MAYO CLINIC LABORATORIES

Test Definition: FLCS

Immunoglobulin Free Light Chains, Serum

Overview

Useful For

Monitoring serum from patients with monoclonal light chain diseases without a M-spike on protein electrophoresis

May be useful as a diagnostic test in patients in whom there is a suspicion of primary systemic amyloidosis, light chain deposition disease, or non-secretory myeloma

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
KFLCS	Kappa Free Light Chain, S	No	Yes
LFLCS	Lambda Free Light Chain, S	No	Yes
KLRS	Kappa/Lambda FLC Ratio	No	Yes

Testing Algorithm

The following algorithms are available:

-Amyloidosis: Laboratory Approach to Diagnosis

-Multiple Myeloma: Laboratory Screening

Special Instructions

- Amyloidosis: Laboratory Approach to Diagnosis
- Multiple Myeloma: Laboratory Screening

Method Name

Turbidimetry

NY State Available

No

Specimen

Specimen Type

Serum

Specimen Required

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 1 mL

Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-General Request (T239)
-Hematopathology/Cytogenetics Test Request (T726)
-Renal Diagnostics Test Request (T830)

Specimen Minimum Volume

0.5 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	Reject
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Ambient	72 hours	
	Refrigerated (preferred)	28 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

The monoclonal gammopathies are characterized by a clonal expansion of plasma cells that secrete a monoclonal immunoglobulin. The monoclonal immunoglobulin secreted by these cells serves as a marker of the clonal proliferation, and the quantitation of monoclonal protein can be used to monitor the disease course. The monoclonal gammopathies include multiple myeloma (MM), light chain MM (LCMM), Waldenstrom macroglobulinemia (WM), nonsecretory MM (NSMM), smoldering MM (SMM), monoclonal gammopathy of undetermined significance (MGUS), primary systemic amyloidosis (AL), and light chain deposition disease (LCDD). The monoclonal light chain diseases (LCMM, AL, LCDD, and NSMM) often do not have serum monoclonal proteins in high enough concentration to be detected and quantitated by serum protein electrophoresis.

An elevated ratio of kappa to lambda free light chains (FLC K/L) indicates a monoclonal kappa FLC, and an abnormally low FLC K/L indicates a monoclonal lambda FLC. The kappa and lambda FLC may both be elevated in the sera of patients with polyclonal hypergammaglobulinemia, but the FLC K/L is normal. If a patient has an abnormal serum FLC K/L ratio but has no serum monoclonal protein detected by immunofixation, a urine monoclonal protein study (eg, immunofixation) should be performed and the serum immunofixation should be repeated.

The FLC K/L ratio may be useful as a diagnostic test for patients in whom immunofixation for serum monoclonal light

chains is negative and in whom there is a suspicion of primary systemic amyloidosis, light chain deposition disease, or non-secretory myeloma.

The quantitation of kappa or lambda immunoglobulin free light chains may be used to monitor disease activity in patients with monoclonal light chain diseases without a serum M-spike.

The following algorithms are available:
-Amyloidosis: Laboratory Approach to Diagnosis
-Multiple Myeloma: Laboratory Screening

Reference Values

KAPPA-FREE LIGHT CHAIN
0.33-1.94 mg/dL

LAMBDA-FREE LIGHT CHAIN
0.57-2.63 mg/dL

KAPPA/LAMBDA FLC RATIO
0.26-1.65

Interpretation

The specificity of this assay for detection of monoclonal light chains relies on the ratio of free kappa and lambda (K/L) light chains. Once an abnormal free light chain (FLC) K/L ratio has been demonstrated and a diagnosis has been made, the quantitation of the monoclonal light chain is useful for monitoring disease activity.

Changes in FLC quantitation reflect changes in the size of the monoclonal plasma cell population. Our experience to date is limited, but changes of more than 25% or trending of multiple specimens are needed to conclude biological significance.

Cautions

Elevated kappa and lambda (K/L) free light chain (FLC) may occur due to polyclonal hypergammaglobulinemia or impaired renal clearance. A specific increase in FLC (eg, FLC K:L ratio) must be demonstrated for diagnostic purposes.
This assay has not been established for use with the pediatric population.
Moderate-to-marked lipemia may interfere with the ability to perform testing.

Supportive Data

Studies at Mayo Clinic have shown that in some patients with urine monoclonal light chains and negative serum immunofixation (IF), the free light chain (FLC) assay can identify monoclonal FLC in the serum. These studies support the increased sensitivity of the nephelometric FLC assay. In a series of patients with primary systemic amyloid treated by stem cell transplantation, the quantitation and monitoring of FLC predicted organ response (eg, disease course).

Clinical Reference

1. Kaleta E, Kyle R, Clark R, Katzmann J: Analysis of patients with gamma-heavy chain disease by the heavy/light chain and free light chain assays. Clin Chem Lab Med. 2014 May;52(5):665-669. doi: 10.1515/cclm-2013-0714
2. Palladini G, Russo P, Bosoni T, et al: Identification of amyloidogenic light chains requires the combination of serum-free light chain assay with immunofixation of serum and urine. Clin Chem. 2009 Mar;55(3):499-504. doi:

10.1373/clinchem.2008.117143
3. Dispenzieri A, Kyle R, Merlini G, et al: International Myeloma Working Group guidelines for serum-free light chain analysis in multiple myeloma and related disorders. Leukemia. 2009 Feb;23(2):215-224. doi: 10.1038/leu.2008.307
4. Drayson M, Tang LX, Drew R, Mead GP, Carr-Smith H, Bradwell AR: Serum free light chain measurements for identifying and monitoring patients with nonsecretory multiple myeloma. Blood. 2001 May 1;97(9):2900-2902

Performance

Method Description

The determination of the soluble antigen concentration by turbidimetric methods involves the reaction with specific antiserum to form insoluble complexes. When light is passed through the suspension formed a portion of the light is transmitted and focused onto a photodiode by an optical lens system. The amount of transmitted light is indirectly proportional to the specific protein concentration in the test sample. Concentrations are automatically calculated by reference to a calibrations curve stored within the instrument.(Package inserts: Optilite Freelite Kappa Free Kit. The Binding Site Group, Ltd; 08/2018; Optilite Freelite Lambda Free Kit. The Binding Site Group, Ltd; 08/2018)

PDF Report

No

Day(s) Performed

Monday through Friday, Sunday

Report Available

Same day/1 to 2 days

Specimen Retention Time

14 days

Performing Laboratory Location

Jacksonville

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

83521 x 2

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
FLCS	Immunoglobulin Free Light Chains, S	104533-5

Result ID	Test Result Name	Result LOINC® Value
LFLCS	Lambda Free Light Chain, S	33944-0
KLRS	Kappa/Lambda FLC Ratio	104546-7
KFLCS	Kappa Free Light Chain, S	104544-2