

Malaria:

The Tropical Traveller Departs



Heather Onyett, MD, FRCP(C), MPH, DTM&H

Malaria is a common, life-threatening mosquito-borne disease found in many tropical and subtropical areas.

In recent years, more Canadians have been travelling to areas of the world where malaria is endemic (*i.e.*, sub-Saharan Africa, the Pacific, southeast Asia and South America). As a result, more people are being diagnosed with malaria in Canada. In 1997, the number of reported malaria cases in Canada peaked at 1,029.¹

Almost all cases of malaria are transmitted between dusk and dawn by the bite of an infected female anopheles mosquito.

Malaria is caused by a parasite that initially undergoes transformation in the liver and then infects the red blood cells, resulting in hemolysis.²

There are four species of malaria that infect humans:

- *Plasmodium falciparum*,
- *Plasmodium vivax*,
- *Plasmodium ovale* and
- *Plasmodium malariae*.

Plasmodium falciparum is the major cause of life-threatening malaria (Table 1).¹

Rarely, malaria can be transmitted by injection or blood transfusion from an infected person or by contaminated needles and syringes in intravenous drug users. Congenital transmission of a pregnant woman to her fetus occurs rarely.

Meet the Saunders

A family presents to your office prior to their one-month vacation to Kenya, Africa. On their vacation, they plan to go on safari and spend a week at a beach resort on the Indian Ocean.

The family consists of father, David, mother, Kimberley, and seven-year-old daughter, Melanie.

- David: Treated for depression as a student; has no health problems
- Kimberley: Three-months pregnant; is healthy
- Melanie: No health problems

The travel agent told them malaria is a risk in Kenya.

The family does not know what malaria is, how it is transmitted and whether it can be prevented or treated.

What do you recommend for the Saunders family?

For the answer, go to page 89.

Fact box

- The World Health Organization (WHO) notes, in 2003, malaria was endemic in over 100 countries; these countries are visited by more than 125 million international travellers every year.
- Every 30 seconds, a person in Africa dies from malaria.
- Annually, malaria is estimated to cause three million deaths, with approximately 300 to 500 million people becoming ill.³

What are the signs and symptoms?

Malaria may mimic a flu-like illness, with such symptoms as:

- fever,
- chills,
- rigors,
- sweats,
- headache and
- myalgias.

There may also be vomiting, diarrhea, cough and abdominal and back pain. These symptoms may resolve for a short time, but they are likely to recur at 48- to 72-hour intervals.

Some individuals with chronic malaria may also have splenomegaly.

In severe malaria, complications of seizures, coma, respiratory and renal failure may result in death.

How can malaria be prevented?

The WHO's approach to malaria prevention is ABCD.⁴

- Assess individual risk;
- prevent mosquito **B**ites;
- use **C**hemoprophylaxis drugs where appropriate and
- seek early **D**iagnosis and treatment if fever develops during or after travel.

What personal protection methods can be used?

To reduce exposure to dusk-to-dawn biting mosquitoes:

- Remain in screened or air-conditioned rooms;
- Sleep under insecticide-treated bed nets and
- Wear light-coloured clothes that cover as much of the body as possible (dark colours may attract mosquitoes).

Table 1

Geographic distribution of malaria

Chloroquine-resistant

Found in all areas except

- Central America, north of the Panama Canal
- Dominican Republic
- Haiti
- North Africa
- Parts of China and the Middle East

Mefloquine-resistant

Found in Thailand's border areas with Cambodia and Myanmar

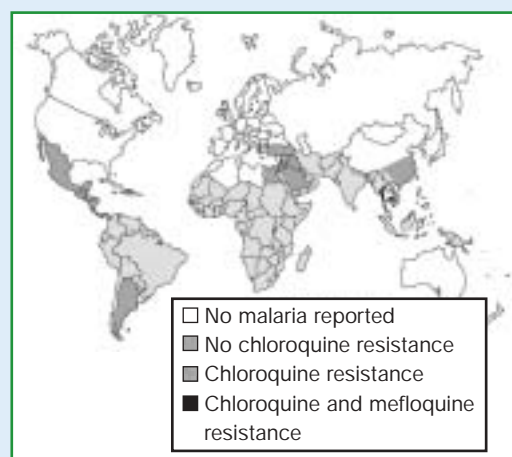


Table 2

Recommended antimalarial agents for chemoprophylaxis

Travel destination	Chemoprophylaxis	
	Preferred	Alternatives
Chloroquine-sensitive	Chloroquine	Mefloquine, doxycycline or atovaquone-proguanil
Chloroquine-resistant	Mefloquine, atovaquone-proguanil or doxycycline	Primaquine
Chloroquine- and mefloquine-resistant	Doxycycline	Atovaquone-proguanil may be effective

Table 3

Recommended doses of antimalarial drugs for chemoprophylaxis

Agent	Adult dose	Pediatric dose	Duration	Adverse effects
Chloroquine (base)	300 mg orally once weekly	5 mg/kg (max 300 mg) orally once weekly	Start 1 week before entering malaria-endemic region, weekly during exposure and for 4 weeks after departure	<ul style="list-style-type: none"> • Nausea, headache, pruritus in black-skinned individuals • Skin eruptions are less common
Mefloquine (base)	250 mg orally once weekly	< 5 kg: 5 mg/kg (no data) 5-9 kg: 1/8 tablet once weekly 10-19 kg: 1/4 tablet once weekly 20-29 kg: 1/2 tablet once weekly 30-45 kg: 3/4 tablet once weekly > 45 kg: 1 tablet once weekly	Starting 1 to 3 weeks before entering malaria-endemic region, weekly during exposure and for 4 weeks after departure	<ul style="list-style-type: none"> • Dizziness, headache, nightmares, nausea, vomiting, diarrhea, occasional seizures, depression, agitation, suicide • Contraindications: psychiatric or seizure disorders, cardiac conduction delays, first trimester of pregnancy
Doxycycline	100 mg/day orally	< 8 yr: not recommended > 8 yr: 1.5 mg/kg (max 100 kg) orally once daily 25-35 kg or 8-10 yr: 50 mg 36-50 kg or 11-13 yr: 75 mg > 50 kg or > 14 yr: 100 mg	Starting 1 day before entering malaria-endemic region, weekly during exposure and for 4 weeks after departure	<ul style="list-style-type: none"> • Gastrointestinal upset, vaginal candidiasis, photosensitivity • Contraindications: in children < 8 years, pregnant and breastfeeding women
Atovaquone-proguanil (250 mg atovaquone, 100 mg proguanil)	1 tablet daily	11-20 kg: 1/4 tablet daily 21-30 kg: 1/2 tablet daily 31-40 kg: 3/4 tablet daily > 40 kg: 1 tablet daily	Starting 1 day before entering malaria endemic region, daily during exposure and for 7 days after departure	<ul style="list-style-type: none"> • Nausea, vomiting, diarrhea, abdominal pain, seizures, rash, mouth ulcers (rare) • Not recommended in pregnancy
Primaquine (base)	30 mg/day orally	0.5 mg/kg (max 30 mg) orally once daily	Starting 1 day before entering malaria-endemic region, daily during exposure and for 1 week	<ul style="list-style-type: none"> • Gastrointestinal upset, methemoglobinemia - • Contraindications: in G6PD after departure deficiency, pregnancy.

What about insect repellent?

On exposed body surfaces, the most effective insect repellents contain diethyltoluamide (DEET).⁵ The higher the DEET concentration, the longer the duration of protection.

With millions of applications of DEET insect repellent used, there have been 14 cases of complications, 13 of which were seizures.⁶

The U.S. Centers for Disease Control and Prevention recommends DEET formulations as high as 50% for both adults and children older than two months. Recommendations for DEET



Dr. Heather Onyett is a professor, departments of pediatrics, microbiology and immunology, community health and epidemiology, Queen's University, Kingston, Ontario.

Helping the Saunders

Personal protection measures

- Use insect repellent
- Wear light-coloured clothing
- Sleep under insecticide-treated bed nets

Chemoprophylaxis

David

- Recommend doxycycline or atovaquone proguanil.
- Mefloquine is not recommended because of his past history with depression.

Kimberley

- Since she is pregnant, she is at higher risk for contracting malaria, and is, therefore, advised not to travel to a malarious area during her pregnancy.
- If she is determined to travel, the option would be to give her mefloquine (in the second and third trimesters of pregnancy).

Melanie

- Recommend mefloquine or atovaquone-proguanil.
- Doxycycline is not recommended because it may stain the developing teeth of children under eight years.

Seek early diagnosis and treatment if fever develops during or after travel.

use in pregnant women are the same for non-pregnant adults.⁷

The Canadian Advisory Committee on Tropical Medicine and Travel (CATMAT) “is satisfied that for travel outside of Canada where the risk of malaria outweighs the risk of any important adverse reaction to DEET, the threshold for use of DEET should be low. CATMAT recommends that concentrations of DEET up to 35% can be used by any age group.”⁸

Which malaria chemoprophylaxis should be considered?

The Canadian Advisory Committee on Tropical Medicine and Travel, the U.S. Centers for Disease Control and Prevention and the WHO recommend malaria chemoprophylaxis for travellers to and individuals living in malarious areas (Table 2).¹

An antimalarial drug is taken before, during and after leaving the malarious area to prevent disease (Table 3).¹

It must be noted, however, no antimalarial prophylactic regimen gives complete protection. Therefore, to prevent life-threatening malaria, it is important to seek early diagnosis and treatment if fever develops during or up to a year after travel to a malarious area.

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References

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