

PREVENTION OF MOSQUITO BITES

1 General

Elimination or reduction of contact with the malaria mosquito is important. These mosquitoes bite only between dusk and daybreak. You must never assume that there are no mosquitoes simply because you cannot hear them flying (*Anopheles* mosquitoes scarcely buzz at all).

Prevention of contact with the malaria mosquito is in itself a very effective measure for prevention of malaria and is particularly useful for young children.

These measures are becoming more and more important as the mosquitoes' resistance to conventional chemoprophylaxis increase.

- You should use an undamaged mosquito net. The edges of the mosquito net should be tucked under the mattress and the net fixed firmly to supports on the 4 corners of the bed. The net must be regularly checked for holes. A mosquito net should also be used over the baby's cot, perambulator etc.
- A pyrethroid-based insecticide can be applied by spraying or nebulizing (aerosol can), vaporization (by electrically heated plates), or by combustion of an anti-mosquito coil. The best way is always to treat (impregnate) the mosquito net with an insecticide such as permethrine, lambda-cyhalothrine or deltamethrine, which remains as a thin film on the meshes of the net. This kills the mosquitoes that land on the net or drives them away before they can bite, and the mosquitoes present in the room are eliminated. These insecticides are safe for humans, even for small children. If used over a baby's cot, you should make sure that the baby cannot get hold of or suck on the impregnated net. Preimpregnated mosquito nets are also available on the market. These products remain effective for 3-6, even 12 months, less if the mosquito net is washed.
- You should stay overnight in a room with windows, ventilation ducts and air-conditioning covered with a mosquito screen (wire mesh) (if this protection is not in place, the air-conditioning system is an easy entrance point for mosquitoes).
- If you go outside in the evening you should wear clothes that cover the arms and legs as much as possible.
- You should apply to the parts of your skin, which are exposed to mosquito bites, an insect repellent (Z-stop, Autan, Anti-M, OTC Repellent, Moustimug and other diethyl-m-toluamide-based repellents). Avoid contact with the eyes and mouth. Regularly repeat the application (every 4 to 6 hours). DEET- based products can affect plastic spectacle frames.

- If you are pregnant you can still use these DEET-based repellents. No side effects resulting from short-term use have been reported, though the possible effects of long-term use are not known. It is advisable to wash off the remnants of the repellent from the skin when protection is no longer needed. Side effects have very occasionally been reported in young children (absorption through the skin) and this repellent should therefore be applied to them with necessary caution. It is better to apply the repellent to the clothing, though it must be added that a number of mosquitoes are repelled by the applied product only from a very short distance away (< 1 cm).

2 Impregnation of the mosquito net

2.1 Quantity

The minimum quantity of liquid required for complete soaking of a synthetic net is usually 800 cc for an individual net, and 1 litre for a collective net. For a **cotton mosquito net** the required quantity of liquid is approximately 4 times greater.

Individual net = 10 to 12 m ² - absorbs 800 cc water
Collective net = 13 to 15 m ² - absorbs 1000 cc water

The required quantity of permethrine/deltamethrine/lambda-cyhalothrine is dissolved and thoroughly mixed with the required quantity of water. Always wear rubber gloves (you must avoid contact with the concentrated liquid). The net is immersed in the liquid, and sufficiently kneaded, until all the liquid is absorbed, so that the whole net is thoroughly impregnated. The net is dried in the shade, as ultraviolet sunlight can decompose permethrine and deltamethrine.

2.2 Deltamethrine

Deltamethrine has an activity lasting 12 months (provided the net is not washed). The product is not available in small bottles in Belgium. In France and in many French-speaking African countries it is readily available under the name **K-Othrine** (Roussel Uclaf Company) (2;5% = 25 mg deltamethrine per ml) for the specific purpose of impregnation of mosquito nets. Clear instructions for use are enclosed with the bottle. A number of professional camping

shops import K-Othrine directly into Belgium.

1 ml of this liquid (**2.5% solution**) **per m²** of surface area of the net is mixed with the required total quantity of water (to give an impregnation of 25 mg/m²).

2.3 Lambda-cyhalothrine

Another product is **lambda-cyhalothrine**, comparable with deltamethrine, and is available in Kenya under the name **Iconet®** (Zeneca Company) although other trade names are used elsewhere.

2.4 Permethrine

Another possible solution to the problem is the use of **Permethrine**, under the name **Permas** (Edialux Company) **100 ml** (10% = 10 grammes of permethrine or 100 mg/ml) available via large pharmacists. Permethrine remains active for 6 months (provided the net is not washed). This product is not registered for use as impregnation fluid for synthetic mosquito nets. In view of the vital importance of the impregnation of mosquito nets as recognized years ago by the World Health Organization, these guidelines are issued in anticipation of the availability of commercial mosquitocidal and mosquito-repellent products on the Belgian market.

5 ml of this liquid (**10% solution**) **per m²** of surface area of the net is mixed with the required quantity of water (to give 500 mg/m²; the concentration is 40x greater than for deltamethrine, as deltamethrine is 40x more active)

Permetrine Tropenzorg® has also recently become available via the specialist camping and outdoor sport shops. In other countries (including France) permethrine is obtainable under the name **Peripel®** (Wellcome Company).

Permethrine can also be used for impregnating cotton ankle- or armbands, and even **outer clothing** (such as in army uniforms) (concentration: approximately 2 g/litre). Example: Permas® 100ml at 10%: Dilute 1 part with 50 parts water, or use BioKill® 500 ml at 0.2% undiluted. Note: Direct contact with the skin must be avoided, the impregnated bands or articles of clothing must be worn over other clothing! Impregnation of outer clothing is however advised only in very specific cases. Only the outside of the outer clothing should be sprayed.