

## MALARIA

**Kate Ward**

NSW Public Health Officer Training Program  
NSW Department of Health

**Rogan Lee**

Centre for Infectious Diseases and Microbiology  
Institute of Clinical Pathology and Medical Research

**Richard Russell**

Faculty of Medicine, University of Sydney  
Department of Medical Entomology  
Institute of Clinical Pathology and Medical Research

Malaria is one of the most important vector borne diseases in the world. Approximately 1 million deaths per year are attributable to malaria with the majority of these being in sub-Saharan Africa.<sup>1</sup>

Malaria is transmitted to humans via the bite of an infected female *Anopheles* mosquito. There are four major species of malaria parasites that cause disease in humans. These belong to the genus *Plasmodium*—and of these, *Plasmodium falciparum* causes the most severe disease.

Inside the mosquito, the parasites multiply and develop further until they reach the stage when they can infect humans. Inside a human, the parasite undergoes a complex life cycle that ultimately destroys red blood cells which often leads to anaemia. A patient infected with *P. falciparum* and left untreated can develop severe malaria affecting vital organs such as the brain, lungs and kidneys, and can result in significant morbidity and subsequent mortality. Infected humans can transmit the parasite to mosquitos that feed on their blood.

Mosquito control efforts have eradicated malaria from many temperate zones including Australia, but it remains endemic to Central and South America, Africa, eastern Europe, Asia and parts of the south-western Pacific.

Children and pregnant women are the most vulnerable to malaria. It is estimated that 1 in 5 childhood deaths in Africa are attributable to the disease.<sup>1</sup> Chronic anaemia resulting from malaria can adversely affect a child's growth and development. In endemic regions of Africa the *P. falciparum* infects pregnant women resulting in severe anaemia for the mother and low birth weight and subsequent poor survival for the infant. Approximately 10,000 maternal deaths and 8-14% of all low birth weight babies born in Africa each year are due to malaria.<sup>1</sup>

**DIAGNOSIS**

The signs and symptoms of acute human malaria include fever, myalgia, malaise, headache, nausea, tachycardia, tachypnoea, cough and vomiting. Given the non-specific presentation, clinical diagnosis is difficult. Consequently, the primary method of diagnosis involves the examination of thick and thin blood films for the presence of malaria parasites. Other methods of diagnosis include serology and Polymerase Chain Reaction (PCR) but both of these have their disadvantages. More recently, a number of Rapid Immunochromatography Tests have become commercially available. Tests that identify the presence of malaria histidine rich protein II are most sensitive to the diagnosis of *P. falciparum*. Tests for other species of malaria currently lack sensitivity and are thus more prone to producing false negatives. These tests may therefore be useful as a back up for inexperienced laboratories, but they cannot replace microscopy as the most acceptable diagnostic test for malaria.

**VECTORS**

There are more than 400 species of *Anopheles* mosquito, of which about 70 can be malaria vectors. In general, those species that are abundant and are primarily attracted to humans are the most efficient vectors.

Those mosquitos with a longer life span and that are endophilic (enter dwellings) and endophagic (feed indoors) such as the African *An. gambiae*, are generally better able to transmit the disease.

Malaria used to be endemic to regions in northern Australia and transmission has occurred in southern regions. While the infection has been eradicated, the *Anopheles* vectors are still present throughout the country. However with modern health services it is considered unlikely that malaria would become re-established in Australia, even in the previously endemic areas.

Strategies to control vectors elsewhere, range from spraying insecticides within houses to pyrethroid impregnated bednets and treated curtains. Personal protection for travellers can be afforded by bednets and topical insect repellents, as well as appropriate chemoprophylaxis.

Worldwide the eradication of malaria has been hampered by the development of both drug resistance and insecticide resistance (due to both physiological and behavioural changes) and infrastructure constraints. Research into vaccines continues but the existence and affordability of a cure remains uncertain.

**REFERENCE**

1. World Health Organisation. Health Topics: Malaria. At: [www.who.int/topics/malaria/en/](http://www.who.int/topics/malaria/en/), accessed January 2006. ☒

\*Bug Breakfast is the name given to a monthly series of hour-long breakfast seminars on communicable diseases delivered by the NSW Department of Health's Division of Population Health.