MAYO CLINIC LABORATORIES

Test Definition: SFGP

Spotted Fever Group Antibody, IgG and IgM, Serum

Overview

Useful For
Aiding in the diagnosis of spotted fever group rickettsial infections

Testing Algorithm
For more information see Acute Tick-Borne Disease Testing Algorithm.

Special Instructions
- Acute Tickborne Disease Testing Algorithm

Method Name
Immunofluorescence

NY State Available
Yes

Specimen

Specimen Type
Serum

Specimen Required
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL
Collection Instructions: Centrifuge and aliquot serum into plastic vial.

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

Specimen Minimum Volume
0.2 mL

Reject Due To

Gross	Reject

hemolysis	
Gross lipemia	Reject

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Species of *Rickettsia* are small (0.3-0.5 mcm x 1-2 mcm) obligately intracellular bacteria (Proteobacteria). They have a gram-negative cell wall structure. *Rickettsiae* are found in arthropod hosts for at least part of their life cycle.

Rickettsial infections in the United States are caused by 2 major groups within the genus *Rickettsia*: spotted fever group and typhus fever group. The spotted fever group includes *Rickettsia rickettsii* (Rocky Mountain spotted fever), *Rickettsia akari, Rickettsia conorii* (Boutonneuse fever), *Rickettsia australis* (Queensland tick typhus), and *Rickettsia sibirica* (North Asian tick typhus). The typhus fever group includes *Rickettsia typhi* (murine typhus; endemic typhus) and *Rickettsia prowazekii* (epidemic typhus).

R rickettsiae is the most common rickettsial species encountered in the United States and is transmitted through a tick vector (*Dermacentor* species or, less commonly, *Rhipicephalus sanguineus*). Following a 2- to 14-day incubation period, patients most commonly present with fever, chills, and myalgia. A maculopapular rash typically appears 2 to 5 days after fever onset, though approximately 10% of patients will not develop a rash. Antibodies to the spotted fever group agents are detectable within 7 to 10 days after illness onset. Demonstration of either seroconversion or a 4-fold change in IgG-specific antibody titers in acute and convalescent serum samples is consistent with acute or ongoing disease.

Reference Values

IgG: <1:64
IgM: <1:64
Reference values apply to all ages.

Interpretation

This test detects reactivity to the group-specific rickettsia. For example, antibody reactivity to the *Rickettsia rickettsii* will also react with other organisms within the spotted fever group.

IgG
Titer results of 1:256 and above:
-Serum end point titers of 1:256 and above are considered presumptive evidence of recent or current infection by organisms of appropriate rickettsial antigen group.

Titer results from 1:64 to 1:256:

-Single serum end point titers from 1:64 to 1:256 are suggestive of infection at an undetermined time and may indicate either past infection or early response to a recent rickettsial infection.
-A 4-fold or greater increase in IgG titer between 2 serum specimens collected 1 to 2 weeks apart and tested in parallel is considered presumptive evidence of a recent or current infection.
-In patients infected with organisms within the rickettsial groups, IgG antibody is generally detectable within 1 to 2 weeks of onset of symptoms, peaking within 1 to 2 months and declining thereafter. Following prompt antimicrobial treatment, titers generally decline below detectable levels within 8 to 11 months. With relapse, prior immunization, or delayed antibiotic treatment, IgG levels may remain elevated for more than a year post-onset.

IgM
Titer results of 1:64 and above:
-Titers of 1:64 and above are considered presumptive evidence of recent or current infection by organisms of appropriate rickettsial antigen group.

Titer results below 1:64:
-Titers below 1:64 suggest that the patient does not have an acute rickettsial infection.
-IgM class antibody is transiently detected within 1 to 2 weeks of onset of symptoms, usually declining rapidly within 3 months following prompt antibiotic treatment. These levels will also be elevated for an extended period with relapse, prior immunization, or delayed antibiotic treatment.

Cautions

Cross-reactivity within the spotted fever group precludes the speciation of the infecting rickettsia by this procedure. Sera reactive with *Rickettsia rickettsii* must be termed "spotted fever group-positive." Spotted fever and typhus fever intragroup cross-reactivity is weak: cross-reactive titers are typically at least 16-fold lower than group-specific titers.

Antibody is variably absent for 1 to 2 weeks after onset of symptoms and an initial negative titer should not be used to exclude the diagnosis of rickettsial disease. A second serum specimen should be collected 1 to 2 weeks later to establish the diagnosis in such patients.

IgM titers must be interpreted with caution, especially in the absence of IgG. Cases should be further evaluated clinically or serologically by testing acute and convalescent serum in parallel to demonstrate a 4-fold or greater change in IgG or IgM titer.

Diagnosis of recent infection based on a single elevated IgG titer is complicated by the slow decline of antibody titer from past infection in many individuals. Titers may remain elevated for longer than 12 months, especially where antibiotic treatment was delayed or prior immunization was involved.

Some patients may maintain a long-term IgM titer, with or without IgG. It is important to check the IgM titer 1 to 2 weeks following testing of an acute specimen.

Clinical Reference

1. Walker DH, Bouyer DH: Rickettsia: In: Murray PR, Baron EJ, Jorgenson JH, et al, eds. Manual of Clinical Microbiology. 8th ed. ASM Press; 2003:1005-1014
2. Helmick C, Bernard K, D'Angelo L: Rocky Mountain spotted fever. Clinical laboratory and epidemiological features of

262 cases. J Infect Dis. 1984 Oct;150(4):480-488
3. Centers for Disease Control and Prevention: Tickborne diseases of the United States. A Reference Manual for HealthCare Providers. 6th ed. 2022. Accessed September 21, 2022. Available at www.cdc.gov/ticks/tickbornediseases/TickborneDiseases-P.pdf

Performance

Method Description
Substrate slides containing antigen wells for measuring antibodies to both groups of *Rickettsia* (spotted fever and typhus) are obtained. The indirect immunofluorescence assay is a 2-stage "sandwich" procedure. In the first stage, the patient serum is diluted in yolk sac diluent. The diluted serum is placed on the slide in contact with the substrate and incubated. Following incubation, the slide is washed in buffered saline, which removes unbound serum antibodies. In the second stage, each antigen well is overlaid with fluorescein-labeled antibody to human IgG or IgM. The slide is incubated allowing antigen-antibody complexes to react with the fluorescein-labeled antihuman IgG or IgM. After the slide is washed, dried, and mounted, it is examined using fluorescence microscopy. Positive reactions appear as rickettsial bodies exhibiting bright apple-green cytoplasmic fluorescence against a background of orange to red yolk sac matrix. Semiquantitative end point titers are obtained by testing serial dilutions of positive specimens.(Package inserts: *Rickettsia* IFA IgM. DiaSorin Molecular LLC; 05/2018; *Rickettsia* IFA IgG. DiaSorin Molecular LLC; 05/2018)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
Same day/1 to 3 days

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

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.

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Spotted Fever Group Antibody, IgG and IgM, Serum

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

86757 x 2

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
SFGP	Spotted Fever Group Ab, IgG, IgM, S	90260-1

Result ID	Test Result Name	Result LOINC® Value
84342	Spotted Fever Group Ab, IgG, S	In Process
84346	Spotted Fever Group Ab, IgM, S	In Process