



EWG's Guide to Bug Repellents in the Age of Zika

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 TIP SHEET

 ZIKA TIP SHEET

INGREDIENT SAFETY

**Which products are safest?**

**What does EPA registration entail? Is it necessary to buy an EPA-registered product?**

**Do botanical repellents work?**

**Are botanical repellents safer than synthetic repellents?**

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## BUG-BORNE ILLNESSES

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**Am I at high risk for Lyme disease?**

**What is the risk of getting Lyme disease when bitten by a tick?**

**What should I know about West Nile Virus?**

**I am traveling abroad. What precautions should I take to avoid bug-borne illness?**

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## ALTERNATIVE TECHNOLOGIES

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**What bug repellent technologies should I avoid?**

**Are repellent candles worth it?**

**What about treated wristbands?**

**When should I consider repellent clothing?**

**What about clip-on repellent fans?**

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## BUYING AND USING REPELLENTS

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### **Q. When should I use tick and insect repellent?**

Bug bites can be irritating and pose serious risks if the bugs in your area carry Lyme disease or West Nile virus. Use repellents sparingly when needed. Higher concentrations of chemical repellents aren't always more effective.

### **Q. How do I prevent tick bites?**

Make sure the repellent you are using is rated for tick protection. Tuck your pants into your socks and apply repellent around your ankles. Repellents are not perfect and ticks tend to crawl to the upper body but often bite anywhere, so always check your body and your children for ticks after returning indoors. Remember to check your dogs too!

### **Q. How do I apply repellents safely?**

Always read product labels and follow all instructions. Take basic precautions to minimize your exposure. Do not apply to your face but you can dab some behind your ears if bugs are bad. Start by applying a small amount to exposed skin. Do not apply to skin covered by clothing. Apply directly to clothes if mosquitoes are landing on or biting through them. Wash hands after applying. Do not let children apply their own repellent, and avoid treating children's faces and hands. When you return home, change out of treated clothes and wash all treated clothing or body parts.

### **Q. How many hours of protection do I need?**

As a general strategy we recommend choosing a product based on how long you plan to be outside. Choose a short protection time product with 5 to 10 percent of DEET, Picaridin or PMD unless you are concerned about ticks or you know you will be outside for an extended period of time. Avoid products with high concentrations of chemical repellents that pose an unnecessary risk of over-exposure. Reapply repellent when you notice signs that it is wearing off.

### **Q. Where can I find out more about bug repellents and their active ingredients?**

The EPA's website at <http://cfpub.epa.gov/oppref/insect/#searchform> allows people to search for licensed bug repellents by active ingredient, mosquito and/or tick protection, and the number of hours of protection they

offer.

### **Q. How does mosquito repellent work?**

Mosquito repellents that are applied to the skin give off an odor that mosquitoes want to avoid. The repellent odor may confuse or discourage ticks and other bugs from landing or crawling on the treated item. The odor of DEET has been shown to stimulate receptors on the antennae of mosquitoes and to block the skin's release of mosquito-attracting compounds such as octanol, nonanal, decanol and geranyl acetone (Syed and Lead 2008).

Permethrin used to treat clothing is an insecticide and according to the EPA, targets the nervous system of insects, "causing muscle spasms, paralysis and death" (EPA 2009).

### **Q. Are some people more attractive to mosquitoes than others?**

Yes. Mosquitoes can smell natural chemicals that evaporate off skin. Some people smell better to mosquitoes than others. Perfume can bring unwanted mosquito attention. A recent paper showed that DEET can reduce or block the release of many compounds that attract mosquitoes (Syed and Lead 2008).

### **Q: What should I do if I have an adverse reaction to a bug repellent?**

Wash off skin and launder any clothing, monitor the reaction and contact your local Poison Control Center to report any potentially serious symptoms. Keep product container for medical professionals to examine, and avoid products with that active ingredient in the future.

### **Q. Can repellents be used on children?**

Generally yes, but it is important to pick the least toxic option and take basic precautions to minimize any risk of overexposure. Do not use bug repellents on infants under 6 months. Limit the amount of repellent on a child, and avoid using repellents on children daily for an extended time. When using repellent on a child, apply it to your own hands and then rub them on your child. Avoid children's eyes and mouth and use it sparingly around their ears. Do not apply repellent to children's hands as children may tend to put their hands in their mouths. Make sure to wash repellent-coated skin when your kids come indoors or at the end of the day. EPA suggests avoiding Oil of Lemon Eucalyptus or PMD on children. Health agencies offer conflicting advice about the DEET concentration safe for children. CDC recommends DEET with maximum concentrations of 20% to 30% for protection from Lyme disease borne by ticks. Health Canada recommends DEET with concentrations no greater than 5% to 10% for children. But this weaker concentration may not offer a strong defense against ticks bearing Lyme disease.



### **Q. Can bug repellents be used by pregnant and nursing women?**

Yes, all licensed repellent products are registered for use during pregnancy and breastfeeding. Human studies haven't found any specific problems in babies born to mothers who use DEET during pregnancy. However it is wise to take precautions to avoid both bug and tick bites and excessive use of repellent during pregnancy. As a first line of defense, try to avoid tick bites by covering up with pants, socks, shoes and long sleeves.

### **Q. Why not use products mixing repellent with sunscreen?**

We recommend that you avoid all products that combine repellent with sunscreen. Sunscreen must be reapplied every two hours, which may overexpose the user to repellent chemicals. The interaction between chemicals that filter harmful ultraviolet rays and repellent chemicals can decrease sunburn protection and cause more pesticide to be absorbed through skin.

### **Q. Do all bug repellents work against ticks?**

No! You must look for a product that claims to protect from tick bites. Repellents are not nearly as effective against ticks as against mosquitoes. Read the product label to ensure some protection from ticks or check EPA's

## REPELLENT CHEMICAL SAFETY

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### Q. Which products are safest?

Repellent chemicals generally fall in the classification of "low" or "very low" toxicity, but unlike agricultural pesticides, they are designed to be applied directly to skin, sometimes repeatedly over the course of weeks or months. Bug repellents can generally be used safely, but minimize your risks by tailoring the product you use to the intensity of bug and disease risks. Some approved repellents have a better safety profile than DEET and can be as effective at preventing bites. There are also numerous products sold as natural repellents that offer some degree of protection. The downside? Plant-based repellents may not work against all species of mosquitoes and will probably need to be reapplied more frequently. Many botanical repellents are potential skin allergens. With newer ingredients and botanicals, the EPA has less data on unusual adverse effects. Take precautions when applying any repellent. Try new repellents on a small patch of skin the day before using them all over the body.

### Q. What does EPA registration entail? Is it necessary to buy an EPA-registered product?

Eight bug repellents have been registered with the EPA, which requires a standard list of safety tests and proof that these chemicals effectively ward off pests. A number of botanical ingredients are exempted from registration because EPA has determined they are "minimal risks" to human health. These include citronella oil, mint oil, geranium oil, lemongrass oil and soybean oil. The safety and effectiveness data for these products is spotty, and most do not offer more than 2 hours of protection against mosquitoes.

### Q. Do botanical repellents work?

Botanical ingredients can prevent bites but vary in terms of how long they last. You'll have to read labels and try them out to see how long they last against the bugs you encounter. In general, products with Oil of Lemon Eucalyptus/PMD and Bite Blocker with soybean oil and geranium oil are the most effective. The EPA classifies IR3535 as a biopesticide because of its similarity to an amino acid alanine. This repellent chemical performs well at concentrations greater than 7.5 percent. The EPA plans to require effectiveness testing for botanical pesticides soon. Until it does, there is no guarantee that botanical repellents will keep the bugs away.

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## BUG-BORNE ILLNESSES

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### Q. Am I at high risk for Lyme disease?

In 2011, most Lyme disease were reported in **13 states**: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, Virginia, and Wisconsin. If you live in these areas you should take special precautions to prevent tick bites. Take extra care in the summer, since more than half of all new cases are confirmed in June and July. Read more about preventing and diagnosing Lyme disease on the CDC website. [www.cdc.gov/lyme/](http://www.cdc.gov/lyme/) Check out CDC's Interactive Lyme Disease Map to find out if you are in a high-risk place.

[\[http://www.cdc.gov/lyme/stats/maps/interactiveMaps.html\]](http://www.cdc.gov/lyme/stats/maps/interactiveMaps.html)

### Q. What is the risk of getting Lyme disease when bitten by a tick?

The answer depends on the type of tick, the deer population at your location and how long the tick was attached to the skin. Lyme disease is caused primarily by bites from the nymph stage of *Ixodes scapularis*, commonly known as the blacklegged tick or deer tick. Peak tick activity occurs during late June and early July.

In high-risk areas of Connecticut, 10 to 30 percent of nymph deer ticks are infected. Infected ticks do not transmit the disease in the first 24 hours, and only a small fraction transmits the disease within 48 hours. It is critical to conduct thorough tick checks after returning indoors (Stanford 2005).

### **Q. What should I know about West Nile virus?**

West Nile virus is a mosquito-borne illness that has recently spread to nearly every state in the U.S. Cases peak in the summer and linger through early fall. About 80 percent of people who are infected with the virus do not show symptoms. Most of the rest have flu-like illness for days or weeks, and about 1 in 150 become seriously ill (CDC 2012A). People older than 50 are at greatest risk of serious infections. The only way to avoid West Nile virus is to prevent mosquito bites. If cases are reported in your area, make an extra effort to rid your yard of standing water, fix window screens, and cover up or use repellent when mosquitoes are out.

Check out CDC's West Nile Virus map of cases diagnosed in 2012

[<http://www.cdc.gov/ncidod/dvbid/westnile/Mapsactivity/surv&control12MapsAnybyState.htm>]

### **Q. I am traveling abroad. What precautions should I take to avoid bug-borne illness?**

The four repellents recommended by CDC for protection from mosquito-borne diseases are DEET, Picaridin, Oil of Lemon Eucalyptus/PMD and IR3535. Products with these ingredients are all EPA-registered to provide protection from a wide range of biting insects and ticks. The risks vary by country, so consult your physician or CDC's traveler information site for details about risks in the regions you plan to visit.

<http://wwwnc.cdc.gov/travel/>

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## ALTERNATIVE TECHNOLOGIES

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### **Q. What bug repellent technologies should I avoid?**

EWG recommends that you avoid all aerosol repellents, all products that mix repellent and sunscreen, all products with more than 30 percent DEET, wristbands, repellent candles, bug zappers, yard insecticides and clip-on fans with repellent in them. These products are either ineffective or subject you to greater risk than lotion-based skin treatments.

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### **Q. Are repellent candles worth it?**

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inhalation hazard for people near them. We recommend other measures to keep bugs away.

### **Q. What about treated wristbands?**

The data generally show that wristbands are not very effective. Try applying repellent on the cuffs of clothing to protect hands and wrists from bites.

### **Q. When should I consider repellent clothing?**

Permethrin is the only chemical repellent registered for use on clothing, shoes, nets and camping gear. It is more toxic than repellents approved for direct skin application. Permethrin repels mosquitoes, ticks, and pre-treated products are designed to withstand multiple uses and washing cycles. These products should be limited to extreme situations where bugs are thick or disease risks are high. As a precaution do not launder these clothes with other clothing. Store in sealed containers out of the reach of children.

### **Q. What about clip-on repellent fans?**

The two ingredients registered for use in clip-on repellent fans are both more toxic than ingredients in lotions. We recommend you avoid those technologies and choose less toxic options.

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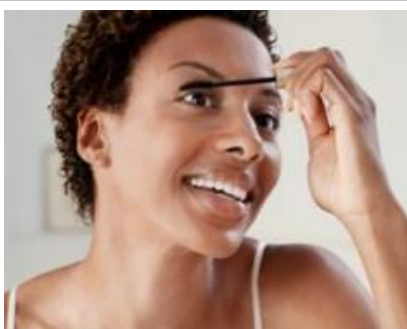




DID EWG HELP YOU PICK A BUG REPELLENT?

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