MAYO CLINIC LABORATORIES

Test Definition: CCOC

Coccidioides Antibody, Complement Fixation and Immunodiffusion, Spinal Fluid

Overview

Useful For
Diagnosing coccidioidomycosis using spinal fluid specimens

Testing Algorithm
For more information Meningitis/Encephalitis Panel Algorithm.

Special Instructions
- Meningitis/Encephalitis Panel Algorithm

Method Name
Complement Fixation (CF)/Immunodiffusion (ID)

NY State Available
Yes

Specimen

Specimen Type
CSF

Specimen Required
Container/Tube: Sterile vial
Specimen Volume: 2 mL
Collection Instructions: Submit specimen from collection vial number 2 (preferred), vials 3, or 4 are acceptable.

Forms
If not ordering electronically, complete, print, and send Infectious Disease Serology Test Request (T916) with the specimen.

Specimen Minimum Volume
0.6 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
CSF	Refrigerated (preferred)	14 days	
	Frozen	14 days	

Clinical & Interpretive

Clinical Information

Coccidioidomycosis (valley fever, San Joaquin Valley fever) is a fungal infection found in the Southwestern US, Central America, and South America. It is acquired by inhalation of arthroconidia of *Coccidioides immitis/posadasii*. Usually, it is a mild, self-limiting pulmonary infection. Less commonly, chronic pneumonia may occur, progressing to fibronodular cavitary disease. A rash often develops within 1 to 2 days, followed by erythema nodosum or multiforme and accompanying arthralgias. About 2 weeks after exposure, symptomatic patients develop fever, cough, malaise, and anorexia; chest pain is often severe. Coccidioidomycosis may disseminate beyond the lungs to involve multiple organs, including the meninges.

IgG antibody is detected by the complement-fixation tests. Precipitating antibodies (IgM and IgG) are detected by immunodiffusion. They are rarely found in cerebrospinal fluid; however, their presence is associated with meningitis. Chronic coccidioidal pulmonary cavities are often accompanied by IgG and IgM precipitating antibodies.

Serologic testing for coccidioidomycosis should be considered when patients exhibit symptoms of meningeal infection and have lived in or traveled to areas where *Coccidioides immitis/posadasii* is endemic. Any history of exposure to the organism or travel cannot be overemphasized when coccidioidomycosis serologic tests are being considered.

Reference Values

Complement Fixation: Negative
If positive, results are titered.

Immunodiffusion: Negative
Results are reported as positive, negative, or equivocal.

Interpretation

Complement fixation:
IgG antibody is detected by complement fixation (CF) testing. Any CF titer in cerebrospinal fluid (CSF) should be considered significant. A positive complement fixation test in unconcentrated CSF is diagnostic of meningitis.

Immunodiffusion:
IgM and IgG precipitins are rarely found in CSF. However, when present, they are diagnostic of meningitis (100% specific). Since the immunodiffusion test is 100% specific, it is helpful in interpreting CF results.

Cautions

While complement fixation (CF) titers may be present in serum months after the infection has resolved, any CF titer in

cerebrospinal fluid should be considered significant.

Clinical Reference

1. McHardy IH, Barker B, Thompson GR 3rd. Review of Clinical and Laboratory Diagnostics for Coccidioidomycosis. J Clin Microbiol. 2023;61(5):e0158122. doi:10.1128/jcm.01581-22
2. Ramanan P, Wengenack NL, Theel ES. Laboratory diagnosis for fungal infections. A review of current and future diagnostic assays. Clin Chest Med. 2017;38(3):535-554. doi:10.1016/j.ccm.2017.04.013
3. Theel ES, Kus JV, Grys TE, Ampel NM, Schwartz IS, Zhang SX. Practical Guidance for Clinical Microbiology Laboratories: Antibody and antigen detection methods for dimorphic fungal infections.Clin Microbiol Rev. 2025;38(2):e0000520. doi:10.1128/cmr.00005-20

Performance

Method Description

Complement fixation:
The immune response of a person to an infection frequently begins with the formation of specific antibody that is capable of combining in vitro with homologous antigen and complement (C'). The complement fixation (CF) test is a 2-stage test based on the ability of antigen-antibody complexes to bind C'. In the first stage, antigen and antibody combine and fix C'. The second stage is an indicator system in which sheep erythrocytes, sensitized by rabbit anti-sheep red cell antibody (hemolysin), are used to demonstrate the presence of unfixed C'. If the patient's serum contains C'-fixing antibody that reacts with the specific antigen (a positive reaction), C' will be fixed and excess C' will not be available to react with and lyse the sensitized sheep erythrocytes. If no antigen-antibody reaction occurs (a negative reaction), C' will be available to lyse the sheep erythrocytes. The CF titer is determined by the greatest dilution of serum (antibody) in which the sheep erythrocytes are not lysed.(Kaufman L, Kovacs JA, Reiss E: Immunomycology. In: Rose NR, de Macario ED, Folds JD, Lane HC, Nakamura RM, eds. Manual of Clinical Laboratory Immunology. 5th ed. ASM Press; 1997:591-592; Pappagianis D, Zimmer BL: Serology of coccidioidomycosis. Clin Microbiol Rev. 1990;3[3]:247-268; Ramanan P, Wengenack NL, Theel ES. Laboratory diagnosis for fungal infections. A review of current and future diagnostic assays. Clin Chest Med. 2017;38[3]:535-554. doi:10.1016/j.ccm.2017.04.013)

Immunodiffusion:
Immunodiffusion (ID) is a qualitative test employed for the detection of precipitating antibodies present in the specimen. Soluble antigens of the fungus are placed in wells of an agarose gel filled Petri dish and the patient's specimen and a control (positive) are placed in adjoining wells. If present, specific precipitate antibody will form precipitin lines between the wells. Their comparison to the control establishes the results. When performing the ID test, only precipitin bands of identity with the reference bands are significant.(Kaufman L, Kovacs JA, Reiss E. Immunomycology. In: Rose NR, de Macario EC, Folds JD, Lane HC, Nakamura RM, eds. Manual of Clinical Laboratory Immunology. 5th ed. ASM Press, 1997:591-593; Ramanan P, Wengenack NL, Theel ES. Laboratory diagnosis for fungal infections. A review of current and future diagnostic assays. Clin Chest Med. 2017;38[3]:535-554)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available
3 to 6 days

Specimen Retention Time
14 days

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
86635 x 3

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CCOC	Coccidioides Ab, CompF/ImmDiff, CSF	88745-5

Result ID	Test Result Name	Result LOINC® Value
81542	Coccidioides Ab, CompF, CSF	13917-0
21002	Coccidioides, IgG, ImmDiff, CSF	94662-4
21001	Coccidioides, IgM, ImmDiff, CSF	94663-2