

# Human Interferon- $\gamma$ (IFN- $\gamma$ ) ELISPOT Kit

Catalog Number: RAS-SP001

Pack Size: 96 tests

**IMPORTANT: Please carefully read this manual before performing your experiment.**

**For Research Use Only. Not For Use in Diagnostic or Therapeutic Procedures**

## **INTENDED USE**

Human Interferon- $\gamma$  (IFN- $\gamma$ ) ELISPOT Kit was developed for the quantitative determination of the frequency of cells releasing human IFN- $\gamma$ .

## **PRINCIPLE OF THE ASSAY**

This assay kit is used to measure the levels of human Interferon- $\gamma$  (IFN- $\gamma$ ) by employing a standard sandwich-ELISA format. The polyvinylidene difluoride (PVDF)-backed micro plate in the kit has been pre-coated with Anti-IFN- $\gamma$  Antibody. IFN- $\gamma$  secreted by cells binds to Anti-IFN- $\gamma$  Antibody fixed on the microplate. Then add the Biotin-Anti-IFN- $\gamma$  Antibody to the plate and form Antibody-antigen-biotinylated antibody complex. Next add Streptavidin-HRP to the plate, incubate and wash the wells. At last, load the substrate into the wells and red brown spots will form at the bottom of the plate hole after termination. Each individual spot representing an individual IFN- $\gamma$  secreting cell. The spots can be counted with an automated ELISpot reader system or manually using a stereomicroscope.

## **MATERIALS PROVIDED**

**Table1. Materials provided**

Catalog	Components	Size (96 tests)	Format	Storage	
				Unopened	Opened
RSP001-C01	Pre-coated Anti-IFN- $\gamma$ Antibody Microplate	1 plate	Solid	2-8°C	2-8°C
RSP001-C02	Positive Stimulus	10 $\mu$ g	Power	2-8°C	-70°C
RSP001-C03	Biotin-Anti-IFN- $\gamma$ Antibody	50 $\mu$ L	Liquid	2-8°C	2-8°C
RSP001-C04	Streptavidin-HRP	50 $\mu$ L	Liquid	2-8°C	2-8°C
RSP001-C05	Washing Buffer (10 $\times$ )	50 mL	Liquid	2-8°C	2-8°C
RSP001-C06	Dilution Buffer (1 $\times$ )	50 mL	Liquid	2-8°C	2-8°C
RSP001-C07	AEC Dilution	25 mL	Liquid	2-8°C	2-8°C
RSP001-C08	AEC Solution A (20 $\times$ )	0.8 mL	Liquid	2-8°C, avoid light	2-8°C, avoid light
RSP001-C09	AEC Solution B (20 $\times$ )	0.8 mL	Liquid	2-8°C	2-8°C
RSP001-C10	AEC Solution C (20 $\times$ )	0.8 mL	Liquid	2-8°C, avoid light	2-8°C, avoid light

## **SRORAGE**

1. The unopened kit is stored at 2°C to 8°C and its expiration date can be found on the kit label.
2. This kit is validated for single use only. Results obtained using previously opened or reconstituted reagents may not be reliable.

*Note: Do not use reagents past their expiration date.*

## **REAGENTS/EQUIPMENT NEEDED BUT NOT SUPPLIED**

Clean bench;

CO<sub>2</sub> incubator;

ELISpot reader or microscope;

Single or multi-channel micropipettes and pipette tips;

Sterile RPMI-1640 culture media;

## **REAGENT PREPARATION**

Bring all reagents and samples to room temperature (20°C-25°C) before use. If crystals have formed in buffer solution, place the sample until the crystals have completely dissolved.

## **ASSAY PROCEDURE**

### **1. Working Solution Preparation**

#### 1.1 Positive stimulus:

According to Table 2, prepare the provided lyophilized product into a storage solution with sterile water, dissolve at room temperature for 15 to 30 minutes, and mix by gently pipetting, this step must be performed in a sterile environment.

**Table 2. Preparation method**

<b>ID</b>	<b>Components</b>	<b>Size (96 T)</b>	<b>Storage solution concentration.</b>	<b>Reconstituted water Vol.</b>
RSP001-C02	Positive Stimulus	10 µg	100 µg/mL	100 µL

#### 1.2 Sterile culture media

RPMI-1640 medium with 10% fetal bovine serum can be used, and it is recommended to add dual antibodies.

#### 1.3 Preparation of 1×Washing Buffer:

Dilute 50 mL 10×Washing Buffer with ultrapure water/deionized water to 500 mL.

#### 1.4 Preparation of Biotin-Anti-IFN- $\gamma$ Antibody working fluid:

Dilute Biotin-Anti-IFN- $\gamma$  Antibody at 1:400 with 1×Dilution Buffer. Please prepare it for one-time use only.

#### 1.5 Preparation of Streptavidin-HRP working fluid:

Dilute Streptavidin-HRP at 1:2000 with 1×Dilution Buffer. The prepared working fluid should avoid light. Please prepare it for one-time use only.

1.6 Preparation of 1×AEC Solution: Please prepare it for one-time use only. The proportion of preparation is shown in Table 3.

**Table 3. Preparation method**

Preparation Vol	AEC Dilution	AEC Solution A (20×)	AEC Solution B (20×)	AEC Solution C (20×)
1 mL	0.85 mL	50 $\mu$ L	50 $\mu$ L	50 $\mu$ L
5 mL	4.25 mL	250 $\mu$ L	250 $\mu$ L	250 $\mu$ L
10 mL	8.5 mL	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L

## 2. Pre-coated Microplate treatment (Aseptic procedure)

Add 200  $\mu$ L Sterile RPMI-1640 culture media to each well, incubate at room temperature for 10min, then remove the remaining solution.

## 3. Add Stimulus and cell suspensions (Aseptic procedure)

Add 10  $\mu$ L stimulus to each well, then add 100  $\mu$ L cell suspensions,

- Positive control: The cell concentration can be  $5 \times 10^4$  cells/well and the final intracellular concentration of positive stimulus is 0.2  $\mu$ g/mL (Dilute 100  $\mu$ g/mL of positive stimulus to 2.0  $\mu$ g/mL with cell culture medium).
- Negative control: The cell concentration can be  $5 \times 10^4$  cells/well without positive stimulus.
- Background control: No cells, no positive stimulus, add to the medium.
- Experimental: The concentration of cell and stimulus should be adjusted according to the actual situation.

*Note: It is recommended to set three doable holes for samples to be tested.*

## 4. Incubation (Aseptic procedure)

Seal the plate with microplate sealing film and incubate at 37°C and 5% CO<sub>2</sub> incubator for 18-22 hour.

*Note: The covered plate is recommended to be covered with aluminum foil, and the cultivation time can be adjusted according to the actual situation.*

## 5. Washing

Remove the remaining solution by aspiration, add 250  $\mu\text{L}$  of 1 $\times$ Washing Buffer to each well, then soak for 60 s, remove any remaining 1 $\times$ Washing Buffer: by aspirating or decanting, invert the plate and blot it against paper towels. Repeat the wash step above for six times.

*Note: Remove the remaining solution by aspiration before washing the plate in this step, add 200  $\mu\text{L}$  cold deionized water to each well, and the hypotonic lytic cells can be placed at 2-8°C for 5-10 minutes to help the washing effect.*

## 6. Add Biotin-Anti-IFN- $\gamma$ Antibody

For all wells, add 100  $\mu\text{L}$  Biotin- Anti-IFN- $\gamma$  Antibody (dilute at 1:400) working solution. Please prepare it for one-time use only. Seal the plate with microplate sealing film and incubate at 37°C for 1 hour.

## 7. Washing

Repeat step 5.

## 8. Add Streptavidin-HRP

For all wells, add 100  $\mu\text{L}$  Streptavidin-HRP (dilute at 1:2000) working solution. Please prepare it for one-time use only, avoid light. Seal the plate with microplate sealing film and incubate at 37°C for 1 hour.

## 9. Washing

Repeat step 5.

*Note: After washing for the fifth time remove the bottom plate, the bottom surface and bottom plate of the membranes can be washed with deionized water; blot it against clean paper towels and prevent damage to the membranes, the bottom plate can be closed, and then washing for the Sixth time to ensure that the experimental background is clean.*

## 10. Substrate Reaction

Add 100  $\mu\text{L}$  AEC Substrate Solution to each well. Incubate at room temperature for 5-15 min, avoid light.

*Note: Too long the color development time will cause the background color in the experimental well to become darker.*

## 11. Termination

Remove the remaining solution by aspiration, Open plate base and rinse the microplate with deionized water for 3-5 times. Place the plate in the shade at room temperature, dry naturally, and close the base.

## 12. Calculation of results

The microplate can be analyzed by counting spots using either a microscope or a specialized automated ELISpot reader.

## PRECISION

Inter/Intra-assay precision was evaluated by stimulating  $5 \times 10^4$  cells/well PBMC with 0.2  $\mu\text{g}/\text{mL}$  Positive Stimulus at 37°C and 5%  $\text{CO}_2$  incubator for 20 h and repeated for six wells.

Well	Number of Spots Counted		
	Batch-1	Batch-2	Batch-3
1	462	499	400
2	474	507	491
3	422	420	335
4	497	490	388
5	383	291	401
6	380	384	372
Intra-assay-Mean	436	432	398
Intra-assay-SD	49.0	84.6	51.8
Intra-assay-CV%	11%	20%	13%
Inter-assay-Mean	422		
Inter-assay-SD	21.0		
Inter-assay-CV%	5%		

## **PRECAUTIONS**

1. This kit is for research use only and is not for use in diagnostic or therapeutic applications.
2. Please strictly follow the instructions for operation. Individual experimental steps are aseptic operation. PVDF membrane is attached to the bottom of the plate, and the gun head should not touch the bottom when adding liquid, so as not to damage the PVDF membrane.
3. Do not mix or substitute reagents with those from other kits or other lot number kits.
4. Bring all reagents and samples to room temperature before use and ensure the crystals have completely dissolved.
5. The kit is stored at 2°C to 8°C, do not use the kit that has expired, and try to use the kit once opened.

## **TROUBLESHOOTING GUIDE**

Problem	Cause	Solution
<b>Dark background color of the filter membrane</b>	<ul style="list-style-type: none"> <li>* Plate is insufficiently washed</li> <li>* The membrane is wet</li> </ul>	<ul style="list-style-type: none"> <li>* Increase the washing times to ensure soaking time</li> <li>* Microplates cannot be analyzed accurately until the PVDF filter membranes are completely dry</li> </ul>
<b>Spots are irregular in shape and severely clumped</b>	<ul style="list-style-type: none"> <li>* Cell disruption</li> <li>* Cell aggregated</li> </ul>	<ul style="list-style-type: none"> <li>* Optimize the cell separation process to ensure cell activity</li> <li>* The cell suspension is thoroughly mixed to</li> </ul>

		ensure a unicellular state
<b>Positive Control spots were low and fuzzy</b>	<ul style="list-style-type: none"> <li>* Enzyme activity is decreased</li> <li>* The temperature of the Substrate reagent is low and oxidized</li> <li>* The titer of the stimulus is low</li> </ul>	<ul style="list-style-type: none"> <li>* Increase enzyme concentration</li> <li>* Balance the color reagent to room temperature before use, do not use reagents that have oxidized precipitation</li> <li>* Increase the concentration of stimulus</li> </ul>
<b>Spots vary in size and shade</b>	<ul style="list-style-type: none"> <li>* When this phenomenon occurs in positive controls, the cell status is uneven and the survival rate is low</li> </ul>	<ul style="list-style-type: none"> <li>* Optimize the cell separation process to ensure cell activity</li> <li>* Strengthen cell washing to remove dead cells</li> </ul>
	<ul style="list-style-type: none"> <li>* When the positive control is normal, the degree of specificity of the stimulus is low</li> </ul>	<ul style="list-style-type: none"> <li>* Change stimulus</li> </ul>
<b>The number of spots in the wells is lower</b>	<ul style="list-style-type: none"> <li>* When the positive control is normal, there are stimulus-specific problems and the level of normal cell response is low</li> </ul>	<ul style="list-style-type: none"> <li>* Change the concentration of the stimulus</li> <li>* Increase the number of cells added per well</li> </ul>
	<ul style="list-style-type: none"> <li>* When the positive control spots were small, the number of surviving cells added was too small.</li> </ul>	<ul style="list-style-type: none"> <li>* Activity count was performed to improve cell activity</li> <li>* Increase the number of cells added per well</li> </ul>
<b>The number of spots in the wells is high</b>	<ul style="list-style-type: none"> <li>* Too many cells were added to the well</li> </ul>	<ul style="list-style-type: none"> <li>* Decrease the number of cells added per well</li> </ul>