

# **ab108826 – Human C Reactive Protein (PTX1) ELISA Kit**

## Instructions for Use

For the quantitative measurement of Human C Reactive Protein (PTX1) in plasma, serum, saliva, milk, urine, CSF, and cell culture supernatants.

This product is for research use only and is not intended for diagnostic use.

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## 1. BACKGROUND

Abcam's C Reactive Protein (PTX1) Human *in vitro* ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for the quantitative measurement of C Reactive Protein concentrations in Human plasma, serum, saliva, milk, urine, CSF, cell lysate, and cell culture supernatants.

A C Reactive Protein specific antibody has been precoated onto 96-well plates and blocked. Standards or test samples are added to the wells and subsequently a C Reactive Protein specific biotinylated detection antibody is added and then followed by washing with wash buffer. Streptavidin-Peroxidase Conjugate is added and unbound conjugates are washed away with wash buffer. TMB is then used to visualize Streptavidin-Peroxidase enzymatic reaction. TMB is catalyzed by Streptavidin-Peroxidase to produce a blue color product that changes into yellow after adding acidic stop solution. The density of yellow coloration is directly proportional to the amount of C Reactive Protein captured in plate.

C Reactive Protein is a liver protein composed of five identical nonglycosylated subunits, with a total molecular weight of 105 kDa. C reactive protein has a variety of powerful effects related to immunology, inflammation, and coagulation. As a marker of low-level inflammation, C reactive protein appears to predict future cardiovascular disease events among apparently healthy individuals. High plasma concentration of C reactive protein was associated with increased risk of stroke, myocardial infarction, and peripheral vascular disease. C reactive protein has also been associated with increased risks of fatal coronary events among high-risk male smokers and incident coronary disease among the elderly. Studies have established the prognostic usefulness of C reactive protein in the setting of angina. Originally used as a marker of acute inflammation, C reactive protein

has become a leading candidate as the measure of choice for estimating the inflammatory component of cardiovascular disease risk.

## 2. ASSAY SUMMARY

### Primary capture antibody



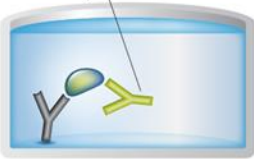
Prepare all reagents, samples and standards as instructed.

### Sample



Add standard or sample to each well used. Incubate at room temperature.

### Primary detector antibody



Wash and add prepared biotin antibody to each well. Incubate at room temperature.

### Streptavidin Label



Wash and add prepared Streptavidin-Peroxidase Conjugate. Incubate at room temperature.

### Substrate **Colored product**



Add Chromogen Substrate to each well. Incubate at room temperature. Add Stop Solution to each well. Read immediately.

## 3. PRECAUTIONS

**Please read these instructions carefully prior to beginning the assay.**

Modifications to the kit components or procedures may result in loss of performance.

## 4. STORAGE AND STABILITY

**Store kit at 4°C immediately upon receipt, apart from the SP Conjugate & Biotinylated Antibody, which should be stored at -20°C.**

Refer to list of materials supplied for storage conditions of individual components. Observe the storage conditions for individual prepared components in sections 9 & 10.

## 5. MATERIALS SUPPLIED

| Item  | Amount    | Storage Condition (Before Preparation) |
|---|-----------|--|
| C Reactive Protein Microplate (12 x 8 well strips)    | 96 wells  | 4°C                                    |
| C Reactive Protein Standard                           | 1 vial    | 4°C                                    |
| 10X Diluent N Concentrate                             | 30 mL     | 4°C                                    |
| Biotinylated Human C Reactive Protein Antibody        | 1 vial    | -20°C                                  |
| 100X Streptavidin-Peroxidase Conjugate (SP Conjugate) | 80 µL     | -20°C                                  |
| Chromogen Substrate                                   | 8 mL      | 4°C                                    |
| Stop Solution   | 12 mL     | 4°C                                    |
| 20X Wash Buffer Concentrate                           | 2 x 30 mL | 4°C                                    |
| Sealing Tapes   | 3         | N/A                                    |

### 6. MATERIALS REQUIRED, NOT SUPPLIED

These materials are not included in the kit, but will be required to successfully utilize this assay:

- 1 Microplate reader capable of measuring absorbance at 450 nm.
- Precision pipettes to deliver 1  $\mu$ L to 1 mL volumes.
- Adjustable 1-25 mL pipettes for reagent preparation.
- 100 mL and 1 liter graduated cylinders.
- Absorbent paper.
- Distilled or deionized water.
- Log-log graph paper or computer and software for ELISA data analysis.
- 8 tubes to prepare standard or sample dilutions.

### 7. LIMITATIONS

- Do not mix or substitute reagents or materials from other kit lots or vendors.

### 8. TECHNICAL HINTS

- Samples generating values higher than the highest standard should be further diluted in the appropriate sample dilution buffers.
- Avoid foaming or bubbles when mixing or reconstituting components.
- Avoid cross contamination of samples or reagents by changing tips between sample, standard and reagent additions.
- Ensure plates are properly sealed or covered during incubation steps.
- Complete removal of all solutions and buffers during wash steps.
- **This kit is sold based on number of tests. A ‘test’ simply refers to a single assay well. The number of wells that contain sample, control or standard will vary by product. Review the protocol completely to confirm this kit meets your requirements. Please contact our Technical Support staff with any questions.**

## 9. REAGENT PREPARATION

Equilibrate all reagents to room temperature (18-25°C) prior to use. Prepare fresh reagents immediately prior to use. When diluting the concentrates, make sure to rinse the bottle thoroughly to extract any precipitates left in the bottle. Mix the 1x solutions gently until the crystals have completely dissolved.

### 9.1 1X Diluent N

Dilute the 10X Diluent N Concentrate 1:10 with reagent grade water. Mix gently and thoroughly. *Store for up to 1 month at 4°C.*

### 9.2 1X Wash Buffer

Dilute the 20X Wash Buffer Concentrate 1:20 with reagent grade water. Mix gently and thoroughly.

### 9.3 1X Biotinylated C Reactive Protein Detector Antibody

9.3.1 The stock Biotinylated C Reactive Protein Antibody must be diluted with 1X Diluent N according to the label concentration to prepare 1X Biotinylated C Reactive Protein Antibody for use in the assay procedure. Observe the label for the “X” concentration on the vial of Biotinylated C Reactive Protein Antibody.

9.3.2 Calculate the necessary amount of 1X Diluent N to dilute the Biotinylated C Reactive Protein Antibody to prepare a 1X Biotinylated C Reactive Protein Antibody solution for use in the assay procedure according to how many wells you wish to use and the following calculation:

| Number of Wells Strips | Number of Wells | (V <sub>T</sub> ) Total Volume of 1X Biotinylated Antibody (μL) |
|------------------------|-----------------|---|
| 4                      | 32              | 1,760   |
| 6                      | 48              | 2,640   |
| 8                      | 64              | 3,520   |
| 10                     | 80              | 4,400   |
| 12                     | 96              | 5,280   |

*Any remaining solution should be frozen at -20°C.*

## Where:

$C_S$  = Starting concentration (X) of stock Biotinylated C Reactive Protein Antibody (variable)

$C_F$  = Final concentration (always = 1X) of 1X Biotinylated C Reactive Protein Antibody solution for the assay procedure

$V_T$  = Total required volume of 1X Biotinylated C Reactive Protein Antibody solution for the assay procedure

$V_A$  = Total volume of (X) stock Biotinylated C Reactive Protein Antibody

$V_D$  = Total volume of 1X Diluent N required to dilute (X) stock Biotinylated C Reactive Protein Antibody to prepare 1X Biotinylated C Reactive Protein solution for assay procedures

Calculate the volume of (X) stock Biotinylated Antibody required for the given number of desired wells:

$$(C_F / C_S) \times V_T = V_A$$

Calculate the final volume of 1X Diluent N required to prepare the 1X Biotinylated C Reactive Protein Antibody:

$$V_T - V_A = V_D$$

## Example:

**NOTE: This example is for demonstration purposes only. Please remember to check your antibody vial for the actual concentration of antibody provided.**

$C_S$  = 50X Biotinylated C Reactive Protein Antibody stock

$C_F$  = 1X Biotinylated C Reactive Protein Antibody solution for use in the assay procedure

$V_T$  = 3,520  $\mu$ L (8 well strips or 64 wells)

$$(1X/50X) \times 3,520 \mu\text{L} = 70.4 \mu\text{L}$$

$$3,520 \mu\text{L} - 70.4 \mu\text{L} = 3,449.6 \mu\text{L}$$

$V_A$  = 70.4  $\mu$ L total volume of (X) stock Biotinylated C Reactive Protein Antibody required

$V_D$  = 3,449.6  $\mu$ L total volume of 1X Diluent N required to dilute the 50X stock Biotinylated Antibody to prepare 1X Biotinylated C Reactive Protein Antibody solution for assay procedures

9.3.3 First spin the Biotinylated C Reactive Protein Antibody vial to collect the contents at the bottom.

9.3.4 Add calculated amount  $V_A$  of stock Biotinylated C Reactive Protein Antibody to the calculated amount  $V_D$  of 1X Diluent N. Mix gently and thoroughly.

### 9.4 **1X SP Conjugate**

Spin down the 100X Streptavidin-Peroxidase Conjugate (SP Conjugate) briefly and dilute the desired amount of the conjugate 1:100 with 1X Diluent N.

*Any remaining solution should be frozen at -20°C.*

## 10. STANDARD PREPARATIONS

- Prepare serially diluted standards immediately prior to use. Always prepare a fresh set of standards for every use.
- Any remaining standard should be stored at -20°C after reconstitution and used within 30 days.
- This procedure prepares sufficient standard dilutions for duplicate wells.

10.1 Reconstitution of the C Reactive Protein Standard vial to prepare the 16 ng/mL C Reactive Protein **Standard #1**.

10.1.1 First consult the C Reactive Protein Standard vial to determine the mass of protein in the vial.

10.1.2 Calculate the appropriate volume of 1X Diluent N to add when resuspending the C Reactive Protein Standard vial to produce a 16 ng/mL C Reactive Protein **Standard #1** by using the following equation:

$C_S$  = Starting mass of C Reactive Protein Standard (see vial label) (ng)

$C_F$  = 16 ng/mL C Reactive Protein **Standard #1** final required concentration

$V_D$  = Required volume of 1X Diluent N for reconstitution (μL)

Calculate total required volume 1X Diluent N for resuspension:

$$(C_S / C_F) \times 1,000 = V_D$$

## Example:

**NOTE: This example is for demonstration purposes only. Please remember to check your standard vial for the actual amount of standard provided.**

$C_S$  = 16 ng of C Reactive Protein Standard in vial

$C_F$  = 16 ng/mL C Reactive Protein **Standard #1** final concentration

$V_D$  = Required volume of 1X Diluent N for reconstitution

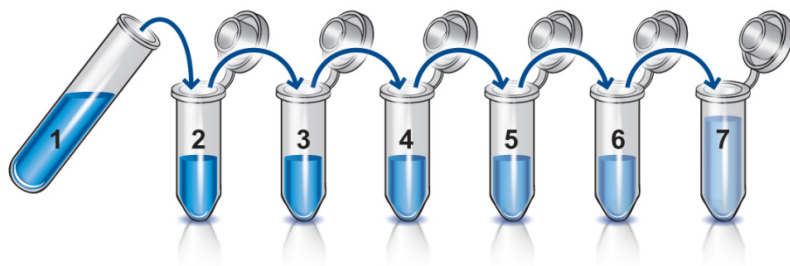
$$(16 \text{ ng} / 16 \text{ ng/mL}) \times 1,000 = 1,000 \text{ } \mu\text{L}$$

- 10.1.3 First briefly spin the C Reactive Protein Standard Vial to collect the contents on the bottom of the tube.
- 10.1.4 Reconstitute the C Reactive Protein Standard vial by adding the appropriate calculated amount  $V_D$  of 1X Diluent N to the vial to generate the 16 ng/mL C Reactive Protein **Standard #1**. Mix gently and thoroughly.
- 10.2 Allow the reconstituted 16 ng/mL C Reactive Protein **Standard #1** to sit for 10 minutes with gentle agitation prior to making subsequent dilutions
- 10.3 Label seven tubes #2 – 8.
- 10.4 Add 120  $\mu\text{L}$  of 1X Diluent N to tubes #2 – 8.
- 10.5 To prepare **Standard #2**, add 120  $\mu\text{L}$  of the **Standard #1** into tube #2 and mix gently.
- 10.6 To prepare **Standard #3**, add 120  $\mu\text{L}$  of the **Standard #2** into tube #3 and mix gently.
- 10.7 Using the table below as a guide, prepare subsequent serial dilutions
- 10.8 1X Diluent N serves as the zero standard, 0 ng/mL (tube #8).

# ASSAY PREPARATION

**Standard Dilution Preparation Table**

| Standard # | Volume to Dilute (μL) | Volume Diluent N (μL) | Total Volume (μL) | Starting Conc. (ng/mL) | Final Conc. (ng/mL) |
|------------|-----------------------|-----------------------|-------------------|------------------------|---------------------|
| 1          | <b>Step 10.1</b>      |                       |                   |                        | <b>16.00</b>        |
| 2          | 120                   | 120                   | 240               | 16.00                  | 8.00                |
| 3          | 120                   | 120                   | 240               | 8.00                   | 4.00                |
| 4          | 120                   | 120                   | 240               | 4.00                   | 2.00                |
| 5          | 120                   | 120                   | 240               | 2.00                   | 1.00                |
| 6          | 120                   | 120                   | 240               | 1.00                   | 0.50                |
| 7          | 120                   | 120                   | 240               | 0.50                   | 0.25                |
| 8          | -                     | 120                   | 120               | -                      | 0                   |



## 11. SAMPLE PREPARATION

### 11.1 Plasma

Collect plasma using one-tenth volume of 0.1 M sodium citrate as an anticoagulant. Centrifuge samples at 3,000 x *g* for 10 minutes. Dilute samples 1:4,000 with 1X Diluent N and assay. If necessary dilute samples within the range of 1:1,000 to 1:8,000. 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 anticoagulant.).

### 11.2 Cell Culture Supernatants

Centrifuge cell culture media at 1500 rpm for 10 minutes at 4°C to remove debris and collect supernatants. If necessary, dilute samples into Diluent N; user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -80°C. Avoid repeated freeze-thaw cycles.

### 11.3 Serum

Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 3,000 x *g* for 10 minutes and remove serum. Dilute samples 1:4,000 into 1X Diluent N and assay. If necessary dilute samples 1:1,000 to 1:8,000. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.

### 11.4 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.

### 11.5 Milk

Collect milk using sample tube. Centrifuge samples at 800 x g for 10 minutes. Milk dilution is suggested at 1:30 into 1X Diluent N then assay; however, the user should determine the optimal dilution factor. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.

### 11.6 Urine

Collect urine 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.

### 11.7 CSF

Collect cerebrospinal fluid (CSF) using sample pot. Centrifuge samples at 3000 x g for 10 minutes. Dilute samples 1:10 into EIA Diluent and assay. The undiluted samples can be stored at -80°C for up to 3 months. Avoid repeated freeze-thaw cycles.

### 11.8 Cell Lysate

Rinse cell with cold PBS and then scrape the cell into a tube with 5 ml of cold PBS and 0.5 M EDTA. Centrifuge suspension at 1500 rpm for 10 minutes at 4°C and aspirate supernatant. Resuspend pellet in ice-cold Lysis Buffer (PBS, 1% Triton X-100, protease inhibitor cocktail). For every  $1 \times 10^6$  cells, add approximately 100 µl of ice-cold Lysis Buffer. Incubate on ice for 60 minutes. Centrifuge at 13000 rpm for 30 minutes at 4°C and collect supernatant. If necessary, dilute samples into Diluent N; user should determine optimal dilution factor depending on application

needs. The undiluted samples can be stored at  $-80^{\circ}\text{C}$ . Avoid repeated freeze-thaw cycles.

### 12. PLATE PREPARATION

- The 96 well plate strips included with this kit are supplied ready to use. It is not necessary to rinse the plate prior to adding reagents.
- Unused well plate strips should be returned to the plate packet and stored at  $4^{\circ}\text{C}$ .
- For statistical reasons, we recommend each sample should be assayed with a minimum of two replicates (duplicates).
- Well effects have not been observed with this assay. Contents of each well can be recorded on the template sheet included in the Resources section.

### **13. ASSAY PROCEDURE**

- **Equilibrate all materials and prepared reagents to room temperature (18-25°C) prior to use.**
- **It is recommended to assay all standards, controls and samples in duplicate.**

- 13.1 Prepare all reagents, working standards and samples as instructed. Equilibrate reagents to room temperature before use. The assay is performed at room temperature (18-25°C).
- 13.2 Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccant inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- 13.3 Add 50 µL of C Reactive Protein Standard or sample per well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for two hours. Start the timer after the last sample addition.
- 13.4 Wash five times with 200 µL of 1X Wash Buffer manually. Invert the plate each time and decant the contents; tap it 4-5 times on absorbent paper towel to completely remove the liquid. If using a machine wash six times with 300 µL of 1X Wash Buffer and then invert the plate, decant the contents; tap it 4-5 times on absorbent paper towel to completely remove the liquid.
- 13.5 Add 50 µL of 1X Biotinylated C Reactive Protein Antibody to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 30 minutes.
- 13.6 Wash microplate as described above.
- 13.7 Add 50 µL of 1X SP Conjugate to each well and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.

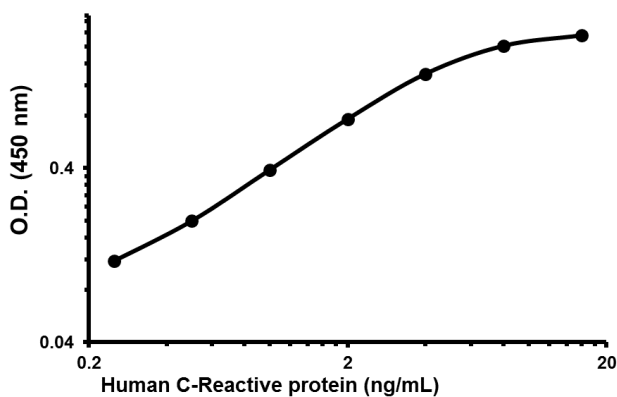
- 13.8 Wash microplate as described above.
- 13.9 Add 50  $\mu$ L of Chromogen Substrate per well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Incubate in ambient light for about 15 minutes or till the optimal blue colour density develops. Gently tap plate to ensure thorough mixing and break the bubbles in the well with pipette tip.
- 13.10 Add 50  $\mu$ L of Stop Solution to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. The color will change from blue to yellow.
- 13.11 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.

### **14. CALCULATIONS**

Calculate the mean value of the 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 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.

## 15. TYPICAL DATA

**TYPICAL STANDARD CURVE** – Data provided for demonstration purposes only. A new standard curve must be generated for each assay performed.



## 16. TYPICAL SAMPLE VALUES

### SENSITIVITY –

The minimum detectable dose of C Reactive Protein is typically ~0.2 ng/mL.

### RECOVERY –

Standard Added Value: 0.5 – 8 ng/mL

Recovery %: 92 – 114

Average Recovery %: 99

### LINEARITY OF DILUTION –

| Plasma Dilution | Average % Expected Value |
|-----------------|--------------------------|
| 1:2,000         | 95                       |
| 1:4,000         | 99                       |
| 1:8,000         | 106                      |

| Serum Dilution | Average % Expected Value |
|----------------|--------------------------|
| 1:2,000        | 93                       |
| 1:4,000        | 101                      |
| 1:8,000        | 105                      |

### PRECISION –

|      | Intra-Assay | Inter-Assay |
|------|-------------|-------------|
| % CV | 3.9         | 9.2         |

**17. ASSAY SPECIFICITY**

| <b>Species</b> | <b>% Cross Reactivity</b> |
|----------------|---------------------------|
| Canine         | None                      |
| Bovine         | None                      |
| Monkey         | None                      |
| Mouse          | None                      |
| Rat            | None                      |
| Swine          | <10                       |
| Human          | 100                       |
| Rabbit         | None                      |

## 18. TROUBLESHOOTING

| Problem             | Cause  | Solution  |
|---------------------|--|---|
| Poor standard curve | Improper standard dilution   | Confirm dilutions made correctly  |
|                     | Standard improperly reconstituted (if applicable)  | Briefly spin vial before opening; thoroughly resuspend powder (if applicable)                                 |
|                     | Standard degraded  | Store sample as recommended   |
|                     | Curve doesn't fit scale  | Try plotting using different scale  |
| Low signal          | Incubation time too short  | Try overnight incubation at 4°C   |
|                     | Target present below detection limits of assay   | Decrease dilution factor; concentrate samples   |
|                     | Precipitate can form in wells upon substrate addition when concentration of target is too high | Increase dilution factor of sample  |
|                     | Using incompatible sample type (e.g. serum vs. cell extract)                                   | Detection may be reduced or absent in untested sample types   |
|                     | Sample prepared incorrectly  | Ensure proper sample preparation/dilution   |
| Large CV            | Bubbles in wells   | Ensure no bubbles present prior to reading plate  |
|                     | All wells not washed equally/thoroughly  | Check that all ports of plate washer are unobstructed wash wells as recommended                               |
|                     | Incomplete reagent mixing  | Ensure all reagents/master mixes are mixed thoroughly   |
|                     | Inconsistent pipetting   | Use calibrated pipettes and ensure accurate pipetting   |
|                     | Inconsistent sample preparation or storage   | Ensure consistent sample preparation and optimal sample storage conditions (eg. minimize freeze/thaws cycles) |

## RESOURCES

| Problem                             | Cause  | Solution   |
|-------------------------------------|--|--|
| High background/<br>Low sensitivity | Wells are insufficiently washed                              | Wash wells as per protocol recommendations   |
|                                     | Contaminated wash buffer                                     | Make fresh wash buffer   |
|                                     | Waiting too long to read plate after adding STOP solution    | Read plate immediately after adding STOP solution  |
|                                     | Improper storage of ELISA kit                                | Store all reagents as recommended. Please note all reagents may not have identical storage requirements. |
|                                     | Using incompatible sample type (e.g. Serum vs. cell extract) | Detection may be reduced or absent in untested sample types  |

### 19. NOTES

10% FBS in culture media will not affect the assay.





**For all technical and commercial enquires please go to:**

[www.abcam.com/contactus](http://www.abcam.com/contactus)

[www.abcam.cn/contactus](http://www.abcam.cn/contactus) (China)

[www.abcam.co.jp/contactus](http://www.abcam.co.jp/contactus) (Japan)