



ELISA PRODUCT INFORMATION & MANUAL

Complement C2 NBP2-60548

Enzyme-linked Immunosorbent Assay for quantitative
detection of Human Complement C2. For research use only.
Not for diagnostic or therapeutic procedures.

Assay Summary

Step 1. Add 50 μ l of Standard or Sample per well.
Incubate 2 hours.

Step 2. Wash, then add 50 μ l of Biotinylated Antibody per well.
Incubate 1 hour.

Step 3. Wash, then add 50 μ l of SP Conjugate per well.
Incubate 30 minutes.

Step 4. Wash, then add 50 μ l of Chromogen Substrate per well.
Incubate 15 minutes.

Step 5. Add 50 μ l of Stop Solution per well.
Read at 450 nm immediately.

Assay Template

Human Complement C2 ELISA Kit

Catalog No. NBP2-60548

Sample insert for reference use only

Introduction

Complement component C2 (C2) is a multi-domain serum protease that has 732 amino acids with 100 kDa. It provides catalytic activity for the C3 and C5 convertases of the complement pathways and plays an important host defense role against microbial infection. Activated complement C1 cleaves C2 into C2a and C2b fragments. The C-terminal 70 kDa fragment C2a consisting of a serine protease (SP) and a von Willebrand factor type A (vWFA) domain. The smaller 30 kDa N-terminal fragment C2b contains 3 complement control protein (CCP) modules (1-3).

Principle of the Assay

The Human Complement C2 ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for detection of C2 in **plasma, serum, milk, saliva, CSF, and cell culture samples**. This assay employs a quantitative **sandwich enzyme immunoassay** technique that measures C2 in less than 4 hours. A polyclonal antibody specific for C2 has been pre-coated onto a 96-well microplate with removable strips. C2 in standards and samples is sandwiched by the immobilized antibody and a biotinylated polyclonal antibody specific for C2, which is recognized by a streptavidin-peroxidase conjugate. All unbound material is washed away and a peroxidase enzyme substrate is added. The color development is stopped and the intensity of the color is measured.

Caution and Warning

- This product is for **Research Use Only** and is Not For Use In Diagnostic Procedures.
- Prepare all reagents (working diluent buffer, wash buffer, standard, biotinylated antibody, and SP conjugate) as instructed, prior to running the assay.
- Prepare all samples prior to running the assay. The dilution factors for the samples are suggested in this insert. However, the user should determine the optimal dilution factor.
- Spin down the SP conjugate vial and the biotinylated antibody vial before opening and using contents.
- The Stop Solution is an acidic solution.
- The kit should not be used beyond the expiration date.

Reagents

- **Human Complement C2 Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a polyclonal antibody against human C2.
- **Sealing Tapes:** Each kit contains 3 precut, pressure sensitive sealing tapes that can be cut to fit the format of the individual assay.
- **Human Complement C2 Standard:** Human C2 in a buffered protein base (0.64 µg, lyophilized).
- **Biotinylated Human Complement C2 Antibody (50x):** A 50-fold biotinylated polyclonal antibody against human C2 (120 µl).
- **MIX Diluent Concentrate (10x):** A 10-fold concentrated buffered protein base (30 ml).
- **Wash Buffer Concentrate (20x):** A 20-fold concentrated buffered surfactant (30 ml, 2 bottles).
- **Streptavidin-Peroxidase Conjugate (SP Conjugate):** A 100-fold concentrate (80 µl).
- **Chromogen Substrate:** A ready-to-use stabilized peroxidase chromogen substrate tetramethylbenzidine (8 ml).
- **Stop Solution:** A 0.5 N hydrochloric acid to stop the chromogen substrate reaction (12 ml).

Storage Condition

- Upon arrival, immediately store components of the kit at recommended temperatures up to the expiration date.
- Store SP Conjugate and Biotinylated Antibody at -20°C.
- Store Microplate, Diluent Concentrate (10x), Wash Buffer, Stop Solution, and Chromogen Substrate at 2-8°C.
- Unused microplate wells may be returned to the foil pouch with the desiccant packs and resealed. May be stored for up to 30 days in a vacuum desiccator.
- Diluent (1x) may be stored for up to 30 days at 2-8°C.
- Store Standard at 2-8°C before reconstituting with Diluent and at -20°C after reconstituting with Diluent.

Other Supplies Required

- Microplate reader capable of measuring absorbance at 450 nm.
- Pipettes (1-20 µl, 20-200 µl, 200-1000 µl, and multiple channel).
- Deionized or distilled reagent grade water.

Sample Collection, Preparation, and Storage

- **Plasma:** Collect plasma using one-tenth volume of 0.1 M sodium citrate as an anticoagulant. Centrifuge samples at 3000 x g for 10 minutes. Samples are recommended for use at 1:400 into MIX Diluent. Depending on application needs, user should determine proper dilutions. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles (EDTA or Heparin can also be used as an anticoagulant).
- **Serum:** Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 3000 x g for 10 minutes, and remove serum. Samples are recommended for use at 1:400 into MIX Diluent. Depending on application needs, user should determine proper dilutions. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Cell Culture Supernatants:** Centrifuge cell culture media at 3000 x g for 10 minutes to remove debris. Collect supernatants and assay. Store the remaining samples at -20°C or below. Avoid repeated freeze-thaw cycles.
- **Saliva:** Collect saliva using sample tube. Centrifuge samples at 800 x g for 10 minutes and assay. Store samples at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Milk:** Collect milk using sample tube. Centrifuge samples at 800 x g for 10 minutes and assay. Store samples at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **CSF:** Collect cerebrospinal fluid (CSF) using sample pot. Centrifuge samples at 3000 x g for 10 minutes. Dilute samples 1:2 into MIX Diluent, and assay. The undiluted samples can be stored at -80°C for up to 3 months. Avoid repeated freeze-thaw cycles.

Refer to Sample Dilution Guidelines below for further instruction.

Guidelines for Dilutions of 1:100 or Greater <i>(for reference only; please follow the insert for specific dilution suggested)</i>	
1:100	1:10000
A) 4 μ l sample : 396 μ l buffer(100x) = 100 fold dilution <i>Assuming the needed volume is less than or equal to 400 μl.</i>	A) 4 μ l sample : 396 μ l buffer (100x) B) 4 μ l of A : 396 μ l buffer (100x) = 10000 fold dilution <i>Assuming the needed volume is less than or equal to 400 μl.</i>
1:1000	1:100000
A) 4 μ l sample : 396 μ l buffer (100x) B) 24 μ l of A : 216 μ l buffer (10x) = 1000 fold dilution <i>Assuming the needed volume is less than or equal to 240 μl.</i>	A) 4 μ l sample : 396 μ l buffer (100x) B) 4 μ l of A : 396 μ l buffer (100x) C) 24 μ l of B : 216 μ l buffer (10x) = 100000 fold dilution <i>Assuming the needed volume is less than or equal to 240 μl.</i>

Reagent Preparation

- Freshly dilute all reagents and bring all reagents to room temperature before use.
- **MIX Diluent Concentrate (10x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the MIX Diluent Concentrate 1:10 with reagent grade water. Store for up to 30 days at 2-8°C.
- **Standard Curve:** Reconstitute the 0.64 μ g of Human Complement C2 Standard with 0.8 ml of MIX Diluent to generate a 0.8 μ g/ml standard stock solution. Allow the standard to sit for 10 minutes with gentle agitation prior to making dilutions. Prepare duplicate or triplicate standard points by serially diluting the standard stock solution (0.8 μ g/ml) 1:2 with MIX Diluent to produce 0.4, 0.2, 0.1, 0.05, 0.025, and 0.013 μ g/ml solutions. MIX Diluent serves as the zero standard (0 μ g/ml). Any remaining solution should be frozen at -20°C and used within 30 days.

Standard Point	Dilution	[C2] (μg/ml)
P1	1 part Standard (0.8 μ g/ml)	0.800
P2	1 part P1 + 1 part MIX Diluent	0.400
P3	1 part P2 + 1 part MIX Diluent	0.200
P4	1 part P3 + 1 part MIX Diluent	0.100
P5	1 part P4 + 1 part MIX Diluent	0.050
P6	1 part P5 + 1 part MIX Diluent	0.025
P7	1 part P6 + 1 part MIX Diluent	0.013
P8	MIX Diluent	0.000

- **Biotinylated Human Complement C2 Antibody (50x):** Spin down the antibody briefly and dilute the desired amount of the antibody 1:50 with MIX Diluent. Any remaining solution should be frozen at -20°C.
- **Wash Buffer Concentrate (20x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the Wash Buffer Concentrate 1:20 with reagent grade water.
- **SP Conjugate (100x):** Spin down the SP Conjugate briefly and dilute the desired amount of the conjugate 1:100 with MIX Diluent. Any remaining solution should be frozen at -20°C.

Assay Procedure

- Prepare all reagents, standard solutions, and samples as instructed. Bring all reagents to room temperature before use. The assay is performed at room temperature (20-25°C).
- Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccants inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- Add 50 μ l of Human Complement C2 Standard or sample per well. Cover wells with a sealing tape and incubate for 2 hours. Start the timer after the last addition.
- Wash five times with 200 μ l of Wash Buffer manually. Invert the plate each time and decant the contents; hit 4-5 times on absorbent material to completely remove the liquid. If using a machine, wash six times with 300 μ l of Wash Buffer and then invert the plate, decanting the contents; hit 4-5 times on absorbent material to completely remove the liquid.
- Add 50 μ l of Biotinylated Human Complement C2 Antibody to each well and incubate for 1 hour.
- Wash the microplate as described above.
- Add 50 μ l of Streptavidin-Peroxidase Conjugate per well and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash the microplate as described above.
- Add 50 μ l of Chromogen Substrate per well and incubate for 15 minutes or till the optimal blue color density develops. Gently tap the plate to ensure thorough mixing and break the bubbles in the well with pipette tip.
- Add 50 μ l of Stop Solution to each well. The color will change from blue to yellow.
- Read the absorbance on a microplate reader at a wavelength of 450 nm **immediately**. If wavelength correction is available, subtract readings at 570 nm from those at 450 nm to correct optical imperfections. Otherwise, read the plate at 450 nm only. Please note that some

unstable black particles may be generated at high concentration points after stopping the reaction for about 10 minutes, which will reduce the readings.

Data Analysis

- Calculate the mean value of the duplicate or triplicate readings for each standard and sample.
- To generate a standard curve, plot the graph using the standard concentrations on the x-axis and the corresponding mean 450 nm absorbance (OD) on the y-axis. The best-fit line can be determined by regression analysis using log-log or four-parameter logistic curve-fit.
- Determine the unknown sample concentration from the Standard Curve and multiply the value by the dilution factor.

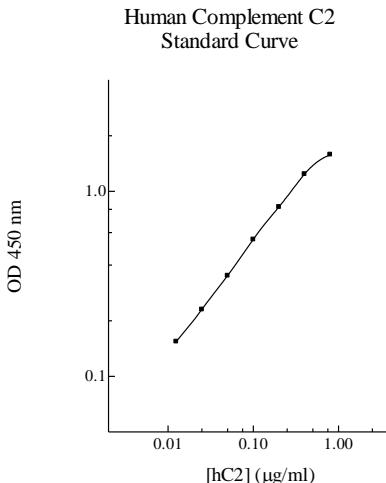
Typical Data

- The typical data is provided for reference only. Individual laboratory means may vary from the values listed. Variations between laboratories may be caused by technique differences.

Standard Point	µg/ml	OD	Average OD
P1	0.800	2.225 2.126	2.175
P2	0.400	1.811 1.785	1.798
P3	0.200	1.231 1.277	1.254
P4	0.100	0.947 0.930	0.939
P5	0.050	0.647 0.633	0.640
P6	0.025	0.476 0.452	0.464
P7	0.013	0.326 0.310	0.318
P8	0.000	0.093 0.083	0.088
Sample: Pool Normal, Sodium Citrate Plasma (400x)		0.828 0.818	0.823

Standard Curve

- The curve is provided for illustration only. A standard curve should be generated each time the assay is performed.



Reference Value

- Normal human C2 plasma levels range from 12 to 50 μg/ml.
- Human plasma and serum samples from healthy adults were tested (n=20). On average, C2 level was 33 μg/ml.

Sample	n	Average Value (μg/ml)
Human Pool Normal Plasma	10	31.9
Human Pool Normal Serum	10	34.2

Performance Characteristics

- The minimum detectable dose of C2 as calculated by 2SD from the mean of a zero standard was established to be 0.01 μg/ml.
- Intra-assay precision was determined by testing replicates of three plasma samples in one assay.
- Inter-assay precision was determined by testing three plasma samples in twenty assays.

Sample	Intra-Assay Precision			Inter-Assay Precision		
	1	2	3	1	2	3
n	20	20	20	20	20	20
CV (%)	4.6%	4.8%	5.2%	9.5%	8.9%	9.4%
Average CV (%)	4.9%			9.3%		

Recovery

Standard Added Value	0.02 – 0.4 µg/ml
Recovery %	86 – 114%
Average Recovery %	97.5%

Linearity

- Plasma and serum samples were serially-diluted to test for linearity.

Average Percentage of Expected Value (%)		
Sample Dilution	Plasma	Serum
1:200	95%	94%
1:400	97%	99%
1:800	106%	105%

Cross-Reactivity

Species	Cross Reactivity (%)
Monkey	<30%
Mouse	None
Rat	None
Swine	None
Canine	None
Bovine	None
Rabbit	None
Human	100%
Proteins	Cross Reactivity (%)
Complement C1	None
Complement C2	100%
Complement C3	None
Complement C4	None
Complement C5	None
Complement C6	None
Complement C7	None
Complement C8	None

Complement C9	None
Complement Factor H	None
Complement Factor B	None

Troubleshooting

Issue	Causes	Course of Action
Low Precision	Use of expired components	<ul style="list-style-type: none"> Check the expiration date listed before use. Do not interchange components from different lots.
	Improper wash step	<ul style="list-style-type: none"> Check that the correct wash buffer is being used. Check that all wells are dry after aspiration. Check that the microplate washer is dispensing properly. If washing by pipette, check for proper pipetting technique.
	Splashing of reagents while loading wells	<ul style="list-style-type: none"> Pipette properly in a controlled and careful manner.
	Inconsistent volumes loaded into wells	<ul style="list-style-type: none"> Pipette properly in a controlled and careful manner. Check pipette calibration. Check pipette for proper performance.
	Insufficient mixing of reagent dilutions	<ul style="list-style-type: none"> Thoroughly agitate the lyophilized components after reconstitution. Thoroughly mix dilutions.
Unexpectedly Low or High Signal Intensity	Improperly sealed microplate	<ul style="list-style-type: none"> Check the microplate pouch for proper sealing. Check that the microplate pouch has no punctures. Check that three desiccants are inside the microplate pouch prior to sealing.
	Microplate was left unattended between steps	<ul style="list-style-type: none"> Each step of the procedure should be performed uninterrupted.
	Omission of step	<ul style="list-style-type: none"> Consult the provided procedure for complete list of steps.
	Steps performed in incorrect order	<ul style="list-style-type: none"> Consult the provided procedure for the correct order.
	Insufficient amount of reagents added to wells	<ul style="list-style-type: none"> Check pipette calibration. Check pipette for proper performance.
	Wash step was skipped	<ul style="list-style-type: none"> Consult the provided procedure for all wash steps.
	Improper wash buffer	<ul style="list-style-type: none"> Check that the correct wash buffer is being used.
	Improper reagent preparation	<ul style="list-style-type: none"> Consult reagent preparation section for the correct dilutions of all reagents.
Deficient Standard Curve Fit	Insufficient or prolonged incubation periods	<ul style="list-style-type: none"> Consult the provided procedure for correct incubation time.
	Non-optimal sample dilution	<ul style="list-style-type: none"> Sandwich ELISA: If samples generate OD values higher than the highest standard point (P1), dilute samples further and repeat the assay. Competitive ELISA: If samples generate OD values lower than the highest standard point (P1), dilute samples further and repeat the assay. User should determine the optimal dilution factor for samples.
	Contamination of reagents	<ul style="list-style-type: none"> A new tip must be used for each addition of different samples or reagents during the assay procedure.
	Contents of wells evaporate	<ul style="list-style-type: none"> Verify that the sealing film is firmly in place before placing the assay in the incubator or at room temperature.

	Improper pipetting	<ul style="list-style-type: none">• Pipette properly in a controlled and careful manner.• Check pipette calibration.• Check pipette for proper performance.
	Insufficient mixing of reagent dilutions	<ul style="list-style-type: none">• Thoroughly agitate the lyophilized components after reconstitution.• Thoroughly mix dilutions.

Version 1.5R