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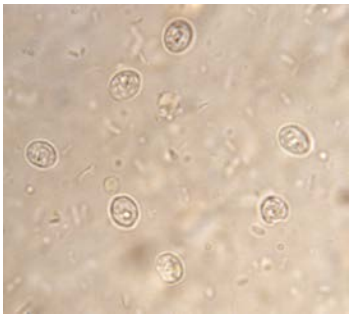
Cryptosporidiosis

Diarrhea can be caused by a wide variety of agents. Bacteria and viruses are often more familiar causes of diarrhea than parasites. Cryptosporidiosis is an illness resulting from infection with a parasitic agent.

The Agent and Illness

Cryptosporidium is a protozoan parasite. Most human infections are caused by two species: C. *hominis* which only infects humans and C. *parvum* which infects humans, cattle and other mammals. Infected animals and people can excrete feces with large numbers of oocysts which are immediately infective to other susceptible hosts, and the infectious dose can be very low.

Persons with symptoms generally experience mild to severe watery diarrhea, usually accompanied by abdominal cramps. Nausea, vomiting, and low-grade fever are common. Symptoms usually last one to two weeks, but can be intermittent and prolonged. Infection can be severe and persistent in persons who are immunocompromised (e.g., chemotherapy, untreated AIDS). Asymptomatic infections also occur.



Cryptosporidium parvum
www.cdc.gov

The incubation period ranges around 2–12 days but is typically 5–8 days. People are communicable as long as oocysts are being shed. Shedding begins with symptoms and can last for weeks after symptoms stop, although the concentration of oocysts (and hence infectivity) declines.

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Laboratory Testing

Various laboratory test methods are available to detect *Cryptosporidium*, and techniques are continually evolving. Understanding the test method is important because the sensitivity and specificity of each test is variable, and the CDC case definition relies upon the particular type of testing conducted. Available tests include:

Light microscopy: Cryptosporidium will not routinely be detected during an Ova and Parasites (O&P) exam, unless the specimen is specifically stained for *Cryptosporidium*. As antigen and PCR tests have become more available, this has become a less common test method.

Direct Fluorescent Antibody (DFA): DFA uses fluorescent labeled antibodies that attach to the *Cryptosporidium* oocysts and make them glow brightly under a fluorescent microscope.

Enzyme Immunoassay (EIA): EIA tests detect antigens on the surface of the organism. EIA tests are most commonly performed by large reference laboratories because the method is best suited for screening large numbers of specimens.

Rapid immunochromatographic cartridge assays: These assays detect antigen and can be performed quickly in hospital and other clinical laboratories. There are concerns about false-positive results associated with these tests, particularly with increased age. One CDC study found that for patients 60 years and older, only 12.5% of rapid test positives could be confirmed by DFA.

Nucleic Acid Amplification Test (NAAT): The most common type of NAAT used is PCR, which amplifies and detects specific *Cryptosporidium* DNA sequences.

Cryptosporidiosis in Washington State

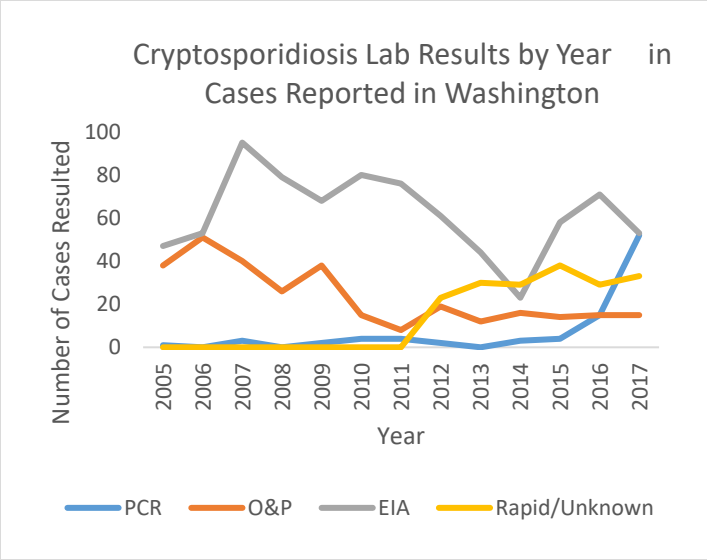
Between 2001 and 2016, cryptosporidiosis case counts have ranged from 62 to 139 per year, with an average of 93. The hospitalization rate in Washington averages around 10%, and no deaths have been reported. There is an overall upward trend in case counts, which may be partially attributable to changes in laboratory testing over time. There is a seasonal trend with cases peaking in the summer months and tapering off over the winter.

In Washington, the use of PCR testing has been increasing dramatically since 2016, and in 2017 the number of cases identified by PCR nearly equaled the number identified by EIA, which has been the most common test method during 13 of the past 14 years for reported cases. Often laboratory reports may not specify the type of test used, and simply report "*Cryptosporidium* antigen detected," which could indicate either an EIA test or a rapid test. Because the CDC case definition counts both rapid tests and unknown tests as probable cases (versus confirmed for EIA), these two test types are collapsed into a single category for reporting purposes.

CRYPTOSPORIDIOSIS STATEWIDE BY YEAR

Year	Cases	Rate*	Deaths
2001	73	1.2	0
2002	62	1.0	0
2003	65	1.1	0
2004	63	1.0	0
2005	94	1.5	0
2006	95	1.5	0
2007	139	2.1	0
2008	99	1.5	0
2009	102	1.5	0
2010	102	1.5	0
2011	88	1.3	0
2012	101	1.5	0
2013	84	1.2	0
2014	75	1.1	0
2015	113	1.6	0
2016	131	1.8	0

*All rates are cases per 100,000 population.



Between 2005 and 2017, 32% of case patients (range 25% to 46%) reported recreational water use during their exposure periods and 12% (range 5% to 25%) reported exposure to cattle. Consumption of unpasteurized milk was rarely reported, with 0-4 cases per year indicating such exposure. These results may be an underrepresentation if the exposure information was entered into comments fields rather than the exposure specific fields available for analysis. Among those reporting cattle exposure, calves with diarrhea or scours were mentioned frequently in the comments related to most likely exposure. Cases with recreational water exposure mentioned a variety of locations including swimming pools, lakes, and rivers. Water exposures were reported to have occurred both within Washington state, and during out of state or international travel.

Waterborne Prevention

Because *Cryptosporidium* is chlorine-tolerant, a fecal incident can contaminate even a properly maintained pool, and the organism can remain viable in the pool for approximately 10 days in the presence of 1 ppm chlorine. Several measures can help reduce the spread of *Cryptosporidium* in recreational water:

- Swimmers should shower thoroughly prior to entering the water to remove any fecal material
- Persons with diarrhea should not swim while sick, or for 2 weeks after being diagnosed with cryptosporidiosis
- Avoid swallowing water in the pool
- Properly remediate pool water after a fecal accident

If proper remediation steps such as hyperchlorination are not taken, a contaminated pool can act as a continuous source of illness, particularly if newly infected swimmers continue to swim in the original pool or swim in other local pools and spread the contamination. See the references section for a MMWR article describing a community wide outbreak involving approximately 1000 cases of cryptosporidiosis propagated through multiple pools.

Zoonotic Prevention

The Compendium of Measures to Prevent Disease Associated with Animals in Public Settings estimates that 16% of cases of cryptosporidiosis are attributable to animal contact. Prevention measures for reducing the risk of cryptosporidiosis associated with animal contact include:

- Educate owners and farm visitors about the risk for illness transmission
- Ensure adequate opportunities for handwashing and proper handwashing techniques
- Avoid eating or drinking after animal contact or after visiting an animal area, until handwashing is performed
- Keep boots or shoes used around animals out of the house
- Limit the handling of pre-weaned calves or goat kids by high-risk individuals such as young children or people with compromised immune systems

Cryptosporidiosis can be an unpleasant infection. A few simple precautions during summertime recreation and activities can reduce the risk.

Resources

Multicenter Study Retesting Public Health Surveillance Stool Samples Positive for *Cryptosporidium*:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5234809/

Protracted Outbreaks of Cryptosporidiosis Associated with Swimming Pool Use:

https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5020a3.htm

Compendium of Measures to Prevent Disease Associated with Animals in Public Settings:

http://nasphv.org/Documents/AnimalContactCompendium2017.pdf