TURBIDIMETRIC IMMUNOASSAY FOR ESTIMATION OF COMPLEMENT C3 IN HUMAN SERUM

SUMMARY

Clinically complement determination helps to detect whether the complement system has been activated. A decrease in complement components due to activation of complement system or a hereditary deficiency and/or dysfunction of a complement component is of clinical significance.

C3 is a central component of the complement system. C3 is the rate-limiting factor for both the alternate and the classical complement pathways. C3 is often decreased in active forms of SLE and membranoproliferative glomerulonephritis. C3 fixation on red cells and on tissue may result in autoimmune hemolytic disorder or severe tissue damage. Increased levels of C3 are observed in biliary obstruction, nephrotic syndrome and during corticosteroid therapy.

Information regarding the concentration of C3 can be obtained by using **Quantia®-C3** reagents.

REAGENT

1. **Quantia®-C3** Activation buffer (R1): Ready to use.
2. **Quantia®-C3** Anti-human C3 Reagent (R2): Ready to use solution of anti-human C3 antibody.
3. **Quantia®-C3** Calibrator: Lyophilized preparation of serum equivalent to the stated amount of C3 on a mg/dl basis, when hydrated appropriately. The **Quantia®-C3** calibrator is traceable to CRM 470.

Each batch of reagents undergoes rigorous quality control at various stages of manufacture for its specificity, sensitivity, and performance.

REAGENT STORAGE AND STABILITY

1. Store the reagents at 2-8°C. DO NOT FREEZE.
2. The shelf life of the reagent, and activation buffer and calibrator is as per the expiry date mentioned on the respective vial labels.
3. The reconstituted calibrator is stable for 7 days at 2-8°C and 48 hours at 25 - 30°C (RT.).

PRINCIPLE

Quantia®-C3 is a turbidimetric immunoassay for the estimation of C3 in human serum based on the principle of agglutination reaction. The test specimen is mixed with the Activation buffer (R1). Anti-human C3 reagent (R2) is then added and allowed to react. Presence of C3 in the test specimen results in the formation of an insoluble complex producing a turbidity, which is measured at wavelength 340 nm. The extent of turbidity corresponds to the concentration of C3 in the test specimen.

NOTE

1. In vitro diagnostic reagent for laboratory and professional use only. Not for medicinal use.
2. All the reagents derived from human source have been tested for HBsAg and Anti-HIV antibodies and are found to be non-reactive. However handle the material as if infectious.
3. Reagents contain 0.095% Sodium Azide as a preservative. Avoid contact with skin and mucosa. On disposal flush with large quantities of water.
4. The reagents can be damaged due to microbial contamination or on exposure to extreme temperatures. It is recommended that the performance of the reagents be verified using known controls periodically.
5. Do not use vortex mixers for mixing reagents. Gently mix the reagents and samples during test procedures.
6. Calibrators of different manufacturers must not be used with **Quantia®-C3** reagents.
7. The calibration curve must be validated periodically using known controls.
8. As the reagents within lots have been matched, reagents from different lots must not be interchanged.
9. The **Quantia®-C3** assay is recommended only for analyzers with cuvette mode. Though any semi automated analyzer with appropriate programming facility can be used, for best results it is recommended to use **Quantiamate** analyzer. Fully automated analyzers may be used, provided the reagent has been standardized on the system.

10. The procedures mentioned in this pack insert are based on a minimum reading volume of 500 µl (0.5 ml). In case of instruments where minimum volume required for reading absorbance is 1.0 ml, use double the quantity of reagents and samples mentioned in the test procedure.

SPECIMEN COLLECTION AND PREPARATION

No special preparation of the patient is required prior to specimen collection by approved techniques.
Only serum should be used for testing. Should a delay in testing occur, store the samples at 2 - 8°C. Samples can be stored for upto a week at 2 - 8°C, provided they are not contaminated. Do not use hemolysed, icteric, or highly turbid sera. Turbid or particulate serum samples must be clarified by centrifugation at 2000 rpm for 15 minutes prior to testing. Use the clear supernatant for testing.

ADDITIONAL MATERIAL REQUIRED

Spectrophotometer with 340 nm wavelength and cuvette mode, stopwatch, well calibrated micropipettes, disposable tips, isotonic saline, particulate free distilled water, test-tube rack, optically clean disposable cuvettes such as **Quantiamate semi micro cuvettes**/ glass cuvettes.

TEST PROCEDURE

Bring reagents and samples to room temperature before use.
Assay conditions:

Wavelength	340 nm
Reaction Temperature	37°C
Cuvette	1 cm path length

Method for preparation of C3 Calibration Curve

The **Quantia®-C3** calibrator must be reconstituted exactly with 1.0 ml of distilled water, wait for five minutes, gently swirl the vial till the solution attains homogeneity. Once reconstituted it is ready to use for preparing the C3 calibration curve. The Concentration (S) of C3 in the reconstituted calibrator is as mentioned at the end of this package insert.
Prepare 1.0 ml of 36 mg/dl C3 **working standard (Sw)** from the reconstituted calibrator as mentioned at the end of this package insert. The working standard (Sw) is stable for eight hours at 2-30°C.
Prepare dilutions of the working standard (Sw) as mentioned below for preparation of calibration curve.

Test Tube No.	**1**	**2**	**3**	**4**	**5**
Calibrator dilution No.	D1	D2	D3	D4	D5
Vol. of Working standard (Sw)	400 µl	200 µl D1	200 µl D2	200 µl D3	10 µl D1
Vol. of Saline in µl	-	200 µl	200 µl	200 µl	350 µl
Conc. of C3 in mg/dl	S	S/2	S/4	S/8	S/32

The above five dilutions of the calibrator including the highest 36 mg/dl (D1) and lowest 1.0 mg/dl (D5) concentrations of measuring range **must** be used for the preparation of the calibration curve.

Note: During calibration on instrument with programming facilities, increasing concentration of the standards must be used for preparing calibration curve.

Test procedure for preparation of calibration curve

1. Zero the instrument with distilled water
2. Pipette 500 µl of **Quantia®-C3** activation buffer (R1) and 25 µl of diluted working standard (D1) in the measuring cuvette. Mix well and incubate for five minutes at 37°C.
3. Read absorbance (A1).
4. Add 50 µl of **Quantia®-C3** reagent (R2), mix gently and start the stopwatch simultaneously.
5. Read absorbance (A2) at the end of **exactly** five minutes.
6. Repeat steps No. 2 – 5 for each diluted working standard (D2 to D5) for preparing calibration curve.
7. Calculate ΔA (A2 – A1) for each dilution of the working standard (D1 to D5). Plot a graph of ΔA versus concentration of C3 on the graph paper provided with the kit.

"The calibration curve" so obtained is valid only for the same lot of Quantia®-C3 reagents.

Test procedure for specimen

For determination of C3 concentration in the test specimen, dilute the test specimen 1:10 with normal saline.

1. Follow steps 2 – 5 as mentioned in above procedure for calibration curve using the diluted test specimen in place of the working standard.
2. Calculate ΔA (A2 – A1) for the diluted test specimen.

VALIDATION CRITERIA

If the ΔA of the diluted test specimen is less than ΔA obtained for the standard of highest concentration (D1) then proceed directly for calculations of results.

If the ΔA of the diluted test specimen is higher than ΔA of the standard with highest concentration (D1) then the test has to be rerun by carrying out further dilution of test specimen such as 1:20, 1:30 etc., till the ΔA of the diluted specimen is less than ΔA of D1.

CALCULATIONS

For determination of C3 concentration in the test specimen :

1. Interpolate ΔA of the diluted test specimen on the calibration curve and obtain the C3 concentration 'C' of the diluted test specimen.
2. Multiply the C3 concentration 'C' with the dilution factor (F) of the test specimen for obtaining the concentration of C3 in the neat test specimen.

Concentration of C3 in the neat test specimen in mg/dl = C x F

(Where 'F' is the dilution factor of the test specimen i.e. 10 for 1:10 dilution of test specimen and so on.)

SPECIFIC PERFORMANCE CHARACTERISTICS

Measuring range

The **Quantia®-C3** reagent has been designed to measure serum C3 concentrations in the range of about 10 – 360 mg/dl, and is linear between the measuring range. The exact range is dependent on the Calibrator value, which is lot specific.

Detection limit / Analytical Sensitivity

Detection limit : 1.0 mg/dl

The detection limit represents the lowest measurable C3 concentrations that can be distinguished from zero.

Prozone limit

No prozone effect was observed upto a C3 concentration of 2500 mg/dl.

Precision

Intra-assay precision	n	Mean mg/dl	SD	CV (%)
Sample 1	10	25	2.0	8.6
Sample 2	10	90	2.7	3.0
Sample 3	10	333	3.7	1.1

Inter-assay precision	n	Mean mg/dl	SD	CV (%)
Sample 1	10	10	0.9	9.3
Sample 2	10	91	1.6	1.8
Sample 3	10	355	4	1.1

Interference

No interference was observed with:

Interference factor	No interference upto
Glucose	500 mg/dl
Albumin	10 g/dl
Bilirubin	50 mg/dl

Haemoglobin	500 mg/dl
Triglycerides	1000 mg/dl

REFERENCE VALUES

The interim reference values for C3 in normal populations are 90 - 180 mg/dl. When fresh serum samples (less than 8 hours old) are used, lower values than those mentioned above can be expected.

The reference values are related to age, geographical and methodological differences and vary widely. Each laboratory should define its own reference range for the relevant population.

REMARKS

1. Usage of well-calibrated equipment and accessories and procedures is critical for achieving correct results.
2. When ΔA obtained for the test specimen is greater than the ΔA of the standard with highest concentration then, it indicates that the concentration of C3 in the test specimen is beyond the measuring range of the **Quantia®-C3** assay. Such specimens should be rerun with further dilutions.
3. Markedly lipemic, hemolysed, and contaminated serum samples could produce non-specific values.
4. Use of plasma rather than serum can lead to erroneous values.
5. Do not read results beyond five minutes.
6. It is recommended that results of the tests should be correlated with clinical findings to arrive at the final diagnosis.

WARRANTY

This product is designed to perform as described on the label and package insert. The manufacturer disclaims any implied warranty of use and sale for any other purpose.

BIBLIOGRAPHY

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2. Plasma proteins Clinical Utility and Interpretation, Foundation for Blood Research.
3. Tietz textbook of Clinical Chemistry Edited by Carl A Burtis, 2nd Ed., Pg. 688-691.
4. Dati et al., Interim reference ranges for 14 serum proteins based on standardization with CRM 470, Eur. J. Clin. Chem. Clin. Biochem. 1996; 34: 517-520.
5. Data on file: Tulip Diagnostics (P) Ltd.

Quantia®-C3 Calibrator

Lot No.:		
Conc. (S) on reconstitution with 1.0 ml distilled water		**mg/dl**
To prepare 1.0 ml working standard (Sw)	**Vol. of normal saline** **+** **Vol. of reconstituted calibrator**	**µl** **µl**