Intestinal infection with the protozoan parasite *Giardia lamblia* is the second leading cause of outbreaks of waterborne disease in people in the United States. This one-celled parasite is common world-wide and occurs in humans, domestic animals, and wildlife. Although some people and domestic animals carry *G. lamblia* with no symptoms, others may develop severe debilitating diarrhea. Disease in free-ranging wildlife has not been reported. *Giardia* cysts are shed in feces and are infective immediately when ingested in contaminated water or food, although symptoms may not appear for 7-10 days. The infective cysts are very susceptible to desiccation and heat; however, they may survive for 2 to 3 months in cool water. Once ingested, cysts release trophozoite stages in the intestine, and the cycle is repeated.

The role of wildlife in transmitting *Giardia* to humans has been controversial. A variety of *Giardia* species have been isolated from wild mammals, birds, amphibians, and reptiles. Beavers are the most well known wildlife host for *Giardia*, to the extent that waterborne outbreaks of human giardiasis have sometimes been called "beaver fever." Experimental studies clearly show that beavers can become infected with *Giardia* of human origin, and beavers shedding *Giardia* cysts were found upstream of contaminated municipal water supplies. However, it still is not clear what species of *Giardia* infects beavers in the wild.

Wildlife other than beavers also have been suspect, but new information has relieved some concerns. DNA analyses recently has disclosed that muskrats and voles are carriers of *G. microti*, a species which does not affect humans. Wading birds such as herons and egrets were once thought to be potential sources of water contamination. Again, genetic analyses have shown that they actually harbor *G. ardeae*, another distinct non-human species. Researchers have found that amphibians and reptiles also carry species distinctly different from the human *G. lamblia* and are not important in causing human giardiasis.

No one can say whether beavers originally contracted *Giardia* from humans or if beavers harbor *Giardia* naturally. Either way, all blame for human giardiasis cannot be focused on the beaver because there is a plethora of important non-wildlife sources that may be of the *G. lamblia* type. Wilderness areas can be heavily contaminated due to improper disposal of human feces. Furthermore, genetic studies have shown that domestic dogs, cats, cattle, and sheep are also capable hosts of *Giardia* similar to that of human origin.

The most important factor in preventing *G. lamblia* infection is avoiding contaminated water. Large-scale waterborne outbreaks of human giardiasis usually occur due to the lack of water filtration or a breakdown in the filtration system. Conventional water treatment plants that use coagulation-sedimentation-filtration methods should prevent waterborne giardiasis outbreaks, regardless of the presence of *Giardia* cysts in the source water. Higher concentrations of chlorine and longer contact times are required to inactivate *Giardia* cysts compared to most other intestinal pathogens, especially in cold water. Boiling water easily inactivates cysts, as the thermal death point of cysts is 130-140° Fahrenheit. Reduction of contamination in streams and wells will depend upon a conscientious effort to dispose of
human and domestic animal feces. Because of the possibility of *G. lamblia* contamination by humans, domestic animals, or beavers, one should never assume that surface water, even in remote areas, is safe to drink without boiling or filtration. (Prepared by Dr. Joe Gaydos)