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Malaria diagnosis in the returned traveller

By Dr Laurens Manning FRACP

Fever in a recently returned traveller is a consultation that can be interesting and daunting. This article explains how we test for malaria in Australia today.

A fever or history of fever such as shakes, chills or rigors is present in the majority of travellers with malaria. Making a diagnosis, however, is not always straightforward because the symptoms are non-specific and can mimic influenza, gastroenteritis or respiratory infection.

Female anopheline mosquito is the vector for malaria parasites.

Malaria testing in WA

EDTA (purple top) tube blood samples are used. Samples taken in association with a rising fever are generally most sensitive. Initial diagnostic tests are a combination of microscopy of thick and thin blood films (still considered the gold standard) and rapid diagnostic tests (RDTs). Molecular methods (PCR) may assist in species identification, as an adjunct to the microscopy, but do not yet replace the initial microscopic examination of thick and thin films. Malaria serology has no role in the diagnosis of acute malaria, due to the time delay for antibodies to appear.

Interpreting the results

While the thick film improves the sensitivity of microscopy, the thin film is used to determine the species of malaria because the morphology of the parasite and its host red cell are visible. The thin film can also be the basis for calculation of parasite load.

The number of parasites required to elicit a febrile reaction in Caucasians was investigated in early studies of malaria therapy for neuro-syphilis and can be very low. The pyrogenic threshold for P. vivax is much lower than that for *P.* falciparum.

Most people with clinical malaria have parasitaemia well above the lower limit of detection for microscopy. This lower limit, however, is dependent on the experience of the microscopist but should be below 2 parasites per 200 white cells (80 parasites/μL). If analysis proves negative but clinical suspicion remains, repeat specimens should be considered.

The role of rapid tests

Malaria rapid diagnostic tests (RDTs) are useful adjuncts to malaria diagnosis, but negative results especially in the setting of travelers with possible P. vivax infection should be interpreted with caution.

Most are immuno-chromatographic tests that detect a protein called PfHRP-2 that is specific to *P. falciparum*. Some also contain a test line that allows detection of non-falciparum malaria species. Typically, when *P. falciparum* parasitaemia is above 2000/μL they perform well. Some brands also perform well down to 200/μL. However, RDT detection rates for P. vivax and other non-falciparum species are highly variable. For a comprehensive comparison of RDT performance visit: http://www.wpro.who.int/sites/rdt.

Because RDTs can remain positive for weeks they are not useful for monitoring disease progression or response to treatment.

Treatment

Treatment is a topic in itself however consultation with the laboratory and/or an infectious disease physician is recommended for assistance regarding resistance and therapeutic options.

Malaria Tips

- Five plasmodium species cause malaria in humans: *P. falciparum, P. vivax, P. ovale, P. malariae*. *P. knowlesi*, a species previously recognized as affecting monkeys, is now the major cause of human malaria in Malaysia.
- Immigrants who visit friends and family in their country of origin now make up more than half of imported malaria cases.
- Not all malaria endemic countries have the same transmission intensity. Travel to West Africa carries a risk of up to 2% per month. The risk for travel in the Americas and North Africa is lower than travel to Melanesia or Sub-Saharan Africa.
- Business travellers spending most time in urban environments are at lower risk than those visiting rural areas.
- No chemotherapeutic prophylaxis provides 100% protection against malaria. Late infections presenting more >2 months after exposure are well documented in people who have taken appropriate anti-malarials.
- The most diagnostic clinical signs are an enlarged spleen and thrombocytopaenia.
- A rash is rare with malaria and normally indicates another pathology such as dengue, Chikungunya or other viruses.

References available on request