

Water Contaminant of the Month

Giardia lamblia, (often called just “Giardia” for short) is a single-celled animal. It is a protozoan and an intestinal parasite. It is also called *Giardia intestinalis*.

Giardia has two forms during its life cycle. The trophozoite, or active form, is teardrop-shaped and attaches to the intestinal wall of the host animal. It is released from the cyst form to cause the disease. It cannot live long outside a host. The cyst, or inactive form, is produced by the trophozoite inside the intestine of the host animal. It is then excreted in the feces of the infected host to contaminate surface water. It has a tough outer shell which allows it to survive outside a host body and eventually infect others. When swallowed it is activated by stomach acid and produces the disease-causing trophozoite. Cysts can be as small as 7 microns in diameter.

Giardia occurs worldwide. Cysts are found in the feces of infected animals and humans. It is most common in surface water and is found in natural waters such as rivers, and lakes. It can also be found in contaminated swimming pools, hot tubs, spas and water parks. It can be found in ice made from contaminated water. It can also be found on surfaces of uncooked, contaminated food.

Giardia causes giardiasis, commonly called “beaver fever”, “traveler’s diarrhea” or “backpacker’s disease”. It is very common, with up to 2.5 million cases occurring worldwide each year. Travelers to lesser developed countries and backwoods travelers such as hunters and backpackers are the most common victims through the consumption of untreated, contaminated water. The symptoms begin one to two weeks after exposure and include diarrhea, stomach or abdominal cramps and nausea. The disease can lead to weight loss and dehydration. It is treatable with specific prescription antibiotics.

Giardia is a primary drinking water contaminant under the Safe Drinking Water Act. The US EPA Maximum Contaminant Level Goal (MCLG) for *Giardia lamblia* in drinking water is zero. Under the federal Surface Water Treatment Rule enforced by the EPA, public water systems using surface water sources must show removal or inactivation to at least the three-log level (99.9% elimination).

Treatment methods for eliminating *Giardia lamblia* in water include filtration to the 4 micron level, including reverse osmosis, nanofiltration and ultrafiltration (filtration to the 1 micron level is recommended for cyst removal under NSF/ANSI standards); ultraviolet irradiation, and ozone purification. Routine chlorination is not recommended, though shock chlorination at high concentrations can be effective.

(Source: *Water Technology* 32:5; May, 2009)