

## Insect Precautions

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In the tropics, insects can transmit significant illnesses such as malaria, dengue, yellow fever, and rickettsial disease—some potentially life-threatening. These diseases are best prevented by personal measures. In some cases (e.g. malaria or yellow fever), a preventive drug or vaccine is available as well but should never replace personal protection measures. Travelers to areas where insects that transmit these diseases may be present can help minimize their risk by following the insect precautions and protective measures discussed below.

### PERSONAL PROTECTION MEASURES

- Wear clothing that exposes as little skin as is practicable.
- Apply a repellent containing the insecticide DEET (concentration 30 to 35%). The DEET preparation should be applied to all exposed nonsensitive areas of the body. Frequent application ensures continuous protection.
- The time of day and type of insects to be avoided determine when the repellent should be applied. Mosquitoes that transmit malaria (*Anopheles* mosquitoes) are night biters. Thus, if traveling in a malarious area, be especially vigilant in apply repellent from dusk to dawn. Mosquitoes that transmit dengue (*Aedes* mosquitoes) are day biters, and travelers need to be especially vigilant applying repellent during daytime hours when in the areas of dengue risk.
- Treat outer clothing with permethrin (or other pyrethroid) when traveling in an area of high risk for malaria or other mosquito-borne or tick-borne diseases.
- If not in a sealed, air-conditioned room, sleep under a permethrin-impregnated bed net when at risk of malaria. Regularly check the net for rips and tears, and keep it tucked in around the bed at all times. Ensure that all open windows have insect screens.
- Use an aerosol insecticide before going to bed and a vaporizer device throughout the night.
- Outdoors, a smoldering pyrethroid coil can be used to reduce flying insects. In areas where tick-borne disease is a risk, perform a full body check at least once a day.

### INSECTICIDES

The most effective repellents contain DEET (N, N diethylmeta-tolumide, an ingredient found in most insect repellents). DEET is effective against mosquitoes, ticks, fleas, and chiggers. Except among specially formulated preparations, the concentration of DEET determines how long it acts; how well it works is the same regardless of concentration. For example, 95% DEET lasts 8-10 hours, whereas 30-35% DEET is effective for 4 to 6 hours. Long-acting preparations such as Ultrathon contain 35% DEET in a formulation that is effective for 8 to 10 hours. Preparations for pediatric use contain 6-10% DEET and have a short duration of action unless they are specifically formulated.

DEET is a remarkably safe insect repellent; only 30 cases of severe toxicity have been reported among billions of uses in over 30 years. Most cases of toxic encephalopathy or seizures were reported in young children in whom excessive amounts were used over prolonged periods. The following precautionary measures can minimize the possibility of adverse reactions to DEET:

- Use repellents according to label directions.
- Apply repellents sparingly and only to exposed skin or clothing.
- Repellents should not be inhaled or ingested and contact with the eyes should be avoided.
- Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
- Never use repellents on wounds or irritated skin.
- Wash repellent-treated skin after coming indoors if there is no further risk of exposure to insects.
- If a suspected reaction to insect repellent occurs, wash treated skin and seek medical attention.
- Pregnant and nursing women should minimize use of repellents since about 15% of the chemical is absorbed through the skin.

Travelers also should purchase a pyrethroid-containing flying-insect spray to use in living and sleeping areas during evening and nighttime hours.

For added protection against mosquitoes, bed nets and clothing may be soaked in or sprayed with permethrin. Permethrin is an insecticide licensed for use on clothing; when applied according to direction it can be effective on clothing for several months and on bed nets for half a year. Permethrin physically binds to the fabric, which can then be repeatedly washed without loss of effect; this also prevents absorption through skin. In some countries, deltamethrin liquid is available.