

# Cryptosporidiosis

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## Etiology

Cryptosporidiosis results from infection by *Cryptosporidium parvum*, a coccidian parasite. This organism is an obligate intracellular pathogen.

## Geographic Distribution

Cryptosporidiosis occurs worldwide.

## Transmission

Transmission is usually by the fecal–oral route but can also occur by aerosols. Sporulated oocysts are shed in the feces and are immediately infectious; they may survive for 2 to 6 months in a moist environment. Direct transmission between animals or humans is common. An estimated 50% of dairy calves shed oocysts; calves often spread cryptosporidiosis to each other or to humans. Infections have also been documented in 10% of the puppies in at least one shelter; however, transmission from household pets to humans is rare and poorly documented. Transmission also occurs on fomites and contaminated food or water can result in outbreaks.

## Disinfection

*C. parvum* is resistant to most disinfectants including a 3% hypochlorite solution. Heating to 65°C for 30 minutes, or an 18–hour exposure to 5% ammonia, 10% formol saline or 3% hydrogen peroxide can reduce infectivity. In the environment, oocysts may be killed with a 5% ammonia solution or by desiccation.

## Infections in Humans

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### Incubation Period

Human infections have an incubation period of 1 to 12 days; 7 days is typical.

### Clinical Signs

In humans, cryptosporidiosis is characterized by profuse, watery diarrhea with cramping, abdominal pains, nausea, anorexia, flatulence and malaise. Some individuals may also experience vomiting, weight loss, fever or myalgia. The disease is usually self-limiting in healthy people but may be chronic, debilitating and severe in those who are immunosuppressed (e.g. AIDS patients). Pulmonary or tracheal cryptosporidiosis is characterized by coughing, often accompanied by a low-grade fever and severe intestinal symptoms. Asymptomatic infections are also seen.

### Communicability

Yes. Sporulated oocysts are shed in the feces throughout the illness and for several weeks afterward. Children wearing diapers often spread the disease in day care centers. Caregivers nursing ill persons are also at an increased risk of infection.

### Diagnostic Tests

Cryptosporidiosis can be diagnosed by finding *C. parvum* after fecal flotation in sucrose or zinc sulfate solutions. Mature oocysts are 4–5µm in diameter and contain four thin, flat, motile sporozoites. The oocysts appear red after acid–fast staining. Immunofluorescence can also be used to identify *Cryptosporidium* in the feces. Pulmonary or tracheal cryptosporidiosis is diagnosed in stained biopsy specimens; intestinal cryptosporidiosis is occasionally diagnosed this way.

### Treatment and Vaccination

Other than supportive care, there is no treatment. Vaccines are not available.



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## Morbidity and Mortality

In North America, approximately 2% of the population is infected and 80% has been exposed at some time. Worldwide, the prevalence is 1 to 4.5% in developed countries and 3 to 20% in developing countries. In healthy people the infection is usually self-limiting and resolves after 2 to 4 days; however, episodes of diarrhea lasting 1 to 4 weeks have been seen at some day care centers. Lifelong symptomatic infections may develop in immunosuppressed individuals, particularly AIDS patients; these infections may be debilitating and contribute to death. Estimated infection rates in AIDS patients range from 3 to 20% in the United States and 50 to 60% in Africa and Haiti.

## Infections in Animals

### Species Affected

*C. parvum* is not host specific and can infect all mammals. Cryptosporidiosis is common in calves and other young ruminants, occurs in pigs, and is rarely seen in dogs, cats and horses. Infections are usually seen in neonates. Other species of *Cryptosporidium* can affect birds and reptiles.

### Incubation Period

The mean incubation period in calves is approximately 4 days.

### Clinical Signs

Cryptosporidiosis mainly occurs in very young animals. Among calves, one to three week old animals seem to be most susceptible. Clinical signs may include anorexia, diarrhea, tenesmus and weight loss. More severe disease can occur with concurrent infections. Animals can also be colonized without symptoms.

### Communicability

Yes. Infectious sporulated oocysts are shed in the feces.

### Diagnostic Tests

Cryptosporidiosis can be diagnosed by finding *C. parvum* after fecal flotation in sucrose or zinc sulfate solutions. Mature oocysts are 4–5µm in diameter and contain 4 thin, flat, motile sporozoites. The oocysts appear red after acid-fast staining. Oocysts are not shed continuously and repeated sampling may be necessary. Cryptosporidiosis can also be diagnosed in stained biopsy/necropsy specimens or fresh intestinal scrapings.

### Treatment and Vaccination

No specific treatment is available; supportive therapy is usually effective as the disease tends to be self-limiting. Vaccines have not been developed.

## Morbidity and Mortality

In normal healthy animals, morbidity is high but mortality is low. Immunosuppressed and neonatal animals are more susceptible to severe disease.

## Post-Mortem Lesions [Click to view images](#)

The typical gross lesion is hyperemia in the intestinal mucosa, with yellowish intestinal contents. Cryptosporidiosis can affect most of the intestinal tract in calves but the most severe lesions are usually found in the distal small intestine. In horses, infection is found only in the small intestine. On microscopic examination, mild to severe villous atrophy can be seen, and spherical organisms may be noted in the brush border.

## Internet Resources

Animal Health Australia.

The National Animal Health Information System (NAHIS)

<http://www.brs.gov.au/usr-bin/aphb/ahsq?dislist=alpha>

Centers for Disease Control and Prevention (CDC)

[http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/crypto\\_source\\_of\\_infect.htm](http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/crypto_source_of_infect.htm)

Material Safety Data Sheets–

Canadian Laboratory Center for Disease Control  
<http://www.hc-sc.gc.ca/pphb-dgspsp/msds-ftss/index.html#menu>

*The Merck Manual*

<http://www.merck.com/pubs/mmanual/>

*The Merck Veterinary Manual*

<http://www.merckvetmanual.com/mvm/index.jsp>

U.S. FDA *Foodborne Pathogenic Microorganisms and Natural Toxins Handbook* (Bad Bug Book)

<http://vm.cfsan.fda.gov/~mow/intro.html>

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"Material Safety Data Sheet – *Cryptosporidium parvum*." January 2001 *Canadian Laboratory Centre for Disease Control*, February 2000. 10 October 2002 <<http://www.hc-sc.gc.ca/pphb-dgsp/psp/msds-ftss/msds48e.html>>.