



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

Last updated on Wednesday, May 09, 2012

Pesticides: Topical & Chemical Fact Sheets

You are here: [EPA Home](#) [Pesticides](#) [Fact Sheets](#) [Specific Chemicals](#) The Insect Repellent DEET

The Insect Repellent DEET

Este Web page está disponible [en español](#)

Current as of: March 23, 2007

DEET (chemical name, N,N-diethyl-meta-toluamide) is the active ingredient in many insect repellent products. It is used to repel biting pests such as mosquitoes and ticks, including ticks that may carry Lyme disease. Every year, approximately one-third of the U.S. population is expected to use DEET.

Products containing DEET currently are available to the public in a variety of liquids, lotions, sprays, and impregnated materials (e.g., wrist bands). Formulations registered for direct application to human skin contain from 4 to 100% DEET. Except for a few veterinary uses, DEET is registered for use by consumers, and it is not used on food.

DEET is designed for direct application to human skin to repel insects, rather than kill them. After it was developed by the U.S. Army in 1946, DEET was registered for use by the general public in 1957. Approximately 140 products containing DEET are currently registered with EPA by about 39 different companies.

Safety review of DEET completed in 1998

After completing a comprehensive re-assessment of DEET, EPA concluded that, as long as consumers follow label directions and take proper precautions, insect repellents containing DEET do not present a health concern. Human exposure is expected to be brief, and long-term exposure is not expected. Based on extensive toxicity testing, the Agency believes that the normal use of DEET does not present a health concern to the general population. EPA completed this review and issued its reregistration decision (called a RED) in 1998. ([More about REDs](#))

How to use DEET products safely

Consumers can reduce their own risks when using DEET by reading and following products labels. All DEET product labels include the following directions:

- Read and follow all directions and precautions on this product label.
- Do not apply over cuts, wounds, or irritated skin.
- Do not apply to hands or near eyes and mouth of young children.
- Do not allow young children to apply this product.
- Use just enough repellent to cover exposed skin and/or clothing.
- Do not use under clothing.
- Avoid over-application of this product.
- After returning indoors, wash treated skin with soap and water.
- Wash treated clothing before wearing it again.

Quick Resources

- [How to Use Insect Repellents Safely](#)
- [Methods of Mosquito Control](#)

Questions on Pesticides?

- [Contact the National Pesticide Information Center \(NPIC\) 1-800-858-7378](#)

- Use of this product may cause skin reactions in rare cases. The following additional statements will appear on the labels of all aerosol and pump spray formulation labels:
- Do not spray in enclosed areas.
- To apply to face, spray on hands first and then rub on face. Do not spray directly onto face.

Using DEET on children

DEET is approved for use on children with no age restriction. There is no restriction on the percentage of DEET in the product for use on children, since data do not show any difference in effects between young animals and adult animals in tests done for product registration. There also are no data showing incidents that would lead EPA to believe there is a need to restrict the use of DEET. Consumers are always advised to read and follow label directions in using any pesticide product, including insect repellents.

What to do in the event of a potential reaction to DEET

If you suspect that you or your child is having an adverse reaction to this product, discontinue use of the product, wash treated skin, and call your local poison control center or physician for help. If you go to a doctor, take the repellent container with you.

Benefits of DEET products

DEET's most significant benefit is its ability to repel potentially disease-carrying insects and ticks. The Centers for Disease Control (CDC) receives more than 20,000 reports of Lyme disease (transmitted by deer ticks) and 100 reports of encephalitis (transmitted by mosquitoes) annually. Both of these diseases can cause serious health problems or even death in the case of encephalitis. Where these diseases are endemic, the CDC recommends use of insect repellents when out-of-doors. Studies submitted to EPA indicate that DEET repels ticks for about three to eight hours, depending on the percentage of DEET in the product.

Deet Registration Information

[DEET Reregistration Eligibility Decision \(RED\)](#) (456 KB, PDF, 134 pages, [About PDF](#))

[DEET RED Fact Sheet](#) (25 KB, PDF, 5 pages, [About PDF](#))



Should kids use bug spray?

The Wilson family was enjoying a long weekend of camping near their favorite lake. Betty had been hearing a lot about West Nile Virus and mosquitoes on the news all summer and made sure she remembered to bring a new aerosol can of insect repellent containing DEET. As the sun set, the mosquitoes were out in full force, ready to bite. Her 17 year old son, Adam, asked her for the repellent can. Betty carefully read through the product label and handed it to Adam, explaining only to use the repellent on exposed skin, not to spray it directly on his face, and to wash his hands when he was done. Adam used the product as instructed and set it down so he could go wash his hands.

Doug, Adam's 4 year old brother, had watched Adam use the spray and didn't want mosquito bites either. Doug picked up the can, pushed down on the nozzle, and sprayed his face. Doug's eyes immediately started to burn and sting. He dropped the can and ran screaming to his Mom. Betty calmed Doug down and noticed he smelled strongly of repellent. Adam found the repellent can on the ground where Doug had dropped it and brought it over to his mom. Betty realized Doug had sprayed the repellent into his eyes! She read the first aid section of the product label and flushed Doug's eyes with clean water for 15 minutes. She loaded Doug into the car and rushed to the nearby hospital, being sure to take the repellent container along to show the doctor.

Don't let this happen to you! [Click here](#) to find out how...



Call toll-free 1.800.858.7378

7:30 am to 3:30 pm Pacific Time (PT), Monday - Friday

Visit us anytime on the web at npic.orst.edu

What is DEET?

DEET is an insect repellent that is used in products to prevent bites from insects such as mosquitoes, biting flies, fleas and small flying insects. DEET is a colorless liquid that has a faint odor and does not dissolve easily in water. DEET was developed by the U.S. Army in 1946 for protection of soldiers in insect-infested areas. Insect repellents containing DEET have been used by the general public in the United States since 1957.

What are some products that contain DEET?

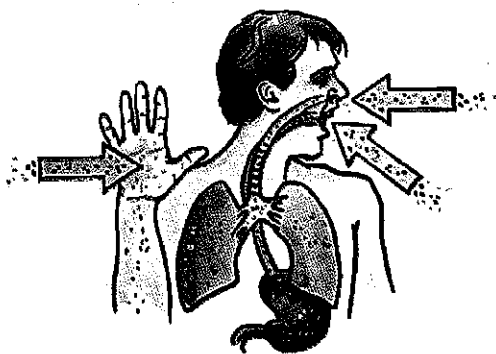
DEET has been used in a number of insect repellent products including liquid sprays, lotions, and sticks. It has been estimated that about 30% of the U.S. population uses one or more products that contain DEET every year.

If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.



How does DEET work?

Scientists do not know exactly how DEET works on all insects. Some insects sense people by detecting the chemicals from our bodies and in the air that we breathe out. It has been shown that insects exposed to DEET are not able to locate a person or animal because they cannot detect them.



How might I be exposed to DEET?

There are four ways that people can be exposed to chemicals: contacting their skin, contacting their eyes, breathing them in, or eating them. DEET is often used directly on skin. DEET may also be inhaled when sprays are used around the body and in indoor spaces where the vapors can remain for some time. It may also be possible to swallow DEET if the hands are not washed after using DEET on skin. People have had adverse reactions to DEET when they applied it to parts of their body that contacted other skin surfaces, and when they applied it to skin that was under clothing. Exposure to DEET can be limited by reading the pesticide label and following all of the directions.

What are some symptoms from a brief exposure to DEET?

When products containing DEET get into the eyes, they may cause irritation, pain and watery eyes. People that have left DEET products on their skin for extended periods of time have experienced irritation, redness, a rash, and swelling. People that have swallowed products containing DEET have experienced stomach upset, vomiting, and nausea. Very rarely, exposure to DEET has been associated with seizures in people. Most of these reactions have happened after drinking products with DEET in them or using the products in ways that do not follow label directions.

NPIC General Fact Sheets are designed to provide scientific information to the general public. This document is intended to promote informed decision-making. Please refer to the Technical Fact Sheet for more information.



Take Home Message

npic
NATIONAL
PESTICIDE • INFORMATION
CENTER

C
O
M
M
O
N

P
E
S
T
I
C
I
D
E

Q
U
E
S
T
I
O
N
S

Should kids use bug spray?

Be sure you keep pesticides, including insect repellents, out of the reach of children. Never allow young children to apply a repellent product themselves. Although Betty read the label, Doug was still able to get hold of the DEET repellent. Fortunately, having already read the label, Betty knew exactly where to find the first aid information to quickly help her son.

Always read the entire label of a pesticide before you use it! The statements on insect repellent labels tell how the product is to be applied and include special precautions for children. Some of these precautions are outlined in the Environmental Protection Agency (EPA) fact sheet on repellents. The Centers for Disease Control and Prevention (CDC) also provide guidance on the use of insect repellents.

For example, EPA says "Do not apply to eyes and mouth, and apply sparingly around ears. When using sprays do not spray directly onto face; spray on hands first and then apply to face." and CDC says "Do not allow young children to apply insect repellent to themselves; have an adult do it for them. Keep repellents out of reach of children." Be sure to wash your hands after the application. If you have questions about insect repellents or other pesticides, call the National Pesticide Information Center at 1-800-858-7378 to speak a Pesticide Specialist. Remember - "Read the Label First!"



NPIC is a cooperative agreement between Oregon State University and the U.S. Environmental Protection Agency (U.S. EPA. cooperative agreement # X8-83458501). The information in this publication does not in any way replace or supercede the restrictions, precautions, directions, or other information on the pesticide label or any other regulatory requirements, nor does it necessarily reflect the position of the U.S. EPA.

Reports of pets being exposed to DEET in amounts that would make them sick are rare. Pets that have been over-exposed to DEET have shown varying effects, including vomiting, shaking, excitement, lack of coordination, and seizures.

What happens to DEET when it enters the body?

When DEET was applied to the skin of volunteers by researchers, they found that a small amount of the DEET was taken into the body through the skin. When DEET and alcohol are applied to the skin, more DEET is taken into the skin compared with DEET alone. Drinking alcohol may also cause more DEET to be absorbed through the skin. Sunscreen products that contain DEET may cause more DEET to be taken into the body through the skin.

The DEET that is taken in to the body can be found in the blood up to 12 hours after it is applied to the skin. Once in the body, DEET is broken down by the liver and eliminated from the body mainly through the urine. All of the DEET that is taken in by the body is broken down into smaller chemicals before it is eliminated. Nearly all of the DEET that is taken in through the skin is eliminated by the body within 24 hours of applying it.

Is DEET likely to contribute to the development of cancer?

Researchers have not found any evidence that DEET causes cancer in animals or humans. DEET has been classified by the U.S. EPA as "Not Classifiable as a Human Carcinogen," which means that there is not enough evidence to say that it does or does not cause cancer.

Has anyone studied non-cancer effects from long-term exposure to DEET?

A trial was done on women to test the safety of using DEET to prevent malaria during pregnancy. Women used a product with 20% DEET on their legs and arms each day during their second and third trimesters of pregnancy. DEET crossed the placenta and was found in 8% of the cord blood samples. There was no increase in birth defects or problems with the survival in the young and there were no further problems in the first year of life.

Are children more sensitive to DEET than adults?

Limited information is available on childhood responses to DEET from experiments or poison center reports. Children have had adverse responses to DEET exposure, but most of these cases have resulted from improper use or accidents. Children involved in accidents have usually had less serious effects than teens and adults. Special instructions have been placed on products containing DEET for use on children.

The American Academy of Pediatrics (AAP) has recommended that DEET not be used on children younger than 2 months of age.¹ The AAP has also recommended that DEET should be applied no more than one time per day for children older than two months, and that products should be used on children that have the lowest DEET concentration available. The AAP has cautioned parents not to use DEET on the hands of children and to avoid applying it to areas around children's eyes and mouths.¹

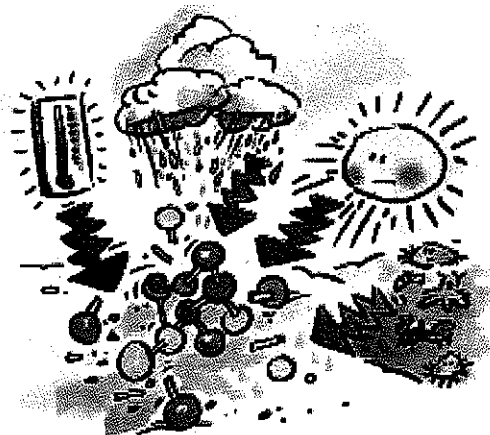


What happens to DEET in the environment ?

When DEET gets into the soil, it can be broken down by microbes, including bacteria and fungi. In experiments where fungi and bacteria broke down DEET, the chemicals remaining were less toxic than DEET itself. DEET usually sticks to soils, but can move in other soils to some degree. DEET does not dissolve or mix very well in water.

Because DEET is used by so many people, it has been found in waste water and in places where waste water moves into other bodies of water.

When DEET is sprayed or evaporates, it will be in the air as a mist or vapor, and then begin to break down in the atmosphere. These times for breakdown will change, depending on environmental conditions like temperature, humidity and wind.



Can DEET affect birds, fish, or other wildlife ?

Tests were done to find out if DEET could affect fish or insects that live in the water. For freshwater fish and insects, DEET was toxic at extremely high levels. For instance, the level of DEET that killed half of the fish or insects was about 75,000 times greater than the highest concentration found in waste water or streams. DEET is not considered to be very toxic to birds.

Where can I get more information ?

For more detailed information see the [DEET Technical Fact Sheet](#) or call the National Pesticide Information Center, Monday - Friday, between 7:30 AM and 3:30 PM Pacific Time (10:30 AM to 6:30 PM Eastern Time) at 1-800-858-7378 or visit us on the web at <http://npic.orst.edu>. NPIC provides objective, science-based answers to questions about pesticides.

Other references cited in this fact sheet include:

1. *Follow Safety Precautions When Using DEET on Children*; American Academy of Pediatrics.
<http://www.healthychildren.org/English/safety-prevention/at-play/Pages/Insect-Repellents.aspx> (accessed March 2008), updated June 2003.

Date Reviewed: July 2008

NPIC is a cooperative agreement between Oregon State University and the U.S. Environmental Protection Agency (U.S. EPA, cooperative agreement # X8-83458501). The information in this publication does not in any way replace or supersede the restrictions, precautions, directions, or other information on the pesticide label or any other regulatory requirements, nor does it necessarily reflect the position of the U.S. EPA.