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EPB 221- Cryptosporidium and Giardia

What are *Cryptosporidium parvum* and *Giardia lamblia*?

They are protozoa or single-celled parasites, which are found in the feces of infected humans or animals. Humans are infected when they ingest contaminated water or food, or touch contaminated objects, and then touch their mouth before washing their hands well. *Cryptosporidium* and *Giardia* can grow only in a living host and do not multiply in the environment. They are found in every region of the world and have become recognized as two of the most common causes of waterborne illness.

Why are these parasites a problem in drinking water?

These two parasites are a problem because they are found in most water from lakes, streams and some groundwater sources under direct influence of surface water. Communities that obtain their drinking water from these surface water sources and fail to properly treat their water can introduce the parasites into the water system. These organisms are both highly resistant to chlorine and other disinfectants that are used to kill bacteria and viruses in drinking water. Also, *Cryptosporidium* and *Giardia* exist as oocysts (cysts) or spores in the environment and are so small that they can get past some types of filters used in conventional water treatment.

How do *Cryptosporidium* and *Giardia* enter our water source?

Surface waters are contaminated in two major ways. Wastewater treatment plants may discharge effluent with *Cryptosporidium* or *Giardia* spores or oocysts, or runoff from certain agricultural operations may contain the spores. All untreated waters that come into contact with feces (such as urban runoff), should be considered as a potential source of contamination.

Generally, water from wells should be free from most parasites because soil filters out these protozoans before they reach groundwater. However, outbreaks of *Cryptosporidiosis* and *Giardiasis* have been reported for communities using wells as a raw water source. Such wells were likely contaminated by either raw sewage, treated wastewater or surface water runoff from livestock or wildlife grazing areas. Properly constructed and maintained wells, not under the influence of surface water, should be free from *Cryptosporidium* and *Giardia*.

How can you treat your water supply to prevent infection?

The removal of *Cryptosporidium* and *Giardia* oocysts from raw water is complicated. The best approach to reduce the risk of infection is the multiple-barrier approach to treatment, including watershed or wellhead protection, optimizing filtration and disinfection, and a properly operated and maintained distribution system.

On a smaller scale, such as individual households, filtration combined with disinfection devices may be used. If protozoa are present or suspected, it is recommended that the water be first passed through a filter with a 0.1-micrometre or smaller pore size to remove these parasites and then be chemically treated with chlorine or iodine to kill bacteria and viruses. It is important that these devices have

certification for cyst removal from a recognized accreditation organization such as the National Sanitation Foundation.

Turbidity is perhaps the most important indicator of *Cryptosporidium* removal in a water treatment system. *Cryptosporidia* is adequately removed by a conventional treatment process when the turbidity in treated water is consistently maintained at 0.3 NTU or lower. Turbidity measurements of raw, processed and treated water should be done on a regular basis, with a well-calibrated turbidimeter.

How do *Cryptosporidium parvum* and *Giardia lamblia* affect human health?

Cryptosporidium and *Giardia* can make people ill. The disease caused by *Cryptosporidium parvum* is called *Cryptosporidiosis*, while the disease caused by *Giardia lamblia* is called *Giardiasis*. Symptoms can range from mild to severe diarrhea accompanied by headaches, fever, cramping, loss of appetite, weight loss and nausea. In healthy individuals with functional immune systems, symptoms usually last 10 to 15 days and the disease is overcome by the body's defence mechanisms.

Who is at risk for severe *Cryptosporidiosis* and *Giardiasis*?

Although these organisms can infect all people, not every person who becomes infected with *Cryptosporidium* or *Giardia* will feel ill or notice symptoms. Some groups, such as children and pregnant women are more likely to develop more serious illness. People at risk for severe illness after infection, include people with AIDS, people who have cancer, or organ or bone marrow transplant patients who are taking drugs that suppress the immune system and people who are born with genetically weakened immune systems.

Is there a cure for *Cryptosporidiosis* or *Giardiasis*?

No. Some drugs can reduce the symptoms of the illness, but no drug known now can cure them.

What are the established numerical *Cryptosporidium* and *Giardia* guidelines?

In general, all drinking water should be free of microbial contaminants. Currently, there are no established numerical *Cryptosporidium* or *Giardia* guidelines for the protection of human health in drinking water. It is recommended that system owners implement appropriate treatment and protection measures discussed earlier, particularly in areas where an outbreak has occurred or is suspected.

What can individuals do to help?

To avoid pathogens and their effects:

- Avoid swimming in recreational water (pools, hot tubs, lakes or rivers, the ocean, etc.) if you have *Cryptosporidiosis* or *Giardiasis* and for at least 2 weeks after diarrhea stops;
- Pick up pet droppings and dispose of them hygienically;
- Take limited amounts of food to beaches to avoid attracting animals and birds that leave droppings. Don't feed animals or birds, and securely close garbage bins;
- Ensure septic systems are operating properly;
- Practice pollution-free boating and dispose of human waste properly;
- Encourage proper wastewater treatment by your municipality and local industries;
- Make sure livestock are maintained a safe distance away from drinking water sources. One best management practice is a buffer area between cattle and stream; and
- Ensure that drinking wells are properly maintained and capped to avoid contamination.