TORCH

Prenatal and Perinatal Screening

TORCH is an acronym for a group of infections that can cause significant birth defects and even fetal death. The infections comprising TORCH are listed below.

- **T**oxoplasmosis
- **O**ther: syphilis, hepatitis B, Coxsackie virus, Epstein–Barr virus (EBV), human parvovirus, and varicella zoster
- **R**ubella
- **C**ytomegalovirus (CMV)
- **H**erpes simplex virus (HSV)

Generally, patient history and risk factors guide prenatal and perinatal maternal testing for TORCH organisms. These tests are performed in the first trimester of pregnancy, and neonates may also be tested for specific TORCH organisms based on clinical history.[1,2]

For most TORCH organisms, the initial screening test is based on detection of antibodies to the organism (Table 1). In general, TORCH infections pose a greater risk to the fetus and neonate if the mother is actively infected during pregnancy. Primary infections (new infections acquired during pregnancy) are generally more damaging than secondary or reactivated infections. Assays that detect both immunoglobulin G (IgG) and immunoglobulin M (IgM) indicate the history of an infection. Assays that detect only IgG or IgM are used in combination to determine whether an infection is past or active. In general, IgG reactivity in the absence of IgM reactivity is indicative of a past infection, while IgM reactivity in the absence of IgG reactivity indicates a current infection. The predictive value of IgM for active infection, however, varies from organism to organism.[1–5]

In toxoplasmosis and CMV infections, IgG avidity may be useful for identifying primary infections. IgG antibody produced in the first few months following the initial infection has lower avidity than IgG produced several months or years later. A greater risk of fetal defect is associated with primary infection versus reinfection or reactivation (with both CMV and toxoplasmosis). Low-avidity antibody can be used to identify high-risk mothers (those with a primary infection). While IgM is also associated with a primary infection, it can also be produced following reactivation or reinfection in some individuals, making IgG avidity a useful additional tool.

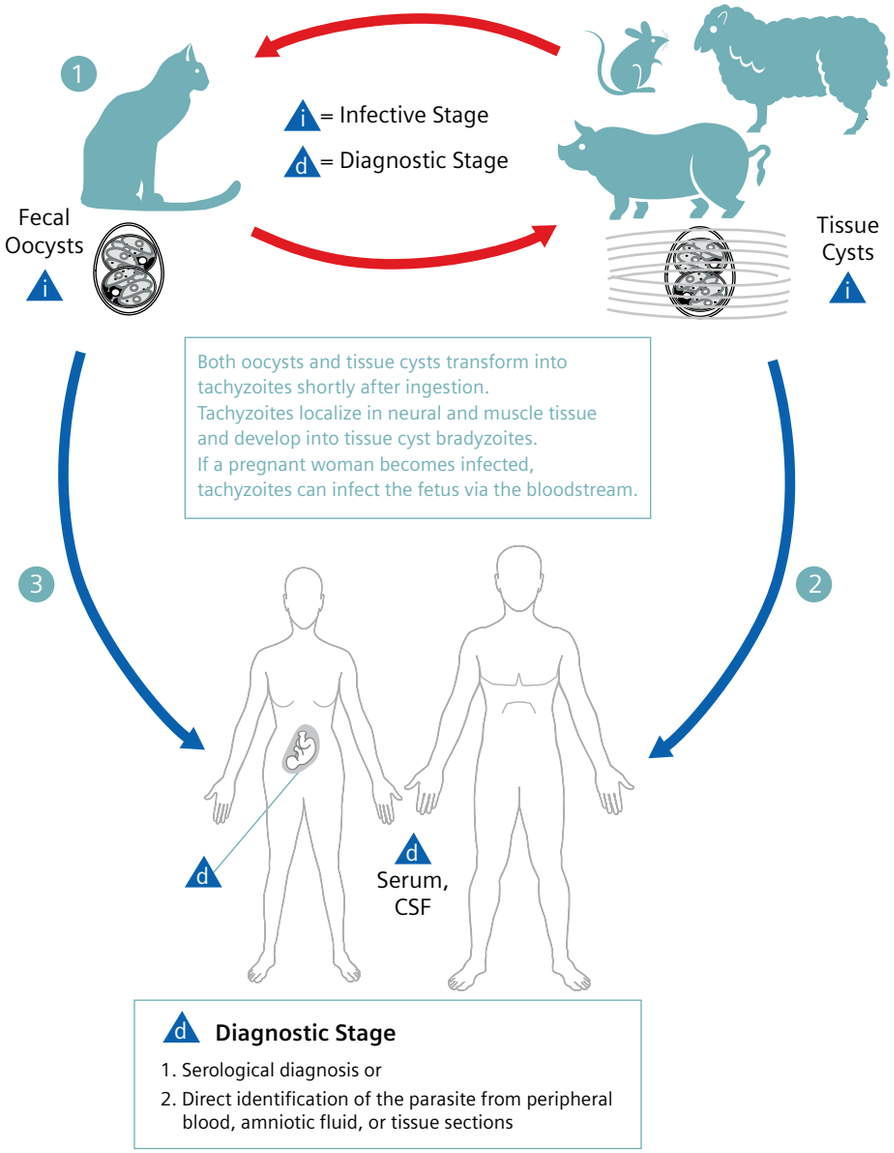
Early diagnosis of TORCH infections is useful because treatment for some active TORCH infections such as varicella zoster and *Toxoplasma gondii* can significantly reduce the risk of birth defects and fetal demise.[1,2] Pregnant women should be advised to exercise care around cats because exposure to *Toxoplasma gondii* fecal oocysts can pose a significant fetal risk (Figure 1).

Table 1. Interpretation of some screening serology tests for common TORCH infections.[1–4]

Infection	Reactive Test	Likely Type of Infection
CMV	IgG	Past / immune
	IgG avidity (ordered when both IgG and IgM are reactive)	Low avidity: indicative of primary infection Moderate or high avidity: past infection
	IgM	Primary / active
EBV	Nuclear antigen (NA) IgG	Past / immune
	Viral capsid antigen (VCA) IgM	Primary / active
	Viral capsid antigen (VCA) IgG	Past / immune
HSV	IgG	Past / immune
	IgM	Primary / active
Rubella	IgG	Past / immune
	IgM	Primary / active
Syphilis	Total (IgG and IgM)	Infected (current or past)
Toxoplasmosis	IgG	Past / immune
	IgG avidity (ordered when both IgG and IgM are reactive)	Low avidity: indicative of primary infection Moderate or high avidity: past infection
	IgM	Primary / active

CMV: cytomegalovirus
EBV: Epstein–Barr virus
HSV: herpes simplex virus
IgG: immunoglobulin G
IgM: immunoglobulin M

Figure 1. Life cycle of *Toxoplasma gondii*.[6,7*]



**Toxoplasma gondii* is a protozoan parasite that infects most species of warm-blooded animals, including humans, causing the disease toxoplasmosis. If women become infected during the first trimester of pregnancy, fetal damage is likely to be severe and can include microcephaly, hydrocephalus, cerebral calcifications, bilateral chorioretinitis, and psychomotor retardation.

CSF: cerebrospinal fluid

Conclusion

Testing for TORCH organisms can identify fetuses and neonates who are at significant risk. Serologic-based TORCH assays can identify infection and facilitate appropriate care thereby effectively reducing the risk of birth defects and fetal demise.

References

1. Mendelson E, et al. Reprod Toxicol. 2006;2:350-82.
2. American College of Obstetricians and Gynecologists. Perinatal viral and parasitic infections. ACOG Practice Bulletin 20. 20th ed. Washington, DC; 2000.
3. CDC. Toxoplasmosis: diagnosis. http://www.cdc.gov/toxoplasmosis/diagnosis.html. Accessed July 2008.
4. CDC. Toxoplasmosis: disease. http://www.cdc.gov/toxoplasmosis/disease.html. Accessed July 2008.
5. CDC. Sexually transmitted diseases: syphilis. http://www.cdc.gov/std/syphilis/default.htm. Accessed July 2008.
6. CDC. Division of Parasitic Diseases. Toxoplasmosis. http://www.dpd.cdc.gov/dpdx/HTML/Toxoplasmosis.htm. Accessed September 2008.
7. Lopes FM, et al. Braz J Infect Dis. 2007;11(5):496-506.