

CCB409Hu 96 Tests
Chemiluminescent Immunoassay Kit
For Hemoglobin (HB)
Organism Species: Homo sapiens (Human)
Instruction manual

FOR IN VITRO AND RESEARCH USE ONLY
NOT FOR USE IN CLINICAL DIAGNOSTIC PROCEDURES

6th Edition (Revised in July, 2013)

[INTENDED USE]

The Chemiluminescent Immunoassay kit is designed for the in vitro sensitive quantitative measurement of hemoglobin in human serum, plasma, tissue homogenates, erythrocyte lysates, cell culture supernates and other biological fluids.

[REAGENTS AND MATERIALS PROVIDED]

| Reagents | Quantity | Reagents | Quantity |
|--|----------|---------------------------|----------|
| Pre-coated, ready to use 96-well strip plate | 1 | Plate sealer for 96 wells | 4 |
| Standard | 2 | Standard Diluent | 1×20mL |
| Detection Reagent A | 1×120μL | Assay Diluent A | 1×12mL |
| Detection Reagent B | 1×120μL | Assay Diluent B | 1×12mL |
| Substrate A | 1×10mL | Substrate B | 1×2mL |
| Wash Buffer (30 × concentrate) | 1×20mL | Instruction manual | 1 |

[MATERIALS REQUIRED BUT NOT SUPPLIED]

1. Luminometer capable of reading 96-well microplates with the following parameters:
lag time 30.0secs; read time 1.0 sec/well .
2. Precision single or multi-channel pipettes and pipette tips with disposable tips.
3. Eppendorf Tubes for diluting samples.
4. Deionized or distilled water.
5. Absorbent paper for blotting the microtiter plate.
6. Container for Wash Solution

[STORAGE OF THE KITS]

1. **For unopened kit:** All the reagents should be kept according to the labels on vials. The **Standard, Detection Reagent A, Detection Reagent B** and the **96-well strip plate** should be stored at -20°C upon receipt while the others should be at 4 °C.
2. **For opened kit:** When the kit is opened, the remaining reagents still need to be stored according to the above storage condition. Besides, please return the unused wells to the foil pouch containing the desiccant pack, and reseal along entire edge of zip-seal.

Note:

It is highly recommended to use the remaining reagents within 1 month provided this is within the expiration date of the kit. For the expiration date of the kit, please refer to the label on the kit box. All components are stable until this expiration date.

[SAMPLE COLLECTION AND STORAGE]

Serum - Use a serum separator tube and allow samples to clot for two hours at room temperature or overnight at 4°C before centrifugation for 20 minutes at approximately 1000×g. Assay freshly prepared serum immediately or store samples in aliquot at -20°C or -80°C for later use. Avoid repeated freeze/thaw cycles.

Plasma - Collect plasma using EDTA or heparin as an anticoagulant. Centrifuge samples for 15 minutes at 1000×g at 2 - 8°C within 30 minutes of collection. Remove plasma and assay immediately or store samples in aliquot at -20°C or -80°C for later use. Avoid repeated freeze/thaw cycles.

Tissue homogenates - The preparation of tissue homogenates will vary depending upon tissue type. For this assay, tissues were rinsed in ice-cold PBS(0.01mol/L,pH 7.0-7.2) to remove excess blood thoroughly and weighed before homogenization. Minced the tissues to small pieces and homogenized them in 5-10mL of PBS with a glass homogenizer on ice(Micro Tissue Grinders works, too). The resulting suspension was sonicated with an ultrasonic cell disrupter or subjected to two freeze-thaw cycles to further break the cell membranes. After that, the homogenates were centrifugated for 5 minutes at 5000×g. Remove the supernate and assay immediately or aliquot and store at $\leq -20^{\circ}\text{C}$.

Erythrocyte lysates:

1. Centrifuge the whole blood for 20 minutes at approximately 1000×g, remove the supernatant and collect the cells.
2. Wash cells three times in cold PBS(0.01mol/L, pH 7.0-7.2).
3. Resuspend cells in ice-cold PBS and the cells was subject to freeze cells at $\leq -20^{\circ}\text{C}$. Thaw cells with gentle mixing. Repeat the freeze/thaw cycle for 3 times.
4. Centrifuge at 5,000×g for 10 minutes at 2 - 8°C to remove cellular debris.
5. Assay the supernatant immediately or store samples in aliquot at -20°C or -80°C. Avoid repeated freeze/thaw cycles.

Cell culture supernates and other biological fluids - Centrifuge samples for 20 minutes at 1000×g. Remove particulates and assay immediately or store samples in aliquot at -20°C or -80°C for later use. Avoid repeated freeze/thaw cycles.

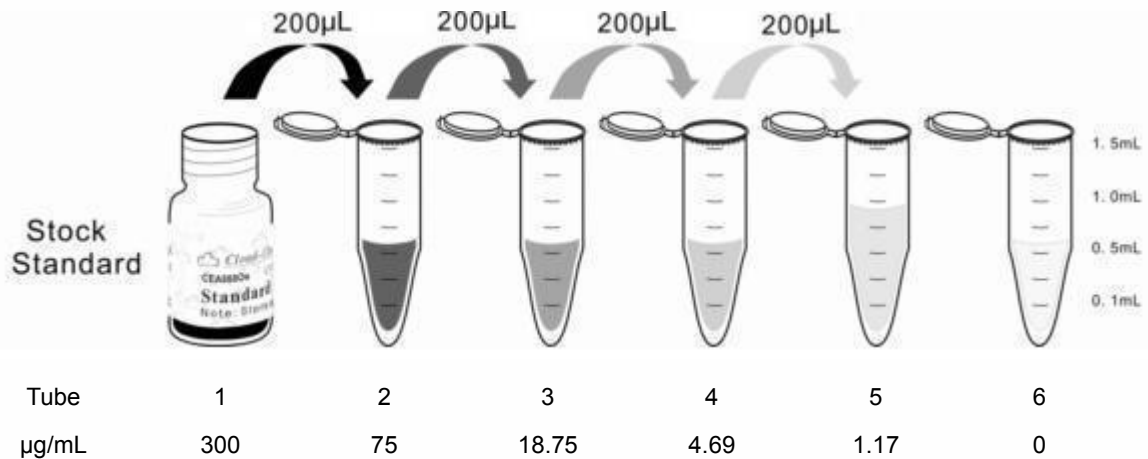
Note:

1. Samples to be used within 5 days may be stored at 4°C, otherwise samples must be stored at -20°C (≤ 1 month) or -80°C (≤ 2 months) to avoid loss of bioactivity and contamination.
2. Sample hemolysis will influence the result, so hemolytic specimen should not be detected.
3. When performing the assay, bring samples to room temperature.

[REAGENT PREPARATION]

1. Bring all kit components and samples to room temperature (18-25°C) before use.
2. **Standard** - Reconstitute the **Standard** with 0.5mL of **Standard Diluent**, kept for 10 minutes at room temperature, shake gently(not to foam). The concentration of the standard in the stock solution is 300µg/mL.

Please prepare 5 tubes containing 0.6mL Standard Diluent and produce a quadruple dilution series according to the picture shown below. Mix each tube thoroughly before the next transfer. Set up 5 points of diluted standard such as 300µg/mL, 75µg/mL, 18.75µg/mL, 4.69µg/mL, 1.17µg/mL, and the last EP tubes with **Standard Diluent** is the blank as 0µg/mL.



- Detection Reagent A and Detection Reagent B** - Briefly spin or centrifuge the stock Detection A and Detection B before use. Dilute to the working concentration with **Assay Diluent A** and **B**, respectively (1:100).
- Wash Solution** - Dilute 20mL of Wash Solution concentrate (30×) with 580mL of deionized or distilled water to prepare 600mL of Wash Solution (1×).
- Substrate working Solution** - Mix the substrate A and B by the ratio of 99:1 to make the substrate working solution. Mix thoroughly. For example, prepare 1,000µL Substrate working Solution with 990µL Substrate A + 10µL Substrate B.

Note:

- Making serial dilution in the wells directly is not permitted.
- Prepare standard within 15 minutes before assay. Please do not dissolve the reagents at 37°C directly.
- Please carefully reconstitute Standards or working Detection Reagent A and B according to the instruction, and avoid foaming and mix gently until the crystals are completely dissolved. To minimize imprecision caused by pipetting, use small volumes and ensure that pipettors are calibrated. It is recommended to suck more than 10µL for once pipetting.
- The reconstituted Standards, Detection Reagent A and Detection Reagent B can be **used only once**.
- Prepare Substrate working Solution within 15 minutes before assay.
- If crystals have formed in the Wash Solution concentrate (30×), warm to room temperature and mix gently until the crystals are completely dissolved.
- Contaminated water or container for reagent preparation will influence the detection result.

[SAMPLE PREPARATION]

- We are only responsible for the kit itself, but not for the samples consumed during the assay. The user should calculate the possible amount of the samples used in the whole test. Please reserve sufficient samples in advance.

2. Please predict the concentration before assaying. If values for these are not within the range of the standard curve, users must determine the optimal sample dilutions for their particular experiments. Sample should be diluted by 0.01mol/L PBS(PH=7.0-7.2).
3. If free HB is detected in nonhemolyzed serum and plasma, samples require about a 10 fold dilution. A suggested 10-fold dilution is 20 μ L Sample + 180 μ L PBS. Sample should be diluted by 0.01mol/L PBS(PH=7.0-7.2).
4. If the samples are not indicated in the manual, a preliminary experiment to determine the validity of the kit is necessary.
5. Tissue or cell extraction samples prepared by chemical lysis buffer may cause unexpected CLIA results due to the impacts from certain chemicals.
6. Due to the possibility of mismatching between antigen from other origin and antibody used in our kits (e.g., antibody targets conformational epitope rather than linear epitope), some native or recombinant proteins from other manufacturers may not be recognized by our products.
7. Influenced by the factors including cell viability, cell number or sampling time, samples from cell culture supernatant may not be detected by the kit.
8. Fresh samples without long time storage is recommended for the test. Otherwise, protein degradation and denaturalization may occur in those samples and finally lead to wrong results.

[ASSAY PROCEDURE]

1. Determine wells for diluted standard, blank and sample. Prepare 5 wells for standard points, 1 well for blank. Add 50 μ L each of dilutions of standard (read Reagent Preparation), blank and samples into the appropriate wells, respectively. And then add 50 μ L of **Detection Reagent A** to each well immediately. Shake the plate gently (using a microplate shaker is recommended). Cover with a Plate sealer. Incubate for 1 hour at 37°C. Detection Reagent A may appear cloudy. Warm to room temperature and mix gently until solution appears uniform.
2. Aspirate the solution and wash with 350 μ L of 1X Wash Solution to each well using a squirt bottle, multi-channel pipette, manifold dispenser or autowasher, and let it sit for 1-2 minutes. Remove the remaining liquid from all wells completely by snapping the plate onto absorbent paper. Repeat 3 times. After the last wash, remove any remaining Wash Buffer by aspirating or decanting. Invert the plate and blot it against absorbent paper.
3. Add 100 μ L of **Detection Reagent B** working solution to each well. Incubate for 30 minutes at 37°C after covering it with the Plate sealer.
4. Repeat the aspiration/wash process for total 5 times as conducted in step 2.
5. Add 100 μ L of **Substrate working Solution** to each well. Cover with a new Plate sealer. Incubate for 10 minutes at 37°C. Protect from light.
6. Measure the chemiluminescence signal in a microplate luminometer or as appropriate for the instrument used.

Note:

1. **Assay preparation:** Keep appropriate numbers of wells for each experiment and remove extra wells from microplate. Rest wells should be resealed and stored at -20°C.

2. **Samples or reagents addition: Please use the freshly prepared Standard.** Please carefully add samples to wells and mix gently to avoid foaming. Do not touch the well wall. For each step in the procedure, total dispensing time for addition of reagents or samples to the assay plate should not exceed 10 minutes. This will ensure equal elapsed time for each pipetting step, without interruption. Duplication of all standards and specimens, although not required, is recommended. To avoid cross-contamination, change pipette tips between additions of standards, samples, and reagents. Also, use separated reservoirs for each reagent.
3. **Incubation:** To ensure accurate results, proper adhesion of plate sealers during incubation steps is necessary. Do not allow wells to sit uncovered for extended periods between incubation steps. Once reagents are added to the well strips, DO NOT let the strips DRY at any time during the assay. Incubation time and temperature must be controlled.
4. **Washing:** The wash procedure is critical. Complete removal of liquid at each step is essential for good performance. After the last wash, remove any remaining Wash Solution by aspirating or decanting and remove any drop of water and fingerprint on the bottom of the plate. Insufficient washing will result in poor precision and false elevated absorbance reading.
5. **For Substrate A and B,** please protect it from light.
6. Relative light units (RLUs) may differ from different luminometers. The Immunoassay was optimized using a Beijing Hamamatsu luminometer. Other instruments may require settings to be adjusted.

[TEST PRINCIPLE]

The microtiter plate provided in this kit has been pre-coated with a monoclonal antibody specific to hemoglobin. A competitive inhibition reaction is launched between biotin labeled hemoglobin and unlabeled hemoglobin (Standards or samples) with the pre-coated antibody specific to hemoglobin. After incubation the unbound conjugate is washed off. Next, avidin conjugated to Horseradish Peroxidase (HRP) is added to each microplate well and incubated. The amount of bound HRP conjugate is reverse proportional to the concentration of hemoglobin in the sample. Then the mixture of substrate A and B is added to generate glow light emission kinetics. Upon plate development, the intensity of the emitted light is reverse proportional to the hemoglobin level in the sample or standard.

[ASSAY PROCEDURE SUMMARY]

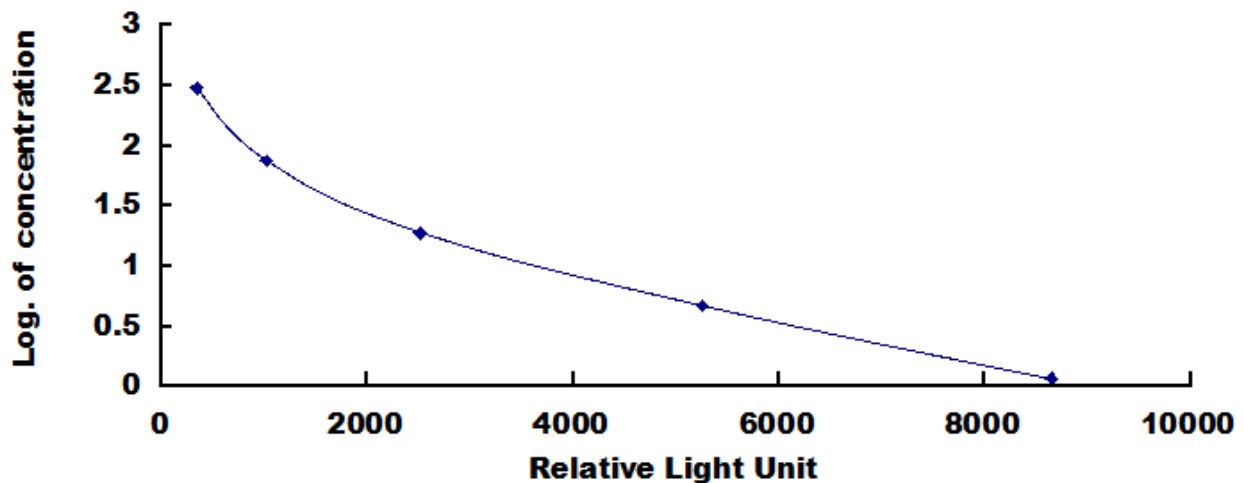
1. Prepare all reagents, samples and standards;
2. Add 50 μ L standard or sample to each well.
And then add 50 μ L prepared Detection Reagent A immediately.
Shake and mix. Incubate 1 hour at 37°C;
3. Aspirate and wash 3 times;
4. Add 100 μ L prepared Detection Reagent B. Incubate 30 minutes at 37°C;
5. Aspirate and wash 5 times;
6. Add 100 μ L Substrate Solution. Incubate 10 minutes at 37°C;
7. Read RLU value immediately.

[CALCULATION OF RESULTS]

Average the duplicate readings for each standard, control, and samples and subtract the average zero standard relative light unit (RLU). Create a standard curve on log-log graph paper, with the log of hemoglobin concentration on the y-axis and the RLU value on the x-axis. Draw the best fit straight line through the standard points and it can be determined by regression analysis. Using some plot software, such as curve expert 1.30, is also recommended. If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.

[TYPICAL DATA]

In order to make the calculation easier, we plot the RLU value of the standard (X-axis) against the known log of concentration of the standard (Y-axis), although concentration is indeed the independent variable while RLU value is the dependent variable. The RLU values of the standard curve may vary according to the conditions of assay performance (e.g. operator, pipetting technique, washing technique or temperature effects). This curve is provided for demonstration only. Typical standard curve below is provided for reference only.



Typical Standard Curve for Hemoglobin, Human CLIA.

[DETECTION RANGE]

1.17-300 μ g/mL. The standard curve concentrations used for the CLIA's were 300 μ g/mL, 75 μ g/mL, 18.75 μ g/mL, 4.69 μ g/mL, 1.17 μ g/mL.

[SENSITIVITY]

The minimum detectable dose of hemoglobin is typically less than 0.42 μ g/mL.

The sensitivity of this assay, or Lower Limit of Detection (LLD) was defined as the lowest protein concentration that could be differentiated from zero. It was determined the mean RLU value of 20 replicates of the zero standard subtracted by their two standard deviations.

[SPECIFICITY]

This assay has high sensitivity and excellent specificity for detection of hemoglobin.

No significant cross-reactivity or interference between hemoglobin and analogues was observed.

Note:

Limited by current skills and knowledge, it is impossible for us to complete the cross- reactivity detection between hemoglobin and all the analogues, therefore, cross reaction may still exist.

[RECOVERY]

Matrices listed below were spiked with certain level of recombinant hemoglobin and the recovery rates were calculated by comparing the measured value to the expected amount of hemoglobin in samples.

| Matrix | Recovery range (%) | Average(%) |
|---------------------|--------------------|------------|
| serum(n=5) | 86-94 | 90 |
| EDTA plasma(n=5) | 91-99 | 96 |
| heparin plasma(n=5) | 86-101 | 92 |

[LINEARITY]

The linearity of the kit was assayed by testing samples spiked with appropriate concentration of hemoglobin and their serial dilutions. The results were demonstrated by the percentage of calculated concentration to the expected.

| Sample | 1: 2 | 1: 4 | 1: 8 | 1: 16 |
|---------------------|---------|---------|---------|---------|
| serum(n=5) | 81-94% | 86-94% | 85-98% | 81-101% |
| EDTA plasma(n=5) | 97-105% | 78-103% | 90-102% | 91-98% |
| heparin plasma(n=5) | 83-97% | 87-97% | 82-96% | 90-96% |

[PRECISION]

Intra-assay Precision (Precision within an assay): 3 samples with low, middle and high level hemoglobin were tested 20 times on one plate, respectively.

Inter-assay Precision (Precision between assays): 3 samples with low, middle and high level hemoglobin were tested on 3 different plates, 8 replicates in each plate.

$$CV(\%) = SD/mean \times 100$$

Intra-Assay: CV<10%

Inter-Assay: CV<12%

[STABILITY]

The stability of CLIA kit is determined by the loss rate of activity. The loss rate of this kit is less than 5% within the expiration date under appropriate storage condition.

To minimize extra influence on the performance, operation procedures and lab conditions, especially room temperature, air humidity, incubator temperature should be strictly controlled. It is also strongly suggested that the whole assay is performed by the same operator from the beginning to the end.

[IMPORTANT NOTE]

- Limited by the current condition and scientific technology, we can't completely conduct the comprehensive identification and analysis on the raw material provided by suppliers. So there might be some qualitative and technical risks to use the kit.
- The final experimental results will be closely related to validity of the products, operation skills of the end users and the experimental environments. Please make sure that sufficient samples are available.

3. Kits from different batches may be a little different in detection range, sensitivity and color developing time. Please perform the experiment exactly according to the instruction attached in kit while electronic ones from our website is only for information.
4. Do not mix or substitute reagents from one kit lot to another. Use only the reagents supplied by manufacturer.
5. Protect all reagents from strong light during storage and incubation. All the bottle caps of reagents should be covered tightly to prevent the evaporation and contamination of microorganism.
6. There may be some foggy substance in the wells when the plate is opened at the first time. It will not have any effect on the final assay results. Do not remove microtiter plate from the storage bag until needed.
7. Wrong operations during the reagents preparation and loading, as well as incorrect parameter setting for the plate reader may lead to incorrect results. We recommend using a single-mode luminometer or a multi-mode detection instrument set for luminescence measurement to measure light emission from 96-well microplates.
8. Even the same operator might get different results in two separate experiments. In order to get better reproducible results, the operation of every step in the assay should be controlled. Furthermore, a preliminary experiment before assay for each batch is recommended.
9. Each kit has been strictly passed Q.C test. However, results from end users might be inconsistent with our in-house data due to some unexpected transportation conditions or different lab equipments. Intra-assay variance among kits from different batches might arise from above factors, too.
10. Kits from different manufacturers with the same item might produce different results, since we haven't compared our products with other manufacturers.
11. The instruction manual also suits for the kit of 48T, but all reagents of 48T kit are reduced by half.