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Preface

Tulip Group of companies believes in offering our valued customers the technical support and scientific information to keep updated with the latest international standards and trends in diagnostic testing.

Laboratory results play a pivotal role in providing the clinician the scientific data in diagnosing, monitoring and prophylaxis of deserving patients. Keeping in mind our valuable customers, Tulip Group will offer periodically a series of Tech Notes presented with a short, summarized overview pertaining to a specific technique / product/ disease related information.

We hope that the tech Notes will assist and benefit the laboratarians in enhancing the standards of reporting results thereby helping the clinician for better diagnosis and patient management.

Yours faithfully,
Zephyr Biomedicals

Limitations of antibody detection assay for malaria

Current Status

Malaria has been recognized to be a major source of mortality and morbidity worldwide. With the emergence of drug resistant strains, the infection presents a diagnostic challenge to laboratories, globally. Although microscopy still remains the Gold Standard for diagnosis, in the recent years, laboratory diagnosis of malaria has been enhanced by the introduction of easy to use, affordable, simple immunochromatography assays. Given the limitations of conventional diagnostic methods, it is not surprising that pathologists and clinicians have looked to these rapid immunochromatography techniques or Rapid Diagnostic Tests (RDT's) as additional, and perhaps more definitive, means of diagnosing and differentiating malaria species.

Tests Available

Currently available RDT's can be classified according to the analyte they detect:

1. **Antibody detection**

Antibodies to the asexual blood stages of the parasite appear a few days after malarial infection, increase in titre over few weeks and persist for months or years in semi-immune patients in endemic areas such as India.

In non-immune patients, the antibodies fall more rapidly after treatment for a single infection and are undetectable within 3-6 months. Reinfection or relapse induces a secondary response with a rapid increase in antibody titre.

Antibody based RDT's detect the presence of anti-malarial antibodies by employing blood stage antigen prepared from primate blood infection or from *P. falciparum* cultures in the laboratory. Blood stage schizonts are often used as source of antigen for high sensitivity.

Application and scope of Antibody based RDT's for malaria:

- Malaria serological methods, though provide useful information with regards to exposure to malaria infection, **are not able to differentiate between the present and past infections**[7]**.**

It is evident that antibody detection has a limited use in routine malaria diagnosis and is more useful for sero-epidemiological studies on malaria.

- Antibody based RDT's have been employed for screening potential blood donors. However, studies [1, 2] have mentioned that an antibody test is not the appropriate test for screening blood transfusion donors, since:
    a) Presence of antibodies to the Plasmodium parasite does not indicate active infection in the donor[1].

b) Antibody titre (due to past exposure) may persist for upto 10 years in endemic areas, thereby giving false positive results even in a normal healthy donor[1].
c) Solitary dependence on malaria antibody detection assays as a screening test for blood donation might lead to **rejection of 19.02% blood donors without apparent malaria infections**[2].

Needless to say, the use of an antibody based test for screening blood donors would result in rejecting precious healthy blood.

- Most antibody based RDT's for malaria employ *P.falciparum* blood stage parasite as antigenic source. *P. falciparum* antigen coated on the test assay tends to cross react with the antibodies directed against *P.ovale,*. *P.malariae* and *P.vivax*[3]. Further some studies have also stated that cross reactions can often occur between *Plasmodium* and *Babesia* species[4].

Hence employing an antibody detection test for routine diagnosis of malaria may lead to false speciation and thereby incorrect therapy.

Antibody based RDT's for malaria may be useful for:
- Investigations of cryptic malaria.
- Screening blood donors involved in cases of transfusion-induced malaria when the donor's parasitemiae may be below the detectable level of blood film examination.
- Testing a patient with a febrile illness who is suspected of having malaria and from whom repeated blood smears are negative.
- In future, detection of protective antibodies will be important in assessing the response to malaria vaccines.

2. Antigen detection

Antigen based RDT's for malaria detect circulating antigens in the infected individual by the corresponding antibody. Malaria antigens currently targeted by RDT's are Histidine Rich Protein – II (HRP-II) and parasite Lactate Dehydrogenase (pLDH)

Many field and laboratory studies have compared these antigen based RDT's with conventional microscopy, fluorescence microscopy and PCR and have concluded that antigen based RDT's are a better alternative for diagnosing malaria, in field and laboratory conditions alike.

Recently, RDT's for combo Pf. HRP-II for *P.falciparum* detection, *P.vivax* specific pLDH for *P.vivax* detection and pan specific pLDH for all 4 *Plasmodium* spp. have been developed.

These combo RDT's offer benefits of accurate detection and true speciation of the '**Big Two**'; *P. falciparum* and *P. vivax*, and can also be employed for monitoring success of anti-malarial therapy. Further, these combo RDT's are simple, rapid, sensitive, specific and suitable for on the spot diagnosis of malaria, even in field settings.

References:

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