

Filariae

Disease Agent:

- *Wuchereria bancrofti*, *Brugia malayi*, *Loa loa*

Disease Agent Characteristics:

- Nematode worms, 177-300 μm (microfilariae)
- Order: Spirurida
- Family: Onchocercidae
- All are parasitic nematodes, which have a microfilariae life-cycle stage in the peripheral blood.

Disease Name:

- Human or Bancroftian filariasis
- Elephantiasis
- Loiasis

Priority Level:

- Scientific/Epidemiologic evidence regarding blood safety: Absent; allergic reactions to transfused microfilaria may occur.
- Public perception and/or regulatory concern regarding blood safety: Absent
- Public concern regarding disease agent: Absent

Background:

- Under normal life-cycle conditions, adult worms in lymphatics and lymph nodes produce microfilariae that are infectious to the vector arthropod, in which they must pass through several molts before they can progress to the infectious filariform stage that gives rise to adult worms in a subsequent human host.
- Generally limited to tropical and subtropical regions
- Incidence stable in endemic areas
- Adult worms are tissue dwelling; microfilariae are in the blood.

Common Human Exposure Routes:

- For *W. bancrofti* and *B. malayi*, bite of an infected mosquito
- For *L. loa*, bite of an infected deer fly

Likelihood of Secondary Transmission:

- Transplacental transmission

At-Risk Populations:

- Individuals at enhanced risk for exposure to infected mosquitoes or deer flies due to travel or residence in areas where agents are endemic

Vector and Reservoir Involved:

- Mosquitoes of the genus *Anopheles*, *Aedes*, *Culex*, and *Mansonia*
- For *L. loa*, bite of an infected deer fly, genus *Chrysops*

Blood Phase:

- May exist in either asymptomatic or symptomatic phase; periodic extracellular microfilaremia is common and may last for years (e.g., up to 15), depending on survival of adult worms.
- Approximately 1 year from time of infection until microfilariae detected in blood in natural infection

Survival/Persistence in Blood Products:

- 21 days

Transmission by Blood Transfusion:

- Microfilariae introduced from a blood donor directly to a recipient are incapable of maturing to adulthood. Thus, transmission of microfilariae by transfusion should be relatively benign and likely would go undetected, with the exception of an allergic reaction to dying microfilariae.

Cases/Frequency in Population:

- Unknown, but can be very common in endemic areas
- Geographic risk areas include worldwide equatorial belt.

Incubation Period:

- Adult worms mature over several months after human infection, and mature females release microfilariae into the circulation for many years.

Likelihood of Clinical Disease:

- Most infections are asymptomatic, but inflammatory responses to adult worms are responsible for classic findings.

Primary Disease Symptoms:

- The common outcomes of lymphatic filariasis are asymptomatic microfilaremia, acute episodic adenolymphangitis (also called filarial fever), and chronic lymphatic obstruction. Asymptomatic microfilaremia is the most common outcome of *Wuchereria* and *Brugia* infections. There is, however, almost uniform underlying lymphatic damage and impaired lymphatic function.
- With loiasis, persons from nonendemic areas generally lack microfilaremia but have severe allergic symptoms with frequent and incapacitating Calabar swellings, pruritus, and urticaria. Calabar swellings are localized areas of evanescent erythema and angioedema (up to 5-10 cm in diameter) that occur primarily on the extremities lasting up to 3 days. Subcutaneous adult organisms are large enough to be visible (they rarely migrate across the conjunctiva). Among individuals from endemic areas, infection is usually asymptomatic with microfilaremia and a

much lower incidence of Calabar swellings and allergic manifestations. Eye worm occurs in up to 50% of these individuals. In chronically infected individuals, nephropathy and cardiomyopathy occur rarely.

Severity of Clinical Disease:

- Primarily involves inflammatory and immune response that varies by individual. Most notable is disfigurement on extremities because of elephantiasis.

Mortality:

- Unknown

Chronic Carriage:

- Adult worms live 15 years or longer.

Treatment Available/Efficacious:

- Treat with diethylcarbamazine; effective against microfilariae, but only partially effective against adult worms

Agent-Specific Screening Question(s):

- No specific question is in use.
- Not indicated because of the low incidence of infection in the developed world
- No sensitive or specific question is feasible.

Laboratory Test(s) Available:

- No FDA-licensed blood donor screening test exists.
- Primary approach is identification of microfilariae in thick blood smears.

Currently Recommended Donor Deferral Period:

- No FDA Guidance or AABB Standard exists.
- Given possibility of chronic carriage, lifetime deferral seems warranted if a history of infection is provided because of the possibility of provoking an allergic reaction in a recipient.

Impact on Blood Availability:

- Agent-specific screening question(s): Not applicable
- Laboratory test(s) available: Not applicable

Impact on Blood Safety:

- Agent-specific screening question(s): Not applicable
- Laboratory test(s) available: Not applicable

Leukoreduction Efficacy:

- Unknown

Pathogen Reduction Efficacy for Plasma Derivatives:

- No specific data available

Other Prevention Measures:

- Effectiveness of pathogen reduction unknown

Suggested Reading:

1. Aubuchon JP, Dzik WH. Survival of *Loa loa* in banked blood. *Lancet* 1983;1:647-8.
2. Bird GW, Menon KK. Survival of *Microfilaria bancrofti* in stored blood. *Lancet* 1961;2:721.
3. Choudhury N, Murthy PK, Chatterjee RK, Khan MA, Ayyagari A. Transmission of filarial infection through blood transfusion. *Indian J Pathol Microbiol* 2003;46:367-70.
4. Duerr HP, Dietz K, Eichner M. Determinants of the eradicability of filarial infections: a conceptual approach. *Trends Parasitol* 2005;21:88-96.
5. Fischer P, Supali T, Maizels RM. Lymphatic filariasis and *Brugia timori*: prospects for elimination. *Trends Parasitol* 2004;20:351-5.
6. Gupta A, Kedhar S. Images in clinical medicine. Eye worm. *N Engl J Med* 2005;353:e22.
7. Walther M, Muller R. Diagnosis of human filariases (except onchocerciasis). *Adv Parasitol* 2003;53:149-93.