Agent Information Sheet (AIS)

Plasmodium falciparum

Agent

Plasmodium spp. parasites belong to the Apicomplexa group of protozoa and encompass a wide variety of genus including Plasmodium falciparum, P. vivax, P. ovale, and P. malariae. Plasmodium is most known for causing malaria, a mosquito-borne disease that manifests itself as fever, chills, and flu-like illness. If left untreated patients may develop severe complications and die.

1. Disease/Infection
   Causes malaria

2. Pathogenicity
   The Plasmodium parasite infects Anopheles mosquitoes, which then in turn feed on humans, transmitting the disease. Once in the body, Plasmodium grows and multiplies first in the liver cells and then in the red cells of the blood. The infected erythrocytes invade deep microvasculature, and can cause many symptoms. Of all the Plasmodium species, most deaths from malaria are caused by severe complications of P. falciparum infection such as cerebral malaria, severe anemia, renal failure, and respiratory failure. Fatal complications usually result from multi-organ failure and superimposed bacterial infections. As many as 34 lab acquired infections have been reported with Plasmodium spp

   a. Special Populations at Risk
      In sub-Saharan Africa, most severe cases and deaths occur in children younger than 5 years old and in pregnant women. Malaria of pregnancy can be a life threatening condition for both the mother and the fetus. Patients with HIV have more severe disease.

3. Biosafety Information
   a. Risk Group/BSL
      Risk Group 2
      Biosafety Level 2 Practices
   b. Modes of Transmission
      Malaria is not spread from person to person.

   c. Host Range/Reservoir
      Female Anopheles mosquito, humans

   d. Symptoms
      Malaria presents as an acute febrile illness, headache and confusion. It is mostly characterized by the classic malaria cycles of chills and rigors, followed by fever spikes up to 104°F. Symptoms vary widely and can either be acutely malignant and painful, or more indolent and asymptomatic. Patients often then experience profuse sweating and fatigue. These paroxysmal cycles can last several hours, and usually coincide with the synchronous rupture of blood schizonts. Cycles usually happen every 48 to 72 hours. Severe disease and high parasitemia can be marked with cerebral edema, shock and multi-organ failure.

   e. Incubation Period
      Usually, the malaria incubation period ranges from 10 days to four weeks in duration.

   f. Viability
      Unknown

   g. Survival Outside Host
      Injected sporozoites require hepatocytes to continue their life cycle and replication.

   Skin Exposure (Needlestick, bite, or scratch):
      Accidental parenteral inoculation, direct blood meal by vector, exposure via wound
Information for Lab Workers

1. Laboratory PPE
   Personal protective equipment includes but is not limited to gowns with tight wrists and ties in back, disposable gloves, combination safety glass and mask or a face shield. Facilities for washing and changing clothing after work should be available.

2. Containment
   BSL-2 facilities, equipment, and operational practices for work involving infectious or potentially infectious materials, animals, or cultures. Procedures that are likely to generate aerosols should be conducted in a biosafety cabinet. Practices may be enhanced based on risk assessment.

3. In Case of Exposure/Disease
   1. For injuries in the lab which are major medical emergencies (heart attacks, seizures, etc...):
      a. Medical Campus: call or have a coworker call the Control Center at 4–4144.
      b. Charles River Campus: call or have a coworker call campus security at 617-353-2121.
         You will be referred to or transported to the appropriate health care location by the emergency response team.
   2. For lab exposures (needle sticks, bite, cut, scratch, splash, etc...) involving animals or infectious agents, or for unexplained symptoms or illness call the ROHP 24/7 hour number (1-617-414-ROHP (7647); or, 4-ROHP (7647) if calling from an on-campus location) to be connected with the BU Research Occupational Health Program (ROHP) medical officer. ROHP will refer you to the appropriate health care location.
   3. Under any of these scenarios, always inform the physician of your work in the laboratory and the agent(s) that you work with.
   4. Provide the wallet-size agent ID card to the physician.

4. Vaccination
   None

Information for First Responders/Medical Personnel

1. Public Health Issues
   Malaria is not transmitted person to person. Standard precautions should be used in care of patients with suspected infections.

2. Diagnosis/Surveillance
   Patients with fever who have had recent lab exposure or recently traveled in malaria-endemic areas should be immediately evaluated using the appropriate diagnostic tests for malaria. Blood smears or a rapid diagnostic test (RTD) should be performed, and if the RTD is positive, a smear is required for speciation.

3. First Aid/Post Exposure Prophylaxis
   Perform one of the following actions:

<table>
<thead>
<tr>
<th>Skin Exposure (Needlestick or scratch):</th>
<th>Immediately go to the sink and thoroughly wash the wound with soap and water for 15 minutes. Decontaminate any exposed skin surfaces with an antiseptic scrub solution.</th>
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<tbody>
<tr>
<td>Mucous Membrane Splash to Eye(s), Nose or Mouth:</td>
<td>Exposure should be irrigated vigorously.</td>
</tr>
<tr>
<td>Splash Affecting Garments:</td>
<td>Remove garments that may have become soiled or contaminated and place them in a double red plastic bag.</td>
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Consideration for post exposure prophylaxis should be made on a case by case basis. More research is needed regarding post exposure prophylaxis in occupational settings.

4. Treatment

Treatment is often based on the species of parasite and known resistance patterns. Presumptive first line treatments for Plasmodium falciparum include atovaquone-proguanil, coartem, quinine, doxycycline, tetracycline, clindamycin or mefloquine.

5. References


Overview of Malaria. UpToDate. 2012. [http://www.uptodate.com/contents/search?source=MISSPELL&sp=0&search=overview+of+non+malaria&searchOffset=0&searchType=PLAIN_TEXT](http://www.uptodate.com/contents/search?source=MISSPELL&sp=0&search=overview+of+non+malaria&searchOffset=0&searchType=PLAIN_TEXT)
