

# Repellents

[Repellents](#) are substances that help people avoid mosquito bites. Anyone working or playing in mosquito-infested areas will find repellents very helpful. Repellents are formulated for use on bare skin. They are sold as aerosols, creams, solids (sticks), pump sprays and liquids. Use repellents containing ingredients such as diethyl phthalate, diethyl carbate; N, N-Diethyl-3-Methylbenzamide (DEET), and ethyl hexanediol. For more than 50 years, DEET has been the gold standard in mosquito repellents. Check the label for these active ingredients. Repellents do not kill mosquitoes and other insects, but they will help deter them from biting people.

Permethrin-containing products (Permanone) are recommended for use on clothing, shoes, bednets and camping gear—but never on skin. Permethrin does kill mosquitoes and ticks and is highly effective. Permethrin-treated clothing repels and kills ticks, mosquitoes and other arthropods. It remains effective even after repeated laundering. Permethrin-treated clothing should be safe when label directions are followed. Permethrin products should never be applied to the skin. It is often helpful to use spray repellents on outer clothing as well as the skin. Protection times vary. Repellents such as DEET that are used on the skin will be effective for anywhere from 90 minutes to 10 hours, depending on the amount of active ingredient in the product. Permethrin products sprayed on clothing generally may be expected up to 6 hours following application.

Oil of citronella is the active ingredient in many of the candles, torches, or coils that can be burned to produce a vapor or smoke that repels mosquitoes. These are only useful outdoors when the wind isn't blowing. These products are less effective than repellents applied to the body or permethrin applied to clothing.

## Here are some commonsense rules to follow when using repellents

- Wear long sleeve shirts and pants outdoors during peak mosquito activity periods.
- Apply repellent sparingly only to exposed skin. Use repellents on skin under clothing only when mosquitoes can pierce through the clothing.
- Do not inhale or ingest repellents or get them into the eyes.
- Avoid applying high-concentration products (more than 50% DEET) to the skin, Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
- Pregnant and nursing women should minimize use of repellents.
- Never use repellents on wounds or irritated skin.
- Use repellent sparingly being sure to cover all exposed skin. A mosquito can find an unprotected spot the size of a dime. Saturation does not increase efficacy. Protection time provided by repellents is determined by the amount of active ingredient in the formulation. A 10% DEET-based repellent will typically last 90 minutes or so. A 30% product will last 5-6 hours.
- Wash repellent-treated skin after coming indoors.

- If a suspected reaction to insect repellents occurs, wash treated skin, and call a physician. Keep the repellent container so that you can tell the physician exactly what product you are using. The most commonly reported reaction is stinging when the repellent gets into the eyes. Flush eyes with cold water immediately if this occurs. Skin reactions are exceedingly rare and resolve quickly when the product is washed off. These reactions are not related to the concentration of the active ingredient in the product.

**Which repellent works best?** N,N-diethyl-3-methylbenzamide (DEET) remains the standard by which all other repellents are judged. DEET was developed by the U.S. Department of Agriculture and was registered for use by the general public in 1957. It is effective against mosquitoes, biting flies, chiggers, fleas, and ticks. Decades of empirical testing of more than 20,000 other compounds has not resulted in other repellent products with the duration of protection and broad-spectrum effectiveness of DEET, although the recent additions of picaridin and oil of lemon eucalyptus are remarkably close in effectiveness to DEET. The American Academy of Pediatrics says that all family members over the age of two months can use DEET-based repellents with up to 30% concentration with confidence.

DEET-based repellents have been around for more than 50 years but that hasn't kept the folks who make these products from innovating with new fragrances, new formulations, new product types, and, best of all, products that feel nice when applied. The DEET-based repellent fragrances are pleasant to use and range from fruity to woody neutral scents. Unscented products have a slight alcohol odor (there's alcohol in the formulation) until they dry on the skin. Folks who tend to be allergic to fragrances should try the unscented products. Today's products start out at a concentration of 5% (lasts 90 minutes or so) and range up to 100% (for approximately 10 hours of protection from bites). Pick one that matches your activity. For an outdoor family barbecue in the evenings, a 10% product is fine. It will help protect from bites for approximately 90 minutes to two hours. Products are available in aerosols, pump sprays, lotions, creams and even towelettes. These are individually packaged and are also sold in a handy plastic container that allows the towelettes to pop up one at a time. There are water resistant and water repellent products. One brand uses a microencapsulation process that helps the DEET release over time after you have applied it. Another goes on dry from an aerosol can, just as powder antiperspirants do.

For those who are in tick country, it's important to use a product with at least a 20% concentration. Lower concentrations of all EPA-registered repellents are not effective at warding off ticks.

Most apparent repellency failures with DEET are due to misapplications, so care should be taken to apply it thoroughly (avoiding the eyes and mouth) and to reapply when necessary. This is crucial to maintain the DEET vapor barrier above the skin. New polymerized 30% DEET cream formulations provide excellent protection that nearly matches that of higher DEET concentrations in regular formulations.

The American Academy of Pediatrics says products containing up to and including 30

percent DEET can be used on children. The AAP says DEET-based repellents can be used on children two months of age and older.

In April of 2005, the Centers for Disease Control and Prevention (CDC) began recommending two new active ingredients as safe, effective repellents.

The first of these is picaridin, a synthetic developed by Bayer Corporation in the 1980s. This repellent has been used widely outside of the United States and is marketed by the same companies that product DEET-based repellents. Picaridin is odorless, has a pleasant feel and doesn't damage certain fabrics and finishes affected by other repellents. Studies have shown it to be as fully repellent to mosquitoes and ticks as DEET and can also be applied on infants as young as 2 months.

Another EPA-registered repellent is oil of lemon-eucalyptus. It is marketed by companies that make both DEET and picaridin repellents. The formulation is based on the molecule found in eucalyptus. It cannot be used on children younger than three years of age. Like other essential oil products, it can cause skin irritation in higher concentrations. It has a pleasant scent and feel without any plasticizing properties. At higher concentrations, it is also effective at repelling ticks.

<http://www.mosquito.org/mosquito-information/repellents.aspx>