Trypanosoma brucei

Disease Agent:

- *Trypanosoma brucei gambiense*
- *Trypanosoma brucei rhodesiense*

Disease Agent Characteristics:

- Protozoan, 14-33 μm
- Order: Kinetoplastida
- Family: Trypanosomatidae
- Hemoflagellates that do not invade cells but inhabit connective tissue space
- Found in humans as pleomorphic trypomastigotes present in peripheral blood, lymph nodes, spleen, and cerebrospinal fluid

Disease Name:

- African sleeping sickness
- Human African trypanosomiasis

Priority Level:

- Scientific/Epidemiologic evidence regarding blood safety: Theoretical
- Public perception and/or regulatory concern regarding blood safety: Absent
- Public concern regarding disease agent: Very low

Background:

- Stable, limited to African continent

Common Human Exposure Routes:

- Bite of infected tsetse fly

Likelihood of Secondary Transmission:

- Low

At-Risk Populations:

- Residents of endemic areas of Africa
  - *T. b. gambiense*—West and Central Africa
  - *T. b. rhodesiense*—East and Southeast Africa
- Over 60 million people at risk, with 150,000 new cases/year and nearly 100,000 deaths/year

Vector and Reservoir Involved:

- Tsetse flies of the genus *Glossina*
- Primarily infects humans

Blood Phase:

- Parasitemia is present during the symptomatic phase and can be present for years.

Survival/Persistence in Blood Products:

- Unknown

Transmission by Blood Transfusion:

- Single, poorly documented case of transmission by blood transfusion

Cases/Frequency in Population:

- WHO estimates that nearly half a million people carry this infection, albeit underreported.

Incubation Period:

- Local signs present 2-3 days to weeks following bite of infected tsetse fly.
- CNS signs can present a few months (*T.b. rhodesiense*) to several years (*T.b. gambiense*) after infection.

Likelihood of Clinical Disease:

- High

Primary Disease Symptoms:

- Chancre at the inoculation site, which persists for up to 2 weeks. Thereafter, generalized lymphadenopathy followed by fever, headache, pruritus, skin rash, hepatosplenomegaly, anemia, edema, cardiovascular, endocrinological, and renal disorders.
- Second stage includes neurological effects (sleeping disturbances, alteration of mental state, abnormal reflexes, tone, coordination, and sensory disorders). Progressive, untreated disease leads into deterioration of consciousness and death in 100% of cases.

Severity of Clinical Disease:

- Severe

Mortality:

- Approaches 100% in untreated cases
- 2-8% in treated cases

Chronic Carriage:

- Months to years

Treatment Available/Efficacious:

- Pentamidine isothionate, suramin, melarsoprol, and eflornithine are used for therapy, depending on the stage of disease (hemolymphatic or CNS) and the subspecies of *T. brucei*.
- Treatments primarily effective during early stages of disease but less effective once central nervous system involved. Drugs can have serious side effects.

Agent-Specific Screening Questions(s):

- No specific question is in use.
- Not indicated in the US
- No sensitive or specific question is feasible.

Laboratory Test(s) Available:

- No FDA-licensed blood donor screening test exists.
- Options for laboratory testing include blood smear microscopy, culture of blood or tissue biopsies, IHA, IFA, EIA, and NAT.

Currently Recommended Donor Deferral Period:

- No FDA Guidance or AABB Standard exists.
- Prudent practice, given the possibility of chronic carriage, would be a lifetime deferral for history of infection.

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, though probably unlikely, given that only a partial reduction effect in parasite load is observed for *T. cruzi*

Pathogen Reduction Efficacy for Plasma Derivatives:

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

Other Prevention Measures:

- Based on studies with *T. cruzi*, pathogen reduction technology for cellular components may be effective.
- Personal protective measures in endemic areas

Suggested Reading:

1. Barbara JAJ. Transfusion-transmitted infections: epidemiology relevant to blood safety. In Rock G, Seghatchian MG, editors. Quality assurance in Transfusion Medicine, Vol. I. Boca Raton: CRC Press; 1992. p. 419-44.
2. Barrett MP, Burchmore RJ, Stich A, Lazzari JO, Frasch AC, Cazzulo JJ, Krishna S. The trypanosomiases. Lancet 2003;362:1469-80.
3. Hira PR, Husein SF. Some transfusion-induced parasitic infections in Zambia. J Hyg Epidemiol Microbiol Immunol 1979;23:436-44.
4. McCulloch R. Antigenic variation in African trypanosomes: monitoring progress. Trends Parasitol 2004;20:117-21.
5. Papadoupolos MC, Abel PM, Agranoff D, Stich A, Tarelli E, Bell BA, Planche T, Loosemore A, Saadoun S, Wilkins P, Krishna S. A novel and accurate diagnostic test for human African trypanosomiasis. Lancet 2004; 363:1358-63.
6. Stich AH, Abel P, Krishna S. Human African trypanosomiasis. BMJ 2002;325:203-6.
7. Welburn SC, Odit M. Recent developments in human African trypanosomiasis. Curr Opin Infect Dis 2002; 15:477-84.
8. Wendel S. The protozoal parasites—Malaria and Chagas' disease. In: Linden JV, Bianco C, editors. Blood safety and surveillance, New York: Marcel Dekker, Inc.; 2001. p. 355-98.
9. World Health Organization (WHO). Human African trypanosomiasis. [cited 2009 May]. Available from: http://apps.who.int/tdr/svc/diseases/african-trypanosomiasis
10. Zavizion B, Pereira M, de Melo Jorge M, Serebryanik D, Mather TN, Chapman J, Miller NJ, Alford B, Bzik DJ, Purmal A. Inactivation of protozoan parasites in red blood cells using INACTINE PEN110 chemistry. Transfusion 2004;44:731-8.