MALARIA PREVENTION & PROPHYLAXIS FOR DIVERS

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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 document. 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:
  - Long sleeves, trousers, socks, 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 7 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 influenza.

(3) TAKE "THE PILL

There are several dangerous myths regarding malaria prophylaxis. Please note that:

- 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 8 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**: 100mg daily *after a meal* starting 1 - 2 days before exposure until 4 weeks after exposure. Doxycycline should be taken with plenty of *non-alcoholic* liquid.
- **Side effects**: Nausea, vomiting, diarrhoea, allergy, photosensitisation. May cause vaginal thrush and may reduce the efficacy of oral contraceptives.
- **Contraindications**: Pregnancy; breastfeeding; children < 8 years
- **Use in Pregnancy**: Unsafe (as is SCUBA DIVING)

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

***(2)* ATOVAQUONE / PROGUANIL** (Malanil ®; Malarone ®)

- Registered in South African as a causal prophylaxis in February 2004. Although safety in diving has not been confirmed, many divers are using it with no reported adverse effects. The side-effect profile does not pose undue risk as long as the medication is commenced at least 24 hours before diving to avoid an inadvertent allergic response or untoward side-effects manifesting during or shortly after a dive. Some increased sensitivity to motion sickness has been reported anecdotally. Preliminary data suggests it is safe for pilots.
- Controlled studies have shown a 98% overall efficacy of Atovaquone / Proguanil in the prevention of *P. falciparum* malaria
- **Dosage**: 1 Tablet daily for adults, starting 24 – 48 hours prior to arrival in endemic area, during exposure in endemic areas and for 7 days after leaving the endemic area only. 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).
- **Paediatric Malanil®**: This is available for children between 12kg and 40kg. Safety in children < 11kg has not been established.
- **Side-effects**: *Heartburn* (Tip: Take after a meal, with a glass of water & do not lie down shortly after taking Atovaquone / Proguanil); *mouth ulcers.* To date Atovaquone has been well tolerated and the most common adverse reaction being *headache.*
- **Use in Pregnancy**: Safety in pregnancy and lactating women has not been established. (Note: SCUBA diving is not considered safe during pregnancy)

(3) **Mefloquine** (Lariam® or Mefliam®)

- About 90% effective against chloroquine resistant malaria. Convenient dosing schedule.
- **Dosage**: One tablet /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 5kg.

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

(4) CHLOROQUINE plus PROGUANIL

a. Chloroquine (Nivaquine® or Daramal® or Plasmaquine®):

- Contains only *chloroquine. Must be taken in combination with Proguanil (Paludrine®)*
- **Dosage**: 2 tabs weekly starting one week before exposure until 4 weeks after leaving the malaria endemic area.
- **Contra-indications**: Known allergy, epilepsy
- **Side effects**: Headache, nausea & vomiting, diarrhoea, rashes; may cause photosensitivity (sunburn; prevention – apply sun block)
- **Use in Pregnancy**: Safe. (Note: SCUBA diving is not considered safe during pregnancy)

b. **Proguanil (Paludrine®)**:

- *Must be taken in combination with Chloroquine (Nivaquine® or Daramal® or Plasmaquine®)*
- **Dosage**: 2 Tablets every day starting one week prior to exposure until 4 weeks after.
- **Contra-indications**: Known allergy to Proguanil. Interactions with Warfarin (An anticoagulant / blood thinning agent -- that is incompatible with diving)
- **Side-effects**: *Heartburn* (Tip: Take after a meal, with a glass of water & do not lie down shortly after taking Proguanil); *mouth ulcers* (Tip: Take Folic acid tablets 5mg per day if this occurs); *loose stools* (self limiting – no treatment required)
- **Use in Pregnancy**: Safe - but must be taken with Folic acid supplement: 5mg per day. (Note: SCUBA diving is not considered safe during pregnancy)

NOTE: *The combination of Chloroquine & 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. It MAY be of use in malaria areas outside of Sub-Saharan Africa and is available as a combination pill, Savarin®, in certain Francophone countries*
NOTE: *Proguanil on its own is no longer available in South Africa making this combination obsolete.*

THE FOLLOWING DRUGS ARE not SUITABLE FOR THE PREVENTION OF MALARIA:

(1) **Pyrimethamine / Dapsone** (Maloprim® or Deltaprim® / Malazone®):
- No longer regarded as effective.

(2) **Sulfadoxine & Pyrimethamine.** (Fansidar®):
- No longer used as *prophylactic*

(3) **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.

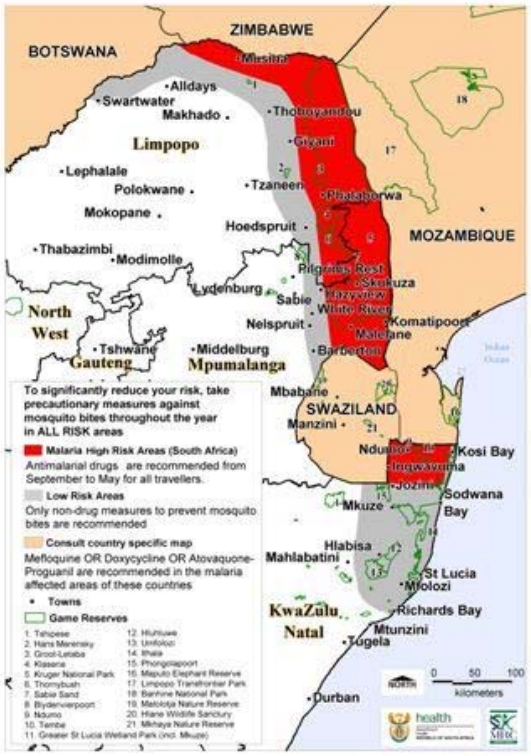
(4) **Artemether** (Cotexin®):

- 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.

(5) **Halofantrine (Halfan®):**

- Not used for prophylaxis and best avoided for treatment.

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



The following popular dive venues in this region also pose a potential malaria risk:

AREA	MALARIA	PROPHYLAXIS RECOMMENDATION
Angola (Cabinda), Comoros Kenya, Madagascar Malawi, Mozambique DRC, Congo Brazzaville (Pointe Noire)	Throughout the year	See above
Botswana	Mainly November to June in the northern parts of the country (e.g. Okavango)	See above. * Nothing – Awareness.
Namibia	Mainly November to June in northern rural areas (E.g. Ovambo, Kavango & Etosha)	See above. * Nothing - Awareness
Zambia Zimbabwe	Mainly November to June in areas below 1200m and throughout the year in the Zambezi valley	See above. * Nothing - Awareness
Tanzania Zanzibar	Mainly November to June in areas below 1200m and throughout the year in the valleys Mainly November to June. Malaria risk lower than on mainland but travel through Tanzania may necessitate prophylaxis.	See above. See above. * Nothing - Awareness in low risk season.
Seychelles	No malaria	* Nothing
Mauritius	Only benign forms of malaria in the north	Chloroquine effective in northern areas – awareness and report any flu-like illness on return.

NOTE:

* In situations where the risk of contracting malaria is low, (e.g. in cities, air conditioned hotel 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. Visit www.malaria.org.za for more information. PERSONAL PROTECTION AGAINST BITES MUST BE ADHERED TO AT ALL TIMES and IN ALL SEASONS.

NOTE:

- Prophylaxis significantly reduces the incidence of malaria and slows the onset of serious complications.

- All anti-malaria drugs *excluding Mefloquine* (and *Quinine* used in treatment only) are considered compatible with diving.

- Like with all other medication, anti-malaria drugs should be tried and tested on land well in advance of a dive.

- If unpleasant side-effects occur, please consult your doctor or DAN.

- Whether or not you take prophylaxis, be vigilant about potential malarial symptoms.

    - Malaria can present in many ways varying from flu-like symptoms: fever, headache, muscle and joint pain to diarrhoea with fever.
    - 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.

- Any strange symptom occurring during or within 6 weeks of leaving a malaria area should be regarded with suspicion and requires medical attention.

- 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.

- Malaria tablets are available on prescription only - you should visit a Travel Health Advisor or your personal physician at least three weeks prior to departing for a malaria risk area to enable you to 'test drive' any malaria medication prior to departure.

The above mentioned recommendations were compiled from material supplied by the National Department of Health, THE TRAVEL DOCTOR and WORLDWIDE TRAVEL MEDICAL CONSULTANTS.