



CRYPTOSPORIDIUM

What Health Care Providers Should Know

DRINKING WATER FACT SHEET # 1

What Is *Cryptosporidium* and Why Is There Concern about Its Presence in Drinking Water?

Cryptosporidium parvum (*C. parvum*) is a protozoan parasite known to infect humans and many animal species. The infective oocysts of *Cryptosporidium* are shed in the feces, and infection can occur by consumption of contaminated food or water, ingestion of contaminated recreational water, or through contact with feces of infected persons or animals. *Cryptosporidium* is not new, but it has gained recognition, both because it has become more widespread and because of evidence that there are potential life-threatening consequences of infection in the growing population of immunocompromised persons.¹

This parasite is most often found in surface water, although ground water can also be contaminated. Studies have shown that up to 97% of U.S. surface waters may be contaminated with *Cryptosporidium* oocysts.^{2,3} Surface water becomes contaminated with *Cryptosporidium* when heavy rains cause runoff of animal waste or when contaminated wastewater is discharged by inefficient or improperly operated wastewater treatment plants. Conventional water treatment systems are not completely effective in removing *Cryptosporidium*, because the organism is resistant to chlorine and filtration units can allow infectious oocysts to pass into finished water.⁴

What are the Health Effects of *C. parvum* Infection?

The number of confirmed cases of cryptosporidiosis attributable to drinking water contamination is low, largely because of case underreporting by patients and by physicians. Studies show that many physicians are unaware of cryptosporidiosis and unfamiliar with its symptoms, and consequently, they often do not test for the infection.⁵

The largest outbreak in U.S. history occurred in 1993 when at least 400,000 people in Milwaukee became ill after drinking municipal water contaminated with *C. parvum*.⁶ A total of 54 deaths were attributed to the outbreak, primarily involving immunocompromised individuals.⁷ Seroprevalence studies

indicate that exposure to *Cryptosporidium* is widespread in the U.S., although many cases are asymptomatic.⁸

In healthy individuals, *Cryptosporidium* infection generally results in a self-limiting diarrhea. Infection may result in gastrointestinal illness after 2 to 10 days with watery diarrhea, headache, abdominal cramps, nausea, vomiting, and low-grade fever. In healthy persons, symptoms normally disappear within 1 to 2 weeks. However, persons with compromised immune systems (e.g., persons with HIV/AIDS, cancer patients, and transplant patients) may experience persistent infection that may lead to severe, if not life-threatening, illness.² *Cryptosporidium* infection is normally limited to the intestinal tract, though the parasite has been found in the lungs, liver, pancreas, bile ducts and gall bladder of AIDS patients.⁹ Elderly patients with chronic illness may also be at increased risk for *Cryptosporidium* infection.¹⁰ There is currently no established therapeutic drug for the treatment of cryptosporidiosis, although paromomycin and azithromycin may be effective.¹¹

How is *Cryptosporidium* Regulated in Drinking Water?

In 1999, the U.S. Environmental Protection Agency (EPA) implemented *Cryptosporidium* treatment and monitoring requirements for drinking water systems. More recently, a Federal Advisory Committee recommended that EPA adopt more stringent *Cryptosporidium* monitoring and treatment requirements in upcoming rules, to be promulgated by May 2002.

What Can Health Care Providers Do to Reduce the Public Threat From *Cryptosporidium*?

- If *Cryptosporidium* infection is suspected, patients should be tested. Standard ova and parasite tests do not necessarily include *Cryptosporidium*, so it must be specifically requested.
- Report confirmed cases of *Cryptosporidium* to your local health department.

- Inform your high-risk patients about how *C. parvum* is contracted and the symptoms of infection. Advise them to wash hands with soap after using the toilet and before handling food. Patients should also be advised to avoid drinking water directly from lakes or rivers.
- If drinking water is suspected to be the source of infection, point of use filters may be appropriate. Patients should look for filters labeled as “Absolute 1 micron” or a reverse osmosis filter. To find out if a particular filter removes *Cryptosporidium*, contact NSF International, an independent testing and certification group (refer to contact information provided below). Filters that are tested and certified by NSF Standard 53 for cyst removal or cyst reduction are also effective in removing *Cryptosporidium*.
- For patients with suppressed immune systems, boiling water is the best measure for inactivating *Cryptosporidium*. According to EPA and CDC, heating water at a rolling boil for one (1) minute will inactivate *Cryptosporidium*. Water should be stored in a clean container with a lid and refrigerated.
- Advise patients that not all bottled water is absolutely free of *Cryptosporidium*. Information on labels has not been standardized and often does not provide the consumer with information needed to choose safe water. Individuals should select a bottled water supplier only after careful research. Bottled water treated by distillation or reverse osmosis assures *Cryptosporidium* removal.
- Health care providers can be a significant force for prevention of waterborne disease, by becoming involved in local efforts to prevent contamination of sources of drinking water. See PSR’s *A Safe Drinking Water Advocacy Kit* for strategies on how to become involved in these advocacy efforts.

Sources of Additional Information and Guidance

- Physicians for Social Responsibility: (202) 898-0150 or www.psr.org
- Campaign for Safe and Affordable Drinking Water: www.safe-drinking-water.org
- U.S. EPA Safe Drinking Water Hotline: (800) 426-4791
- U.S. EPA Office of Ground Water and Drinking Water: (202) 260-5543 or www.epa.gov/ogwdw
- Centers for Disease Control and Prevention (CDC): Cryptosporidiosis Information Line (888) 232-3228.
- Cryptosporidium and Water: A Public Health Handbook. Available from CDC or on-line at: www.cdc.gov/ncidod.diseases/crypto/crypto.pdf

- CDC guidance for persons with HIV/AIDS concerned about Cryptosporidium: www.cdc.gov/ncidod/diseases/crypto/hiv aids.htm
- CDC Fact Sheet: Preventing Cryptosporidiosis: A Guide to Water Filter and Bottled Water. www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_crypto_prevent_water.htm
- For information on water filters and home treatment units effective for Cryptosporidium removal, contact NSF International: (800) 637-8010 or www.nsf.org/notice/crypto.html.

Acknowledgements

PSR would like to thank Harry Keyserling, MD, Jerome A. Paulson, MD, and John M. Balbus, MD, MPH, for reviewing this fact sheet’s clarity and scientific and medical accuracy.

References

- 1 Guarrant, R.L., Cryptosporidiosis: An emerging, highly infectious threat. *Emerging Infectious Diseases* 3(1) (1997). Accessed on-line at <http://www.cdc.gov/ncidod/eid/vol3no1/guarrant.htm>.
- 2 Juranek, D.D., Cryptosporidiosis: Sources of Infection and Guidelines for Prevention. Centers for Disease Control and Prevention (CDC), Division of Parasitic Diseases. Fact sheet accessed on-line at http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/crypto_sources_of_infect.htm
- 3 LeChevallier, M.W. et al., Occurrence of Giardia and Cryptosporidium spp. in surface water supplies. *Applied and Environmental Microbiology* 57(9): 2610-2616 (1991).
- 4 LeChevallier M.W. et al., Giardia and Cryptosporidium spp. in filtered drinking water supplies. *Applied and Environmental Microbiology* 57(9): 2617-2621 (1991).
- 5 Morin C.A. et al., What do physicians know about Cryptosporidiosis? *Archives of Internal Medicine* 157(9): 1017-1022 (1997).
- 6 Mackenzie, W.R. et al., A massive outbreak in Milwaukee of Cryptosporidium infection transmitted through the public water supply. *The New England Journal of Medicine* 331(3): 161-167 (1994).
- 7 Hoxie, N.J. et al., Cryptosporidiosis-associated mortality following a massive waterborne outbreak in Milwaukee, Wisconsin. *American Journal of Public Health* 87(12): 2032-2035 (1997).
- 8 Ford, T.E., Microbiological safety of drinking water: United States and global perspectives. *Environmental Health Perspectives* 107 (Suppl. 1). (1999).
- 9 US Department of Agriculture, Cryptosporidium (fact sheet). USDA Immunology and disease Resistance Laboratory. Access on-line at: <http://www.lpsi.bare.usda.gov/idrl/cryptosporidium.asp>.
- 10 Neill M.A. et al., Cryptosporidiosis: An unrecognized cause of diarrhea in elderly hospitalized patients. *Clinical Infectious Diseases* 22(1): 168-170 (1996).
- 11 Gilbert D.N. et al., eds. *The Sanford Guide to Antimicrobial Therapy 2000*. Jeb C. Sanford Publisher: Hyde Park, VT. (2000).

This document is one in a series of Drinking Water Fact Sheets developed specifically for health care providers by Physicians for Social Responsibility. These fact sheets provide practical and concise information to assist health care providers in recognition and prevention of disease caused by exposure to drinking water contaminants.



Physicians for Social Responsibility

1101 14th Street, NW • Suite 700 • Washington, DC 20005