METHODS OF BACKCOUNTRY WATER TREATMENT

Heat

Heating water is a time-proven method of killing contaminants. While Giardia cysts die at temperatures below boiling (130-145° F), to be safe you should maintain a rolling boil for several minutes-longer at high altitudes. Some tough organisms form cysts or spores that are especially resistant to heat; to increase your odds of killing them some authorities recommend boiling for as long as l5-20 minutes. Heat disinfection takes significant amounts of time and fuel, but if you aren't prepared to use one of the other methods, boiling is the most reliable way to purify water.

Chemical

While not as foolproof as boiling, disinfection with chlorine or iodine solutions can be a practical approach; however, since Giardia is more resistant than most other organisms to chemical disinfection, you must take care to follow proper procedures when using the solutions. Chemical treatments require formulas that can vary with the characteristics of the water; you need to increase the concentration and contact time in cold, sediment-laden or alkaline water.

Iodine and chlorine disinfect because they are highly toxic in concentrated form. Store and dispense the chemicals away from food and minimize personal exposure to the chemicals and their fumes.

Don’t use iodine solutions when preparing water for a group unless you know the health history of all the members. Use chemical methods with caution; they can bring about undesirable side effects in some individuals, including pregnant women or those who are especially sensitive to iodine.

If you haven't learned a chemical’s preparation technique from a reliable source, can’t remember the correct recipe, or have chemical tablets that aren’t fresh, to be safe you should boil your water.

Filtration

A variety of filtration devices are available to remove organisms from the water. With filters you need no fuel and no formulas, and, with some devices, you are left with no treatment aftertaste in the water. Filter units, however, require an initial investment and their operation involves time and effort; especially in silty water.

Be sure that your filter is the proper size for the job: the effective pore size must be two micrometers or smaller for Giardia; and less than one half a micrometer for bacteria. The filter can plug up and become unusable unless you carry a spare element or have one that can be cleaned. Between periods of use, harmful organisms can grow in the pores of some filters; be cautious of devices that don't have a growth-inhibiting substance embedded into the filter material.

Remember; take special care with your water if it contains visible sediment, since the probability of exposure to harmful microorganisms is especially high under such conditions.

RECOMMENDED SANITARY PROCEDURES

Transmission by humans is thought to have increased the number of wild animals infected with disease organisms such as Giardia. Scientists do not agree on whether animals infected with certain types of Giardia can transmit the disease to humans; more research is needed on this subject. To help prevent further spread of Giardia you should make every effort to minimize the amount fecal material entering surface waters.

Establish common toilets for all camp groups larger than three persons. When burying feces make sure they are well-mixed in the soil to promote natural composting. Dig temporary latrines at least 100 feet from water, trails, or campsites. If a campsite has an established latrine, do not use it for disposal of wastewater; privies work better and smell less if moisture is minimized.

To encourage personal hygiene provide hand washes at latrine sites. The risk of exposure to intestinal diseases carried by other members of your camping group can be as great as the chance of getting sick from contaminated water.

OTHER BACKCOUNTRY HEALTH CONCERNS

Giardiasis is not the only potential health risk associated with backcountry travel. The next drink you take directly from a stream could include not only Giardia, but also other protozoan, bacteria, or viruses. Among the ailments caused by these organisms are other diarrheal diseases which affect you more quickly (often within a day) after exposure than does giardiasis. Symptoms may include fever and bloody stools - symptoms not generally associated with giardiasis.

You may also become sick from the food you eat. Summer temperatures and inadequate refrigeration may lead to the multiplication of harmful microorganisms in fresh foods, especially meat, poultry and dishes prepared with mayonnaise. Disease-causing organisms may also be transmitted by food handlers or by utensils that are not clean and sanitized.

To guard against transmission of disease, you should:

- thoroughly wash your hands before preparing or eating foods;
- remind others to wash their hands before eating;
- make sure individuals with boils, skin infections or diarrheal diseases do not prepare food;
- sanitize cooking utensils thoroughly (make a small bottle of chlorine bleach part of your cooking gear).

To find out about sources of additional information on this subject, or to order more copies of this brochure, contact:

Backcountry Water
Stream Ecology Center
Department of Biological Sciences
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B A C K C O U N T R Y W A T E R

Giardia and other potential health hazards

Water “clean enough to drink” has long been part of the appeal of the backcountry, but, as human impact intensifies, pure, safe water has become harder to find. The truth is that all water may contain harmful microscopic organisms. To drink water straight from that spring or free-flowing creek is to invite disease.

Health problems associated with a protozoan called Giardia duodenalis have increased noticeably over the past decade. This microscopic animal causes a disease known as giardiasis, which, while rarely fatal, can make you miserable. These days, enjoying the backcountry requires taking steps to protect your health.

All backcountry water should be considered potentially contaminated by Giardia or some other harmful microorganism. Be especially careful with creek water that is turbid because of storm runoff. Be suspicious of water near beaver ponds, campsites, or other areas with high levels of use by humans. Backcountry hot springs commonly are loaded with microorganisms; if you can’t resist taking a dip, keep the warm water away from your face. Disease-causing organisms can lurk even in a spring or stream that looks crystal clear. Water clarity is no guarantee of purity.

Giardia duodenalis is a parasite that can reproduce only in the intestines of warm-blooded animals – including muskrats, beaver, dogs, wading birds, and humans.

Animals that live around water are critical in the Giardia life cycle. Once Giardia enters a host through water or food, it multiplies and attaches to the intestinal wall. Giardia cysts (an inactive stage) pass from the intestines by means of excreted fecal matter. From the feces the cysts may enter water, where they can survive for months. An animal that drinks contaminated water then provides Giardia with a new host and the life cycle continues.

Attachment to the intestinal wall by Giardia interferes with the normal functions of the gastrointestinal system. Typically, it takes 8-16 days from the ingestion of the parasite to the onset of the disease. Symptoms are highly variable, but often include diarrhea, gas, fatigue, loss of weight, and nausea. Individuals can have mild cases of the disease or show no symptoms whatever, yet still be infected and shed cysts. It appears to be possible for humans to acquire resistance to the disease, yet, since there may be a number of different strains of Giardia duodenalis, you should not assume that you are immune. If you are new to a particular backcountry area, you may be especially vulnerable. If you experience the symptoms of giardiasis, you should consult a physician.

Enjoy the backcountry, but protect yourself: take care of the water.

The simplest way to ensure that your water is safe to drink is to carry it. When carrying water is not practical, you will have to kill or remove the disease-causing organisms by heat, chemical, or mechanical disinfection of the water.

Each purification method has its limitations (see the back side of this sheet), but boiling your water is the simplest and most foolproof. You should take care to treat any water that you may swallow, including water used for preparing food, washing dishes, and brushing teeth.

Be your own health inspector.

- Be aware of sanitation.
- Keep latrines away from water.
- Wash and rinse your hands.
- Keep your water pure.

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