



X-Plain[™] **Malaria**

Reference Summary

Malaria is one of the most common parasitic infections. About 500 million new cases of malaria arise in the world each year, resulting in more than 1 million deaths. Even though there are only about 2,000 cases of malaria per year in the U.S., the threat is increasing as malaria parasites become resistant to drugs.

This health education reference summary will help you understand malaria and how it can be treated. This brochure also discusses prevention tips for those traveling to countries where malaria is common.

Malaria

Malaria is an infectious disease caused by *Plasmodium* parasites, which are one-cell parasites. A human infection begins with the bite of an infected female *Anopheles* mosquito.

After biting a person, the mosquito injects Plasmodium parasites into the body. The parasites attack red blood cells and multiply. Malaria infection ends in one of two ways: either the patient dies or the parasite is defeated by the immune system or medications.

The symptoms of malaria are similar to those of the common flu:

1. chills
2. fever
3. sweating



Malaria is one of the major killers of humans, threatening the lives of more than 1/3 of the world's population. Malaria thrives in the tropics of Asia, Africa, and South and Central America. Most deaths due to malaria are of infants and children.

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Malaria has been nearly eliminated in mild climates, such as the United States. However, it still affects hundreds of people in the U.S. every year. In 1997, about 2,000 cases of malaria were reported in the United States.

The great majority of reported cases of malaria in the United States were acquired overseas where malaria is common. Those countries are known as *malaria endemic areas*.

During the last 10 years, there have been cases of malaria in the states of California, Florida, Texas, Michigan, New Jersey, and New York.

Causes

Malaria is caused by one-cell parasites from a group of parasites called *Plasmodium*. A parasite is an organism that cannot live on its own; it has to feed off other organisms to reproduce and live.

More than 100 different species of *Plasmodium* exist, and they produce malaria in many types of animals and birds, as well as people. Four species of *Plasmodium* infect humans: *falciparum*, *vivax*, *malariae* and *ovale*.

The human malaria parasite is transmitted from human to human through infected Anopheles mosquitoes.



A human infection begins with the bite of an infected female Anopheles mosquito. The mosquito sucks human blood to nourish her eggs. At the same time, she injects saliva containing parasites into the person's bloodstream. The parasites very quickly hide from the immune system inside liver cells. They multiply 1000 times, which causes the infected liver cells to burst and spill the parasites in the bloodstream.

The parasites rapidly invade red blood cells, fueling their activity by consuming hemoglobin, the part of the blood that carries oxygen. Next, they divide again, causing the red blood cells to burst and spill more parasites in the blood.

The parasites attack other red blood cells and the cycle continues until the immune system or medications are able to stop the infection, or until the patient dies.

If parasites are already circulating in a person's bloodstream, a female Anopheles mosquito could suck some up while biting the person. She would then become infected and spread the disease by re-infecting other people.

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Malaria is sometimes transmitted through

1. Blood transfusions from infected people
2. Needle sharing for intravenous drugs

An infected, pregnant mother can infect her unborn child.

In the U.S., blood transfusions rarely transmit malaria. This is because in the U.S. people may not donate blood for a certain period of time after traveling to areas where malaria is common.

Symptoms

Ten to sixteen days after an infectious mosquito bite, infected red blood cells burst. Malaria symptoms show up when this happens. Malaria has flu-like symptoms that go through 3 stages:

1. chills
2. fever
3. sweating

Along with chills, the patient is likely to have headaches, nausea, and vomiting.

Within 1-2 hours of getting the chills, the patient's temperature rises, and the skin feels hot and dry. Then, as the body temperature falls, a drenching sweat begins. The patient, feeling tired and weak, is likely to fall asleep.

The patient may feel well after the sweating stage. However, 2-3 days later, another attack occurs. Each attack happens when more red blood cells burst.

Diagnosis

A doctor may suspect malaria when a person has recently been to a tropical area or has received a blood transfusion and develops a fever and other flu-like symptoms.

A doctor or a health care provider will examine blood smears taken from a finger prick under a microscope. If malaria parasites are present, the diagnosis is confirmed.

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Treatment

The sooner malaria is found, the better the chances are of successfully treating it. For this reason, if the doctor suspects malaria, treatment may start before confirming the diagnosis. The treatment recommended by the doctor depends on the type of malaria parasite infecting the blood and where the patient got the infection.

Chloroquine is the main element of malaria treatment. However, some malaria parasites are resistant to this medication, in which case, a combination of other drugs may be needed. With some species of malaria, extra treatment is needed to get rid of the parasites hiding in the liver.

Patients are also treated with sponging and aspirin to lower fever and relieve headaches.

During treatment, doctors watch patients closely for potential complications, such as anemia; kidney failure; fluid imbalance; or brain damage.

The recovering patient may find that it takes several weeks to gain back full strength.

Prevention

Before leaving home, anyone traveling to an area where malaria is common should talk with his or her doctor. A traveler who spends even one night in a malarious country risks getting infected.

Here are four tips for preventing malaria when traveling to malaria endemic countries.

1. Keep arms and legs covered.
2. Sleep under mosquito netting.
3. Use mosquito repellent.
4. Stay indoors beginning at dusk and through the night. This is when *Anopheles* mosquitoes like to feed!



People traveling to malarious areas should also protect themselves with anti-malarial medicines. The medication may have to be taken for few weeks during and after leaving the area. If a fever or other malaria symptoms develop, either while taking medicine or after stopping it, medical attention should be sought immediately.

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Summary

Malaria is a very common disease. If not treated early, it can be fatal. Up to 1 million people die each year from malaria. Medications are available to treat malaria. They should be started as soon as symptoms appear: chills, fever, then sweating.

It is possible to prevent malaria when traveling overseas. Contact with mosquitoes should be limited. Anti-malarial medications are also available for prevention. Make sure to talk to your doctor before visiting tropical countries!

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