

Leishmania Species

Disease Agent:

- *Leishmania* species

Disease Agent Characteristics:

- Protozoan, 2.5 × 5.0 μm
- Order: Kinetoplastida
- Family: Trypanosomatidae
- Intracellular pathogen of macrophages/monocytes
- Only the amastigote stage is found in humans.

Disease Name:

- Leishmaniasis
- Visceral leishmaniasis is called kala-azar in India and various names elsewhere.
- Cutaneous forms have a variety of colloquial names around the world.

Priority Level:

- Scientific/Epidemiologic evidence regarding blood safety: Low
- Public perception and/or regulatory concern regarding blood safety: Low
- Public concern regarding disease agent: Low, but moderate among military personnel

Background:

- Generally limited to tropical and sub-tropical climates, sometimes referred to as Old World and New World forms
- Considered stable, but with sporadic outbreaks like those recently observed in Sudan and India
- 2 million new cases of *Leishmania* worldwide each year: 1.5 million cutaneous and 0.5 million visceral
- Nine US soldiers who served in the Persian Gulf area in 1990 were found to have viscerotropic *L. tropica* infections. They experienced a nonspecific febrile illness with fatigue, arthralgia, and diarrhea. Some soldiers recovered spontaneously, whereas others progressed and developed a chronic condition with adenopathy or splenomegaly. These events led to concern about the safety of returnees from the Persian Gulf as blood donors. That concern continues with the recent deployment.

Common Human Exposure Routes:

- Bite of infected sandfly vector

Likelihood of Secondary Transmission:

- Minimal

- Fewer than 15 probable or confirmed cases of transmission by blood transfusion and 10 reported cases of congenital transmission worldwide

At-Risk Populations:

- Residents of and travelers to endemic areas

Vector and Reservoir Involved:

- Phlebotomine sandflies: *Phlebotomus* genus (Old World) and *Lutzomyia* genus (New World)

Blood Phase:

- *Leishmania* parasites survive and multiply in mononuclear phagocytes. Parasite circulation in peripheral blood has been reported in asymptomatic *L. donovani*, *L. tropica*, and *L. infantum* infections, and in treated and inapparent *L. braziliensis* infections.

Survival/Persistence in Blood Products:

- *Leishmania* species are known to survive in human RBCs under blood bank storage conditions for as long as 15 days and longer in experimental animal models.

Transmission by Blood Transfusion:

- Transfusion transmission has been documented in at least three cases in nonendemic areas in which the recipients who received transfusion were either infants or immunocompromised patients. One probable case of *L. donovani* transmission by platelet transfusion has been reported.
- No transfusion cases reported in the US
- *Leishmania* species have been transmitted via clinical transfusions from seropositive donor dogs to recipient dogs.

Cases/Frequency in Population:

- No cases, and unknown frequency in nonmilitary, nonexpatriate US population
- Worldwide, leishmaniasis is found in 88 countries. There are 350 million people at risk and 12 million people are infected. The estimated annual number of new cases of visceral leishmaniasis is about 500,000, of which 90% are found in India, Bangladesh, Nepal, Sudan and Brazil. Approximately 10,000,000 annual cases of cutaneous infection are estimated worldwide.

Incubation Period:

- Weeks to months following bite of infected sandfly

Likelihood of Clinical Disease:

- Variable depending upon infecting *Leishmania* species, host genetics, and immune status

Primary Disease Symptoms:

- Cutaneous leishmaniasis: cutaneous lesion/ulcer at the bite site, variable in size, can be active for months but usually self-healing (caused by *L. major*, *L. tropica*, *L. aethiopica*, and *L. mexicana* subspecies). Diffuse cutaneous leishmaniasis with lesions that do not heal has been reported in Ethiopia and South America and has been attributed to *L. aethiopica* and *L. mexicana amazonensis*, respectively.
- Visceral leishmaniasis: (caused by *L. donovani*, *L. infantum*, and *L. chagasi*); characterized in diseased individuals by intermittent fever, massive hepatosplenomegaly, anemia, and hypergammaglobulinemia. However, a significant proportion of the population in areas of endemic infection shows subclinical infection (*L. infantum*).
- Mucocutaneous leishmaniasis: (e.g., *L. braziliensis*) The initial skin lesion may cure spontaneously, but metastatic lesions develop in the mucosa of the nasopharynx.

Severity of Clinical Disease:

- Visceral leishmaniasis: fatal if not treated
- Other forms: can be severely disfiguring (social impact)

Mortality:

- Visceral leishmaniasis: usually fatal if untreated

Chronic Carriage:

- Viable parasites can remain in the host for months to years, if not lifetime, in both visceral and cutaneous infections. Disease can be reactivated by immunosuppression. Visceral leishmaniasis is a common reactivating syndrome in AIDS patients.

Treatment Available/Efficacious:

- When treatment is needed, antimonial compounds (e.g., sodium stibogluconate) are efficacious, but have toxic side effects. Amphotericin B and miltefosine are alternative therapies being used with increasing frequency.

Agent-Specific Screening Question(s):

- Presently, military and civilians who have traveled to Iraq are deferred for 1 year, but effectiveness is unknown.
- Of the 88 countries endemic for leishmaniasis, all but 20 are also endemic for malaria, and travelers to malaria areas are currently deferred for 1 year, which likely reduces the number of *Leishmania*-infected donors.

- Military blood banks ask a question about lifetime history of leishmaniasis and enforce a permanent deferral for an affirmative response.

Laboratory Test(s) Available:

- No FDA-licensed blood donor screening test exists.
- There are several FDA-licensed diagnostic tests.
- Options for laboratory testing include blood smear microscopy, culture, IFA, EIA, western blot, NAT, and antigen-based rapid diagnostic tests.

Currently Recommended Donor Deferral Period:

- One-year deferral from the last date of departure from Iraq
- Deferral for a history of leishmaniasis has been discussed, but no regulation or standard exists covering civilian blood banks.

Impact on Blood Availability:

- Agent-specific screening question(s): Existing deferral for travel to Iraq negatively impacts blood availability, especially for the military. A deferral for travel to or immigration from other endemic countries could have a significant impact.
- Laboratory test(s) available: Not applicable

Impact on Blood Safety:

- Agent-specific screening question(s): The impacts of the Iraq deferral and the potential deferral for travel to or immigration from other endemic countries are unknown.
- Laboratory test(s) available: Not applicable

Leukoreduction Efficacy:

- Moderate to high. Because *Leishmania* are found in blood cells of the monocyte/macrophage lineage, leukocyte reduction could be an efficient method to reduce the risk of transfusion-transmitted leishmaniasis. Laboratory spiking studies indicate that not all parasites are removed, particularly if found extracellularly.
- Universal leukocyte reduction has been implemented in at least 15 countries, including France and Spain, that have regions of high prevalence of *Leishmania* seropositivity. Although surveillance for transfusion-transmission of *Leishmania* is of unknown quality, there have been no reported cases of *Leishmania* transmission by blood transfusion in these countries.

Pathogen Reduction Efficacy for Plasma Derivatives:

- No specific data are available but it is presumed that the agent should be sensitive to many measures used in the fractionation process.

Other Prevention Measures:

- Avoidance of the sandfly vector
- *Leishmania* parasite can be inactivated in plasma or platelet concentrates using riboflavin and ultraviolet light (Mirasol PRT System).
- A second study showed *Leishmania* inactivation in human apheresis platelets by a psoralen and a long wavelength ultraviolet irradiation (more than 10,000-fold reduction in viability).
- No vaccine available, but some communities intentionally infect children to provide protection

Suggested Reading:

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