MAYO CLINIC LABORATORIES

Test Definition: TULAB

F. tularensis Ab, IgM/IgG ELISA, S

Overview

Useful For

Aiding in the diagnosis of tularemia caused by *Francisella tularensis*

This test should **not be used** as a test of cure as it is not quantitative and patients may remain seropositive for months to years following resolution of disease.

Highlights

This test detects IgM and IgG class antibodies to *Francisella tularensis* in serum and may be used as an aid for the diagnosis of tularemia.

Serologic testing should be performed alongside other diagnostic methods, including culture of appropriate specimens.(**Note:** please notify microbiology laboratory in cases of suspected *F tularensis* to minimize exposure risk to bench technologists)

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
TULM	F. tularensis Ab, IgM ELISA, S	No	Yes
TULG	F. tularensis Ab, IgG ELISA, S	No	Yes
TULI	F. tularensis Interpretation	No	Yes

Method Name

Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Supplies: Aliquot Tube, 5 mL (T465)

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 0.6 mL

Collection Instructions: Centrifuge and aliquot serum.

Forms

If not ordering electronically, complete, print, and send a Microbiology Test Request (T244) with the specimen.

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject
Heat inactivated specimen	Reject

Specimen Minimum Volume

0.5 mL

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	30 days	

Clinical & Interpretive

Clinical Information

Francisella tularensis is a small, intracellular, coccobacillary Gram-negative bacterium and is an obligate pathogen in animals and humans, primarily maintained in rabbits, hares, cats, ticks, and deerflies. *F tularensis* is found throughout North America and parts of Asia, and similar to *Brucella* species is considered a potential agent of bioterrorism. Human infection with *F tularensis* usually occurs through inhalation of infected aerosols, ingestion of contaminated meat or water, handling of diseased or sick animals, or through the bite of an infected arthropod (eg, tick, deerflies).

Following a 3 to 5 day incubation period, the clinical manifestations of infection with *F tularensis* differ primarily depending on the site and route of infection. The most common form of disease is ulceroglandular (45%-80% of cases), which is associated with an arthropod (or animal) bite or another cause of skin barrier compromise. This leads to development of a painful papule that ultimately ulcerates allowing the bacterium to enter the lymphatic system. Glandular tularemia is similar in presentation to ulceroglandular disease, however it lacks the ulceration and more frequently causes septicemia. Other, less frequent clinical manifestations include oculoglandular (Parinaud syndrome), oropharyngeal and gastrointestinal disease, pneumonic or typhoidal tularemia.

Diagnostic testing options for *F tularensis* primarily include culture and serology. Physicians suspecting tularemia should collect appropriate specimens (eg, skin lesion biopsy, lymph node aspirates, etc) promptly and send for culture. The microbiology laboratory should be alerted to the possibility of *F tularensis* to ensure that appropriate safety measures are taken to protect the laboratory technologists. Growth on culture is a definitive means of making a diagnosis of tularensis. Serologic testing may be used to support a diagnosis of current or recent tularensis in patients who are IgM positive, who seroconvert to IgM, or who are IgG positive in paired sera collected 2 to 3 weeks apart.

Reference Values

Negative

Reference values apply to all ages.

Interpretation

IgM result	IgG result	Interpretation
Negative	Negative	No antibodies to *Francisella tularensis* detected. Antibody response may be negative in samples collected too soon following infection/exposure. Repeat testing on a new sample if clinically indicated.
Positive	Negative	IgM class antibodies to *F tularensis* detected, suggesting current or recent infection. Repeat testing in 2 to 3 weeks to detect seroconversion of IgG may be considered to confirm the diagnosis.
Positive	Borderline	
Borderline	Negative	Questionable presence of IgM antibodies to *F tularensis*. Consider repeat testing in 1 to 2 weeks.
Borderline	Positive	IgG class antibodies to *F tularensis* detected suggesting recent or past infection. Clinical correlation alongside presentation, exposure history and other laboratory findings required.
Borderline	Borderline	Questionable presence of IgM and IgG class antibodies to *F tularensis*. Consider repeat testing in 1 to 2 weeks.
Positive	Positive	IgM and IgG class antibodies to *F tularensis* detected suggesting current, recent or past

		infection. Clinical correlation alongside presentation, exposure history and other laboratory findings required.
Negative	Positive	IgG class antibodies to *F tularensis* detected suggesting recent or past infection. Clinical correlation alongside presentation, exposure history and other laboratory findings required.
Negative	Borderline	Questionable presence of IgG antibodies to *F tularensis*. Consider repeat testing in 1 to 2 weeks.

Cautions

False-negative results may occur in specimens collected too soon following symptom onset, prior to the development of a detectable immune response. Repeat testing on new specimens collected 2 to 4 weeks later may be helpful.

False-positive results may occur in patients previously or currently infected with *Brucella* species. Other less frequent causes of cross-reactivity that have been reported include prior infection with *Yersinia*, *Salmonella,* or *Legionella* species.

IgM-class antibodies may be detectable as soon as 1 week after symptom onset and may remain detectable for multiple years following resolution of disease in some individuals. Therefore, an IgM-positive result may not indicate current or recent infection in some cases.

There are multiple subspecies of *Francisella tularensis*, including *F tularensis* subspecies *tularensis*, *F tularensis* subspecies *holarctica* and *F tularensis* subspecies *novicida,* which are found throughout the northern hemisphere, including in the United States. The IgM and IgG anti-*F tularensis* enzyme-linked immunosorbent assay (ELISA) tests used at Mayo Clinic Laboratories are based on the lipopolysaccharide (LPS) antigen of *F tularensis*. Although not directly tested, previous studies indicate that there are no antigenic differences between the LPS of *F tularensis* subspecies *tularensis* and the other subspecies. Therefore, these assays should not be used to differentiate between infections with the various *F tularensis* subspecies.

Clinical Reference

1. Petersen JM, Schriefer ME, Araj GE: *Francisella* and *Brucella.* In: Carroll KC, Pfaller MA, Landry ML, et al, eds. Manual of Clinical Microbiology. 12th ed. AMS Press; 2019

2. Nigrovic LE, Wingerter SL: Tularemia. Infect Dis Clin North Am. 2008;22(3):489-504 doi: 10.1016/j.idc.2008.03.004

Performance

Method Description

The enzyme-linked immunosorbent assay (ELISA) is an immunoassay, which is particularly suited to the determination of antibodies in various kinds of samples. The reaction is based on the specific interaction of antibodies with their corresponding antigen. The test strips of the microtiter plate are coated with specific antigens of the pathogen of interest. If antibodies in the sample are present, they bind to the fixed antigen. A secondary antibody, which has been conjugated with the enzyme alkaline phosphatase, detects and binds to the immune complex. The colorless substrate p-nitrophenylphosphate is then converted into the colored product p-nitrophenol. The signal intensity of this reaction product is proportional to the concentration of the analyte in the sample and is measured photometrically.(Package insert: Francisella tularensis IgG/IgM ELISA, Immuno-Biological Laboratories Inc; Version No. 142.4)

PDF Report

No

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees & Codes

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

86668 x 2

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
TULAB	F. tularensis Ab, IgM/IgG ELISA, S	93715-1

Result ID	Reporting Name	LOINC®
TULM	F. tularensis Ab, IgM ELISA, S	93716-9
TULG	F. tularensis Ab, IgG ELISA, S	93717-7
TULI	F. tularensis Interpretation	93718-5