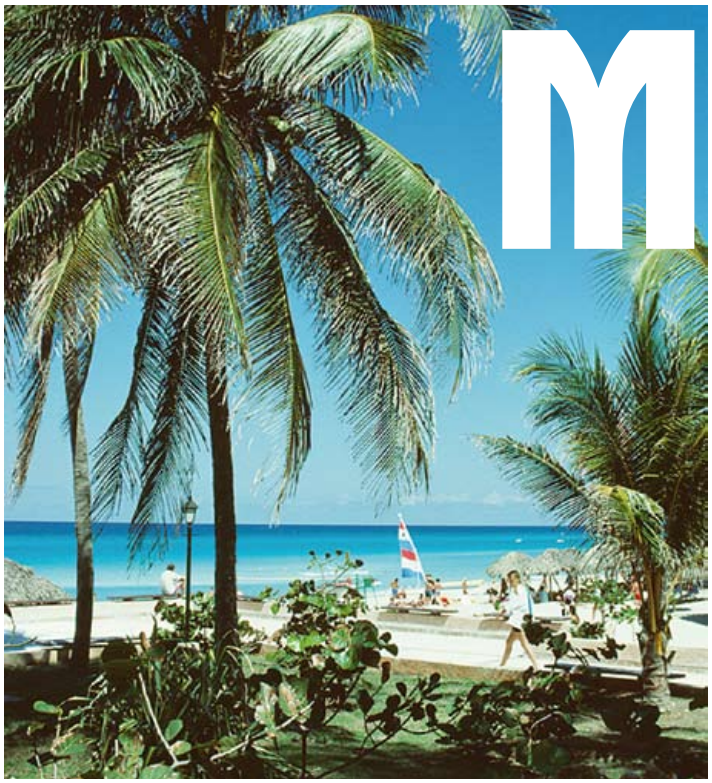

Malaria

Prevention and Prophylaxis

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Malaria is a perennial concern to travellers in Africa. Of all the questions DAN receives, malarial prophylaxis is one of the most common. Safety of medication while diving and drug resistance considerations are the most pressing issues. As divers venture deeper into the African tropics, the risks of contracting malaria increase proportionally. Lack of medical facilities, transportation and communication add additional complexity to managing this medical emergency. Understanding malaria prophylaxis and general preventative measures is therefore of the utmost importance. The following section covers the most important considerations in selecting and using malaria prophylactic measures and medications. The medical treatment of malaria, which is complex and requires close medical supervision, falls outside the scope of this article. If you think that you may have malaria or are concerned about unexplained symptoms after visiting a malaria area, contact DAN immediately.

The three most important guidelines regarding malaria prevention and survival are:

- Do not get bitten
- Seek immediate medical attention if you suspect malaria
- Take "the pill" (Anti-malaria tablets/ prophylaxis)

(1) DO NOT GET BITTEN

- Stay indoors from dusk to dawn.
- If you have to be outside between dusk and dawn, cover up with long sleeves, trousers, socks and shoes (90% of mosquito bites occur below the knee).
- Apply DEET containing insect repellent to all exposed areas of skin; repeat four-hourly.
- Sleep in mosquito-proof accommodation:
  - Air-conditioned and/or proper mosquito gauze
  - Buildings/tents regularly treated with pyrethrum-based insect repellent/ insecticide
  - Burn mosquito coils/mats
  - Sleep under an insecticide impregnated (Permacote®/Peripel®) mosquito net (very effective)

(2) SEEK IMMEDIATE MEDICAL ATTENTION IF YOU SUSPECT MALARIA

- Any flu-like illness starting seven days or more after entering a malaria endemic area is malaria until proven otherwise.
- The diagnosis is made on a blood smear or a rapid malaria antigen finger prick test.
- One negative smear/rapid test does NOT exclude the diagnosis. Repeat the smear/ rapid test until the diagnosis is made; another illness is conclusively diagnosed or spontaneous recovery occurs, e.g. from ordinary influenza.

(3) TAKE "THE PILL"

There are several dangerous myths regarding malaria prophylaxis.

- Prophylaxis does not make the diagnosis more difficult
- It does protect against the development of cerebral malaria
- Prophylaxis is not 100% effective - hence the importance of avoiding bites
- Not all anti-malaria medication is safe with diving
- Malaria is often fatal – making prophylaxis justified

Anti-malaria drugs, like all drugs, have potential side effects. The majority of side effects decrease with time. Serious side effects are rare and can be avoided by careful selection of a tablet or combination of tablets to suit your requirements (country, region and season).

The following drugs are available for the prevention of malaria:

(1) Doxycycline (Vibramycin® or Cyclidox® or Doryx®, etc.):

- Used extensively in the prevention of chloroquine resistant malaria. About 99% effective. Not officially recommended for use in excess of eight weeks for malaria prevention, but it has been used for as long as three years with no reported adverse effects. Offers simultaneous protection against tick-bite fever.
- Dosage: 100 mg daily after a meal starting one - two days before exposure until four weeks after exposure. Doxycycline should be taken with plenty of non-alcoholic liquid.
- Contra-indications: Pregnancy, breasfeeding, children < eight years.
- Side effects: Nausea, vomiting, diarrhoea, allergy, photosensitisation. May cause vaginal thrush and may reduce the efficacy of oral contraceptives.
- Use in pregnancy: Unsafe (as is scuba diving).

Doxycycline is DAN-SA's agent of choice for divers diving in sub-Saharan Africa as well as other areas with chloroquine resistance/"resistant malaria".

(2) Chloroquine (Nivaquine® or Daramal® or Plasmaquine®):

- Contains only chloroquine. Must be taken in combination with Proguanil (Paludrine®).
- Dosage: Two tablets weekly starting one week before exposure until four weeks after leaving the malaria endemic area.
- Contra-indications: Known allergy, epilepsy.
- Side effects: Headache, nausea and vomiting, diarrhoea, rashes. May cause photosensitivity (sunburn; prevention – apply sun block).
- Use in pregnancy: Safe. (Note: scuba diving is not considered safe during pregnancy.)

(3) Proguanil (Paludrine®):

- Must be taken in combination with Chloroquine (Nivaquine® or Daramal® or Plasmaquine®).
- Dosage: Two tablets every day starting one week prior to exposure until four weeks after.
- Contra-indications: Known allergy to Proguanil. Interactions with Warfarin (An anti-coagulant/blood thinning agent that is incompatible with diving).
- Side effects: Heartburn (Tip: take after a meal, with a glass of water and do not lie down shortly after taking Proguanil); mouth ulcers (Tip: take folic acid tablets, 5 mg per day, if this occurs); loose stools (self limiting – no treatment required).
- Use in pregnancy: Safe, but must be taken with a folic acid supplement: 5 mg per day. (Note: scuba diving is not considered safe during pregnancy.)

The combination of Chloroquine and Proguanil is about 65% effective for resistant falciparum malaria. Although not a first choice, its relative safety and limited side effects may justify its use in certain individuals.

(4) Atovaquone/Proguanil (Malarone ®; Malanil ®):

- Registered in South Africa as a causal prophylaxis in February 2004. Safety in diving has not been confirmed, but many divers have used it with no adverse effects. Use with caution. Additional sensitivity to motion sickness has been reported anecdotally. Preliminary data suggests it is safe for pilots.
- Effective against malaria isolates that are resistant to other drugs.
- Controlled studies have shown a 98% overall efficacy of Atovaquone/Proguanil in the prevention of P. falciparum malaria.
- Dosage: One tablet daily for adults, starting 24 - 48 hours prior to arrival in endemic area, during exposure in endemic area and for seven days after leaving the endemic area. Dose should be taken at the same time each day with food or a milky drink.
- Contra-indications: Known allergy to Proguanil or Atovaquone or renal impairment (i.e. significant renal disease is likely to be incompatible with diving). Safety in children < 11 kg has not been established.
- Side effects: Heartburn (Tip: take after a meal with a glass of water and do not lie down shortly after taking Atovaquone/Proguanil); mouth ulcers. To date, Atovaquone has been well tolerated with the most common adverse reaction being headaches.
- Use in pregnancy: Safety in pregnancy and lactating women has not been established. (Note: scuba diving is not considered safe during pregnancy.)

"Doxycycline is DAN-SA's agent of choice for divers diving in sub-Saharan Africa as well as other areas with chloroquine resistance/ "resistant malaria".

SUMMARY

(1) Prophylaxis significantly reduces the incidence of malaria and slows the onset of serious symptoms of malaria.
(2) All anti-malaria drugs, excluding Mefloquine, are considered compatible with diving.
(3) Like with all other medication, anti-malaria drugs should be tried and tested on land well in advance.
(4) If unpleasant side effects occur, please consult your doctor or DAN.
(5) Whether or not you take prophylaxis, be vigilant about potential malarial symptoms. Malaria can present itself in many ways varying from fever and diarrhoea to flu-like symptoms. Always inform your doctor that you have been in a malaria area. Symptoms can start within 7-14 days from first exposure until 30 days (and rarely even months) after leaving a malaria area.
(6) No single medication is 100% effective and barrier mechanisms/ personal protection against bites (e.g. mosquito repellents, nets, protective clothing, not going outdoors from dusk to dawn) must be applied.
(7) Any strange symptom occurring during or within six weeks of leaving a malaria area should be regarded with suspicion and requires medical attention.

The above-mentioned recommendations were compiled from material supplied by the National Department of Health and Worldwide Travel Medical Consultants.

(5) Mefloquine (Lariam® or Mefliam®):

- About 90% effective against chloroquine resistant malaria. Convenient dosing schedule.
- Dosage: One tablet per week.
- Side effects: May cause drowsiness, vertigo, joint aches and interfere with fine motor co-ordination (making it difficult to exclude DCI in some cases).
- Use in pregnancy: Probably safe in early pregnancy and may be used with confidence after the first trimester of pregnancy. May be used in breast feeding and babies weighing more than 5 kg.

Mefloquine is considered unsafe for divers and pilots. It is contra-indicated in epilepsy but is a good first choice for other travellers.

(6) Pyrimethamine/Dapsone (Maloprim® or Deltaprim®/Malazone®):

- No longer regarded as effective.

(7) Sulfadoxine and Pyrimethamine. (Fansidar®):

- No longer used as prophylactic

(8) Quinine (Lennon-Quinine Sulphate®):

- Not used for prophylaxis but is the backbone in the treatment of moderate and severe malaria.
- Serious side effects are not uncommon during treatment.

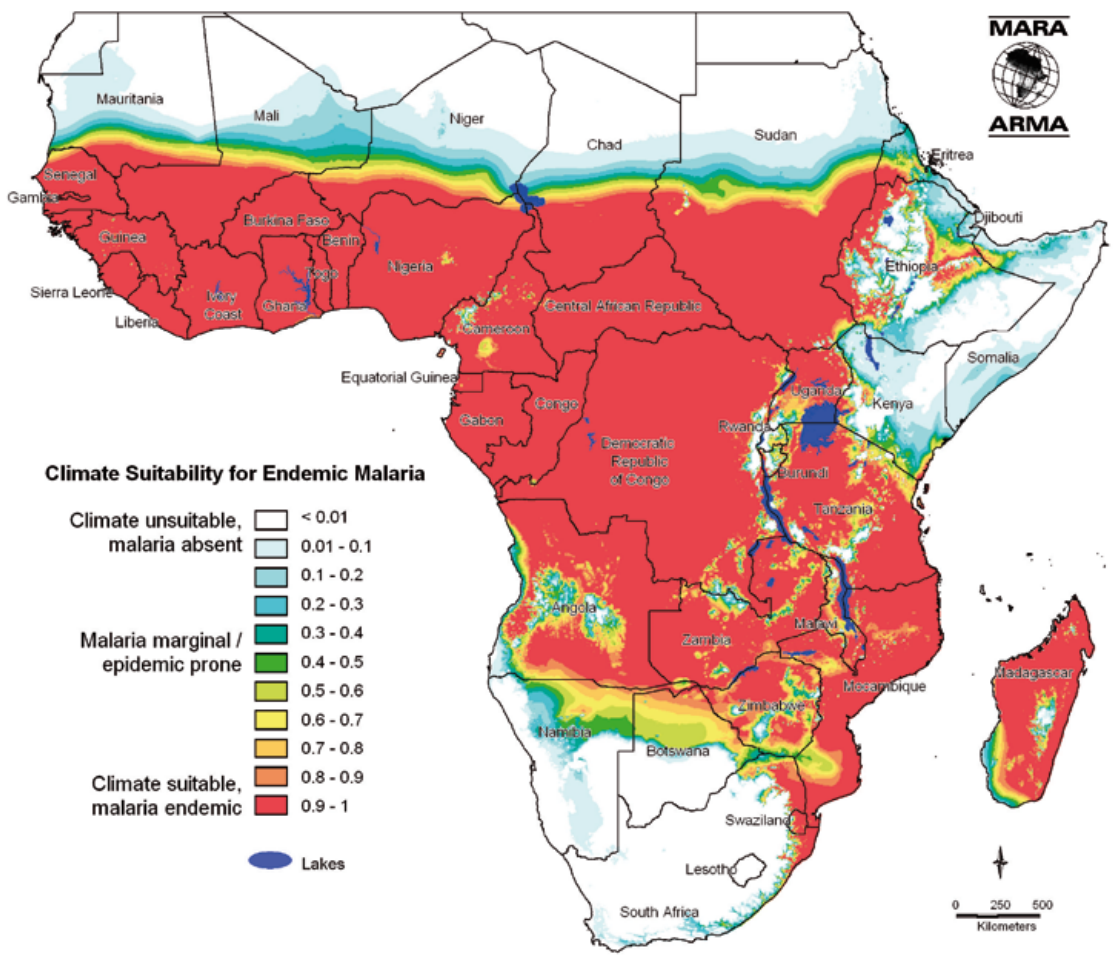
(9) Artemether (Cotexin®):

- The "Chinese drug". Available in some areas of Africa. Not for prophylaxis. Used in combination with other drugs in the treatment of mild to moderate malaria.

(10) Halofantrine (Halfan®):

- Not used for prophylaxis and best avoided for treatment. AD

DISTRIBUTION OF ENDEMIC MALARIA



This map is a product of the MARA/ARMA collaboration (http://www.mara.org.za). July 2002, Medical Research Council, PO Box 70380, Overport, 4067, Durban, South Africa
CORE FUNDERS of MARA/ARMA: International Development Research Centre, Canada (IDRC); The Wellcome Trust UK; South African Medical Research Council (MRC); Swiss Tropical Institute, Multilateral Initiative on Malaria (MIM) / Special Programme for Research & Training in Tropical Diseases (TDR), Roll Back Malaria (RBM).
Malaria distribution model: Craig, M.H. et al. 1999. Parasitology Today 15: 105-111.
Topographical data: African Data Sampler, WRI, http://www.igc.org/wri/sdis/maps/ads/ads_idx.htm.

RECOMMENDED MALARIA DRUG PROPHYLAXIS IN DAN SOUTHERN AFRICA REGION (AFRICAN AND INDIAN OCEAN ISLANDS)

AREA	MALARIA	RECOMMENDED DRUGS
Kruger Park Mpumalanga Northern Province KwaZulu-Natal (Excluding Ingwavuma and Ubombo)	Low: June to August/low rainfall. High: Hot wet seasons November to May.	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Ingwavuma and Ubombo	Throughout the year.	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Swaziland	Throughout the year in lowveld areas.	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Zimbabwe	Mainly November to June in areas below 1 200 m and throughout the year in the Zambezi valley.	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Angola, Comoros, Kenya, Madagascar Malawi, Mozambique, Zaire	Throughout the year.	# High risk persons: Mefloquine Doxycycline Malanil® Chloroquine and Proguanil *Low risk persons: Nothing
Botswana	Mainly November to June in the northern parts of the country (e.g. Okavango).	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Namibia	Mainly November to June in northern rural areas (e.g. Ovambo, Kavango and Etosha).	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Zambia	Mainly November to June in areas below 1 200 m and throughout the year in the Zambezi valley.	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Seychelles	No malaria.	N/A
Mauritius	Only benign forms of malaria in the north.	# High risk persons: Chloroquine in northern areas *Low risk persons: Nothing
Tanzania	Mainly November to June in areas below 1 200 m and throughout the year in the valleys	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing
Zanzibar	Mainly November to June. Mostly benign forms of malaria on the island, but travel through Tanzania may necessitate prophylaxis.	# High risk persons: Mefloquine Doxycycline Malanil® *Low risk persons: Nothing

* In situations where the risk of contracting malaria is low, (e.g. in cities, air-conditioned hotels or when rainfall has been low, etc.) the traveller may be advised to take no drug prophylaxis but standby treatment must be carried unless medical care is readily available. PERSONAL PROTECTION AGAINST BITES MUST BE ADHERED TO AT ALL TIMES.

High risk people include babies and children under five years, pregnant women, elderly people (> 65 years), people with suppressed immunity (e.g. diabetics, etc.).