

Plasmodium Species - Malaria

Clinical Background

Malaria is caused by the protozoan parasite *Plasmodium* spp and is transmitted by infected mosquitos.

Epidemiology

- Incidence
 - Worldwide distribution in tropical areas; more than 500 million cases reported every year
- Transmission
 - Vector is the *Anopheles* mosquito

Organism

- Protozoan species that cause most malarial infections in humans include:
 - *P. vivax*
 - *P. falciparum* (~80% of cases)
 - *P. ovale*
 - *P. malariae*
 - *P. knowlesi*

Pathophysiology

- Accumulation and sequestration of parasite-infected red blood cells in various organs, such as the heart, brain, lungs and kidneys, create characteristic features of the disease

Clinical Presentation

- May be nonspecific – malaise, fever, myalgias
 - Typically occurs 7-30 days after mosquito bite
- Progresses to splenomegaly, anemia, jaundice
- Severe infection, usually from *P. falciparum* species, may cause:
 - Cerebral encephalopathy
 - Hypoglycemia
 - Hypotension
 - Liver dysfunction
 - Renal failure
 - Liver dysfunction
- Dormant infections can occur with *P. vivax* and *P. ovale*
- Complications in pregnant patients
 - Spontaneous abortion
 - Preterm labor
 - Low birth weight
 - Congenital infection

Treatment

- Drug treatment depends on *Plasmodium* species, drug-resistance patterns, clinical condition of patient, and drug allergies, among other factors

Prevention

- Personal protection measures that are helpful
 - Use repellents containing DEET or picaridin

- Avoid outdoor activities during mosquito feeding times (dusk to dawn)
- Wear appropriate clothing for protection from mosquito bites
- Prophylaxis for travel to endemic countries is usually successful in the following cases:
 - Appropriate drugs are selected for area visited
 - Patient is compliant

Diagnosis

- Indications for testing – clinical history and symptoms with residency or travel to endemic area
- Laboratory testing
 - Giemsa-stained blood smear
 - Demonstration of intraerythrocytic parasites is diagnostic
 - Should be collected when patient's temperature is rising
 - Malaria antibody testing
 - Not useful in acute disease
 - Provides evidence of past exposure
 - Does not provide definitive identification of *Plasmodium* spp
 - Rapid antigen testing
 - In U.S., the Centers for Disease Control and Prevention (CDC) recommends follow-up confirmation of rapid testing
 - Nucleic acid testing
 - Very sensitive and specific
 - Ability to accurately quantify parasitemia depends on platform

Lab Tests

Indications for Laboratory Testing

Tests generally appear in the order most useful for common clinical situations. For test-specific information, refer to the test number in the ARUP Laboratory Test Directory on the ARUP Web site at www.aruplab.com.

Test Name and Number	Recommended Use	Limitations	Follow Up
Parasites Smear (Giemsa Stain), Blood 0049025 Method: Stain	Diagnose acute cases of malaria Detect blood parasites, including species of <i>Plasmodium</i> and <i>Babesia</i> , microfilaria, trypanosomes Confirm positive ELISA result for malaria antibodies	Blood collection during fever usually yields highest parasite numbers Time sensitive Travel history required	Sequential blood samples may be required for diagnosis due to cyclical nature of disease
Malaria Antibody, IgG 0051356 Method: Enzyme Linked Immunosorbent Assay	Retrospectively diagnose malaria in a previously non-immune individual Screen for chronic malaria	False-positive results for malaria antibodies seen in up to 18% of antinuclear antibody positive or rheumatoid factor positive patients Serologic results from assay should not be used as sole method of diagnosis	

<p>Malaria, Rapid Screen (Includes Giemsa stain 0049025) 2001547 Method: Stain</p>	<p>Screen for malaria Travel history required</p>	<p>Rapid screen does not detect parasitemia less than 0.5% Rapid screen should not be used for therapeutic monitoring</p>	<p>All rapid antigen test results are confirmed by blood smear examination</p>
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General References

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Reviewed by

Litwin, Christine, MD. Medical Director, Immunology at ARUP; Professor of Pathology (Clinical), University of Utah

Perkins, Sherrie L., MD, PhD. Director of Laboratories, Chief Medical Officer, and Medical Director, Hematopathology, at ARUP Laboratories; Professor of Anatomic Pathology, University of Utah

She, Rosemary C., MD. Assistant Medical Director, Virology, Parasitology, and Microbial Amplified Detection at ARUP; Assistant Professor of Pathology (Clinical), University of Utah

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