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Journal of Medical Diagnostic Methods

Commentary

Targeting Malaria vector to Control Malaria: Advancement and Challenges

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DESCRIPTION

Malaria presents a diagnostic challenge for laboratories in the majority of nations. Some of the most sensitive techniques for malaria diagnosis are impracticable for normal laboratory usage due to the urgency and need of receiving data rapidly from the evaluation of blood samples from patients with suspected acute malaria. Laboratory methods that take more than 1 hour to establish an unambiguous diagnosis of malaria are not considered. Quick tests for the purposes of this evaluation, although they may be regarded reference procedures.

Endemic malaria, population mobility, and international travel all add to the malaria diagnostic challenges faced by laboratories that may lack proper microscopy competence. Changing patterns of recognised morphological appearances of malaria species, maybe owing to medication pressure, strain variation, or blood collection methods, have generated diagnostic issues that cannot be easily resolved by referring to a parasitology database. Fortunately, modern technology offers more diagnostic possibilities that can be studied and compared to older traditional approaches. Concurrently, the World Health Organization (WHO) has initiated a discussion with scientists, physicians, and manufacturers of malaria diagnostic test equipment on the realistic prospects for creating accurate, sensitive, and cost-effective quick diagnostic tests for malaria. The capacity to identify 100 parasites/μl from all *Plasmodium spp.* and perform semi quantitative assessments for monitoring medication treatment effects are prerequisites for these quick assays.

The majority of malaria cases are located in nations where cost-effectiveness is a key priority, as are ease of diagnostic test performance and personnel training. The majority of contemporary malaria detection technology uses immunochromatographic capture processes, with conjugated monoclonal antibodies serving as the signal of infection. Targeted antigens that are abundant in all asexual and sexual stages of the parasite are preferred; currently, interest is focused on the detection of Histidine-Rich Protein 2 (HRP-2) from *Plasmodium falciparum* and Parasite-specific Lactate Dehydrogenase (pLDH) or *Plasmodium aldolase* from the parasite glycolytic pathway found in all species. Clinical investigations allow for meaningful comparisons of various test formats, as well as clarification on the practicality and clinical significance of utilizing no microscopic procedures.

Blood-stained films

The fabrication and microscopic analysis of blood films stained with Giemsa, Wright's, or Field's stain is the standard laboratory procedure for the diagnosis of malaria. Because the density of mature trophozoites or schizonts is higher in blood from this capillary-rich location, blood obtained by pricking a finger or earlobe is the optimal sample. Venipuncture blood collected with heparin or Sequestrine (EDTA) anticoagulant-coated tubes is appropriate if utilized soon after drawing to avoid changes in the shape of White Blood Cells (WBC) and malaria parasites. It is necessary to create both thick and thin blood films.

Thick blood film

The thick blood film concentrates Red Blood Cell (RBC) layers on a tiny surface by a factor of 20 to 30 and is stained as an unfixed preparation with Field's stain or diluted Wright's or Giemsa stain. The thick blood film approach improves sensitivity and is far superior to the thin film technique for detecting low levels of parasitemia and the return of circulating parasites during infection recrudescence or relapse. The lysis of the RBC during the staining procedure might make scanning for parasites more challenging unless expertise in locating parasites among the WBC and platelets is developed.

Thin blood films

To highlight the parasite inclusions in the RBC, the thin blood film is stained with methanol and diluted Giemsa or Wright's stain in buffered water at pH 7.2. Because of the stable monolayer of RBC accessible in this approach, morphological identification of the parasite to the species level is considerably easier and more specific than thick-film testing. Because the organisms are simpler to identify and count, thin blood films are frequently selected for regular parasitemia estimates. The capacity to count parasites on sequential blood films allows for the monitoring of therapeutic response, notably in *P. falciparum* infections.

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Received: 02-Mar-2022, Manuscript No. JMDM-22-488;**Editor assigned:** 04-Mar-2022, PreQC No. JMDM-22-488(PQ);**Reviewed:** 24-Mar-2022, QC No. JMDM-22-488; **Revised:**04-Apr-2022, Manuscript No. JMDM-22-488; **Published:**13-Apr-2022, DOI: 10.35248/ 2168-9784.22.11.488.

Citation: Daniela K (2022) Targetting Malria Vector to control Malaria: Advancement and Challenges J Med Diagn Meth. 11: 488.