

Protecting Yourself from Mosquito Bites

Biting mosquitoes are at the least very annoying. At worst, their bites may spread serious disease. West Nile Virus has been transmitted from mosquitoes to humans resulting in almost 10,000 cases in the U.S. with more than 260 known deaths since the virus was first identified in New York in 1999.

How can I reduce my risk of bites?

Taking simple steps to limit the number of emerging adult mosquitoes and using personal protection can greatly limit the number of bites.

Immature mosquitoes (larvae) develop in water but they don't need a pond or lake; many species can transform from egg to biting adult (only the females bite) within a week in as little as a teaspoonful of water. While this ability to prosper in tiny reservoirs is a tremendous advantage for mosquitoes it is also their greatest weakness. **If you eliminate standing water at least once every six days you will halt the production of the biting adults.** This is known as "source reduction," because you eliminate the source of the pests. Scrub clean and refill birdbaths,

and dump water out of plant saucers, children's toys, watering cans, and yard equipment. Keep your gutters clean and in good repair. The water that sits in gutters for a week after a rain, whether due to improper slope or minor blockage, is one of the primary sources of mosquitoes in an urban/suburban landscape. Do you temporarily store mulch or other soil amendments in plastic bags? Bags can easily trap enough water in pockets or wrinkles to allow mosquitoes to flourish.

What if the water sources can't be eliminated?

An extremely safe product is available to kill mosquito larvae before they turn into biting adults. The active ingredient is the bacterium *Bacillus thuringiensis israelensis* (Bti) and it is formulated in granules or long-lasting donut shapes that can be put in the water with no harm to reptiles, amphibians, fish, or plants.

Methoprene is another product that can be used in standing water with minimal risk to the environment. This compound is a growth regulator that prevents the immature larvae from molting into adults.

Bti and methoprene products are available at hardware stores, home and garden centers, and from the Web.

What will protect me?

If you have to be outdoors when the mosquitoes are biting, wear protective clothing (long sleeves, pants, socks, etc.) if possible and use a repellent. Hundreds of formulations and devices are sold that are absolutely ineffective or work for only a few minutes. There are, however, two active ingredients that have been exhaustively tested, work very well, and are **safe if applied according to package directions**. Permethrin can be purchased as a spray to apply to clothing in advance of use (not while you are wearing it!). DEET (N, N-diethyl-3-methylbenzamide) is the best performing repellent on the market. Formulations over 35 percent active are unnecessary because there is no significant additional benefit to higher concentrations. Microencapsulated formulations allow for sustained, slow release of the active and are preferred because of their persistence. DEET-containing repellents can be applied to most clothing and to **uncovered skin**. This means you should not apply it to your arms and then roll your sleeves down. If you put DEET on your skin, that skin cannot safely have clothing over it. Most of the rare adverse reactions to millions of applications of DEET have been the result of inappropriate use, so **follow label directions!** Properly using a combination of permethrin-treated clothing and DEET repellent will give close to 100 percent protection from biting mosquitoes in our area.

Products containing DEET should never be applied to infants under 2 months of age. See the links under DEET and children or consult your pediatrician for more information.

If entertaining on your deck or patio, use fans to keep the air moving. Biting insects prefer still air to breezes!

How can I protect my pets?

All the source reduction techniques will help lower the risk of bites. Keep cats and dogs inside as much as possible. Avoid the so-called “natural” mosquito control products that contain essential oils especially tea tree oil, pennyroyal, or d-limonene. These have not been proven effective and have caused symptoms of weakness, paralysis, liver problems, and seizures in pets. Products containing DEET are neurological toxins for dogs and cats. Consult your veterinarian for recommendations of safe, appropriate topical mosquito repellents. Products safe for use on humans are not necessarily safe for other animals.

What about all those mechanical devices?

Insect electrocuters don't work on mosquitoes. Buzz imitators don't frighten away mosquitoes. Electronic pest repellers don't affect mosquitoes (or any other pest). The jury is still out on whether mosquito traps employing propane or CO₂ tanks are effective in the suburban environment. Costs are high, placement is critical, and all species of biting mosquitoes may not be caught in numbers that will actually reduce the chances of being bitten. Trap designs are improving all the time but they are unlikely to ever offer a complete “silver-bullet” solution. Personal protection and source reduction strategies will always be needed.

Bats, purple martins and dragonflies, Oh my!

Bats prefer moths but will eat an occasional mosquito. Don't depend on them to protect you from bites. Purple martins are swift, elegant, mosquito-eating birds but they will only colonize housing in specific habitats and they won't catch every mosquito. Dragonflies are also great mosquito eaters but they don't get all of them. If you have a pond for dragonflies make sure the sides are straight rather than sloped, and that it is appropriately stocked with fish or treated with Bti to avoid raising even more mosquitoes.

Eight simple steps to fewer bites:

- Eliminate standing water at least every 6 days.
- Use the environmentally safe Bti products to kill mosquito larvae before they become biting adults.
- Make sure gutters are clean and drain completely.
- Prune dense vegetation to allow air movement and discourage resting adults.
- If you must be outside when mosquitoes are biting:
 - Wear protective clothing.
 - Use a product containing up to 35% DEET on clothing or uncovered skin. Microencapsulated formulations repel longer and need fewer applications.
 - Pretreat your clothing with a product containing permethrin.

- In small areas (deck or patio) use fans blowing in the same general direction to keep the air moving.

More information

DEET and children:

<http://www.aap.org/family/wnv-jun03.htm>
<http://www.deet.com/content/htm/child.html>
<http://epa.gov/pesticides/factsheets/chemicals/deet.htm>

Mosquito traps:

<http://www.sove.org/june2002/KLINE.pdf>

Repellents:

<http://www.aafp.org/afp/20021101/tips/1.html>

<http://npic.orst.edu/factsheets/DEETgen.pdf>

<http://www.epa.gov/pesticides/factsheets/pyrethroids4mosquitos.htm>

http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm

<http://www.epa.gov/pesticides/factsheets/skeeters.htm>

<http://www.epa.gov/pesticides/factsheets/insectrp.htm#choosing>

http://www.cdc.gov/ncidod/dvbid/westnile/prevention_info.htm

<http://www.annals.org/cgi/content/full/128/11/931>

Travel precautions:

<http://www.cdc.gov/travel/bugs.htm>

<http://www.permethrin-repellent.com/permethrin1.htm>

West Nile Virus:

http://www.hgic.umd.edu/pubs/online/West_Nile_Virus_2003_2.pdf

http://www.cdc.gov/ncidod/dvbid/westnile/site_index.htm

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