Torque Teno Virus (TTV) Complex

Disease Agent:

- Torque teno virus (TTV) and SEN virus (SENV)

Disease Agent Characteristics:

- Family: Circoviridae; Genus: Anellovirus
- Virion morphology and size: Nonenveloped, nucleocapsid of unknown symmetry, 30-50 nm in diameter
- Nucleic acid: Circular, negative-sense, single-stranded DNA, ~3.6-3.8 kb in length
- Physicochemical properties: Not described, but chicken anemia virus is inactivated at 95°C for 30 minutes or 100°C for 10 minutes; resistant to ether and other lipid solvents

Disease Name:

- No confirmed disease associations

Priority Level:

- Scientific/Epidemiologic evidence regarding blood safety: Absent; transmission documented, but no disease associated despite extensive studies
- Public perception and/or regulatory concern regarding blood safety: Absent
- Public concern regarding disease agent: Absent

Background:

- The name torque teno virus was selected by a working group on the circoviruses after torques (necklace) and tenuis/teno (thin), thereby preserving the widely used term, TTV, which originally employed the initials of the patient (i.e., T. T.).
- Phylogenetic analysis showed TTV to represent the prototype virus for a vast group of heterogeneous agents unrelated to any known human or animal hepatitis viruses.
- SENV was discovered in Italy by using degenerate primers from TTV. Although originally thought to be novel, it was subsequently shown to be a member of a genetically diverse group of viruses in the TT complex.
- Despite their source from hepatitis cases, subsequent studies showed that these viruses are ubiquitous (prevalence rates up to 90% in adults) and that neither agent is a cause of human hepatitis.

Common Human Exposure Routes:

- Parenteral transmission is the major route of transmission, but the fecal-oral route is similarly suspected to contribute to spread of the virus.
- Sexual transmission probable

Likelihood of Secondary Transmission:

- Probably moderate, but the extent of secondary spread is not well defined

At-Risk Populations:

- Blood component recipients
- Injection-drug users
- Household contacts
- Sexual partners

Vector and Reservoir Involved:

- Humans

Blood Phase:

- Persistent viremia is common.

Survival/Persistence in Blood Products:

- Survives refrigeration and freezing

Transmission by Blood Transfusion:

- Well documented in prospective studies

Cases/Frequency in Population:

- The prevalence of viremia ranged from 2-12% in blood donors; however, using primers for highly conserved sequences, TTV DNA has been detected in >90% of some populations.
- Prevalence of TTV ranges from 40-70% in hemophiliacs, dialysis patients and injection-drug users, but could be higher with different primers.

Incubation Period:

- In nonhuman primates, viremia is detected 4-7 days after intravenous injection and 7-10 days after oral inoculation.

Likelihood of Clinical Disease:

- SENV and TTV were originally suspected to be etiologic agents for acute and chronic non-A to -E hepatitis, hepatitis-associated aplastic anemia, acute liver failure, or cryptogenic cirrhosis, but these associations have been excluded.

Primary Disease Symptoms:

- No virus-specific symptoms have been identified.
Severity of Clinical Disease:
- No clinical disease established; thus any clinical relevance of the TT complex is speculative.

Mortality:
- None

Chronic Carriage:
- Asymptomatic carrier state frequent

Treatment Available/Efficacious:
- No treatment required
- Interferon treatment has been associated with viral clearance during treatment of coinfections with other hepatitis viruses.

Agent-Specific Screening Question(s):
- No specific question is in use.
- Not indicated because transfusion-transmitted disease has not been demonstrated
- No sensitive or specific question is feasible.

Laboratory Test(s) Available:
- No FDA-licensed blood donor screening test exists.
- Virus detected by NAT

Currently Recommended Donor Deferral Period:
- No FDA Guidance or AABB Standard exists.
- There is no indication for deferral in the absence of disease associations.

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 but unlikely to be effective against a noncell-associated virus.

Pathogen Reduction Efficacy for Plasma Derivatives:
- Not inactivated by solvent-detergent
- No data on other inactivation procedures, but two other circoviruses (porcine circovirus 2 and chicken anemia virus) demonstrated extreme thermal resistance to pasteurization or prolonged dry heat methods similar to those proven effective for plasma products.

Other Prevention Measures:
- None

Suggested Reading: