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## Malaria

### What is Malaria?

Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects a certain type of mosquito which feeds on humans. People who get malaria are typically very sick with high fevers, shaking chills, and flu-like illness. Four kinds of malaria parasites can infect humans: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*. Infection with *P. falciparum*, if not promptly treated, may lead to death. Although malaria can be a deadly disease, illness and death from malaria can usually be prevented.

About 1,300 cases of malaria are diagnosed in the United States each year. The vast majority of cases in the United States are in travelers and immigrants returning from malaria-risk areas, many from sub-Saharan Africa and South Asia.

The World Health Organization estimates that each year 300-500 million cases of malaria occur and more than 1 million people die of malaria, especially in developing countries. Most deaths occur in young children. For example, in Africa, a child dies from malaria every 30 seconds. Because malaria causes so much illness and death, the disease is a great drain on many national economies. Since many countries with malaria are already among the poorer nations, the disease maintains a vicious cycle of disease and poverty.

### How People Get Malaria (Transmission)

#### How is malaria transmitted?

Usually, people get malaria by being bitten by an infective female *Anopheles* mosquito. Only *Anopheles* mosquitoes can transmit malaria and they must have been infected through a previous blood meal taken on an infected person. When a mosquito bites an infected person, a small amount of blood is taken in which contains microscopic malaria parasites. About 1 week later, when the mosquito takes its next blood meal, these parasites mix with the mosquito's saliva and are injected into the person being bitten.

Because the malaria parasite is found in red blood cells of an infected person, malaria can also be transmitted through blood transfusion, organ transplant, or the shared use of needles or syringes contaminated with blood. Malaria may also be transmitted from a mother to her unborn infant before or during delivery ("congenital" malaria).

#### Is malaria a contagious disease?

No. Malaria is not spread from person to person like a cold or the flu, and it cannot be sexually transmitted. You cannot get malaria from casual contact with malaria-infected people, such as sitting next to someone who has malaria.



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## Who is at risk for malaria?

Anyone can get malaria. Most cases occur in people who live in countries with malaria transmission. People from countries with no malaria can become infected when they travel to countries with malaria or through a blood transfusion (although this is very rare). Also, an infected mother can transmit malaria to her infant before or during delivery.

### Who are the people most at risk of getting very sick and dying from malaria?

*Plasmodium falciparum* causes severe and life-threatening malaria; this parasite is very common in many countries in Africa south of the Sahara desert. People who are heavily exposed to the bites of mosquitoes infected with *P. falciparum* are most at risk of dying from malaria. People who have little or no immunity to malaria, such as young children and pregnant women; or travelers coming from areas with no malaria, are more likely to become very sick and die. Poor people living in rural areas who lack knowledge, money, or access to health care are at greater risk for this disease. As a result of all these factors, an estimated 90% of deaths due to malaria occur in Africa south of the Sahara; most of these deaths occur in children under 5 years of age.

### If I was born in a country where malaria is present and had malaria as a child, then moved to the United States many years ago; do I need to worry about getting malaria when I return home to visit my friends and relatives?

Yes, anyone who goes to a malaria-risk country should take precautions against contracting malaria. During the last several years that you have spent in the United States, you have lost any malaria immunity that you might have had while living in your native country. Without frequent exposure to malaria parasites, your immune system has lost its ability to fight malaria. You are now as much at risk as someone who was born in the United States (a "non-immune" person). Please consult with your health-care provider or a travel clinic about precautions to take against malaria (preventive drugs and protection against mosquito bites) and against other diseases.

## What are the signs and symptoms of malaria?

Symptoms of malaria include fever and flu-like illness, including shaking chills, headache, muscle aches, and tiredness. Nausea, vomiting, and diarrhea may also occur. Malaria may cause anemia and jaundice (yellow coloring of the skin and eyes) because of the loss of red blood cells. Infection with one type of malaria, *Plasmodium falciparum*, if not promptly treated, may cause kidney failure, seizures, mental confusion, coma, and death.

### How soon will a person feel sick after being bitten by an infected mosquito?

For most people, symptoms begin 10 days to 4 weeks after infection, although a person may feel ill as early as 7 days or as late as 1 year later. Two kinds of malaria, *P. vivax* and *P. ovale*, can occur again (relapsing malaria). In *P. vivax* and *P. ovale* infections, some parasites can remain dormant in the liver for several months up to about 4 years after a person is bitten by an infected mosquito. When these parasites come out of hibernation and begin invading red blood cells ("relapse"), the person will become sick.

### How do I know if I have malaria for sure?



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Most people, at the beginning of the disease, have fever, sweats, chills, headaches, malaise, muscles aches, nausea and vomiting. Malaria can very rapidly become a severe and life-threatening disease. The surest way for you and your health-care provider to know whether you have malaria is to have a diagnostic test where a drop of your blood is examined under the microscope for the presence of malaria parasites. If you are sick and there is any suspicion of malaria (for example, if you have recently traveled in a malaria-risk area) the test should be performed without delay.

## Preventing Malaria During Travel

### **I will be traveling outside of the US to an area with malaria; how do I find out what is the best drug to take against malaria?**

CDC Travelers' Health destination pages give detailed information on the proper drugs to take for the area you are visiting and specific prevention tips.

Many effective antimalarial drugs are available. Your health care provider and you will decide on the best drug for you based on your travel plans, medical history, age, drug allergies, pregnancy status, and other health factors.

To allow enough time for the drugs to become effective and for a pharmacy to prepare any special doses of medicine (especially doses for children and infants), visit your health care provider 4-6 weeks before travel.

### **What is known about the long term effects of drugs that are commonly used to prevent and treat malaria?**

In general, most drugs used to prevent and treat malaria have been shown to be well tolerated for at least 1 year or more.

### **Is it safe to buy my malaria drugs in the malaria-risk country where I will be traveling?**

Buying medications abroad has its risks. The drugs could be of poor quality because of the way they are produced. The drugs could contain contaminants or they could be counterfeit drugs and therefore may not provide you the protection you need against malaria. In addition, some medications that are sold overseas are not used anymore in the United States or were never sold here. These drugs may not be safe or their safety has never been evaluated.

It would be best to purchase all the medications that you need before you leave the United States. As a precaution, note the name of the medication(s) and the name of the manufacturer(s). That way, in case of accidental loss, you can replace the drug(s) abroad at a reliable vendor.

### **Isn't there a malaria vaccine? And if not, why?**

There is currently no malaria vaccine approved for human use. The malaria parasite is a complex organism with a complicated life cycle. Its antigens are constantly changing and developing a vaccine against these varying antigens is very difficult. In addition, scientists do not yet totally understand the complex immune responses that protect humans against malaria. However, many scientists all over the world are working on developing an effective vaccine. Because other methods of fighting malaria,



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including drugs, insecticides, and bed nets, have not succeeded in eliminating the disease, the search for a vaccine is considered to be one of the most important research projects in public health.

## After Returning from a Malaria Risk Area

### How long after returning from an area with malaria could I develop malaria?

Any traveler who becomes ill with a fever or flu-like illness while traveling, and up to 1 year after returning home should immediately seek professional medical care. You should tell your healthcare provider that you have been traveling in a malaria-risk area.

### Can I give blood if I have been in a country where there is malaria?

It depends on what areas of that country you visited, how long ago you were there, and whether you ever had malaria. In general, most travelers to an area with malaria are deferred from donating blood for 1 year after their return. People who used to live in malaria-risk areas cannot donate blood for 3 years. People diagnosed with malaria cannot donate blood for 3 years after treatment, during which time they must have remained free of symptoms of malaria.

Blood banks follow strict guidelines (e.g. those of the American Red Cross) for accepting or deferring donors who have been in malaria-endemic areas. This is in order to avoid collecting blood for transfusions from an infected donor. In the United States during the period 1963-1999, there were 93 cases reported to CDC where people acquired malaria through a transfusion. Because of these control measures, transfusion-transmitted malaria is very rare in the United States and occurs at a rate of less than 1 per million units of blood transfused.

## Treating Malaria

### When should malaria be treated?

The disease should be treated early in its course, before it becomes serious and life-threatening. Several good antimalarial drugs are available, and should be taken early on. The most important step is to think about malaria if you are presently in, or have recently been in, an area with malaria, so that the disease is diagnosed and treated in time.

### What is the treatment for malaria?

Malaria can be cured with prescription drugs. The type of drugs and length of treatment depend on the type of malaria, where the person was infected, their age, whether they are pregnant, and how sick they are at the start of treatment.

For health care providers treating malaria, please see the [CDC Guidelines for Treatment of Malaria](#) in the US.

### When is malaria self-treatment recommended?

Travelers who are taking effective malaria preventive drugs but who will be in very remote areas may decide, in consultation with their healthcare provider, to take along antimalarial medication for self-treatment. Malaria self-treatment should begin right away if fever, chills, or other influenza-like illness



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occurs and if professional medical care is not available within 24 hours. Self-treatment of a possible malarial infection is only a temporary measure and immediate medical care is important.

The CDC Malaria Branch (Malaria Hotline 770-488-7788) can provide consultation to health-care providers on other potential options for self-treatment if atovaquone/proguanil cannot be used.

### **If I get malaria, will I have it for the rest of my life?**

No, not necessarily. Malaria can be treated. If the right drugs are used, people who have malaria can be cured and all the malaria parasites can be cleared from their body. However, the disease can continue if it is not treated or if it is treated with the wrong drug. Some drugs are not effective because the parasite is resistant to them. Some people with malaria may be treated with the right drug, but at the wrong dose or for too short a period of time.

Two types (species) of parasites, *Plasmodium vivax* and *P. ovale*, have liver stages and can remain in the body for years without causing sickness. If not treated, these liver stages may re-activate and cause malaria attacks ("relapses") after months or years without symptoms. People diagnosed with *P. vivax* or *P. ovale* are often given a second drug to help prevent these relapses. Another type of malaria, *P. malariae*, if not treated, has been known to stay in the blood of some people for several decades.

However, in general, if you are correctly treated for malaria, the parasites are eliminated and you are no longer infected with malaria.

## **Where Malaria Occurs**

### **Where does malaria occur?**

Malaria typically is found in warmer regions of the world -- in tropical and subtropical countries. Higher temperatures allow the *Anopheles* mosquito to thrive. Malaria parasites, which grow and develop inside the mosquito, need warmth to complete their growth before they are mature enough to be transmitted to humans.

Malaria occurs in over 100 countries and territories. More than 40% of the world's population is at risk. Large areas of Central and South America, Hispaniola (the Caribbean island that is divided between Haiti and the Dominican Republic), Africa, South Asia, Southeast Asia, the Middle East, and Oceania are considered malaria-risk areas.

Yet malaria does not occur in all warm climates. For example, malaria has been eliminated in some countries with warm climates, while a few other countries have no malaria because *Anopheles* mosquitoes are not found there.

## **Eradication**

### **Wasn't malaria eradicated years ago?**

No, not in all parts of the world. Malaria has been eradicated from many developed countries with temperate climates. However, the disease remains a major health problem in many developing countries, in tropical and subtropical parts of the world.



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An eradication campaign was started in the 1950s, but it failed globally because of problems including the resistance of mosquitoes to insecticides used to kill them, the resistance of malaria parasites to drugs used to treat them, and administrative issues. In addition, the eradication campaign never involved most of Africa, where malaria is the most common.

### **What is CDC doing to help stop malaria?**

In the US, CDC is involved in the following activities:

- Epidemiologic surveillance
- Investigations of outbreaks of locally transmitted malaria and of other occurrences (e.g., transfusion malaria)
- Determine country-specific risk of malaria in US residents traveling abroad.
- Advice to international travelers
- Consultations with clinicians
- Advice to blood collection centers
- Diagnostic assistance
- Investigations of new drugs to prevent and treat malaria
- Develop and update guidelines for malaria prevention and treatment

CDC's international activities include:

- Work with the U.S. Agency for International Development (USAID) in the planning and implementation of the President's Malaria Initiative (PMI), a \$1.2 billion initiative to rapidly scale up malaria control interventions in 15 African countries.
- Conduct scientific and operations research in malaria-endemic countries to improve understanding of best practices for prevention and treatment of malaria.
- Provide technical assistance to the Ministry of Health and local disease prevention and control partners (e.g., the national malaria control program, the reproductive health program responsible for maternal health, the child health program) to strengthen malaria control activities.
- Work with key multilateral and bilateral Roll Back Malaria (RBM) partners (e.g., World Health Organization (WHO), the United Nations' Children's Fund (UNICEF), the World Bank, and the U.S. Agency for International Development (USAID) on malaria control programs.

CDC currently has staff posted at the Global Fund to Fight AIDS, Tuberculosis, and Malaria; UNICEF; and the World Bank; as well as in many malaria-endemic countries. Their work spans the spectrum of policy development, program guidance and support, scientific research, and monitoring and evaluation of progress toward RBM and PMI goals.



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