# Technical Manual

# Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) CLIA Kit

- **Catalogue Code: HUES00913**
- **CLIA Kit**
- **Research Use Only**

1. **Description and Principle**
2. **Key Features and Sample Types**
3. **Kit Contents**
4. **Shipping and Storage**
5. **Sample preparation**
6. **Protocol**
7. **Assay Procedure**
8. **Data Analysis**
9. **Important General Notes**

## 1. Description and Principle

This CLIA kit applies to the in vitro quantitative determination of Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) concentrations in serum, plasma and other biological fluids.

### How Do Our CLIA Kit Assays Work?

This CLIA kit uses the Sandwich CLIA principle. The CLIA plate provided in this kit has been pre-coated with an antibody specific to Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2). Standards or samples are added to the CLIA plate wells and combined with the specific antibody. Then a biotinylated detection antibody specific for Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) and Avidin-Horseradish Peroxidase (HRP) conjugate are added successively to each plate well and incubated. Free components are washed away and then the substrate solution is added to each well. Only those wells that contain Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2), biotinylated detection antibody and Avidin-HRP conjugate will generate signal. The Relative light unit (RLU) value is measured by the Chemiluminescence immunoassay analyzer. The RLU value is associated with the concentration of Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2). The concentration of Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) is calculated by comparing the RLU value of the samples to the standard curve.

## 2. Key features and Sample Types

**Sensitivity:** 9.38 pg/mL

**Detection Range:** 15.63-1000 pg/mL

**ELISA Type:** CLIA

**Specificity:** This kit recognizes Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) in samples. No significant cross-reactivity or interference between Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) and analogues was observed.

## SUMMARY

1. Add 100µL standard or sample to each well. Incubate for 90 min at 37℃.
2. Remove the liquid. Add 100µL Biotinylated Detection Ab. Incubate for 1 hour at 37℃.
3. Aspirate and wash 3 times.
4. Add 100µL HRP Conjugate. Incubate for 30 min at 37°C.
5. Aspirate and wash 5 times.
6. Add 100µL Substrate Mixture Solution. Incubate for 5 min at 37℃.
7. Determine RLU Value.
8. Calculation of results

## 3. Kit Contents

| Product | Size | Cat. Code |
|---|---|---|
| **Human VEGFR-2/KDR (Vascular Endothelial Growth Factor Receptor 2) CLIA Kit** | 24/96 assays | HUES00913 |

**Each kit contains reagents for 24/96 assays in a 24/96 well plate including:**

| Item | 24T | 96T | Storage |
|---|---|---|---|
| CLIA Plate | 8 wells x 3 strips | 8 wells x 12 strips | -20°C, 6 months |
| Reference Standard | 1 vial | 2 vials | |
| Concentrated Biotinylated Detection Ab (100×) | 1 vial, 60 μL | 1 vial, 120 μL | |
| Concentrated HRP Conjugate (100×) | 1 vial, 60 μL | 1 vial, 120 μL | -20°C (shading light), 6 months |
| Reference Standard & Sample Diluent | 1 vial, 20 mL | 1 vial, 20 mL | 4°C, 6 months |
| Biotinylated Detection Ab Diluent | 1 vial, 14 mL | 1 vial, 14 mL | |
| HRP Conjugate Diluent | 1 vial, 14 mL | 1 vial, 14 mL | |
| Concentrated Wash Buffer (25×) | 1 vial, 30 mL | 1 vial, 30 mL | |
| Substrate Reagent A | 1 vial, 5 mL | 1 vial, 5 mL | 4°C (shading light) |
| Substrate Reagent B | 1 vial, 5 mL | 1 vial, 5 mL | 4°C (shading light) |
| Desiccant | 1 | 1 | |
| Plate Sealer | 5 pieces | 5 pieces | |
| Product Description | 1 copy | 1 copy | |

**Additional Materials required**

1. CLIA plate reader
2. High-precision transfer pipette, EP tubes and disposable pipette tips
3. Incubator capable of maintaining 37°C
4. Deionized or distilled water
5. Absorbent paper
6. Loading slot for Wash Buffer

## 4. Shipping and Storage

An unopened kit can be stored at 4°C for 1 month. If the kit is not used within 1 month, store the items separately according to the vial labels.

## 5. Sample Preparation

**Serum:** Allow samples to clot for 2 hours at room temperature or overnight at 4°C before centrifugation for 15 min at 1000×g at 2~8°C. Collect the supernatant to carry out the assay. Blood collection tubes should be disposable and be endotoxin-free.

**Plasma:** Collect plasma using EDTA or heparin as an anticoagulant. Centrifuge samples for 15 min at 1000×g at 2~8°C within 30 min of collection. Collect the supernatant to carry out the assay. Hemolysed samples are not suitable for ELISA assay.

**Cell lysates:** For adherent cells, gently wash the cells with pre-cooled PBS and dissociate the cells using trypsin. Collect the cell suspension in a tube and centrifuge for 5 min at 1000×g. Discard the medium and wash the cells 3 times with precooled PBS. For each $1\times10^6$ cells, add 150-250μL of pre-cooled PBS to keep the cells suspended. Optimal cell concentration is 1 million/ml. To release cellular components, dilute the cell pellet in PBS and use 3-4 freeze-thaw cycles in liquid Nitrogen (commercial lyses buffers can be used according to manufacturer's instructions). Centrifuge at 4°C for 20 mins at 2000-3000 rpm to pellet debris and remove clear supernatant to clean microcentrifuge tube for ELISA or storage.

**Tissue homogenates:** It is recommended to get detailed references from the literature before analyzing different tissue types. For general information, hemolysed blood may affect the results, so the tissues should be minced into small pieces and rinsed in ice-cold PBS (0.01M, pH=7.4) to remove excess blood thoroughly. Tissue pieces should be weighed and then homogenized in PBS (tissue weight (g): PBS (mL) volume=1:9) with a glass homogenizer on ice. To further break down the cells, you can sonicate the suspension with an ultrasonic cell disrupter or subject it to freeze-thaw cycles. The homogenates are then centrifuged for 5 min at 5000×g to get the supernatant.

**Cell culture supernatant or other biological fluids:** Centrifuge samples for 20 min at 1000×g at 2~ 8°C. Collect the supernatant to carry out the assay.

**Notes:**

1. Samples should be assayed within 7 days when stored at 4°C. Otherwise samples must be aliquoted up and stored at -20°C (≤1 month) or -80°C (≤3 months). Avoid repeated freeze-thaw cycles.

2. Determine the concentration before assaying. If the sample concentration is not within the range of the standard curve, users must determine the optimal sample dilutions for their particular experiments.

3. If the sample type is not included in the manual, a preliminary experiment is suggested to verify the validity.

4. If a lysis buffer is used to prepare tissue homogenates or cell culture supernatant, there is a possibility of causing a deviation.

5. Some recombinant proteins may not be detected due to a mismatch with the coated antibody or detection antibody.

## 6. Protocol

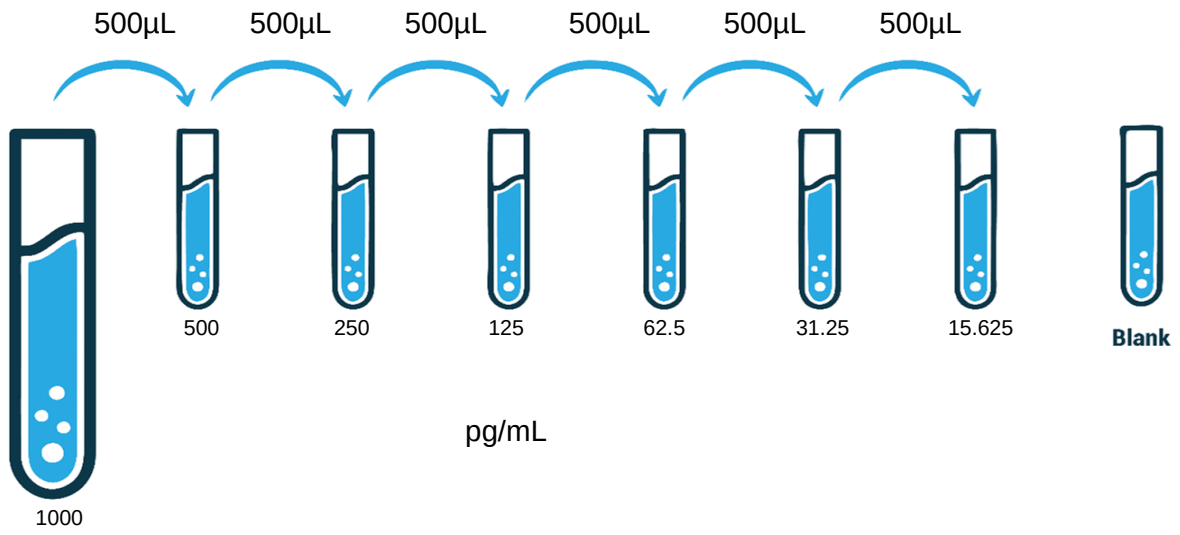
**1. Bring all reagents to room temperature:** (18~25°C) before use.

**2. Wash Buffer:** Dilute 30 mL of Concentrated Wash Buffer with 720 mL of deionized or distilled water to prepare 750 mL of Wash Buffer.

Note: if crystals have formed in the concentrate, warm it in a 40°C water bath and mix it gently until the crystals have completely dissolved.

**3. Standard working solution:** Centrifuge the standard at 10,000×g for 1 min. Add 1.0 mL of Reference Standard &Sample Diluent, let it stand for 10 min and invert it gently several times. After it dissolves fully, mix it thoroughly with a pipette. This reconstitution produces a working solution of 1000 pg/mL. Then make serial dilutions as needed. The recommended dilution gradient is as follows: 1000, 500, 250, 125, 62.5, 31.25, 15.625, 0 pg/mL. Note: the last tube is regarded as a blank. Don't pipette solution into it from the former tube.

**Dilution method:** Take 7 EP tubes, add 500μL of Reference Standard & Sample Diluent to each tube. Pipette 500μL of the 1000 pg/mL working solution to the first tube and mix up to produce a 500 pg/mL working solution. Pipette 500μL of the solution from the former tube into the latter one according to these steps. The illustration below is for reference. Note: the last tube is regarded as a blank.




**4. Biotinylated Detection Ab working solution:** Calculate the required amount before the experiment (100μL/well), slightly more than calculated should be prepared. Centrifuge the stock tube before use, dilute the 100× Concentrated Biotinylated Detection Ab to 1×working solution with Biotinylated Detection Ab Diluent.

**5. Concentrated HRP Conjugate working solution:** Calculate the required amount before the experiment (100μL/well), slightly more than calculated should be prepared. Dilute the 100× Concentrated HRP Conjugate to 1× working solution with Concentrated HRP Conjugate Diluent.

**6. Substrate Mixture Solution:** Calculate the required amount before the experiment (100μL/well). In preparation, slightly more than calculated should be prepared. Mix the Substrate Reagent A and B with equal volumes before use.
Note: don't open the vial until you need it.

## 7. Assay procedure

1. Set standard, test sample and control (zero) wells on the pre-coated plate and record their positions. It is recommended to measure each standard and sample in duplicate. Note: add all solutions to the bottom of the plate wells while avoiding contact with the well walls. Ensure solutions do not foam when adding to the wells.

2. Aliquot 100µl of standard solutions into the standard wells.

3. Add 100µl of Sample / Standard dilution buffer into the control (zero) well.

4. Add 100µl of properly diluted sample (serum, plasma, tissue homogenates and other biological fluids.) into test sample wells.

5. Cover the plate with the sealer provided in the kit and incubate for 90 min at 37°C. Note: add all solutions to the bottom of the plate wells while avoiding contact with the well walls. Ensure solutions do not foam when adding to the wells.

6. Aspirate the liquid from each well, do not wash. Immediately add 100µL of Biotinylated Detection Ab working solution to each well. Cover the plate with a plate seal and gently mix. Incubate for 1 hour at 37°C.

7. Aspirate or decant the solution from the plate and add 350µL of wash buffer to each well and incubate for 1-2 minutes at room temperature. Aspirate the solution from each well and clap the plate on absorbent filter paper to dry. Repeat this process 3 times. Note: a microplate washer can be used in this step and other wash steps.

8. Add 100µL of HRP Conjugate working solution to each well. Cover with a plate seal and incubate for 30 min at 37°C.

9. Aspirate or decant the solution from each well. Repeat the wash process five times as conducted in step 7.

10. Add 100µL of Substrate mixture solution to each well. Cover with a new plate seal and incubate for no more than 5 min at 37°C. Protect the plate from light.

11. Determine the RLU value of each well immediately.

## 8. Data analysis

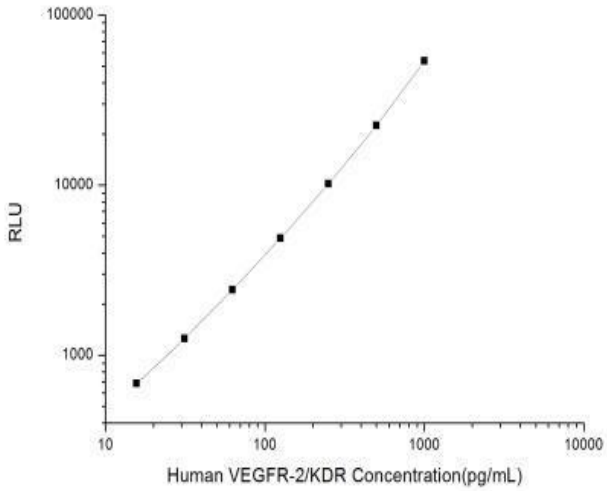
Average the duplicate readings for each standard and samples, then subtract the average zero standard RLU. Plot a four-parameter logistic curve on log-log graph paper, with standard concentration on the x-axis and RLU values on the y-axis.

If the samples have been diluted, the concentration calculated from the standard curve must be multiplied by the dilution factor. If the RLU of the sample surpasses the upper limit of the standard curve, you should re-test it with an appropriate dilution. The actual concentration is the calculated concentration multiplied by the dilution factor.

## Typical data

As the RLU values of the standard curve may vary according to the conditions of the actual assay performance (e.g. operator, pipetting technique, washing technique or temperature effects), the operator should generate a standard curve for each test. Typical standard curve and data is provided below (for reference only).

| Concentration (pg/mL) | RLU | Corrected RLU |
|---|---|---|
| 1000 | 56375 | 56346 |
| 500 | 22816 | 22787 |
| 250 | 11060 | 11031 |
| 125 | 5078 | 5049 |
| 62.5 | 2456 | 2427 |
| 31.25 | 1293 | 1264 |
| 15.63 | 759 | 730 |
| 0 | 29 | - |



## Precision

Intra-assay Precision (Precision within an assay): 3 samples with low, mid-range and high level were tested 20 times on one plate.
Inter-assay Precision (Precision between assays): 3 samples with low, mid-range and high level were tested on 3 different plates, 20 replicates in each plate.

| | Intra-assay Precision | | | Inter-assay Precision | | |
|---|---|---|---|---|---|---|
| **Sample** | 1 | 2 | 3 | 1 | 2 | 3 |
| **n** | 20 | 20 | 20 | 20 | 20 | 20 |
| **Mean (pg/mL)** | 50.08 | 139.14 | 480.54 | 51.41 | 138.83 | 499.06 |
| **Standard deviation** | 5.13 | 14.86 | 52.62 | 5.07 | 15.05 | 32.89 |
| **C V (%)** | 10.24 | 10.68 | 10.95 | 9.86 | 10.84 | 6.59 |

## Recovery

The recovery of spiked at three different levels in samples throughout the range of the assay was evaluated in various matrices.

| Sample Type | Range (%) | Average Recovery (%) |
|---|---|---|
| **Serum (n=5)** | 90-104 | 97 |
| **EDTA plasma (n=5)** | 100-117 | 108 |
| **Cell culture media (n=5)** | 86-99 | 92 |

## Linearity

Samples were spiked with high concentrations of and diluted with Reference Standard & Sample Diluent to produce samples with values within the range of the assay.

| | | Serum (n=5) | EDTA plasma (n=5) | Cell culture media (n=5) |
|---|---|---|---|---|
| 1:2 | Range (%) | 86-99 | 91-104 | 89-104 |
| | Average (%) | 92 | 96 | 97 |
| 1:4 | Range (%) | 96-112 | 98-109 | 91-107 |
| | Average (%) | 102 | 103 | 98 |
| 1:8 | Range (%) | 102-117 | 87-101 | 91-102 |
| | Average (%) | 108 | 94 | 97 |
| 1:16 | Range (%) | 102-119 | 101-118 | 91-101 |
| | Average (%) | 109 | 108 | 96 |

## 9. Important General Notes:

| Problem | Causes | Solutions |
|---|---|---|
| Poor standard curve | Inaccurate pipetting | Check pipettes. |
| | Improper standard dilution | Centrifuge the standard vial and ensure contents are dissolved thoroughly. |
| | Wells are not completely aspirated | Completely aspirate wells between steps. |
| Low fluorescence | Insufficient incubation time | Ensure sufficient incubation time. |
| | Incorrect assay temperature | Use recommended incubation temperature. Bring substrate to room temperature before use. |
| | Inadequate reagent volumes | Check pipettes and ensure correct preparation. |
| | Improper dilution | |
| Large CV | Inaccurate pipetting | Check pipettes. |
| High background | Concentration of target protein is too high | Use recommended dilution factor. |
| | Plate is insufficiently washed | Review the manual for proper washing procedure If using a plate washer, check that all ports are unobstructed. |
| | Contaminated wash buffer | Prepare fresh wash buffer. |
| Low sensitivity | Improper storage of the CLIA kit | All the reagents should be stored according to the instructions. |
| | Too long incubation time | Ensure precise incubation time. |

### Additional Notes:

1. Please wear lab coats, eye goggles and latex gloves for protection. Perform the experiment following the national security guidelines for biological laboratories, especially when using blood samples or other bodily fluids.

2. A freshly opened CLIA Plate may appear to have a water-like substance. This is normal and will not have any impact on the experimental results.

3. Do not reuse the diluted standard, biotinylated detection Ab working solution, concentrated HRP conjugate working solution. The unspent undiluted concentrated biotinylated detection Ab (100×) and other stock solutions should be stored according to the storage conditions in the above table.

4. Do not mix or use components from other lots.

5. Change pipette tips in between adding standards, in between sample additions, and in between reagent additions. Also, use separate reservoirs for each reagent.

## Declaration

1. Limited by current scientific technology, we can't conduct comprehensive identification and analysis on all the raw materials provided. (So, there might be some qualitative and technical risks for users using the kit.)

2. The final experimental results will be closely related to the validity of products, operational skills and the experimental environment. Please make sure that sufficient samples are available.

3. To get the best results, please only use the reagents supplied with this kit and strictly comply with the instructions.

4. Incorrect results may occur from incorrect reagent preparation and loading, as well as incorrect parameter settings of the Microplate reader. Please read the instructions carefully and adjust the instrument prior to the experiment.

5. Each kit passes a strict QC procedure. However, results from end-users might be inconsistent with our data due to some variables such as transportation conditions, different lab equipment’s, and so on. Intra-assay variance among kits from different batches might also arise from the above reasons, too.

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## Contact Details

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