitology, the American Association of Veterinary Parasitologists, and the American Heartworm Society. He has directed and participated in various research projects involving drug efficacy in food and companion animals. Dr. Villeneuve has published numerous articles in scientific journals, a book on parasitic zoonosis and is a frequent lecturer, both nationally and internationally. His current research interest is in zoonotic diseases.

Our pets occupy an increasingly large part of our lives, because there are more of them than ever before and because we have very close contact with them. In such a context, having healthy pets becomes a priority, particularly in relation to their parasites. Notwithstanding decades of research and curative and preventative treatments, of helminth infections in particular, there appears to be a marked increase

in the incidence of parasite disease. Another group of parasites is now gaining importance however, either because they are genuinely emerging or because diagnostic methodology is beginning to improve (1). They now represent the group of parasites that are found most frequently. Thus, in our laboratory, in the first half of the year 2008, protozoa were found in 21.2% of the fecal samples from 709 dogs and helminth eggs were found in 5.2% of them. In cats, 18.5% of the samples from 226 cats contained protozoa and 5.3% contained helminths. Unfortunately, the risk this represents to animal and human health cannot be ignored, especially as the prophylactic protocols generally applied do not address these infections at all.

Within this context, two species, *Giardia* (Figure 1) and *Cryptosporidium* (Figure 2), deserve particular attention. Laboratory data show their very high prevalence, particularly in young animals. Moreover, the treatments are not always well established and their transmission to humans remains poorly characterized.

◆ The causative species

For *Giardia*, Assemblage A-I and F (2) and, more rarely, Assemblages B, D and E have been identified in cats, and Assemblages AI, BIII, C and D in dogs (3). The *Cryptosporidium* species found in cats is *C. felis* (4); it exhibits high host specificity, this species having only been found in cats and, in very rare cases, humans. The genotype *C. canis* seems to be dominant in dogs (5-6).

◆ Prevalence

The prevalence of these infections varies greatly, depending on the population tested and the technique used (Table 1). In our laboratory,

using a routine fecal examination technique involving centrifugation in saturated zinc sulfate solution, the prevalence of *Giardia* was 7.9 and 10.7% in cats and dogs, respectively, and the prevalence of *Cryptosporidium* in the same species was 5.7 and 9.0%.

☒ Infections

These infections are difficult to characterize, especially in the presence of concurrent infection. They are generally associated with small intestinal diarrhea, particularly in young animals (7,8). Giardiasis has been characterized as an acute or chronic, intermittent or continuous, self-limiting, small intestinal diarrhea (7,9). Appetite remains normal and vomiting is very rare (10).

Thus, in the presence of diarrhea, the risk of excreting *Giardia* cysts increases by a factor of 2.50 (95% CI: 1.10-5.68) and that of excreting *Cryptosporidium* oocysts by a factor of 2.33 (95% CI: 0.60-9.02) compared to cats without diarrhea (11). In another study (10), the same risk for *Giardia* was increased by a factor of 5.81 (95% CI: 2.02-16.76) in cats with diarrhea.

The prepatent period for *Cryptosporidium* infection is said to be 8 to 10 days (12) and the patent period is said to last for several weeks, and even 3 to 6 months but with variable excretion (4,12). After a probable latency of several months, excretion can be reactivated by prednisolone injection (12) or by surgery-related stress (13). We verified some of these features and established others based on our laboratory results obtained by the technique of centrifugation of 2 g of fecal material in saturated zinc sulfate solution (n = 709 dogs and 226 cats) (**Tables 2 and 3**).

☒ Testing and diagnosis

It is important to screen for these infections with routine techniques, because the great majority of infected animals present no clinical signs and because concurrent infections are the rule, particularly in dogs (**Tables 2 and 3**). One of the commercial technologies may be used in order to confirm a provisional diagnosis of one of these infections. However, in a clinical trial on feline samples, the results from zinc sulfate centrifugation were compared with those of Snap *Giardia* from IDEXX (Snap *Giardia* Antigen Test Kit; IDEXX

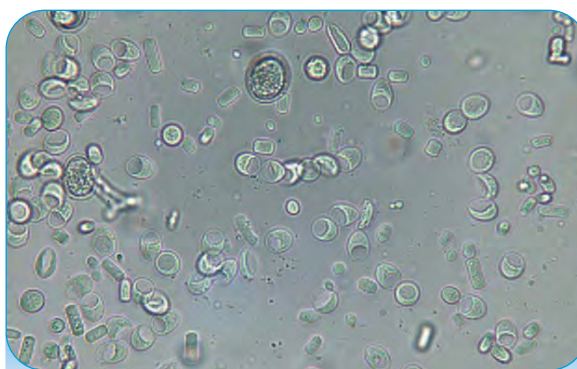


Figure 1.

Giardia cysts, zinc sulphate centrifugation (Magnification x400).

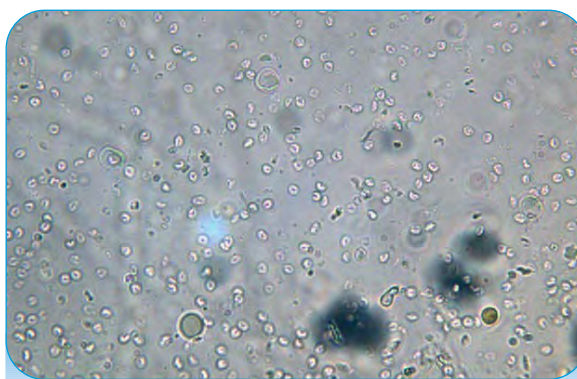


Figure 2.

Numerous *Cryptosporidium* oocysts, zinc sulphate centrifugation (Magnification x400).

Table 1.

Prevalence of *Giardia* and *Cryptosporidium* infection in cats and dogs

Parasite	Host	Prevalence (%)	Reference
<i>Giardia</i> spp.	cat	1-52	(24)
	dog	0.8-55.2	(25)
<i>Cryptosporidium</i>	cat	0-15.3	(24)
	dog	0-9.7	(25)

Laboratories, Westbrook, ME) and those of the Prospect T kit (Prospect T *Giardia* Microplate Assay; Remel Microbiology Products, Lenexa, KS). Only the Prospect T kit showed slight superiority over centrifugation, with a sensitivity of 91.2%, whereas the sensitivity of the other two tests was 85.3% (11). The specificity of all these tests was greater than 99.4%. The sensitivity of the Snap *Giardia* test in dogs was also 92% (14). It should be noted however

Table 2.
Characteristics of the animals excreting *Giardia* cysts

	Cats	Dogs
Contaminated samples (%), animals < 1 year	7.4 (n = 94)	23.5 (n = 242)
Contaminated samples (%), animals ≥ 1 year	0.9 (n = 108)	2.3 (n = 419)
Frequency per microscopic field using a 40X objective lens	< 10 oocysts (in 61% of animals)	< 10 oocysts (in 56% of animals)
Concurrent parasitic infections (%)	22.3 (n = 18)	48.7 (n = 76)

Table 3.
Characteristics of the animals excreting *Cryptosporidium* oocysts

	Cats	Dogs
Contaminated samples (%), animals < 1 year	15.9 (n = 94)	23.5 (n = 242)
Contaminated samples (%), animals ≥ 1 year	2.7 (n = 108)	2.1 (n = 419)
Duration of excretion	≥ 6 weeks	≥ 6 weeks
Frequency per microscopic field using a 40X objective lens	10-100 oocysts	< 10 oocysts
Concurrent parasitic infections (%)	23.6 (n = 17)	50 (n = 74)

that a certain degree of expertise is required in order to identify *Giardia* by microscopic examination (15).

As far as testing for *Cryptosporidium* in cats is concerned, the specificity of the Prospect T test (Prospect T *Cryptosporidium* Microplate Assay; Remel Microbiology Products, Lenexa, KS) was 71.4%, while that of a direct immuno-fluorescence test (MeriFluor *Cryptosporidium* Direct Immuno-fluorescence Test Kit, Meridian Bioscience Inc., Cincinnati, OH) was 21.4% (11). Similar evaluations do not appear to have been carried out in dogs.

⊕ Treatments

Although well known, there appear to be occasional difficulties with the treatments for giardiasis, although they are not yet considered

resistant. Two substances, fenbendazole and metronidazole are used, sometimes even concomitantly (www.capcvet.org).

Amongst the most probable reasons for treatment failure figure diagnostic error, untreated concomitant infection or new infection originating from the animal's immediate environment or from its coat. It is advisable to request a minimum level of disinfection of contaminated objects by washing with hot water or a short spell in the drying machine or through the use of quaternary ammonium compound based disinfectants for a minimum period of 15 minutes. Bathing the animal on the last day of treatment will help eliminate any parasites still present in its coat.

Treatment of cryptosporidiosis is suggested for animals with a seriously weakened immune system, involving the experimental use of paromomycin (Humatin®, Morris Plan (sic)) at a dose of 125 mg/kg/day PO BID x 5 days, or nitazoxanide (Alinia®, Romark Labs) at a dose of 25 mg/kg/day PO BID x 7-28 days (16). There are some risks associated with the use of these medicinal products since renal impairment and deafness have been reported with paromomycin treatment in very young animals, and vomiting has also been reported with nitazoxanide treatment in cats (17). The treatment of certain concurrent infections is said to eliminate the parasite through an indirect effect; thus, in one clinical trial, treatment of feline giardiasis also caused the excretion of *Cryptosporidium* to disappear in several animals (18).

⊕ Transmission to humans

As *Giardia* cysts and *Cryptosporidium* oocysts are infectious as soon as they are excreted in the feces, these infections are highly contagious, even to humans. Hunter and Thompson reviewed several epidemiological studies that evaluated the risk of *Cryptosporidium* infection associated with pets (risk of 0.6 to 2.19) and concluded that contact with a pet has little effect and even provides protection against infection (19). However, since this infection is almost exclusively limited to animals under one year of age, epidemiological studies could have produced different observations if this criterion had been taken into consideration. Similarly, the fact

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that cats excrete a larger number of oocysts than dogs ought to increase the probability of human infection through contact with cats. Several studies including those by Cama, *et al.* (20), Matos, *et al.* (21) and the review by Raccurt, *et al.* (22) have shown that human infection with animal species was a relatively common event, and can result in serious clinical signs in patients with AIDS.

It also appears that transmission of *Giardia* from animals to man is a reality. In a German study, 88% (n = 60) of dogs from an urban region excreted Assemblage AI, which is transmissible to humans (23). In an American study, 6 out of 17 cats tested (35%) excreted Assemblage AI, which is transmissible to humans (2).

These two infections represent a public health hazard and it is therefore important to call upon

animal owners' social responsibility and to remind them of the importance of picking up any of their animals' droppings, especially the youngest animals, in any public areas and around accommodation areas.

❖ Veterinary recommendations

As a safety precaution, the treatment of young pets infected with *Giardia* should be recommended (2) and one could go even further, given its high prevalence, by recommending preventive treatment for all pets under one year of age and for recently adopted pets. As for *Cryptosporidium*, it is impossible to set up effective preventive treatment and we are therefore compelled to put the emphasis on hygiene measures. The treatment of all infected dogs is recommended, despite the low risk of zoonosis (1). ☹

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