Borna Disease Virus

Disease Agent:

- Borna disease virus (BDV)

Disease Agent Characteristics:

- Family: *Bornaviridae*; Genus: *Bornavirus*
- Virion morphology and size: Enveloped, helical nucleocapsid symmetry, spherical, 90-100 nm or larger in diameter
- Nucleic acid: Linear, nonsegmented, negative-sense, single-stranded RNA, 8.9 kb in size
- Physicochemical properties: Cell-free virion infectivity is inactivated by heating at 56°C for 0.5-3 hours but more stable in tissues or in the presence of serum; under in vitro conditions, virions are relatively stable when stored at 37°C, with minimal loss of infectivity after 24 hours in the presence of serum; stable after drying and for at least 3 months at 4°C; tolerant of alkaline pH but inactivated below pH 4; virions are sensitive to treatment with organic solvents and detergents, and infectivity is reduced after exposure to ultraviolet light and irradiation.

Disease Name:

- Borna disease

Priority Level:

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

Background:

- 1766: Borna disease first described in European sheep and horses
- BDV naturally infects ostriches, horses, cattle, sheep, dogs, cats, and foxes; experimentally transmitted to nonhuman primates.
- 1996: BDV isolated from patients with mood disorders
- BDV's role as a potential human pathogen has not been established and is currently controversial. Only infrequently has viral nucleic acid been found in human blood or tissue specimens.

Common Human Exposure Routes:

- Unknown, but contact with infected domestic animals, such as horses, sheep, and cats, has been proposed. However, no research is available to prove transmission from domestic animals to humans.

Likelihood of Secondary Transmission:

- Unknown

At-Risk Populations:

- Unknown

Vector and Reservoir Involved:

- Sporadic enzootic disease of horses and sheep although host range is wide; however, mode of transmission and reservoir is unknown.
- Neonatal rats experimentally infected with BDV develop viral persistence, so rodents are a theoretical reservoir and vector, although naturally infected rodents have not been found.

Blood Phase:

- Unknown, but transcripts and proteins detected in PBMC from patients with acute or chronic psychiatric disease; cross-contamination not ruled out

Survival/Persistence in Blood Products:

- Unknown

Transmission by Blood Transfusion:

- Never reported

Cases/Frequency in Population:

- Worldwide natural infection of domestic animals
- High seroprevalence (6%-37%) in hospitalized patients with psychiatric, neurologic, and/or immunologic disorders, i.e., major depression and schizophrenia
- Low seroprevalence (1%-2%) found in healthy volunteers
- BDV RNA detected in 4.7% healthy Japanese blood donors
- BDV RNA present in monocytes from acute or chronic psychiatric patients at a frequency of up to 50%

Incubation Period:

- Approximately 1-3 months for horses and sheep
- Unknown human incubation period

Likelihood of Clinical Disease:

- Theoretical
- More research is needed to associate BDV infection with human neuropsychiatric disease, and much work is required to demonstrate transfusion transmission.

Primary Disease Symptoms:

- Causes severe, frequently fatal neurological disease in horses and sheep
- Potential cause of human psychiatric and neurologic disorders

- Patients with acute major depression exhibit seroconversion to BDV, but the etiologic significance is speculative.

Severity of Clinical Disease:

- Unknown

Mortality:

- Unknown, but acute BD in animals results in high mortality (75%-95%)

Chronic Carriage:

- Unknown in humans
- Horses: Lifelong persistence with short periods of activation and long periods of inactivity

Treatment Available/Efficacious:

- No consensus

Agent-Specific Screening Question(s):

- No specific question is in use.
- Not indicated because transfusion transmission has not been demonstrated
- No sensitive or specific question is feasible.

Laboratory Test(s) Available:

- No FDA-licensed blood donor screening test exists.
- Generally accepted standards for diagnosis of human BDV infection not established.
- Options for laboratory testing include immunofluorescence, immunoprecipitation, and western blot (specific antibodies in serum and CSF), flow cytometry (BDV nucleic acid and antigens in PBMC), tissue culture (BDV in CSF), and RT-PCR (saliva, nasal or conjunctival fluid).

Currently Recommended Donor Deferral Period:

- No FDA Guidance or AABB Standard exists.

Impact on 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:

- Multiple pathogen reduction steps used in the fractionation process have been shown to be robust in the removal of enveloped viruses.

Other Prevention Methods:

- None

Suggested Readings:

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