

Toxoplasmosis

Toxoplasmosis is a zoonotic disease caused by infection with the protozoan parasite *Toxoplasma gondii*. Infection typically occurs through ingestion, either of parasitic cysts present in undercooked meat or oocysts shed by infected domestic cats. Less common routes of transmission include solid organ transplantation and blood transfusion.¹ Exposure to *T gondii* is a relatively common occurrence in the US, with approximately 20% to 30% of the adult population showing serological evidence of past infection.² In most individuals acute infection is entirely asymptomatic; clinical disease occurs almost exclusively in individuals with cell-mediated immune compromise and results primarily from reactivation of a past infection.¹ Primary infection is, however, of considerable concern during pregnancy because of the risk for transmission of the parasite to the fetus leading to congenital toxoplasmosis.³

Diagnosis of *T gondii* infection is generally achieved either indirectly via serological detection of anti-*T gondii* antibodies or directly via amplification of *T gondii* nucleic acid using the polymerase chain reaction (PCR). A summary of the uses and limitations of these test methodologies can be found in Table 1.

- Testing for IgG antibody is extremely valuable in assessing risk, either of reactivation (if positive in immunocom-

promised individuals) or primary infection (if negative early in pregnancy), enabling appropriate counseling and/or prophylaxis. For certain defined clinical manifestations of toxoplasmosis (eg, toxoplasmic encephalitis), a positive IgG result in conjunction with a compatible clinical and radiologic presentation is sufficiently predictive to justify therapeutic intervention.

- Anti-*T gondii* IgM antibodies can remain detectable long after initial infection and false-positive results are not uncommon,⁴ thus testing for IgM is primarily useful for its negative predictive value. Accurate diagnosis of primary infection in pregnancy typically requires supplemental testing of IgM-positive individuals using reference serological tests (eg, IgG avidity determination).
- Testing for *T gondii* DNA in clinical samples via PCR is primarily used to assist in the diagnosis of toxoplasmosis in seropositive, immunocompromised individuals, since detection of parasitic DNA is strongly suggestive of active infection. Studies have consistently demonstrated that the positive predictive value of PCR in a variety of disease settings including congenital, disseminated, and cerebral toxoplasmosis supports its use as an adjunctive test in patients with clinically compatible syndromes.¹

Table 1. — Available Methodologies for Detecting *Toxoplasma gondii* Infection

Methodology	Test Name	N°	Use/Limitations
Serology	<i>Toxoplasma gondii</i> Antibodies, IgG	006478	IgG assay is the primary test for assessing risk in appropriate populations (eg, HIV-positive, immunocompromised, pregnant). ¹
	<i>Toxoplasma gondii</i> Antibodies, IgM	096651	IgM is most useful (in conjunction with IgG) for its negative predictive value in ruling out primary infection in pregnancy. ¹ Positive IgM results require cautious interpretation and may necessitate specialized supplemental testing. ¹
Nucleic Acid Amplification	<i>Toxoplasma gondii</i> by PCR (Blood/CSF)	138602	Provides direct evidence of active infection via specific detection of <i>T gondii</i> DNA. ¹ Tests of blood and CSF samples is helpful in confirming the diagnosis of neonatal, disseminated, and cerebral toxoplasmosis. ¹ Tests of amniotic fluid is helpful in confirming suspected congenital toxoplasmosis. ¹
	<i>Toxoplasma gondii</i> , Amniotic Fluid, PCR	138586	Reported positive predictive values of PCR assays have been good ¹ ; however, published clinical sensitivities vary considerably, ¹ making this test most useful as one of inclusion rather than exclusion.

***Toxoplasma gondii* Antibodies, IgG 006478**

CPT 86777
Synonym Toxoplasmosis Antibodies
Test Includes Index result quantitating IgG antibodies
Specimen Serum
Volume 1 mL
Minimum Volume 0.5 mL
Container Red-top tube or gel-barrier tube
Storage Instructions Maintain specimen at room temperature.
Causes for Rejection Hemolysis; lipemia; gross bacterial contamination
Reference Interval
Negative: <6.5 IU/mL
Equivocal: 6.5-7.9 IU/mL
Positive: >7.9 IU/mL
Use Support the diagnosis of toxoplasmosis; document past exposure and/or immunity to *Toxoplasma gondii*.
Methodology Chemiluminescence

***Toxoplasma gondii* Antibodies, IgM, Quantitation . . . 096651**

CPT 86778
Synonym Toxoplasmosis Acute Antibodies
Specimen Serum
Volume 1 mL
Minimum Volume 0.5 mL
Container Red-top tube or gel-barrier tube
Storage Instructions Maintain specimen at room temperature.
Causes for Rejection Hemolysis; lipemia; gross bacterial contamination
Reference Interval
Negative: <0.9 index
Indeterminate: 0.9-1.0 index
Positive: >1.0 index
Use Support the diagnosis of toxoplasmosis
Limitations Low levels of toxoplasmosis IgM may persist for months to years after an initial infection.
Methodology Immunochemiluminometric assay (ICMA)

***Toxoplasma gondii* by PCR 138602**

CPT 87798
Specimen Cerebrospinal fluid (CSF), whole blood or bone marrow
Volume 0.5 mL CSF, 2 mL whole blood or bone marrow
Container Lavender-top (EDTA) tube, yellow-top (ACD) tube, or sterile container (CSF)
Storage Instructions Maintain whole blood or bone marrow ambient; CSF, freeze **Stability:** Whole blood or bone marrow: Ambient up to seven days CSF: Ambient, refrigerated, or frozen up to seven days
Use This test is used in conjunction with standard serological tests to assist in the diagnosis of *Toxoplasma gondii* infection by detecting *Toxoplasma gondii* DNA in tissue, blood, and body fluid. Detection of *Toxoplasma gondii* DNA in blood, cerebrospinal fluid, amniotic fluid, or fetal/neonatal tissue is suggestive of acute infection.
Methodology Real-time polymerase chain reaction (PCR)

***Toxoplasma gondii*, Amniotic Fluid, PCR 138586**

CPT 87798
Specimen Amniotic fluid, uncentrifuged
Volume 2-10 mL
Minimum Volume 1 mL
Container Sterile container
Collection To avoid delays in turnaround time when requesting multiple tests on frozen samples, please submit separate frozen specimens for each test requested.
Storage Instructions Ambient, refrigerated, or frozen. Ship overnight refrigerated (preferred) or frozen on dry ice overnight. **Stability:** Ambient, refrigerated, or frozen up to seven days.
Causes for Rejection Quantity not sufficient for analysis; amniotic fluid more than than four days old stored at refrigerated temperature
Use This test is used in conjunction with standard serological tests to assist in the diagnosis of *Toxoplasma gondii* infection by detecting *Toxoplasma gondii* DNA. Detection of *Toxoplasma gondii* DNA in blood, cerebrospinal fluid, amniotic fluid, or fetal/neonatal tissue is suggestive of acute infection.
Methodology Real-time polymerase chain reaction (PCR)

References

1. Montoya JG, Liesenfeld O. Toxoplasmosis. *Lancet*. 2004 Jun 12; 363:1965-1976.
2. Jones JL, Kruszon-Moran D, Wilson M, McQuillan G, Navin T, McAuley JB. *Toxoplasma gondii* infection in the United States: Seroprevalence and risk factors. *Am J Epidemiol*. 2001; 154(4):357-365.
3. Dunn D, Wallon M, Peyron F, Petersen E, Peckham C, Gilbert R. Mother-to-child transmission of toxoplasmosis: Risk estimates for clinical counselling. *Lancet*. 1999 May 29; 353:1829-1833.
4. Wilson M, Remington JS, Clavet C, Varney G, Press C, Ware D, FDA Toxoplasmosis Ad Hoc Working Group. Evaluation of six commercial kits for detection of human immunoglobulin M antibodies to *Toxoplasma gondii*. *J Clin Microbiol*. 1997 Dec; 35(12):3112-3115.



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