

## MOSQUITO REPELLENT HAS HEALTH RISKS

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It has long been known that the most effective insect repellents are those that contain a high percentage of DEET as their active ingredient. DEET is a well known abbreviation for the chemical N,N-diethyl-meta-toluamide. DEET has been marketed commercially since 1956 and is used by an estimated 50-100 million persons each year.

Repellents containing DEET are formulated as aerosols, lotions, creams, soaps, and semi-solid sticks. In general, the inexpensive, over-the-counter repellents contain less than 10% DEET, while the more expensive formulations are at least 20% DEET. The repellent formulation used by the U.S. Army is 75% DEET in an ethanol carrier. Formulations containing from 50% to 75% DEET can be purchased through camping stores.

Repellents are usually applied to the skin, especially on the arms, legs, neck, and face. Sometimes, the repellent is applied directly to clothing. One company has marketed a mesh sweatshirt designed to be stored in a 90% formulation of liquid DEET and then used for outdoor activity in areas where biting flies are abundant. DEET is sometimes applied to bed nets to protect humans in areas where arthropod-borne diseases are common. In some areas, liquid repellents are sprayed on pets, especially dogs and horses, to help protect them against biting flies and the diseases they carry.

Repellent use is generally directed against mosquitoes. However, DEET containing repellents also are quite effective at protecting against the bites of black flies, sand flies, horse flies, deer flies, and chiggers. Recently, because of the growing concern over Lyme disease throughout the eastern and Midwestern United States, some companies have repackaged and re-advertised their repellents. Many well-known repellents are now prominently advertised as being effective against ticks.

DEET remains the active ingredient in all of these repellents. Because of the Lyme disease scare, repellents are now used much more frequently, especially on small children. This is because ticks are abundant throughout the warm season and are active throughout the daylight hours. On the other hand, mosquitoes and other biting flies tend to be more periodic in their seasonal distribution and their daily activity is more restricted. An impressive amount of scientific evidence collected over the past few years has demonstrated that repellents can help to protect individuals against arthropod-borne diseases in areas of the world where these diseases present a human health risk.

There has been some concern that over-application of DEET may have toxic side effects. A 1987 report in the Journal of the American Medical Association documented five cases

of severe toxic reaction and death following the ingestion of DEET-containing insect repellent.

Of more immediate concern is the fear that toxic side effects may be associated with DEET absorbed through the skin. Workers in the field who rely on DEET-containing repellent for protection against biting flies may be exposed to nearly 900 grams of DEET a year. Human studies have shown that 9 to 56% of topically applied DEET can penetrate the skin and up to 17% can be absorbed into the circulatory system. Skin irritation resulting from DEET application is frequently reported. These side effects seem to be particularly acute when infants and children are involved.

In October 1989, the Centers for Disease Control (CDC) in Atlanta, Georgia reported five cases of seizures associated with the use of DEET insect repellent. Three of the cases were from New York and two from Connecticut. Four of the patients were boys aged 3-7 years and one was a 29-year-old man. The onset of seizures ranged from 8-48 hours after the application of repellent. All of the afflicted individuals recovered quickly. As a result of these cases, health officials in New York, Connecticut, and New Jersey issued a health alert advising caution in the use of DEET-containing repellents. At the same time, health officials reinforced the importance of DEET for protection against Lyme disease. The CDC outline the following 9 precautions to minimize the possibility of adverse reactions to DEET:

1. Apply the repellent sparingly and only to exposed skin or clothing.
2. Avoid applying high concentration products (i.e., 75% DEET) to the skin, particularly of children and infants.
3. Do not inhale or ingest repellents or get them into the eyes.
4. When practical, wear long sleeves and long pants. Apply repellent to all clothing to help reduce DEET absorption through the skin.
5. Avoid applying repellent to portions of children's hands that are likely to have contact with eyes or mouth.
6. Never use repellent on wounds or irritated skin.
7. Use repellent sparingly; one application will last 4-8 hours. Saturation does not increase efficacy.
8. Wash repellent-treated skin after coming indoors.
9. If a suspected reaction to insect repellent occurs, wash treated skin, and call a physician. Take the can of repellent to the physician.