THE AUSTRALASIAN COLLEGE
OF DERMATOLOGISTS

Insect Bite Reactions

Insects are small animals with six legs and a hard protective outer shell called an exoskeleton. Most insects have wings and antennae. They belong to the *Phylum Arthropoda* which contains more subgroups (species) than any other grouping of animals.

Mosquitoes, flies, ticks and fleas are the main cause of bites and stings. These insects occur worldwide and may transmit diseases. Some insects are found only in certain geographic locations. Most people experience occasional stings and bites but after natural disasters such as floods and storms, the numbers of bites and stings are often greatly increased.

The following list shows the main insect groups whose bites can cause reactions in the skin and which may transmit diseases.

- **Biting flies and mosquitoes**

This group includes sand flies, march flies, the black flies seen in Northern US and Canada and mosquitoes. Some larval flies can invade the skin causing myiasis.

- **Bees, wasps, hornets and ants**

Stings by members of this group may cause anaphylaxis. In fact, the stings by this group of insects cause an estimated 25% of all cases of anaphylaxis.

- **Fleas**

The cat flea is the most common cause of problems in humans, followed by dog fleas and sand fleas. Bites from fleas look like groups of red itchy bumps on the lower leg. Some lesions may blister. Fleas can transmit diseases such as typhus.

- **Lice**

Lice are wingless insects that cause head, body or pubic lice infestations.

- **Mites**

Scabies is caused by infestation of the surface layer of the skin (epidermis) by *Sarcoptes scabei* that infests only humans. The insect most frequently burrows into the skin of the web spaces of the hands and around the wrists. Most, but not all, infected

individuals become allergic to the presence of the mite and develop groups of itchy red lumps over time, involving web spaces of hands, on elbows, around the edges of the armpits, around the nipples, buttocks and genital area. The itchiness is frequently worse at night and may interrupt sleep.

- **Other mites**

There are thousands of different mite species that may bite humans. They are widespread in the environment and may be found on domestic dogs and cats, domestic and wild birds, mice, plants, straw, flour and dust. Their bites are often numerous and may cause redness, itching, swelling and blistering of the skin.

- **Ticks**

These are parasites that feed on animal and human blood. The paralysis tick is found along the eastern coastal regions of Queensland, NSW, Victoria and into Tasmania.

The bite mainly causes itchy swollen reactions at the site of the tick bite. Some individuals develop anaphylaxis to ticks. Tick paralysis is rare but, when it occurs, it is usually seen in children.

Ticks can transmit tick typhus. Although locally acquired Lyme disease cannot be ruled out there is little evidence that it occurs in Australia (See http://www.health.gov.au/lyme-disease for more information). There is a continuing risk for people travelling overseas to places where Lyme disease is regularly seen.

Ticks need to be attached for 24 or more hours to transmit disease. Prompt removal is important.

- **Bedbugs**

These are bloodsucking insects that bite at night producing rows of red swollen lumps where they contact the skin.

- **Moths, butterflies and their caterpillars**

Irritation of the skin is caused by contact with the stinging hairs on the surface of the caterpillars or their cocoons. Irritation may be persistent if the hairs become embedded in clothing.

- **Centipedes and millipedes**
- **Beetles**
- **Scorpions**
- **Spiders**

The ***funnel web spider*** is found on the east coast of Australia from southeast Queensland to Tasmania. The Sydney funnel web spider is the most dangerous and is found in Sydney and areas north to Newcastle and south to the Illawarra. Apply a pressure immobilisation bandage if bitten by a funnel web spider to reduce spread of the

venom in the tissues. Then, apply a splint to further reduce movement of the limb. Seek medical attention.

- The ***red back spider*** bite causes intense pain at the site of the bite. In some cases, other symptoms such as sweating, nausea, vomiting, and weakness may develop. Do not apply a compression bandage. Ice packs reduce the pain. Seek medical attention if pain is severe or general symptoms worsen. There is an effective antivenom that can be given up to 3 days after the bite.

What are the skin manifestations of an insect bite reaction?

While many bites and stings cause inflammation with redness, swelling, blistering, itching, soreness or pain at the site of the bite, it may be possible to differentiate between the different insects causing the problem by looking at:

- where the person was geographically when the bite occurred
- what the person was doing when the bite occurred
- whether other people are also affected
- the time of day or night where the bite occurred
- whether there are multiple bites or just a single bite
- the part of the body where the bite or bites occurred
- whether the reactions are local or widespread

With conditions such as scabies and head, body and pubic lice, the history and the clinical pattern of changes in the skin aids diagnosis.

Hypersensitivity to insect bites, known as papular urticaria, causes more persistent lesions to develop after mosquito, flea and other bites. These lesions are more frequently seen in children. It may be difficult to identify the causative insect.

How are insect bites treated?

Local treatments for symptoms of insect bites include:

- Cool compresses
- Ice packs
- Pain relief
- Topical or systemic steroids in some cases to reduce inflammation
- For spider bites in areas where funnel webs are known to occur, apply compression bandaging and splinting before presenting to a hospital emergency department.

General principles of prevention of insect-borne diseases

- Avoid areas where there is a high likelihood of being bitten.
- Wear appropriate clothing (including long-sleeved shirt, long pants tucked into socks and light coloured clothing which makes it easier to see crawling insects).
- Apply a registered topical mosquito repellent. The first two products on the following list give the most reliable protection:
- ***Diethytoluamide (DEET)*** duration of effect
    - <10% 2 hours
    - 10-20% 3-4 hours

    - 20-40% 4–6 hours
    - 80% As required
- ***Picaridin*** duration of effect
    - <10% 2 hours
    - 10-20% 3-4 hours
- ***Others*** – duration of effect
    - Extract of lemon eucalyptus (PMD) 30% 2 hour
    - Eucalyptus oil <10% 1 hour
    - Melaleuca oil <10% 1 hour
    - Citronella oil <10% 1 hour
    - Blend of botanical extracts <10% 1 hour

Reapplication times can be influenced by an individual's activity, climatic conditions and local mosquito populations. Over application of a repellent will not increase protection times.

How do repellents work?

- Repellents do not kill mosquitoes; they prevent mosquito bites by inhibiting the mosquito's stimuli for blood feeding.
- Some mosquitoes may be attracted to individuals wearing repellent but mosquitoes will not bite if an effective repellent has been applied appropriately. The type and concentration of active ingredient in an insect repellent determines how long an individual will be protected from biting mosquitoes.
- Repellents are most effective if there is an even application to all areas of exposed skin.

How should repellents be applied?

- Repellent must be applied to all areas of exposed skin to ensure protection against bites.
- When using pump spray or roll-on formulations, it is important to cover the skin evenly. First apply the repellent from the container and then spread it over the skin using your hands.
- Repellent sprays will not work effectively if they are applied sparingly or patchily. A quick spray "here and there" will generally not prevent mosquito bites.
- Repellents should not be applied to broken skin (ie cuts, abrasions). Repellents should not be applied beneath clothing.

(The above data was sourced from the Department of Entomology, University of Sydney and Westmead Hospital 2011.)

What environmental repellents can be used?

- Bed nets and window screens can help protect from insect bites.
- Permethrin kills many insects. Washes are available that can be used to treat clothing, sleeping bags, mosquito nets and tents. The combination of permethrin impregnated clothing and the personal use of repellents provides effective insect bite protection.

Insect control programs include:

- Drainage of breeding grounds
- Treatment of animals who may carry the insect

Seek local knowledge of where insects are found and reduce exposure as much as possible.

This information has been written by Dr Pam Brown