

## Human HS- IFN- $\gamma$ (high sensitive Interferon gamma) Accquant® ELISA Kit

**Catalogue No.:** AQ-H0164-B

**Revision:** V 2.1

**Size:** 48T/96T

**Reactivity:** Human

**Range:** 2.34-150pg/ml

**Sensitivity:** 1.41pg/ml

**Application:** For quantitative detection of IFN- $\gamma$  in serum, plasma, tissue homogenates and other biological fluids.

**Storage:** 2-8°C for 6 months

**Expiry Date:** see kit label

**Principle:** Sandwich

**NOTE: FOR RESEARCH USE ONLY.**

### Background

Interferon gamma (IFN- $\gamma$ ) is a cytokine critical to both innate and adaptive immunity, and functions as the primary activator of macrophages, in addition to stimulating natural killer cells and neutrophils. Interferon-gamma (IFN-gamma), also known as type II or immune interferon exerts a wide range of immunoregulatory activities and is considered to be the prototype proinflammatory cytokine. Mature human IFN-gamma exists as a non-covalently linked homodimer of 20-25 kDa variably glycosylated subunits. IFN-gamma dimers bind to IFN-gamma RI (alpha subunits) which then interacts with IFN-gamma RII (beta subunits) to form the functional receptor complex of two alpha and two beta subunits. Inclusion of IFN-gamma RII increases the binding affinity for ligand and the efficiency of signal transduction. IFN-gamma is produced by a variety of immune cells under inflammatory conditions, notably by T cells and NK cells. It plays a key role in host defense by promoting the development and activation of Th1 cells, chemoattraction and activation of monocytes and macrophages, up-regulation of antigen presentation molecules, and immunoglobulin class switching in B cells. It also exhibits antiviral, antiproliferative, and apoptotic effects. In addition, IFN-gamma functions as an anti-inflammatory mediator by promoting the development of regulatory T cells and inhibiting Th17 cell differentiation. The pleiotropic effects of IFN-gamma contribute to the development of multiple aspects of atherosclerosis.

### Principle of the Assay

This kit was based on sandwich enzyme-linked immune-sorbent assay technology. Capture antibody was pre-coated onto 96-well plates. And the biotin conjugated antibody was used as detection antibodies. The standards, test samples and biotin conjugated detection antibody were added to the wells subsequently, and washed with wash buffer. HRP-Streptavidin (HRP-SA) and Biotin System (BS) was added and unbound

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conjugates were washed away with wash buffer. Then by twice signal amplification, TMB substrates were used to visualize HRP enzymatic reaction. TMB was catalyzed by HRP to produce a blue color product that changed into yellow after adding acidic stop solution. The density of yellow is proportional to the target amount of sample captured in plate. Read the O.D. absorbance at 450nm in a microplate reader, and then the concentration of target can be calculated.

### Kit Components

Item	Specifications(48T/96T)	Storage
ELISA Microplate(Dismountable)	8×6/8×12	2-8°C/-20°C
Lyophilized Standard	1vial/2vial	2-8°C/-20°C
Sample/Standard Dilution Buffer	5ml/10ml	2-8°C
Assay Dilution	2.5ml/5ml	2-8°C
Biotin-labeled Antibody	5ml/10ml	2-8°C(Avoid Direct Light)
HRP-Streptavidin (HRP-SA)	10ml/20ml	2-8°C(Avoid Direct Light)
Biotin System (BS)	60ul/120ul	2-8°C
BS Dilution Buffer	5ml/10ml	2-8°C
TMB Substrate	5ml/10ml	2-8°C(Avoid Direct Light)
Stop Solution	5ml/10ml	2-8°C
Wash Buffer(25X)	30ml/60ml	2-8°C
Plate Sealer	3/5pieces	
Product Description	1copy	

### Typical Data & Standard Curve

Results of a typical standard operation of a IFN- $\gamma$  ELISA Kit are listed below. This standard curve was generated at our lab for demonstration purpose only. Users shall obtain standard curve as per experiment by themselves. (N/A=not applicable)

STD.(pg/ml)	OD-1	OD-2	Average	Corrected
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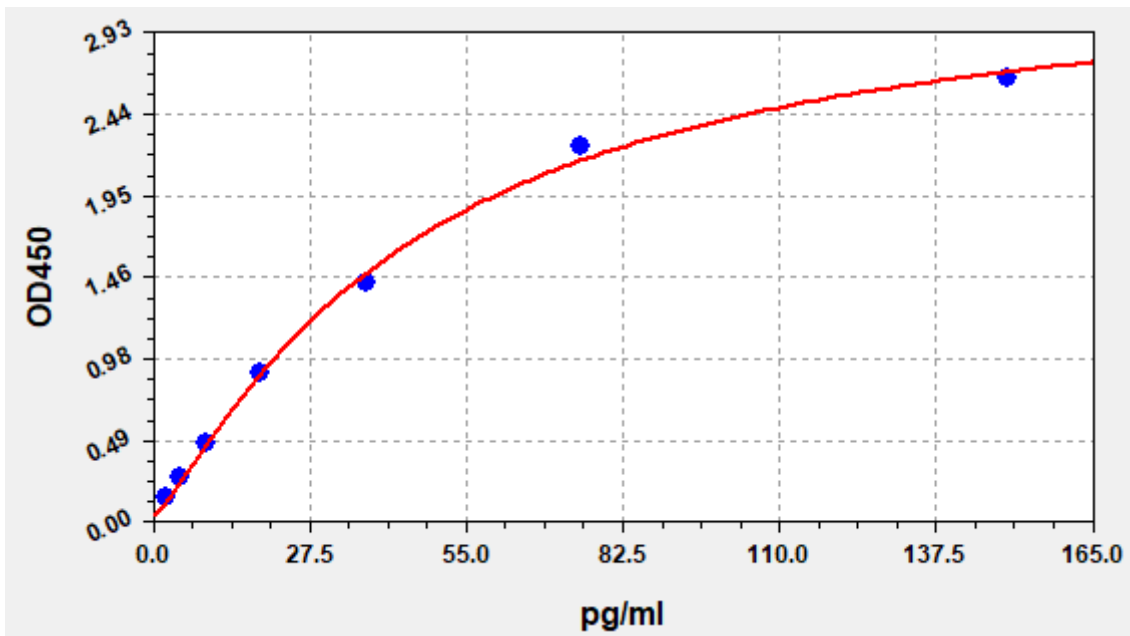
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0	0.166	0.186	0.176	0.000
2.343	0.334	0.321	0.328	0.152
4.687	0.460	0.442	0.451	0.275
9.375	0.657	0.632	0.645	0.469
18.75	1.058	1.084	1.071	0.895
37.5	1.584	1.623	1.604	1.428
75	2.394	2.452	2.423	2.247
150	2.803	2.871	2.837	2.661



### Specificity

This assay has high sensitivity and excellent specificity for detection of IFN- $\gamma$ . No significant cross-reactivity or interference between IFN- $\gamma$  and analogues were observed.

Note: Limited by current skills and knowledge, it is difficult for us to complete the cross-reactivity detection between IFN- $\gamma$  and all the analogues, therefore, cross reaction may still exist.

### Recovery

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Matrices listed below were spiked with certain level of IFN- $\gamma$  and the recovery rates were calculated by comparing the measured value to the expected amount of IFN- $\gamma$  in samples.

Matrix	Recovery Range (%)	Average (%)
Serum(n=5)	90-99	97
EDTA Plasma(n=5)	87-100	95
Heparin Plasma(n=5)	85-105	97

### Linearity

The linearity of the kit was assayed by testing samples spiked with appropriate concentration of IFN- $\gamma$  and their serial dilutions. The results were demonstrated by percentage of calculated concentration to the expectation.

Sample	1:2	1:4	1:8
Serum(n=5)	86-104%	90-105%	85-102%
EDTA Plasma(n=5)	84-99%	84-98%	83-98%
Heparin Plasma(n=5)	84-100%	82-91%	81-85%

### Sample values

Cell Culture Supernates - Human peripheral blood mononuclear cells ( $1 \times 10^6$  cells/mL) were cultured in RPMI supplemented with 10% fetal bovine serum, 50  $\mu$ M  $\beta$ -mercaptoethanol, 2 mM L-glutamine, 100 U/mL penicillin, and 100 $\mu$ g/mL streptomycin sulfate and stimulated for 24h with 10 $\mu$ g/mL PHA. Aliquots of the culture supernates were removed and assayed for levels of human IFN- $\gamma$ .

Condition	Con.(pg/mL)
unTreated	ND
treated	42520

ND=Non-Detectable

### Precision

Intra-Assay: CV<8%

Inter-Assay: CV<10%

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## Stability

The stability of ELISA kit is determined by the loss rate of activity. The loss rate of this kit is less than 10% within the expiration date under appropriate storage condition.

Standard(n=5)	37°C for 1 month	2-8°C for 6 months
Average (%)	80	95-100

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

## Precautions

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. Storage TMB reagents avoid light.
5. Washing process is very important, not fully wash easily cause a false positive and high background.
6. Duplicate well assay is recommended for both standard and sample testing.
7. Don't let microplate dry at the assay, for dry plate will inactivate active components on plate.
8. Don't reuse tips and tubes to avoid cross contamination.
9. Avoid using the reagents from different batches together.
10. Lightly Seal the plate, If the well is sealed too tight, it is easy to produce steam, which will affect the test results.

## Material Required but Not Supplied

1. Microplate reader (wavelength:450nm)
2. 37°C incubator
3. Automated plate washer
4. Precision single and multi-channel pipette and disposable tips
5. Clean tubes and Eppendorf tubes
6. Deionized or distilled water

## Washing

**Manual:** Discard the solution in the plate without touching the side walls. Clap the plate on absorbent filter papers or other absorbent material. Fill each well completely with 350ul wash buffer and soak for 1 to 2 minutes, then aspirate contents from the plate, and clap the plate on absorbent filter papers or other absorbent material.

**Automatic:** Aspirate all wells, and then wash plate with 350ul wash buffer. After the final wash, invert plate, and clap the plate on absorbent filter papers or other absorbent material. It is recommended that the washer shall be set for soaking 1 minute. (**Note:** set the height of the needles; be sure the fluid can be sipped up completely)

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## Sample Collection and Storage (universal)

- **Serum:** Place whole blood sample at room temperature for 2 hours or put it at 2-8°C overnight and centrifugation for 20 minutes at approximately 1000×g. Collect the supernatant and carry out the assay immediately. Blood collection tubes should be disposable, non-pyrogenic, and non-endotoxin.
- **Plasma:** Collect plasma using EDTA-Na<sub>2</sub> or heparin as an anticoagulant. Centrifuge samples for 15 minutes at 1000×g at 2-8°C within 30 minutes of collection. Collect the supernatant and carry out the assay immediately. Avoid hemolysis, high cholesterol samples.
- **Tissue Homogenates:** As hemolysis blood has relation to assay result, it is necessary to remove residual blood by washing tissue with pre-cooling PBS buffer (0.01M, pH=7.4). Mince tissue after weighing it and get it homogenized in PBS (the volume depends on the weight of the tissue. Normal, 9mL PBS would be appropriate to 1 gram tissue pieces. Some protease inhibitors are recommended to add into the PBS) with a glass homogenizer on ice. To further break 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 minutes at 5000×g to get the supernatant. The total protein concentration was determined by BCA kit and the total protein concentration of each pore sample should not exceed 0.3mg.
- **Cell Culture Supernatant:** Centrifuge supernatant for 20 minutes at 1000×g at 2-8°C to remove insoluble impurity and cell debris. Collect the clear supernatant and carry out the assay immediately.
- **Cell Culture Lysate:** Commercial RIPA kits are recommended to follow the instructions provided. Generally, 0.5ml RIPA lysis buffer would be appropriate to 2x10<sup>6</sup> cells, DNA must to be removed. The total protein concentration was determined by BCA kit and the total protein concentration of each pore sample should not exceed 0.3mg.
- **Other Biological Fluids:** Centrifuge samples for 20 minutes at 1000×g at 2-8°C. Collect supernatant and carry out the assay immediately.

**Note:** Samples to be used within 5 days can be stored at 2-8°C, besides that, samples must be stored at -20°C (assay ≤1 month) or -80°C (assay ≤2 years) to avoid loss of bioactivity and contamination. Avoid multiple freeze-thaw cycles. The hemolytic samples are not suitable for this assay.

## Sample Dilution

The user should estimate the concentration of target protein in the test sample, and select a proper dilution factor to make the diluted target protein concentration fall in the optimal detection range of the kit. Dilute the sample with the provided dilution buffer, and several trials may be necessary. The test sample must be well mixed with the dilution buffer. And also standard curves and sample should be making in pre-experiment. If samples with very high concentrations, dilute samples with PBS first and then dilute the samples with Sample Dilution.

## Reagent Preparation and Storage

Bring all reagents and samples to room temperature for 20 minutes before use.

### **1, Wash Buffer:**

If crystals have formed in the concentrate, you can warm it with 40°C water bath (Heating temperature should not exceed 50°C) and mix it gently until the crystals have completely been dissolved. The solution should be cooled to room temperature before use.

Dilute 30ml (15ml for 48T) Concentrated Wash Buffer to 750ml (375ml for 48T) Wash Buffer with deionized or distilled water. Put unused solution back at 2-8°C.

### **2, Standards:**

1). Add 1 ml Sample Dilution Buffer into one Standard tube (labeled as zero tube), keep the tube at room temperature for 10 minutes and mix them thoroughly.

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

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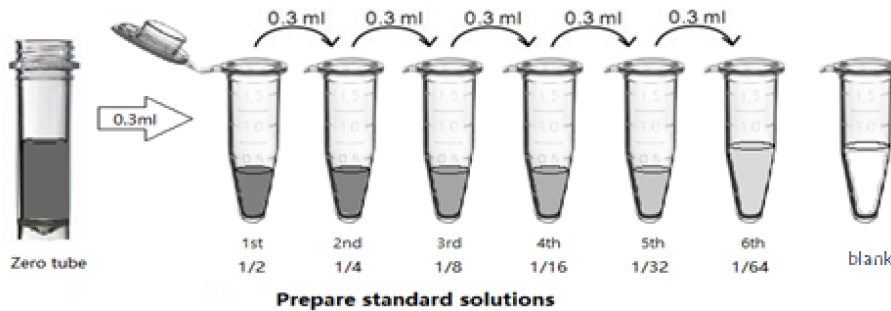
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2). Label 7 EP tubes with 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 and blank respectively. Add 0.3ml of the Sample Dilution Buffer into each tube. Add 0.3ml of the above Standard solution (from zero tube) into 1st tube and mix them thoroughly. Transfer 0.3ml 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.



**Note:** It is best to use Standard Solutions within 2 hours.

### 3, Preparation of BS Working Solution:

Prepare it within 15 minutes before experiment.

- 1 ) Calculate required total volume of the working solution:  $0.1\text{ml/well} \times \text{quantity of wells}$ . (Allow 0.1-0.2ml more than the total volume.)
- 2 ) Dilute the BS with BS Dilution Buffer at 1:100 and mix them thoroughly. (i.e. Add 1ul of BS into 99ul of Poly-biotin Dilution Buffer.)

**NOT:** If crystals have formed in the BS, you can warm it with water (temperature should not exceed 30°C) and mix it gently until the crystals have completely been dissolved.

## Assay Procedure

When diluting samples and reagents, they must be mixed completely and evenly. Before adding TMB into wells, equilibrate TMB Substrate for 30 minutes at 37°C. It is recommended to plot a standard curve for each test.

1. Set standard, test samples, control (blank) wells on the pre-coated plate respectively, and then, records their positions. It is recommended to measure each standard and sample in duplicate.
2. Add 50µL of Assay Diluent to each well.
3. **Prepare Standards:** Aliquot 50ul of zero tube, 1<sup>st</sup> tube, 2<sup>nd</sup> tube, 3<sup>rd</sup> tube, 4<sup>th</sup> tube, 5<sup>th</sup> tube, 6<sup>th</sup> tube and Sample Dilution Buffer (blank) into the standard wells.
4. **Add Samples:** Add 50ul of properly diluted sample into test sample wells.
5. **Incubate:** Seal the plate with a cover and incubate at 37°C for 90 minutes.
6. **Wash:** Remove the cover and discard the plate content, and wash plate 2 times with Wash Buffer. Do NOT let the wells dry completely at any time.
7. **Biotin-labeled Antibody:** Add 100ul Biotin-labeled antibody into above wells (standard, test sample and blank wells). Add the solution at the bottom of each well without touching the sidewall, cover the plate and incubate at 37°C for 60 minutes.
8. **Wash:** Remove the cover, and wash plate 2 times with Wash Buffer, and let the Wash Buffer stay in the wells for 1-2 minutes each time.

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9. **HRP-Streptavidin (HRP-SA):** Add 100ul of HRP-SA into each well, cover the plate and incubate at 37°C for 30 minutes.
10. **Wash:** Remove the cover and wash plate 3 times with Wash Buffer, and let the wash buffer stay in the wells for 1-2 minutes each time.
11. **BS Working Solution:** Add 100ul of BS Working Solution into each well, cover the plate and incubate at room temperature for 15 minutes.
12. **Wash:** Remove the cover and wash plate 3 times with Wash Buffer
13. **HRP-Streptavidin (HRP-SA):** Add 100ul of HRP-SA into each well, cover the plate and incubate at 37°C for 30 minutes.
14. **Wash:** Remove the cover and wash plate 3 times with Wash Buffer, and let the wash buffer stay in the wells for 1-2 minutes each time.
15. **TMB Substrate:** Add 90ul TMB Substrate into each well, cover the plate and incubate at 37°C in dark within 10-20 minutes. (**Note:** The reaction time can be shortened or extended according to the actual color change, but not more than 30 minutes. You can terminate the reaction when apparent gradient appeared in standard wells.)
16. **Stop:** Add 50ul Stop Solution into each well. The color will turn yellow immediately. The adding order of Stop Solution should be as the same as the TMB Substrate Solution.
17. **OD Measurement:** Read the O.D. absorbance at 450nm in Microplate Reader immediately after adding the stop solution.

Regarding calculation, (the relative O.D.450) = (the O.D.450 of each well) – (the O.D.450 of blank well). The standard curve can be plotted as the relative O.D.450 of each standard solution (Y) vs. the respective concentration of the standard solution (X). The target concentration of the samples can be interpolated from the standard curve. It is recommended to use some professional software to do this calculation, such as [Curve Expert 1.3 or 1.4](#).

**Note:** If the samples measured were diluted, multiply the dilution factor to the concentrations from interpolation to obtain the concentration before dilution.

## Summary

**Step1:** Add 50µL of Assay Diluent to each well

**Step2:** Add 50ul standard or sample to each well and incubate for 90 minutes at 37°C

**Wash step:** Aspirate and wash plates 2 times.

**Step3:** Add 100ul Biotin-labeled antibody to each well and incubate for 60 minutes at 37°C.

**Wash step:** Aspirate and wash plates 2 times.

**Step4:** Add 100ul HRP-SA into each well and incubate for 30 minutes at 37°C.

**Wash step:** Aspirate and wash plates 3 times.

**Step5:** Add 100ul BS Working Solution Incubate 15minutes at RT.

**Wash step:** Aspirate and wash plates 3 times.

**Step6:** Add 100ul HRP-SA into each well and incubate for 30 minutes at 37°C.

**Wash step:** Aspirate and wash plates 3 times.

**Step7:** Add 90ul TMB Substrate Solution. Incubate 10-20 minutes at 37°C.

**Step8:** Add 50ul Stop Solution. Read at 450nm immediately and calculation.

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