



# MALARIA

1. **Agent:** Protozoan parasites *Plasmodium falciparum*, *P. malariae*, *P. ovale*, *P. Vivax*, and *P. knowlesi*.
2. **Identification:**
  - a. **Symptoms:** Acute or subacute febrile disease, usually with episodes of chills and fever every 2-3 days, separated by afebrile periods. Malaria caused by *P. falciparum* may progress to jaundice, shock, renal failure, coma, and death.
  - b. **Differential Diagnosis:** Other febrile illnesses associated with international travel, e.g., brucellosis, typhoid fever, and yellow fever.
  - c. **Diagnosis:** Demonstration of parasites in thick or thin blood smears is the gold standard. Detection of antigens using rapid diagnostic test (RDT) or of parasite DNA by PCR are alternative methods.
3. **Incubation:** Variable; 8-12 days for *P. falciparum*, 18 days or up to years for *P. malariae*; 12-18 days for *P. ovale* and *P. vivax*; 9-12 days for *P. knowlesi*. Inadequate or inappropriate prophylaxis may extend the incubation period.

Note: *P. vivax* and *P. ovale* strains can occur 8-12 month after exposure, due to dormant forms remaining in liver.

4. **Reservoir:** Human.
5. **Source:** Infected female mosquitoes of the genus *Anopheles*.
6. **Transmission:** Bite of infective anopheles female mosquito, blood transfusion from infected persons, congenital and parenteral transmission.
7. **Communicability:**
  - a. **Mosquito infection:** When gametocytes are present in blood of patient.
  - b. **Parenteral transmission:** When trophozoites are present in blood.

## 8. Specific Treatment:

- a. *Plasmodium ovale*, *P. vivax*: Chloroquine for acute malaria, primaquine for prevention of relapses (sometimes called "radical cure"). "Terminal prophylaxis" refers to primaquine treatment after leaving regions endemic for these species. Consult CDC yellow book or ACDC physician for details.
- b. *Plasmodium falciparum*, *P. malariae*: Chloroquine for non-resistant strains. Patients with resistant *P. falciparum* malaria may require alternative treatment; consult ACDC.
- c. Infection by any species transmitted by transfusion, parenteral, or congenital route: chloroquine or consult ACDC physician for suspected resistant strain.

9. **Immunity:** Partial immunity for individuals with continuous exposure in endemic areas, e.g., Africa, Central America and Southeast Asia.

## REPORTING PROCEDURES

1. **Reportable.** *California Code of Regulations*, Sections 2500, 2586. Malaria smears in local laboratories, must be sent to LAC PHL for confirmation of species.

**Report Form: MALARIA CASE REPORT (CDPH 8657).**

2. **Epidemiologic Data** (as noted in case report form):
  - a. Residence in or travel to areas endemic for malaria 3 years prior to onset. List countries and cities, dates of stay, and any prophylactic medication.
  - b. Transfusion of blood or blood products 2 years prior to onset. Include dates, places, lot numbers, and manufacturer. **Notify ACDC at once for assistance in follow-up.**



- c. History of blood donation.
- d. Use of parenteral drugs.
- e. Surveillance of travel contacts and persons sharing intravenous drug paraphernalia for symptoms of malaria.
- f. Follow-up examination of asymptomatic mothers of infant cases, and asymptomatic infants born to mothers with malaria.

### CONTROL OF CASE, CONTACTS & CARRIERS

- 1. ACDC will review suspect reports.
- 2. Case investigation to be completed by ACDC staff.
- 3. Investigation should be initiated within 7 days of notification.

**CASE:** Isolation: None.

**CONTACTS:** No restrictions.

**CARRIERS:** Not applicable.

### PREVENTION-EDUCATION

- 1. Appropriate chemoprophylaxis for travelers to areas endemic for malaria.
- 2. Avoid outdoor exposure during hours of peak mosquito activity, i.e., between dusk and dawn.
- 3. Use mosquito repellent (DEET-based up to 35% protective clothing, and mosquito netting at bedtime when traveling to areas with endemic malaria.
- 4. Exclude persons with malaria from blood donor programs for 3 years after becoming asymptomatic and after therapy stopped. Asymptomatic U.S. donors not on anti-malarial chemoprophylaxis may donate 1 year after returning from an endemic area.
- 5. IV drug users may acquire malaria by sharing paraphernalia.
- 6. Several episodes of locally acquired (autochthonous) malaria have been reported

in several states since 1996. Vector mosquitoes (*An. quadrimaculatus*) have a wide range in central and eastern USA, and *An. freeborni* in the western USA.

- 7. Pregnant women should avoid travel to malaria endemic areas unless absolutely necessary.

### DIAGNOSTIC PROCEDURES

- 1. **Microscopic Container:** Hematology-differential (slide holder).

**Laboratory Form: Test Requisition and Report Form H-3021**

**Examination Requested:** Malaria.

**Material:** Blood smears, 2 thick and 2 thin on standard slides.

**Remarks:** Obtain smears midway between febrile episodes, if possible.

- 2. **PCR:**

- 3. **Rapid Diagnostic Test (RDT):**

**Remarks:** RDT may not detect parasites in patients with low level parasitemia. RDT also does not detect *P. knowlesi*. It is recommended that negative RDT results be confirmed with a blood smear.