The Dangers Of Cryptosporidium In Drinking Water

The word *crypto* means hidden or secret, and the word *spore* means seed or germ. Therefore, *Cryptosporidium* literally means "hidden germ." To residents of Milwaukee, Wis., the roots of this strange word were driven home in April 1993 when the city suffered the largest outbreak of cryptosporidiosis ever recorded. More than 370,000 people suffered from the disease, which causes flu-like symptoms such as severe stomach cramping, fever, vomiting and diarrhea. At least 47 residents died.

The culprit was *Cryptosporidium*, a waterborne parasite delivered to unsuspecting residents through the city's water supply - a water supply that met all current standards for water quality and was believed to be safe when it left the water treatment plant.

What is Cryptosporidium?

Cryptosporidium parvum is a waterborne parasite encased in a leathery shell, or oocyst, and causes severe flu-like symptoms when ingested. Once ingested, the walls of the oocysts are softened by the digestive fluids in the stomach and small intestine. Four tiny protozoa emerge and immediately being to reproduce and infect the intestinal lining. This process impairs the small intestine's ability to absorb water and nutrients, which causes the infected person or animal to expel the oocysts through diarrhea and vomiting. It is estimated that an infected person produces 100 million oocysts a day.

In the last 10 years, there has been an increasing number of cryptosporidiosis outbreaks in the United States. According to the United States Environmental Protection Agency, *Cryptosporidium* can be found in virtually any surface water source. Unfortunately, the EPA still does not yet require municipal water systems to test for *Cryptosporidium.*

Effects of Cryptosporidium

The *Cryptosporidium* parasite incubates during a 2 to 12 day period, followed by a 10 to 14 day illness period that can sometimes last as long as six months.

Cryptosporidium can cause anyone who ingests the infected water to become ill. Nobody is immune at first, but a healthy person will eventually recover from cryptosporidiosis. However, for individuals with weakened immune systems, such as the elderly, infants, chemotherapy patients, organ transplant recipients and AIDS patients, cryptosporidiosis can be fatal, as the parasite also can infect other organs. The result is extreme malnutrition and dehydration.

The only treatment is to let the infection run its course and drink plenty of fluids to restore electrolyte balance to the body.

How Water Becomes Contaminated

Cryptosporidium is usually connected with poor sanitation. It is a common and difficult problem in developing countries and ranks as a leading cause of diarrheal illness worldwide.

According to one theory, the Milwaukee outbreak was caused by water runoff from a nearby farm or slaughterhouse that was contaminated with *Cryptosporidium* from animal intestines or feces. The runoff traveled into the Milwaukee River and then into Lake Michigan, where it eventually entered one of Milwaukee's lake water intake pipes.

Contaminated water sometimes passes freely through water treatment plants because *Cryptosporidium* is not readily killed by chlorine, and filtration may be ineffectual or nonexistent. What's more, the standard tests that water purification plants routinely rely on to indicate biological contamination do

not pick up the presence of *Cryptosporidium.* In fact, during the Milwaukee outbreak, the municipal water treatment plant met all safe water standards for disinfection and filtration.

Protection Against Cryptosporidium

Unfortunately, *Cryptosporidium* is one of the most resistant parasites to water chemical treatments ever encountered. This makes treating water for *Cryptosporidium* very difficult. The parasite responds somewhat to chlorine but only in high doses, and it is resistant to many commonly used hospital and laboratory disinfectants. To date, it seems *Cryptosporidium* can be removed only by filtration, and many municipal filtration plants are not efficient enough to take them out.

Fortunately, there is a solution. One alliterative for protection is a point-of-use (POU) water filtration system Certified by NSF International for the Cyst Reduction, including *Cryptosporidium* oocysts. A POU system is a simple and cost effective way to protect yourself from *Cryptosporidium* and other water contaminants. NSF International is an independent testing agency that sets product standards for manufacturers of POU systems.

NSF-Certified drinking water systems filter out at least 99.95 percent of particles between three and four microns in size. *Cryptosporidium* oocysts range in size from four to seven microns.

Typically the size of a household fire extinguisher, POU systems designed for residential use are installed under the kitchen sink and plumbed to the cold water line. The filtered water is served through a dedicated faucet to dispense water for drinking and cooking.

Commercial systems are larger in size due to their increased capacity, and are typically wall-mounted near the incoming water line. As water travels through the filtration system, cysts such as *Cryptosporidium* and *Giardia,* sediment, submicron sized particles, most bacteria and many harmful or unwanted chemicals are removed by the system's active ingredient, which most frequently is activated carbon.

Activated carbon is an extremely porous material that attracts and captures many harmful contaminants on its surface through a process known as adsorption The result is better tasting and cleaner water with fewer contaminants. Depending on the model, POU filtration systems are capable of correcting most water problems, including the removal of parasitic cysts such as *Cryptosporidium* and *Giardia;* the reduction of chlorine, chloramines, lead, pesticides, trihalomethanes (THMs), volatile organic chemicals (VOCs), and asbestos.

Everpure, Inc., a leading manufacturer of water filtration systems for residential and commercial use, offers a full line of systems to meet all water quality needs.

Homework Questions:

1. What is cryptosporidium and what are its dangers?
2. How did cryptosporidium get in Milwakee's water? Was the city's water treatment system poor?
3. What is the main difficulty in treating water for cryptosporidium?
4. What are some effective methods for treatment?

The following page contains this article:

http://www.everpure.com/issues/iowq007.html

You may also want to look at the following pages for some additional info:

http://www.mwra.state.ma.us/germs/crypto.htm