

TDI-Brooks International's Malaria Information and Control Program

INTRODUCTION

Malaria is caused by a unicellular parasite (protozoan) in the genus *Plasmodium* that is typically transmitted through the bite of an infected mosquito. There are four species known to cause malaria. The most prevalent ones are *Plasmodium falciparum* and *Plasmodium vivax*. *Plasmodium falciparum* is the major organisms responsible for malaria deaths. This species accounts for approximately 90% of malaria in Africa and 50% in Southeast Asia and Latin America. Left untreated, *P. falciparum* can lead to fatal cerebral malaria. Human malaria is typically acquired from female mosquitoes belonging to the genus *Anopheles* seeking a blood meal. There are approximately 40 species of mosquitoes that can transmit the malaria parasite. Malaria can also be transmitted by blood transfusions or contaminated needles and syringes.

In 2010, an estimated 216 million cases of malaria occurred worldwide and 655,000 people died, most (91%) in the African Region. Malaria was once widespread but is now largely confined to Africa, Asia and Latin America.

LIFE CYCLE

Plasmodium develops in the gut of female *Anopheles* mosquitoes. It takes approximately 15 days for the parasite to fully mature and rupture out of their sac in the gut and reach the saliva of the mosquito. As the female takes a blood meal the *Plasmodium* is passed to humans and other animals in the saliva of an infected insect. The parasites are carried in the blood to the liver where they invade liver cells and multiply. The multiplication stage lasts on average 10-12 days, after which they rupture out of the liver cells and invade red blood cells. The parasite matures and multiplies in the red blood cells for approximately 48-72 hours. The red blood cells rupture releasing parasites and toxins into the blood stream. At this stage the parasite can re-invade blood cells starting the cycle all over again (this induces the cycle of fever and anemia in the infected human) or mature in to a stage that can be taken into a mosquito with blood meal.

TWO MOST COMMON PLASMODIUM SPECIES

Plasmodium falciparum is found globally, but is most common in Africa and is the most aggressive species, often killing through coma or anemia. It is estimated that 1-2% of those infected by this parasite die. This species is associated with cerebral malaria. The exact cause of cerebral malaria is not known but it appears to be a result of *P. falciparum* infected red blood cells inter-reacting and partially obstructing blood vessels in the brain leading to hypoxia or low oxygen. Symptoms of cerebral malaria include behavior changes, decrease in consciousness, delirium and coma. Coma and death can ensue within 24 hours in those individuals without at least partial immunity. Diagnosed cases

of cerebral malaria have a fatality rate of 20% in adults. *Plasmodium vivax*, ranges throughout Asia, Africa and the Middle East and can cause recurring and debilitating infection, but is rarely fatal. *P. vivax* can lie dormant in the liver and relapse up several years after the initial illness.

MALARIA PREVENTION

Malaria-carrying mosquitoes are like any other mosquito and are most actively feeding at dusk/dawn and reproduce in standing water. The following recommendations can minimize exposure to mosquitoes.

To minimize exposure:

1. Avoid movement during dusk and dawn when mosquitoes are most active.
2. Avoid mosquito hangouts, dark, shady and areas filled with vegetation.
3. Spray sleeping and work areas with insecticides.
4. Eliminate standing water.
5. Wear long-sleeved and long-pants to minimize bare skin, spray with Permethrin. (insect repellent that is good for 4 weeks and 6 washings).
6. Use an insect repellent containing DEET (30%) on exposed skin.

Preventing malaria through the use of anti-malaria drugs

In West Africa the *Falciparum* malaria is resistant to chloroquine and consequently the recommend anti-malarias are:

1. **Malarone**
2. **Mefloquine (Lariam)**
3. **Doxycycline**

These drugs are taken prior to arrival, during stay and after leaving a malaria-prone area. The length of time and frequency of dosage depends upon which drug taken.

Doxycycline is taken one or two days before entering a malarious area and usage is to continue for four weeks following departure. People taking this drug may exhibit sensitivity to the sun and experience GI-tract upset.

Mefloquine (Lariam) was developed by the military and has been used since the early 1980s. Lariam is taken once a week for 1 to 2 weeks prior to entering infected area and is continued for 4 weeks after departure. Side effects associated with Lariam include psychiatric symptoms (ranging from anxiety, paranoia, depression and hallucinations), nausea, vomiting, dizziness, and insomnia. Lariam should not be given to anyone with a history of seizures, depression, anxiety disorder, psychosis or other major psychiatric disorder, cardiac conduction disorders or allergy to quinine or quinidine.

Malarone was approved by the FDA for use in the United States in 2000 and is a combination pill of atovaquone and proguanil hydrochloride. It is 98% effective. Malarone is taken 2 days before entering a malarious area and usage is continued for 7 days after departure. It is not recommended to take Malarone if one is taking tetracycline, meoclopramide, rifampin or rifabutin. Side effects associated with this drug are typically mild and temporary and include: tiredness, headache, loss of appetite, nausea, vomiting, diarrhea, insomnia, and rash.

Malarone is the preferred anti-malarial due to its dosage schedule and minimum side effects. Malarone is provided.

SYMPTOMS AND MEDICAL ADVICE

Initial malaria symptoms are similar to those for many other illnesses including flu. Symptoms include fever, headache, sweats and chills, back and limb pain, fatigue, cough, diarrhea, nausea and vomiting. However should you become ill after visiting a malarious (for up to several months) area, seek medical attention immediately and inform your medical care provider that you were potentially exposed to malaria. It is imperative that you tell your medical care provider what part of the world you have visited so that they can determine to which form you may have been exposed.

POST MALARIAL DIAGNOSIS RETURN TO WORK

Any employee that has been diagnosed by a medical professional as having malaria must have a post recovery medical and a written clearance to return to work by a licensed medical professional.

TDI-BROOKS INTERNATIONAL'S MALARIA POLICY

TDI-Brooks is committed to a safe, healthy, and productive workplace for all employees. TDI-Brooks takes very seriously the threat of illness or death presented by malaria. We provide education/training to employees that will be/are in locations that malaria is known to be a significant health risk. TDI-Brooks encourages all crew members to use the steps explained to minimize exposure to malaria-carrying mosquitoes. TDI-Brooks recommends, but does not require their employees to take anti-malaria drugs. The drugs are available to employees if they are requested. If an employee has any questions about anti-malaria drugs, prevention or symptoms of malaria, they are encouraged to ask their supervisor and he/she will get in contact with a qualified medical professional.

Additional Information:

If you have any additional questions or concerns about malaria, please visit <http://www.cdc.gov/malaria/index.html> or call the Center for Disease Control Malaria Hotline at 770-488-7788 or 855-856-4713.

**TDI-Brooks International Employee Statement of
Understanding and Compliance of the Malaria Control
Program**

I understand that my employer is committed to a safe, healthy, and productive workplace for all employees. My employer takes very seriously the threat of illness or death presented by malaria and has implemented a malaria control program. I also understand that this program applies to me because I am working at the sites in locations where I could possibly be exposed to contracting malaria. I have been provided with information about the malaria control program as it applies where I am going and if I have any questions about this program I understand that I should seek guidance from a qualified medical professional.

Print Name _____

Signature _____ **Date** _____

EDUCATION AND TRAINING

TDI-Brooks will provide an education/training session concerning malaria and its prevention prior to arrival (if not already in Africa) and prior to departure for the job. Specific topics will include a brief description of each of the approved anti-malaria drugs, dosage of each drug, symptoms of malaria and advice to contact medical professional.

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