

## 4 | *TOXOPLASMA GONDII*

### 4.1 | Disease agent

- *Toxoplasma gondii*

### 4.2 | Disease agent characteristics

- Protozoa,  $2.5 \times 5.0 \text{ mm}^2$ .
- Order: Eucoccidiorida.
- Family: *Sarcosystidae*.
- Humans harbor only asexual, replicating stages including tachyzoites, which can occur in blood cells and bradyzoites in tissues.
- Obligate intracellular parasite.

### 4.3 | Disease name

- Toxoplasmosis

### 4.4 | Priority level

- Scientific/epidemiologic evidence regarding blood safety: Very low
- Public perception and/or regulatory concern regarding blood safety: Very low
- Public concern regarding disease agent: Low, but moderate among pregnant women

### 4.5 | Background

- First discovered in 1908, before known link to disease.
- Cosmopolitan and stable distribution worldwide.
- Seroprevalence rates increase with age, with prevalence globally estimated around 30% and up to 80% in some areas.
- When humans ingest *T. gondii* oocytes, the organism invades the intestinal epithelium and disseminate throughout the body. They then encyst in any type of nucleated cell and can lie dormant within tissues for the life of the host.

### 4.6 | Common human exposure routes

- Exposure to cat feces
- Eating raw or undercooked meat (often pork or lamb) or shellfish
- Congenital transmission

- Ingestion of contaminated water, soil, fruits, and vegetables contaminated with cat feces

### 4.7 | Likelihood of secondary transmission

- Minimal; congenital transmission if acute infection acquired during pregnancy in a previously unexposed mother

### 4.8 | At-risk populations

- Risk for acquiring *T. gondii* infection may be present in individuals who handle feces from infected cats without proper precautions.
- Individuals who eat raw or undercooked meat or shellfish are at elevated risk for acquisition of infection.
- Immunocompromised patients including those undergoing chemotherapy, taking immunosuppressive drugs, or with HIV/AIDS are at risk for severe outcomes from new or reactivated infection.

### 4.9 | Blood phase

- Parasitemia rarely identified other than in severely immunocompromised patients.

### 4.10 | Vector and reservoirs involved

- Definitive hosts are cats, both wild and domestic.

### 4.11 | Survival/persistence in blood products

- Survives in citrated whole blood stored at 4°C up to 50 days

### 4.12 | Transmission by blood transfusion

- Rare; four cases of transmission associated with granulocyte concentrates from donors with chronic myelogenous leukemia; donors demonstrated elevated anti-toxoplasma antibody titers following investigation.
- There are no known transmissions from RBCs or fresh frozen plasma. One possible case from a platelet transfusion has been reported.

#### 4.13 | Cases/frequency in population

- US: 10.4% age-adjusted seroprevalence (IgG antibody) in individuals as measured by the National Health and Nutrition Examination Survey (2011–2014), with lower socio-economic status and foreign-born status associated with higher seroprevalence.
- Worldwide: Antibody prevalence ranges from 5% to 95% among adolescents and adults depending on geographic location, population group, living conditions, and occupation.

#### 4.14 | Incubation period

- 1–2 weeks for acute symptoms
- Years for recrudescence of quiescent infections

#### 4.15 | Likelihood of clinical disease

- Immunocompetent host: Low, as most infections are asymptomatic or benign
- Immunocompromised host, transplant recipients, and fetus: High, with severe or fatal consequences

#### 4.16 | Primary disease symptoms

- Usually asymptomatic but can include malaise, fever, and cervical lymphadenopathy
- More severe implications in congenital cases or in patients with AIDS, including hydrocephalus and mortality in the fetus and damage to the brain, eyes, or other organs in adults

#### 4.17 | Severity of clinical disease

- Absent/low in most people
- High in immunocompromised patients and in the fetus, especially if infection occurs early in pregnancy

#### 4.18 | Mortality

- HIV toxoplasmosis encephalitis: 10.8%, though incidence has decreased since advent of highly active antiretroviral therapy. The probability of developing reactivated toxoplasmosis is as high as 30% among AIDS patients with CD4 counts of <100 cells/microliter who are toxoplasma seropositive and not receiving effective prophylaxis or antiretroviral

therapy. The most common site of reactivation is the central nervous system.

- Congenital toxoplasmosis: 1%–4%.

#### 4.19 | Chronic carriage

- Over 50% of seropositives in the United States are chronically infected as demonstrated by the presence of bradyzoites (dormant stages found in tissues).
- Parasitemia has been reported to persist for up to 1 year after infection in otherwise well individuals.
- Latent infections are reactivated when individuals become immunocompromised.

#### 4.20 | Treatment available/efficacious

- Generally, treatment is not warranted, but, in some cases, pyrimethamine and sulfonamides are effectively given together.

#### 4.21 | Agent-specific screening questions(s)

- No specific question is in use.
- Not indicated, based on the low risk of transfusion transmission.
- No sensitive or specific screening question is feasible.

#### 4.22 | Laboratory test(s) available

- No FDA-licensed blood donor screening test exists.
- Options for laboratory testing include histological analyses of blood smears and tissues, culture, Sabin-Feldman dye, agglutination, indirect immunofluorescence assay, enzyme immunoassay (IgM and IgG), and nucleic acid test. An IgM-positive result alone is not definitive and should be confirmed by a reference laboratory. Rise in IgG titer is diagnostic.

#### 4.23 | Currently recommended donor deferral period

- No FDA Guidance or AABB Standard exists.
- Prudent practice would be to defer donors with acute toxoplasmosis until signs and symptoms are gone and a course of treatment is complete. If no treatment was

administered, prudent practice would be to defer for 1 year after resolution of symptoms.

#### 4.24 | Impact on blood availability

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

#### 4.25 | Impact on blood safety

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

#### 4.26 | Leukoreduction efficacy

- Unknown
- May be effective at removing infected macrophages/monocytes

#### 4.27 | Plasma reduction efficacy for plasma derivatives

- No specific data are available.

#### 4.28 | Other prevention measures

- Psoralen-based pathogen inactivation has been shown effective for other protozoa but has not been specifically evaluated on *T. gondii*.

#### SUGGESTED READING

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