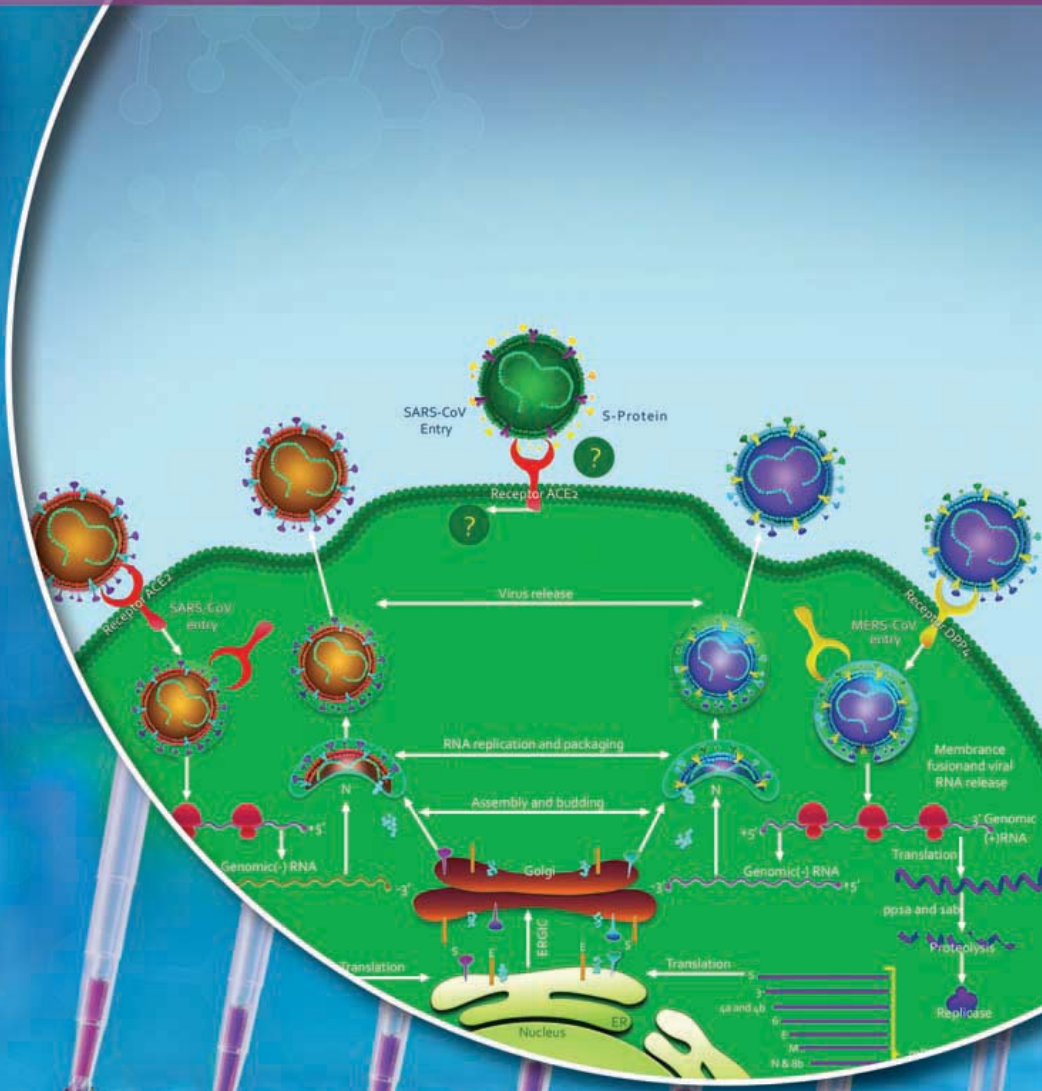
# Human ACE2 (Angiotensin-converting enzyme 2) Pre-Coated ELISA Kit




USER MANUAL

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# Human ACE2
## (Angiotensin-converting enzyme 2)
# Pre-Coated ELISA Kit

Catalog No: 90-7003
1 × 96 well Format (96 tests)
Detection Range: 0.391-25 ng/ml
Sensitivity: <0.234 ng/ml

For quantitative detection of ACE2 in serum, plasma, tissue homogenates and other biological fluids.

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## I. BACKGROUND

Angiotensin I-converting enzyme2 (ACE 2) is a protein belongs to the angiotensin-converting enzyme family of dipeptidyl carboxydipeptidases and has considerable homology to human angiotensin 1 converting enzyme. By sequence similarity to a sequence in GenBank, this gene is mapped to Xp22.2. This secreted protein catalyzes the cleavage of angiotensin I into angiotensin 1-9, and angiotensin II into the vasodilator angiotensin 1-7. The organ- and cell-specific expression of this gene suggests that it may play a role in the regulation of cardiovascular and renal function, as well as fertility. In addition, the encoded protein is a functional receptor for the spike glycoprotein of the human coronaviruses SARS and HCoV-NL63.

## II. OVERVIEW

This assay employs an antibody specific for Anti-Human ACE2 coated on a 96-well plate. Standards and samples are pipetted into the wells and ACE2present in a sample is bound to the wells by the immobilized antibody. The wells are washed and biotinylated anti-human ACE2 antibody is added. After washing away unbound biotinylated antibody, HRP-conjugated streptavidin is pipetted to the wells. The wells are again washed, a TMB substrate solution is added to the wells and color develops in proportion to the amount of ACE2bound. The Stop Solution changes the color from blue to yellow, and the intensity of the color is measured at 450 nm.

## III. ADVANTAGES

Multiple samples can be analyzed in a low volume, high-throughput format. Full analysis can be completed in 2 hours.

## IV. STORAGE

Kit can be stored in 4°C, if you are using within a week. If you are using within 6 months, lyophilized standard can be stored in -20°C and other components at 4°C.

### Kit Components

| Item | Specifications | Storage |
|---|---|---|
| 96 well Strip ELISA Plate | 8 X 12 well | 4°C |
| Lyophilized Standard | 2 vials | -20°C |
| Sample and Standard Dilution Buffer | 20 ml | 4°C |
| Biotinylated Detection Antibody for hACE2 | 120 µl | 4°C in dark |
| Antibody Dilution Buffer | 10 ml | 4°C |
| HRP Conjugated Streptavidin | 120 µl | 4°C in dark |
| SABC Dilution Buffer | 10 ml | 4°C |
| TMB Substrate | 10 ml | 4°C in dark |
| Stop Solution | 10 ml | 4°C |
| 25X Wash Buffer | 30 ml | 4°C |
| Plate Sealer | 5 pieces | |
| Product Manual | 1 Copy | |

### Material Required, (Not Supplied)

Microplate Reader
37°C Incubator
Plate Reader
Multi Chanel Pipette and disposable tips
Eppendorf Tubes
Deionized Water

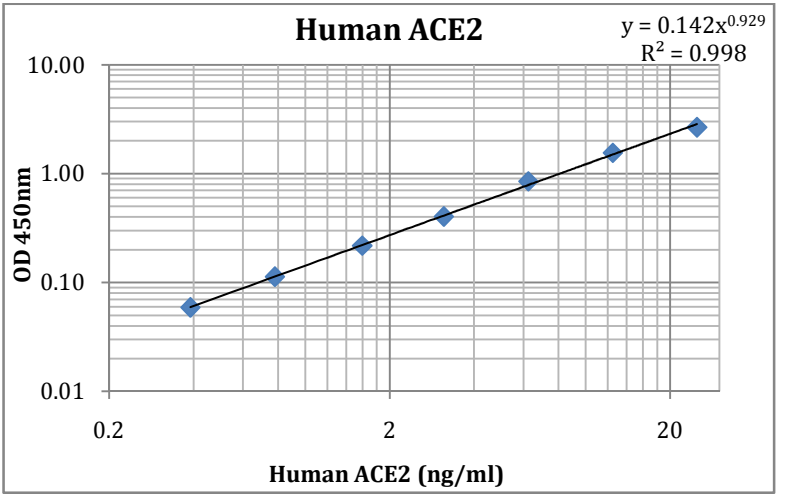
## V. PRECAUTIONS FOR USE

1. To inspect the validity of experiment operation and the appropriateness of sample dilution proportion, pilot experiment using standards and a small number of samples is recommended.
2. After opening and before using, keep plate dry.
3. Before using the Kit, spin tubes and bring down all components to the bottom of tubes.
4. Store TMB reagents avoid light.

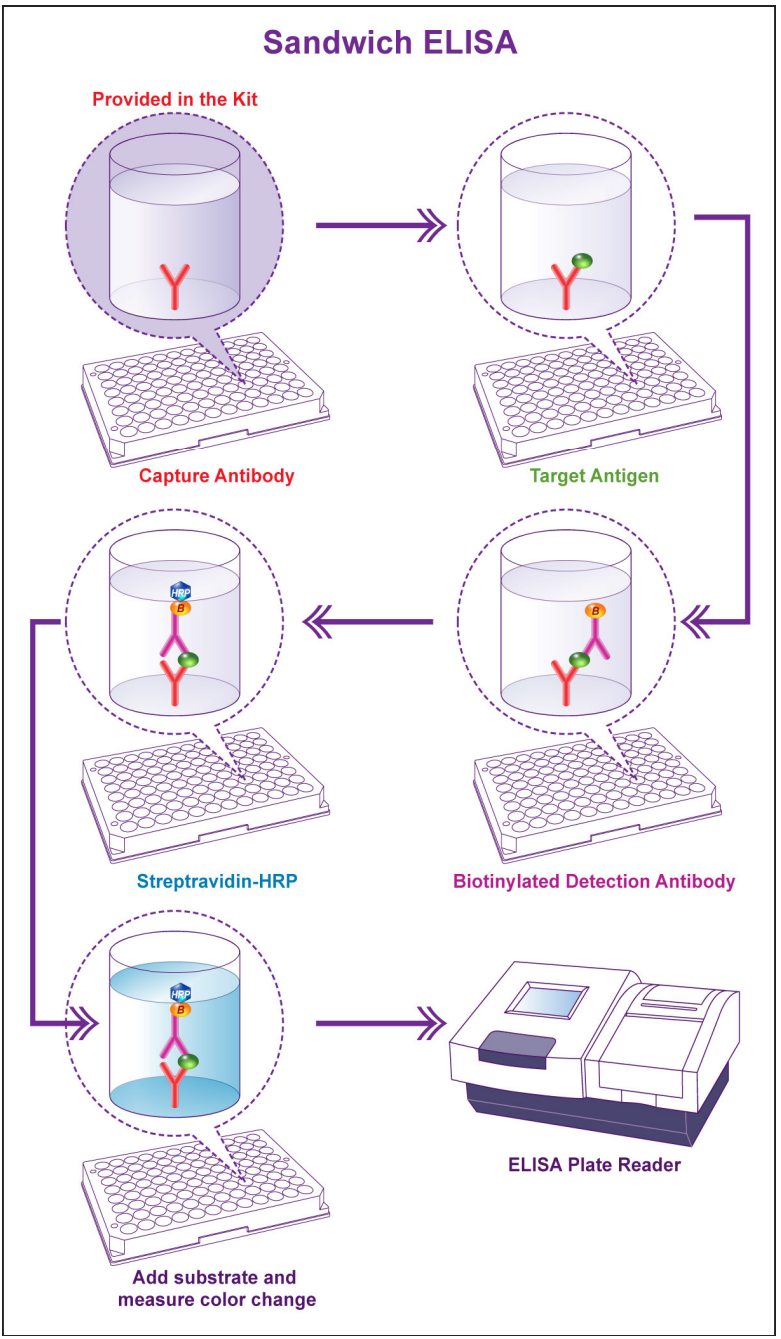
5. Washing process is very important, not fully washing can easily cause a false positive.
6. Duplicate well assay is recommended for both standard and sample testing.
7. Don't let the Micro plate dry during the assay, drying will disable active components on the plate.
8. Don't reuse tips and tubes to avoid cross contamination.
9. Avoid using the reagents from different batches together.

## VI. STANDARD CURVE

Human ACE2 Standard Curve is shown below.




| X | ng/ml | 25 | 12.5 | 6.25 | 3.125 | 1.6 | 0.8 | 0.4 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| Y | O.D.450 | 2.67 | 1.552 | 0.855 | 0.41 | 0.225 | 0.12 | 0.067 | 0007 |


Sandwich ELISA
Provided in the Kit
Capture Antibody
Target Antigen
Biotinylated Detection Antibody
Streptravidin-HRP
Add substrate and measure color change
ELISA Plate Reader

## VII. REAGENT PREPARATION AND STORAGE

*Included buffers and reagents are optimized for use with this kit. Substitution with other reagents is not recommended and may not give optimal results.*

1. **Prepare Standard Curve:** One hour before the experiment. Use one tube for each experiment.

   **a.** Quick spin down one vial of lyophilized standard. ***(DO NOT dilute standard directly on the plate)***. Add 1ml of sample/standard dilution buffer into one of the standard tube. Incubate at room temp. for 10 min. Mix thoroughly by vortex. Stock Standard concentration is 25 ng/ml.

   ***Note:*** *If the standard tube concentration higher than the range of the kit, please dilute it and labeled as zero tube.*

   **b.** Label 7 EP tubes with 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 and blank respectively. Add 0.3ml of the Sample Dilution Buffer into each tube. Add 0.3ml of the above Standard solution (from zero tube) into 1st tube and mix them thoroughly. Transfer 0.3ml from 1st tube to 2nd tube and mix them thoroughly. Transfer 0.3ml from 2nd tube to 3rd tube and mix them thoroughly, and so on. Sample Dilution Buffer was used for the blank control.

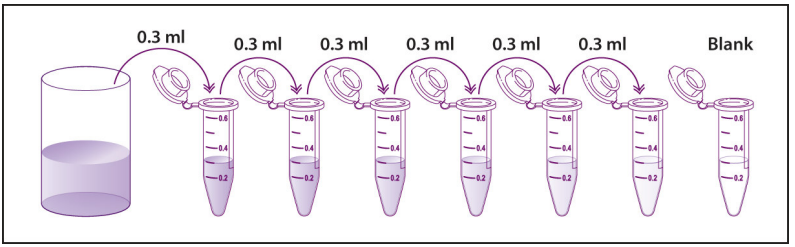



**Fig-1: Dilution tubes**

***Note:*** *Standard Solutions are best used within 2 hrs. Standard solution should be stored at 4°C for up to 12 hrs. or store at -20°C for up to 48 hrs. Avoid repeated freeze-thaw.*

2. **Sample Preparation and storage:** Test samples should be collected, analyze immediately (within 2 hrs.) or aliquot and store at -20°C for long term. Avoid multiple freeze-thaw cycles.

**a.** **Cell culture supernatants**: Centrifuge to remove precipitate, analyze immediately or aliquot and store at -20°C.

**b.** **Serum**: Coagulate the serum at room temp about 1 hr. Centrifuge approximately 1000 × g for 15 min. Analyze serum immediately or aliquot and store at -20°C.

**c.** **Plasma:** Collect plasma with heparin or EDTA as the anti-coagulant. Centrifuge for 15 min at 2-8°C at 1500 × g within 30 min of collection. For eliminating the platelet effect, suggesting that further centrifugation for 10 min at 2-8°C at 10,000 × g. Analyze immediately or aliquot and store frozen at -20°C.

**d.** **Tissue Homogenates**: For general information, hemolytic blood may affect the results, you should rinse the tissues with ice cold PBS (0.01M, pH 7.4) to remove excess blood thoroughly. Tissue pieces should be weighed and then minced to small pieces. This will be homogenized in PBS in a cold glass homogenizer. *(Volume depends on the weight of the tissue, 1gram of tissue requires 9 ml of ice cold PBS with protease inhibitor)*. To further break the cells, you can sonicate the suspension with an ultrasonic cell disrupter or subject it to freeze- thaw cycle. Homogenates are then centrifuged for 5 min. at 5000 × g to get the supernatant.

***Note:*** *Samples to be used within 5 days may be store at 4°C, otherwise sample should be stored at -20°C (<1 month) or -80°C (<2 months) to avoid loss of bioactivity and contamination. Hemolyzed samples are not suitable for use in this Assay.*

**e.** End user should estimate the concentration of the target protein in the test samples first, then select proper dilution factor to make the diluted target protein concentration falls the optimal detection range of the kit. Dilute the samples with the provided dilution buffer. Several trials may be necessary in practice. The test sample should be well mixed with the dilution buffer. Standard curve and sample should be made before the experiment.

High target protein concentration 10-100 ng/ml: Dilute 1:100 (add 1 µl of sample into 99 µl of sample/ standard dilution buffer).

Medium target protein concentration 1-10 ng/ml: Dilute 1:10 (add 10 µl of sample into 90 µl of sample/ standard dilution buffer).

Low target protein concentration 15.6-1000 pg/ml: Dilute 1:2 (add 50 µl of sample into 50 µl of sample/ standard dilution buffer).

Very low target protein concentration <15.6 pg/ml: Do not dilute, use 100 µl of sample.

3. **Preparation of Biotin detection antibody working solution:** Prepare within one hour before the experiment. Calculate total volume working solution required. (0.1 ml/ well × number of wells. Add 100-200 µl extra).

   Dilute Biotin detection antibody with antibody dilution buffer at 1:100 and mix thoroughly. (*i.e.* add 1 µl of Biotin conjugated detection antibody into 99 µl of antibody dilution buffer).

4. **Preparation of HRP-Streptavidin Conjugate (SABC) working solution:** Prepare within 30 min before the experiment. Calculate total volume working solution required. (0.1 ml/well × number of wells. Add 100- 200 µl extra).

   Dilute SABC with SABC dilution buffer at 1:100 and mix thoroughly. (*i.e.* add 1 µl of SABC into 99 µl of SABC dilution buffer).

5. **Preparation of 1 X Wash buffer:** Prepare 1 X Wash buffer by diluting 25X Wash buffer in sterile water. Diluted Wash buffer may be stored at 4°C, however we recommend preparing fresh 1X wash buffer for each experiment.

   *For example: 10 ml of 25X Wash buffer in 240 ml of sterile water.*

## VIII. ASSAY PROCEDURE:

Before starting the experiment, equilibrate the SABC working solution and TMB substrate for at least 30 min at room temp. When diluting samples and reagents, they should be mixed completely and evenly. It is recommended to plot a standard curve for each test.

** If not all microplate strips will be used, remove the excess strips by pressing up from underneath each strip. Place excess strips back in the foil pouch with the included desiccant pack and reseal.*

1. Set standard, test sample and blank (control zero) wells on the pre-coated plate and then record their position. It is recommended to measure each standard and sample in duplicate.

   ***Note:*** *Wash plate twice before adding standard, sample and blank into the well.*

2. Add 0.1 ml of standard (12.5 ng/ml, 6.25 ng/ml. 3.125 ng/ml, 1.6 ng/ml, 0.8 ng/ml, 0.4 ng/ml, control zero dilution buffer) into standard well.
3. Add 0.1 ml of diluted samples into test sample wells.
4. Seal plate with a cover and incubate at 37°C for 90 min.
5. Remove the cover and discard samples and standard solution by tapping plate on an absorbent paper. ***Note:*** *DO NOT let the wells completely dry any time. DO NOT wash plate.*
6. Add 0.1 ml of Biotin-detection antibody working solution into the above wells (Standards, control zero and samples).
7. Seal plate with cover and incubate at 37°C for 60 min.
8. Remove the cover, and wash plate 3 times with 1X wash buffer.
9. Add 0.1 ml of SABC working solution into each well. Cover the plate and incubate at 37°C for 30 min.
10. Remove the cover and wash plate 5 times with 1X wash buffer. Each time let the wash buffer stay in the well for 1-2 min.
11. Add 90 µl of TMB substrate into each well, cover the plate and incubate at 37°C in dark within 15-30 min. *(**Note**: This incubation time is for reference use only. The optimal time should be determined by end user)*. The shades of blue can be seen in the first 3-4 wells, only on most concentrated standards. Other wells show no obvious color.
12. Add 50 µl of stop solution into each well and mix thoroughly. Color will change into yellow immediately.
13. Read O.D. absorbance at 450 nm in a micro-plate reader immediately after adding the stop solution.

**14.** Calculation: Relative O.D. 450 = O.D. for each well – O.D. 450 control zero well. The Standard curve can be plotted as the relative O.D. 450 of each standard solution in Y axis vs. the respective concentration of the standard in X axis. Concentration of the samples can be incorporated from the standard curve. If the samples were diluted, multiply the dilution factor to the concentration.

**Table-1**

| | Standard1 | Standard2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | **25 ng/ml** | **25 ng/ml** | | | | | | | | | | |
| **B** | **12.5 ng/ml** | **12.5 ng/ml** | | | | | | | | | | |
| **C** | **6.25 ng/ml** | **6.25 ng/ml** | | | | | | | | | | |
| **D** | **3.125ng/ml** | **3.125ng/ml** | | | | | | | | | | |
| **E** | **1.6 ng/ml** | **1.6 ng/ml** | | | | | | | | | | |
| **F** | **0.8 ng/ml** | **0.8 ng/ml** | | | | | | | | | | |
| **G** | **0.4 ng/ml** | **0.4 ng/ml** | | | | | | | | | | |
| **H** | **0** | **0** | | | | | | | | | | |

## IX. TROUBLE SHOOTING:

| Problem | Probable Cause | Suggestion |
|---|---|---|
| No signal | Forgot to add all components. | Prepare check list and add the components in the correct order. |
| Low signal | Not enough lysates per well. | Check the protein concentration. Add more lysates. |
| High background | Washing is not sufficient. | Wash plates thoroughly after incubation with Streptavidin-HRP secondary |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