

PUBLIC HEALTH FACT SHEET

Mosquito Repellents

Massachusetts Department of Public Health (MDPH), 305 South Street, Jamaica Plain, MA 02130

What is a mosquito repellent?

A mosquito repellent is a substance put on skin, clothing, or other surfaces which discourages mosquitoes from landing or crawling on that surface.

Why should I use a mosquito repellent?

Mosquitoes can spread viruses that cause serious diseases. In Massachusetts, the diseases spread by mosquitoes are West Nile virus (WNV) and eastern equine encephalitis (EEE). Mosquito repellents can reduce your chances of being bitten by a mosquito and can reduce the risk that you will get one of these diseases.

When should I use a mosquito repellent?

Use a mosquito repellent when you are outside and exposed to mosquitoes. Mosquitoes are generally most active between dusk and dawn, though some types may also be out during the day. Mosquitoes usually start to become active during early or mid-spring and remain active until the first hard frost (when the ground freezes).



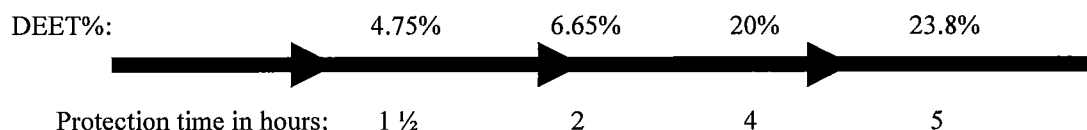
Did you know?

Every year from approximately late May until the first hard frost, mosquito samples are collected from various locations around the state and tested for WNV and EEE virus. Visit the MDPH website at www.mass.gov/dph/wnv during the mosquito season to see where positive mosquito samples have been found.

Which repellent should I use?

Different repellents work against different bugs. It is important to look at the active ingredient on the product label. Repellents that contain **DEET** (N, N-diethyl-m-toluamide), **permethrin**, **IR3535** (3-[N-butyl-N-acetyl]-aminopropionic acid) or **picaridin** (KBR 3023) provide protection against mosquitoes. In addition, **oil of lemon eucalyptus** [p-menthane 3, 8-diol (PMD)] has been found to provide as much protection as low concentrations of DEET when tested against mosquitoes found in the United States.

DEET products should not be used on infants under 2 months of age. Children older than two months should use products with DEET concentrations of 30% or less. DEET products are available in formulations up to 100% DEET, so always read the product label to determine the percentage of DEET included. Products with DEET concentrations higher than 30% do not confer much additional protection, but do last longer. In a study that looked at how long different concentrations of DEET worked against mosquitoes, the results ranged from 1½ to 5 hours. However, the length of protection time will vary widely depending on temperature, perspiration, and water exposure.



Permethrin products are intended for use on items such as clothing, shoes, bed nets and camping gear and should not be applied to skin. Apply the permethrin to your clothes before you put them on and follow the product's instructions.

Oil of lemon eucalyptus products should not be used on children under the age of three years.

Always Use Repellents Safely

- ❖ Follow the instructions given on the product label. If you have questions after reading the label, such as how many hours does the product work for, or if and how often it should be reapplied, contact the manufacturer.
- ❖ Don't use repellents under clothing.
- ❖ Don't use repellents on cuts or irritated skin.
- ❖ Don't use repellents near the mouth or eyes and use them sparingly around the ears. When using spray products, spray the product onto your hands first, and then apply it to your face.
- ❖ Use just enough product to lightly cover exposed skin and/or clothing. Putting on a larger amount does not make the product work any better.
- ❖ Don't let children handle the product. When using repellents on children, put some on your hands first, and then apply it to the child. Don't put repellents on a child's hands.
- ❖ When you come inside, wash your skin and the clothes that had repellent on them.
- ❖ **If you develop a rash or other symptoms you think were caused by using a repellent**, stop using the product, wash the affected area with soap and water, and contact your doctor or local poison control center. If you go to the doctor, bring the product with you to show him or her.

Do "natural" repellents work?

A number of plant-derived products are available for use as mosquito repellents, including oil of lemon eucalyptus and IR3535. Limited information is available regarding how well most of these products work and how safe they are. The information that is available shows that most of these products generally do not provide the same level or duration of protection as products like DEET or permethrin, except for oil of lemon eucalyptus and IR3535, which have been found to provide as much protection as low concentrations of DEET.

I'm concerned about using repellents on my infant. What else can I do to protect my infant from mosquitoes?

Mosquitoes are most active between dusk and dawn, so try to avoid outdoor activities with your infant during these times. When your infant is outside, use mosquito netting on baby carriages or playpens and consider going indoors if you notice a lot of mosquito activity.

Where can I get more information?

- The Massachusetts Department of Public Health (MDPH), Division of Epidemiology and Immunization at (617) 983-6800 or toll-free at (888) 658-2850, or on the MDPH Arbovirus website at www.mass.gov/dph/wnv, or your local board of health (listed in the telephone directory under local government).
- **Health effects of pesticides**, MDPH, Center for Environmental Health at 617-624-5757
- **Mosquito control in your city or town**: Mosquito control in Massachusetts is conducted through nine mosquito control districts. The State Reclamation and Mosquito Control Board (SRMCB) oversees all nine districts. Contact information for each district can be found online at www.mass.gov/agr/mosquito/districts.htm. You may also contact the SRMCB within the Massachusetts Department of Agricultural Resources at 617-626-1777 or your local board of health.
- **Information on repellents** (such as choosing the right repellent, using repellents on children or pregnant women, or detailed toxicology information), National Pesticide Information Center (NPIC) toll free at 1-800-858-7378 or online at <http://npic.orst.edu/index.html>

PUBLIC HEALTH FACT SHEET

West Nile Virus

Massachusetts Department of Public Health (MDPH), 305 South Street, Jamaica Plain, MA 02130

What is West Nile Virus (WNV)?

West Nile virus (WNV) is a mosquito-carried virus that can cause illness ranging from a mild fever to more serious disease like encephalitis or meningitis. It was first identified in the United States in 1999.

How is WNV spread?

WNV is most commonly spread to people through the bite of an infected mosquito. More information about different types of mosquitoes that can spread WNV can be found on the MDPH website at www.mass.gov/dph/wnv.

WNV may also be spread through blood transfusion or organ transplant. In addition, there are rare reports of WNV being passed from pregnant or breastfeeding women, who are infected with WNV, to their babies. Since these reports are rare, the health effects on an unborn or breastfeeding baby are unclear and still being studied.

People do not become infected by having direct contact with other infected people, birds or animals.

Why don't I need to report dead birds anymore?

From 2000 to 2008, MDPH collected reports and ran tests for WNV on dead birds in Massachusetts as one of several ways to monitor WNV activity across the state. In recent years, this method has become less useful for finding the virus. Many other states have discontinued dead bird reporting and testing. Mosquito collection and testing gives the most reliable indication of current WNV activity and this is where monitoring activities will continue to be focused.

Dead birds are no longer being tested for WNV and do not need to be reported to MDPH. Dead birds can be safely disposed of in the trash. Using gloves, a shovel or plastic bags covering your hands, the dead bird should be double-bagged and placed in the trash. You should then wash your hands.

What are the symptoms of WNV?

The majority of people who are infected with WNV (approximately 80%) will have no symptoms.

A smaller number of people who become infected (~20%) will have symptoms such as fever, headache, body aches, nausea, vomiting, and sometimes swollen lymph glands. They may also develop a skin rash on the chest, stomach and back.

Less than 1% of people infected with WNV will develop severe illness, including encephalitis or meningitis. The symptoms of severe illness can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. Persons older than 50 years of age have a higher risk of developing severe illness.

How common is WNV in Massachusetts?

Because most people who are exposed to WNV have no symptoms, it is difficult to know exactly how many people have been infected. People who develop severe illness with WNV are most often reported. Between 2000 and 2010, 67 people were reported with WNV infection in Massachusetts. Six of these people died. Cases have been identified from around the state.

Is there any treatment for WNV?

There is no specific treatment for WNV infections. People with mild WNV infections usually recover on their own. People with severe WNV infections almost always require hospitalization. Their symptoms may last several weeks and neurological effects may be permanent. Approximately 10% of people who develop severe illness will die from the infection.

What can you do to protect yourself from WNV?

Since WNV is most commonly spread by mosquitoes, here are some things you can do to reduce your chances of being bitten:

- Schedule outdoor events to avoid the hours between dusk and dawn, when mosquitoes are most active.
- When you are outdoors, wear long pants, a long-sleeved shirt and socks. This may be difficult to do when the weather is hot, but it will help keep mosquitoes away from your skin.
- Use a repellent with **DEET** (N, N-diethyl-m-toluamide), **permethrin**, **picaridin** (KBR 3023), **IR3535** (3-[N-butyl-N-acetyl]-aminopropionic acid) or **oil of lemon eucalyptus** [p-menthane 3, 8-diol (PMD)] according to the instructions on the product label.
 - DEET products should not be used on infants under two months of age and should be used in concentrations of 30% or less on older children.
 - Oil of lemon eucalyptus should not be used on children under three years of age.
 - Permethrin products are intended for use on items such as clothing, shoes, bed nets and camping gear and should not be applied to skin.
 - More information on choosing and using repellents safely is included in the MDPH Mosquito Repellents fact sheet which can be viewed online at www.mass.gov/dph/wnv. If you can't go online, contact the MDPH at (617) 983-6800 for a hard copy.
- Keep mosquitoes out of your house by repairing any holes in your screens and making sure they are tightly attached to all your doors and windows.
- Remove areas of standing water around your home. Here are some suggestions:
 - Look around outside your house for containers and other things that might collect water and turn them over, regularly empty them, or dispose of them.
 - Drill holes in the bottom of recycling containers that are left outdoors so that water can drain out.
 - Clean clogged roof gutters; remove leaves and debris that may prevent drainage of rainwater.
 - Turn over plastic wading pools and wheelbarrows when not in use.
 - Change the water in birdbaths every few days; aerate ornamental ponds or stock them with fish.
 - Keep swimming pools clean and properly chlorinated; remove standing water from pool covers.
 - Use landscaping to eliminate standing water that collects on your property.



Did you know?

Mosquitoes can begin to multiply in any puddle or standing water that lasts for more than four days! Mosquito breeding sites can be anywhere. **Take action** to reduce the number of mosquitoes around your home and neighborhood. Organize a neighborhood clean up day to pick up containers from vacant lots and parks and to encourage people to keep their yards free of standing water. Mosquitoes don't care about fences, so it's important to remove areas of standing water throughout the neighborhood.

Where can I get more information?

- Your doctor, nurse, or health care clinic, or your local board of health (listed in the telephone directory under local government)
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Updated: March 2011

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Eastern Equine Encephalitis

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What is Eastern Equine Encephalitis?

Eastern equine encephalitis (EEE) is a rare but serious disease caused by a virus.

How is the EEE virus spread?

The virus that causes EEE is spread through the bite of an infected mosquito. In Massachusetts, the virus is most often identified in mosquitoes found in and around freshwater, hardwood swamps. More information about different types of mosquitoes that can spread the virus can be found on the MDPH website at www.mass.gov/dph/wnv.

EEE virus particularly infects birds, often with no evidence of illness in the bird. Mosquitoes become infected when they bite infected birds. Although humans and several other types of mammals, particularly horses and llamas, can become infected, they do not spread disease.

How common is EEE in Massachusetts?

EEE is a very rare disease. Since the virus was first identified in Massachusetts in 1938, fewer than 100 cases have occurred. Over 60% of those cases have been from Plymouth and Norfolk counties.

Outbreaks of EEE usually occur in Massachusetts every 10-20 years. These outbreaks will typically last two to three years. The most recent outbreak of EEE in Massachusetts began in 2004 and included 13 cases with six fatalities through 2006.

What are the symptoms of EEE?

The first symptoms of EEE are fever (often 103° to 106°F), stiff neck, headache, and lack of energy. These symptoms show up three to ten days after a bite from an infected mosquito. Inflammation and swelling of the brain, called encephalitis, is the most dangerous and frequent serious complication. The disease gets worse quickly and some patients may go into a coma within a week.

What is the treatment for EEE?

There is no treatment for EEE. In Massachusetts, about half of the people identified with EEE died from the infection. People who survive this disease will often be permanently disabled. Few people recover completely.

What can you do to protect yourself from EEE?

Since the virus that causes EEE is spread by mosquitoes, here are some things you can do to reduce your chances of being bitten:

- Schedule outdoor events to avoid the hours between dusk and dawn, when mosquitoes are most active.
- When you are outdoors, wear long pants, a long-sleeved shirt and socks. This may be difficult to do when the weather is hot, but it will help keep mosquitoes away from your skin.
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Frequently Asked Questions about Dead Birds and WNV

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What do dead birds have to do with WNV?

Because West Nile virus (WNV) causes the death of certain kinds of birds, especially crows and blue jays, reporting and testing of dead birds has historically been a way to detect WNV activity in an area. In recent years however, the tracking and testing of dead birds has become less useful for monitoring WNV activity.

Many other states have also discontinued dead bird reporting and testing. Mosquito collection and testing provides a more reliable indication of current WNV activity. This is where monitoring efforts will be focused.

Do I need to report dead birds anymore?

No. Dead birds are no longer being tested for WNV and do not need to be reported to MDPH.

However, certain situations should be reported to other agencies.

- Report sick, dying, or recently dead waterfowl (duck and geese), shorebirds (sandpipers, plovers) or other waterbirds (herons) found at any location(s) to the Massachusetts Division of Fisheries and Wildlife (MDFW), Westborough Field Headquarters at 508-389-6300 or the U.S. Department of Agriculture (USDA) at 413-253-2403.

Larger bird die-offs of other species can be reported to the closest district office of the MDFW.

Western Wildlife District in Pittsfield—413-447-9789

Connecticut Valley Wildlife District in Belchertown—413-323-7632

Central Wildlife District in West Boylston—508-835-3607

Northeast Wildlife District in Acton—978-263-4347

Southeast Wildlife District in Buzzards Bay—508-759-3406

- Poultry flocks (i.e., chickens) experiencing sudden mortality, respiratory symptoms, or swollen heads should be reported to the Massachusetts Department of Agricultural Resources at 617-626-1795.

How can I safely dispose of the dead bird in my backyard?

You should avoid directly touching any dead bird, or any other wild animal, with your bare hands. Double-bag the bird carcass by using gloves, a shovel or plastic bags on hands and place it in the trash. You should then wash your hands.

Isn't it unsanitary or dangerous to put a dead bird in the garbage?

Our recommendation to dispose of dead birds via double bagging and placing in the trash is consistent with the national Centers for Disease Control and Prevention's recommendation for dead bird disposal. You should avoid touching a live or dead bird or their droppings with your bare hands since there may be harmful germs present. There is no evidence that a person can get WNV from handling infected birds. WNV is transmitted to humans from the bite of an infected mosquito. If you are concerned about WNV illness then you should take precautions to prevent mosquito bites.

My dog/cat had a dead bird in its mouth. Will it get WNV?

WNV is transmitted to humans and other mammals through the bite of an infected mosquito. There have been no documented cases of a dog or cat becoming infected after eating a dead infected animal. Even if bitten by an infected mosquito, WNV infection does not appear to cause serious illness in most dogs or cats.

Do you test animals like squirrels or dogs for WNV?

Mosquitoes are routinely tested because they are the main way the virus is spread to humans. While small mammals may become infected with WNV, they are not believed to play a major role in the cycle of transmission to humans.

Although routine surveillance is not currently occurring in small mammals, MDPH does perform some WNV testing in small mammals that are submitted for rabies testing. Small mammals that have a history of neurologic symptoms and test negative for rabies are tested for WNV when the laboratory workload permits. To date all such tests have been WNV negative. Larger mammals, particularly horses, have been found to be WNV positive in Massachusetts.

I found a dead bird in my pool. Is it safe to swim in?

WNV is spread to humans through the bite of an infected mosquito. There is no evidence to suggest that you can contract WNV, or any other disease of birds, by entering a swimming pool which has contained a dead bird. As a general precaution, it is good practice to keep up the chemical maintenance requirements of your pool, particularly when a dead animal has been in the water.

There have been a lot of dead birds in my neighborhood. Why aren't you spraying my town for mosquitoes?

Decisions about mosquito control are made by the local board of health within a city or town. Some towns may be served by a Mosquito Control Project. A community's decision to spray may depend on a number of factors, such as the results of mosquito surveillance. Your local board of health can be found in the phone directory under government. To find out if a mosquito control project serves your town, visit www.mass.gov/agr/mosquito/districts.htm or ask your local board of health.

Where can I get more information about WNV or other diseases spread by mosquitoes?

Visit the MDPH website at www.mass.gov/dph/wnv or call the MDPH Public Health Information Line at (866) 627-7968. People experiencing illness should contact their health provider.

Revised May 2009