



Just the Facts...

Malaria

Q. What is malaria?

A. Malaria is a serious mosquito-borne illness that is caused by a microscopic parasite which infects red blood cells. There are four species of malaria parasites that can infect humans: *Plasmodium falciparum*, *P. malariae*, *P. ovale*, and *P. vivax*. There are other species of *Plasmodium* that infect animals. The severity of disease depends on the species of *Plasmodium* causing the infection. Infection with any of the malaria species can make a person feel very ill. However, infection with *P. falciparum*, if not promptly treated, can be fatal, and the majority of deaths worldwide are due to this type of malaria. *Plasmodium vivax* and *P. ovale*, although rarely fatal, can develop dormant liver stages that can reactivate after symptom-free intervals of up to 2 to 4 years, respectively.

Q. How is malaria spread?

A. Malaria parasites are spread by the bites of infected female *Anopheles* mosquitoes.

Q. Where is malaria found?

A. Malaria is most prevalent in warmer regions of the world – typically tropical and subtropical areas, including over 100 countries in Central and South America, Hispaniola (Haiti and the Dominican Republic), Africa, the Indian subcontinent, Southeast Asia, the Middle East, and Oceania. Although risk-free for many years, and despite its more temperate climate, the Korean peninsula is again experiencing malaria along the demilitarized zone (DMZ). Over 1,000 cases of malaria are diagnosed in the United States every year, most occurring in travelers and immigrants returning from malaria-risk areas of the world.

Q. How many people get malaria?

A. Each year, 350-500 million cases of malaria occur worldwide, and over one million people die, most of them young children in sub-Saharan Africa.

Q. What is the malaria life cycle?

A. In humans, malaria parasites develop and multiply first in the liver and then in the blood, rupturing liver cells and red blood cells in the process. When a female mosquito feeds on the blood of the infected human, it picks up certain “gametocyte” forms (the sexually differentiated, male and female forms) of the blood stage parasites. If the mosquito is a female of the genus *Anopheles*, the gametocytes will then develop and multiply into sporozoites which ultimately reside within its salivary glands. When the *Anopheles* mosquito feeds on another human, the sporozoites are inoculated along with the mosquito’s saliva into the new human, and the infectious cycle begins anew.

Q. Can malaria be transmitted from person-to-person?

A. No. Malaria cannot be transmitted from person-to-person like a cold or the flu. You cannot get malaria through casual contact with an infected person (e.g. touching or kissing a person with the disease). The primary means of contracting malaria is via mosquito bite. Other, rare means of infection include blood transfusion, organ transplant, use of needles or syringes contaminated with blood, or congenital transmission (infected mother passing the parasite to her fetus during pregnancy).

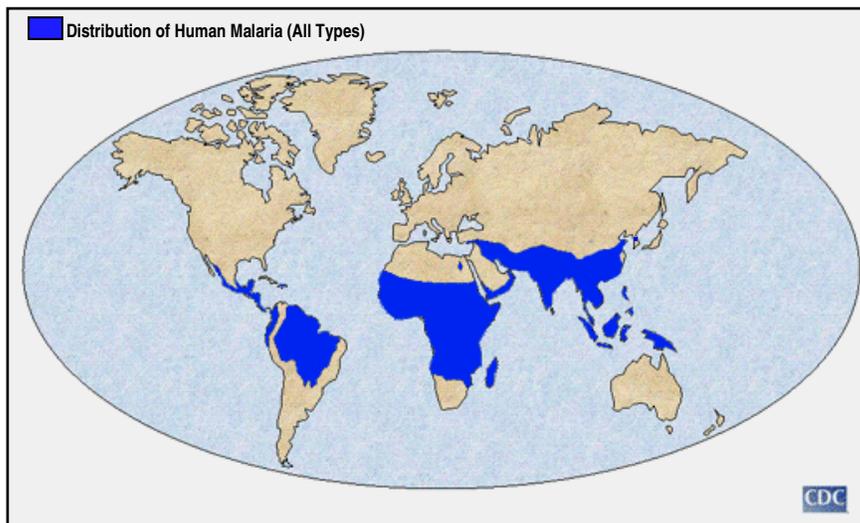
Q. What are the symptoms of malaria?

A. Symptoms vary depending on the specific type of *Plasmodium* involved, but at the outset generally include fever, shaking chills, sweats, headache, muscle aches and exhaustion. Nausea, vomiting, and diarrhea may also occur. Anemia and jaundice (yellow coloring of skin and eyes) can occur due to destruction of red blood cells. Infection with *P. falciparum*, if not promptly treated, can lead to kidney failure, seizures, coma, and death. Symptoms of malaria may continue for weeks or months, with recurring episodes of fever and chills. *Plasmodium vivax* and *P. ovale* have dormant liver stage parasites (known as “hypnozoites”) which can reactivate (“relapse”) and cause malaria symptoms several months or years later. *Plasmodium malariae* may produce a long-lasting infection that can persist without symptoms (the infection is asymptomatic) for years, or even a lifetime. Malaria in pregnant women can be more severe than in nonpregnant women and can cause adverse pregnancy outcomes, including prematurity, miscarriage, and stillbirth.



Photo: James Gathany, CDC

A female *Anopheles* mosquito takes a blood meal from a human host.



Q. How soon do symptoms appear?

A. Typically, symptoms begin 10 days to 4 weeks following the bite of an infected mosquito, but range from as early as 7 days to as late as 1 year or longer, depending on the type of malaria.

Q. How is malaria diagnosed?

A. Malaria is diagnosed based on symptoms, followed by laboratory confirmation. The test that is used most widely is microscopy. A drop of the patient's blood is smeared across a slide, stained with a special dye, and then examined under a microscope for presence of the malaria parasites.

Q. How is malaria treated?

A. Anyone who is sick with flu-like symptoms and has any suspicion that they may have malaria should seek immediate medical attention. Malaria can be effectively treated with a variety of prescription drugs if diagnosed early, and before it becomes severe and life-threatening.

Q. How long does a person remain infected with malaria?

A. If the correct drugs are administered for the proper length of time, malaria can be cured and all the parasites eliminated from the body. However, if the disease is improperly treated, relapses can occur and parasites can persist in the blood for years or decades.

Q. How can malaria be prevented?

A. There is no vaccine against malaria. However, there are oral prescription drugs that can help prevent travelers from getting infected while visiting areas in which malaria is common. It is very important for any person who will be traveling to areas where malaria occurs to consult with their physician about the current recommendations for preventive medications (chemoprophylaxis) against the disease.

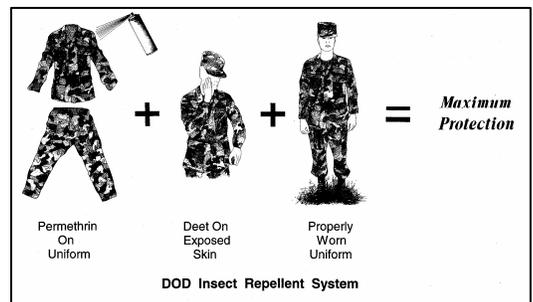
Q. What can I do to reduce my risk of becoming infected with malaria?

A. You can help prevent malaria, and other mosquito-borne diseases, by protecting yourself from mosquito bites.

- Stay inside well-screened areas at dawn, dusk, and nighttime. This is when *Anopheles* mosquitoes are most active.
- Wear long-sleeved shirt, long pants, and socks whenever you are outdoors.
- Wear loose-fitting clothing to prevent mosquito bites through thin fabric.
- Use both skin and clothing repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
 - For your skin, use a product that contains 20-50% **DEET** (N,N-diethyl-meta-toluamide). **DEET** in higher concentrations is no more effective.
 - Use **DEET** sparingly on children, and don't apply to their hands, which they often place in their eyes and mouths.
 - Apply **DEET** lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
 - To apply to your face, first dispense a small amount of **DEET** onto your hands and then carefully spread a thin layer.
 - Wash **DEET** off when your exposure to ticks, mosquitoes, and other arthropods ceases.
 - For your clothing, use a product that contains **permethrin**. **Permethrin** is available commercially as 0.5% spray formulations. Clothing that is factory-impregnated with permethrin may also be purchased commercially. Permethrin will withstand numerous launderings.
 - **Permethrin** should only be used on clothing, never on skin.
 - When using any insect repellent, always FOLLOW LABEL DIRECTIONS. Do not inhale aerosol formulations.

For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the military combat uniform (e.g. ACUs, BDUs) (pants tucked into boots, sleeves down, undershirt tucked into pants), this system includes the concurrent use of both skin and clothing repellents:

- Standard military skin repellent: 33% **DEET** lotion, long-acting formulation, one application lasts up to 12 hours, NSN 6840-01-284-3982.
- Standard military clothing repellents: either aerosol spray, 0.5% **permethrin**, one application lasts through 5-6 washes, NSN 6840-01-278-1336; or IDA (impregnation kit), 40% **permethrin**, one application lasts the life of the uniform (approx. 50 washes), NSN 6840-01-345-0237. Factory permethrin-treated ACUs are also available via contract [Contact the Armed Forces Pest Management Board (AFPMB) for details, DSN 295-7476; CM (301) 295-7476].



Take malaria chemoprophylaxis pills as directed by the medical authority. This is CRITICAL.

- Eliminate mosquito-breeding sites by cleaning birdbaths routinely, and emptying water from old tires and other outdoor containers or debris.
- Make sure that door and window screens do not have holes.
- Vitamin B, ultrasonic devices, and "bug zappers" are NOT effective in preventing mosquito bites.