

## **PERSONAL PROTECTION MEASURES AGAINST MOSQUITOES, TICKS, AND OTHER ARTHROPODS**

One of the most important topics is how to protect yourself from bites from mosquitoes and other arthropods. Arthropod-associated diseases are a major cause of morbidity in travellers.

Arthropods are defined as invertebrate animals with an exoskeleton, segmented body, and joint appendages and include mosquitoes, ticks, flies and chiggers. Among returned travellers presenting to travel clinics, vector-borne disease (malaria, dengue, rickettsia) accounted for most of the systemic febrile illnesses.

The following diseases can be transmitted to humans from arthropods, and are particularly relevant for travellers:

1. **Malaria** is transmitted by the Anopheles mosquito which usually bites from dusk through to dawn and the greatest risk is during the rainy season in parts of Africa, Latin America, Caribbean, Asia, Eastern Europe and the South Pacific. Chemoprophylaxis is recommended as well as personal protection.
2. **Dengue fever** is transmitted by the Aedes mosquito which bites during the day and is an issue following the rainy season and during epidemics. It can be found in Central and South America, Africa, Middle East, Caribbean, Asia and Oceania (in Far NQ and Torres Strait Islands). Severe dengue is associated with 20% mortality and there is a new vaccine being developed which is not yet readily available as still in the trial phase.
3. **Chikungunya** is also transmitted by the Aedes mosquito which bites during the day and it can occur in any season in the Indian Ocean, Pacific Islands, Central America and South America and Africa, Asia and Europe. It has been associated with severe unremitting arthralgia and the symptoms can last for years.
4. **West Nile Virus** is transmitted by the Culex mosquito which bites mostly at dusk and dawn and is found year-round in the Tropics and the warmer months in the Northern Hemisphere. It can be found in North America, Europe, Central and South America, Caribbean, Africa, Middle East and Australia!!

5. **Yellow Fever** is transmitted by the Aedes mosquito during the day and is an issue in Africa and South and Central America. It is mandated to have an up to date vaccination which the WHO now approves for life long protection however certain countries in Africa may not accept that new guideline from June 2016.
6. **Japanese Encephalitis** is transmitted by the Culex mosquito which bites dusk and dawn and is primarily a risk in rural agricultural areas (forests have been cleared for farming), temperate areas in Asia and in the Tropics all year round. It mostly occurs in Asia and Western Pacific and vaccination is now available as a single dose however it is very expensive, and the overall risk is quite low. However recently in the media it has been reported of a tourist from Melbourne who contracted the disease in Phuket and died.
7. **Leishmaniasis** is transmitted by sand flies who mostly bite from dusk to dawn unless disturbed in their habitat during the day. They are found in every continent except Australia and Antarctica.
8. **Scrub Typhus** is transmitted by chiggers (larval mites) who bite any time of day or night and the risk is greatest in rural areas of endemic countries. These countries include Northern Japan, SE Asia, Western Pacific Islands, Eastern Australia, China, Russia, India and Sri Lanka.
9. **African tick-bite Fever** is transmitted by ticks who bite day and night and is relevant to countries in Sub-Saharan Africa and West Indies. it is important to check your body for ticks after being in high-risk areas.
10. **Zika Fever** is transmitted by Aedes mosquito and was recently in the media due to the outbreak in Brazil prior to the Rio Olympics in 2016. Its relevance is for pregnant woman or people who might want to try to get pregnant in the 6 months post travel due to the proven risk for microcephaly and other congenital malformations. This virus has been found in Australia, SE Asia, Pacific Islands, Africa, Central and South America, Eastern Europe.

### **Simple suggestions for Personal Protection include:**

- wear light coloured clothing to cover arms and legs, especially in the evenings  
(light, loose, long)
- avoidance of outdoor activities, especially between dusk and dawn and near the water
- visiting malaria prone areas only during the day
- using insect repellents, especially those containing DEET, and apply every 2 hours rather than 4 hours but be cautious of over-exposure with long-term use
- if needing to use combination sunscreen and DEET during the day, protection times have been shown to be much less due to the interaction between the 2 products; we recommend using <20% DEET concentration to minimise any risk of over-exposure to DEET
- using insecticide-impregnated bed nets, usually using commercially available permethrin
- stay in screened, modern "tight" buildings, preferably which are airconditioned
- avoidance of the use of perfumes, after-shaves and aromatic soaps which attract mosquitoes
- spray the room with insect spray prior to sleeping
- consider using the mosquito coils, candles and other spatial repellents
- use fans to blow away the mosquitoes when sleeping

It should be remembered that mosquitoes can still bite through thin clothing and bed nets which are in contact with your skin.

**DEET (N,N-diethyl-m-toluamide)** is a broad spectrum insect repellent first developed in the USA in 1946 for military use. Products are sold in multiple formulations and it is considered the gold standard insect repellent by the WHO and CDC for protection against malaria, and is the control by which other insect repellents are compared. Concentrations are available from 5 - 100% but a plateau effect usually occurs at about 50%. A concentration of 20 - 50% should be used in areas where malaria and other vector-borne diseases are endemic, as this concentration has been shown to be the minimal amount needed to provide complete protection against the various mosquito breeds for up to 6 hours. It is safe to use in pregnant women in the 2nd and 3rd trimester and in breastfeeding mums and infants > 2months of age. Nothing is recommended in the 1st trimester.

**Picardin** was first marketed in Europe in the 1990s and USA in 2005. Like DEET it seems to involve an olfactory mechanism that discourages the insects from biting. The product should be applied every 4 - 6 hours. Unlike DEET it does not damage plastics (glasses frames) or synthetics (various clothing) and is less irritating to the skin and nose so it's favourable side effect profile makes it an appealing option and acceptable alternative in kids older than 2 years of age.

**PMD p-Methane-3,8-diol or Oil of Lemon Eucalyptus** has been shown to be effective but only for shorter periods of time so needs more frequent applications and can only be used in kids older than 3 years of age.

**Permethrin** is an odourless, biodegradable, pyrethroid insecticide derived from the plant **Chrysanthemum Cinerariifolium**. It is the most common insecticide available for use on fabrics, and is unique in its role as both a contact insecticide via neural toxicity and as an insect repellent. Permethrin is the most common product used to treat clothing and offers protection against mosquitoes, chigger mites, fleas, lice, sand flies, kissing bugs and tsetse flies. Maybe there is an excuse to shop at the Adventure stores like Mountain Designs and Kathmandu for this pre-treated clothing (remember light, long and loose).

**Insecticide-Treated Bed Nets (ITNs)** are recommended for use in all travellers to malaria endemic regions, however they need to be used regularly and retreated frequently to retain effectiveness. Pyrethroid-treated nets last for several months if they are not washed.

**Spatial Repellents and Aerosols** can prevent nuisance biting but there is no evidence for prevention against malaria. Essential oils in candles, and mosquito coils are another option for nuisance biting but they have no evidence for disease prevention. Finally, knockdown insecticide sprays which are intended to be sprayed inside rooms have not been shown to be effective at preventing malaria in travellers and may present a health risk due to the inhalation of vapours.

Adventure travellers are at an increased risk due to the cultural immersion, connection to the environment and outside physical activities. **Adventure travel and backpacking were the common forms of travel in patients presenting with a skin disorder.** So, if hiking, trekking, camping, hunting, safari trips you would be more at risk. This is one of the reasons we are keen to get you thinking of the types of activities you plan to do when away, and if you are aware of an epidemic in a region you are planning on visiting, there might be a few reasons why you should consider changing your itinerary. It has been reported that Chikungunya in an epidemic will infect 80% of the population in that area, so a definite reason to keep abreast of updated reports from DFAT.

**Despite being very effective, compliance with personal protection measures among travellers to malaria-endemic regions is poor.** The pre-travel consult serves a key role for vector-borne disease prevention. We strongly recommend you take advantage of the funded visit with our Practice Nurses to better understand your risk, and ensure you are aware of all the options that exist for personal protection. ATM stocks various mosquito products, such as personal sprays, and mosquito netting if camping/trekking.