# Test Definition: C1QFX

C1q Complement, Functional, Serum

## Overview

### Useful For

Diagnosis of C1 deficiency

Investigation of a patient with an absent total complement level

### Method Name

Turbidimetric Measurement of Liposome Lysis

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Ordering Guidance

The total complement assay (COM / Complement, Total, Serum) should be used as a screen for suspected complement deficiencies before ordering individual complement component assays. A deficiency of an individual component of the complement cascade will result in an undetectable total complement level.

### Specimen Required

**Patient Preparation:**

Fasting: 12 hours, preferred but not required

**Supplies:** Sarstedt Aliquot Tube, 5 mL (T914)

**Collection Container/Tube:**

**Preferred:** Serum gel

**Acceptable:** Red top

**Submission Container/Tube:** Plastic vial

**Specimen Volume:** 1 mL serum

**Collection Instructions:**

1. Immediately after specimen collection, place the tube on wet ice and allow specimen to clot.
2. Centrifuge at 4 degrees C and aliquot serum into a plastic vial.
3. Within 30 minutes of centrifugation, freeze specimen. Specimen must be placed on dry ice if not frozen immediately.

**Note:** If a refrigerated centrifuge is not available, it is acceptable to use a room temperature centrifuge, provided the specimen is kept on ice before centrifugation, and immediately afterward, the serum aliquoted and frozen.

### Specimen Minimum Volume

Serum: 0.5 mL

### Reject Due To

| | |
|---|---|
| Gross hemolysis | Reject |
| Gross lipemia | Reject |
| Gross icterus | OK |

### Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Serum | Frozen | 14 days | |

## Clinical & Interpretive

### Clinical Information

Complement proteins are components of the innate immune system. There are 3 pathways to complement activation: 1) the classical pathway, 2) the alternative (or properdin) pathway, and 3) the lectin (or mannan binding lectin) pathway. The classical pathway of the complement system is composed of a series of proteins that are activated in response to the presence of immune complexes. A single IgM molecule or 2 IgG molecules are sufficient to trigger activation of the recognition complex initiated by C1q. The activation process triggers a cascade that includes an amplification loop. The amplification loop is mediated by C3, with cleavage of a series of proteins, and results in 3 main end products: 1) anaphylatoxins that promote inflammation (C3a, C5a), 2) opsonization peptides that are chemotactic for neutrophils (C3b) and facilitate phagocytosis, and 3) the membrane attack complex, which promotes cell lysis.

There are 3 subunits that compose the C1 component, designated as C1q, C1r, and C1s. The C1q subunit recognizes and binds to immunoglobulin complexed to antigen and initiates the complement cascade. Congenital deficiencies of any of the early complement components (C1-C4) result in an inability to generate the peptides that are necessary to clear immune complexes and to attract neutrophils or generate lytic activity. These patients have increased susceptibility to infections with encapsulated microorganisms. They may also have symptoms that suggest autoimmune disease in which complement deficiency may be an etiologic factor.

Inherited deficiency of C1 is rare. Just over 40 cases have been reported for C1q deficiency, and another 20 cases have been described for C1s and C1r deficiency. C1 deficiency is associated with increased incidence of immune complex disease (systemic lupus erythematosus [SLE], polymyositis, glomerulonephritis, and Henoch-Schonlein purpura), with SLE the most common manifestation of C1 deficiency. The SLE associated with C1 deficiency is similar to SLE without complement deficiency, but the age of onset is often prior to puberty.

Low C1 levels have also been reported in patients with abnormal immunoglobulin levels (Bruton and common variable hypogammaglobulinemia and severe combined immunodeficiency), and this is most likely due to increased catabolism.

Complement levels can be detected by antigen assays that quantitate the amount of the protein. For most of the complement proteins a small number of cases have been described in which the protein is present but is nonfunctional. These rare cases require a functional assay to detect the deficiency.

### Reference Values

> or =63 U/mL

### Interpretation

Low levels of complement may be due to inherited deficiencies, acquired deficiencies, or due to complement consumption (eg, as a consequence of infectious or autoimmune processes).

The measurement of C1q activity is an indicator of the amount of C1 present. Absent C1q levels in the presence of normal C3 and C4 values are consistent with a C1 deficiency. Low C1q levels in the presence of low C4 but normal C3 may indicate the presence of an acquired inhibitor (autoantibody) to C1 esterase inhibitor.

### Cautions

As with all complement assays, proper specimen handling is of utmost importance to ensure that the complement system is not activated before clinical testing.

Absent (or low) C1q functional levels in the presence of normal C1q antigen levels should be replicated with a new serum specimen to confirm that C1q inactivation did not occur during shipping.

### Clinical Reference

1. Sonntag J, Brandenburg U, Polzehl D, et al. Complement system in healthy term newborns: reference values in umbilical cord blood. Pediatr Dev Pathol. 1998;1(2):131-135
2. Prellner K, Sjoholm AG, Truedsson L. Concentrations of C1q, factor B, factor D and properdin in healthy children, and the age-related presence of circulating C1r-C1s complexes. Acta Paediatr Scand. 1987;76(6):939-943
3. Davis ML, Austin C, Messmer BL, Nichols WK, Bonin AP, Bennett MJ. IFCC-standardized pediatric reference intervals for 10 serum proteins using the Beckman Array 360 system. Clin Biochem. 1996;29(5):489-492
4. Gaither TA, Frank MM. Complement. In: Henry JB, ed. Clinical Diagnosis and Management by Laboratory Methods. 17th ed. WB Saunders Company: 1984:879-892
5. O'Neil KM. Complement deficiency. Clin Rev Allergy Immunol. 2000;19(2):83-108
6. Frank MM. Complement deficiencies. Pediatr Clin North Am. 2000;47(6):1339-1354
7. Brodszki N, Frazer-Abel A, Grumach AS, et al. European Society for Immunodeficiencies (ESID) and European Reference Network on Rare Primary Immunodeficiency, Autoinflammatory and Autoimmune Diseases (ERN RITA) Complement Guideline: Deficiencies, diagnosis, and management. J Clin Immunol. 2020;40(4):576-591
8. Willrich MAV, Braun KMP, Moyer AM, Jeffrey DH, Frazer-Abel A. Complement testing in the clinical laboratory. Crit Rev Clin Lab Sci. 2021;58(7):447-478. doi:10.1080/10408363.2021.1907297

## Performance

### Method Description

Testing is performed on the Binding Site Optilite turbidimetric analyzer with the Optilite CH50 Reagent kit using modified manufacturer's instructions. C1q activity is measured by mixing patient serum with C1q-deficient serum. The lytic activity of the serum mixture is tested against sensitized, labeled liposomes.(Package insert: Optilite CH50 Reagent, The Binding Site Group, Ltd.; INS095.OPTA, 08/2024)

### PDF Report

No

### Day(s) Performed
Tuesday, Friday

### Report Available
1 to 3 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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

### CPT Code Information
86161

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| C1QFX | C1Q Complement, Functional, S | 87722-5 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| C1QFX | C1Q Complement, Functional, S | 87722-5 |