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human IFN $\gamma$  20,000 tests

For in vitro research use only  
Storage temperature : -80°C

www.htrf.com

HTRF<sup>®</sup> package insert

Document reference : 62IFNPEC rev08 (Sept. 2011)

Packaging details :

	384-well low volume plate (20 $\mu$ L)
62IFNPEC	20,000 tests

## 1. Assay description and intended use

This kit is intended for the quantitative determination of human Interferon gamma.

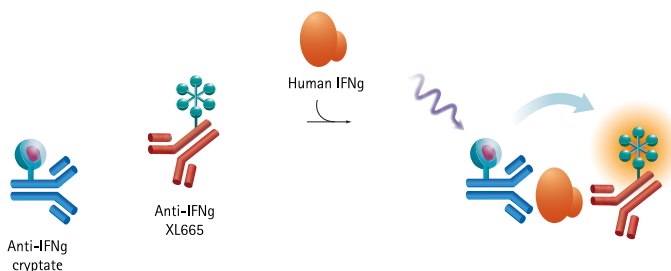
Its principle is based on HTRF<sup>®</sup> technology (Homogeneous Time-Resolved Fluorescence). As shown below, the IFN $\gamma$  is detected by an anti-IFN $\gamma$  MAB labeled with XL665, the second MAB is labeled with Cryptate. These mouse MABs recognize distinct epitopes of human IFN $\gamma$ . They do not crossreact with IFN $\gamma$  from other species.

Specific signal (i.e. energy transfer) is proportional to the concentration of IFN $\gamma$  in the sample or standard.

The human IFN $\gamma$  assay can be run under two different protocols:

1. The "supernatant" protocol (see §3), a standard IFN $\gamma$  assessment in cell supernatant : i) cells are stimulated in a regular cell culture plate, and ii) cell supernatant is then transferred to the assay plate.
2. The "cell-based" protocol (see §4) is carried out in a single plate and allows the quantification of IFN $\gamma$  directly on stimulated cells, without any transfer steps.

**CAUTION ! Reagent reconstitution differs between the two protocols. Make sure to reconstitute the conjugates according to the chosen protocol's specifications.**

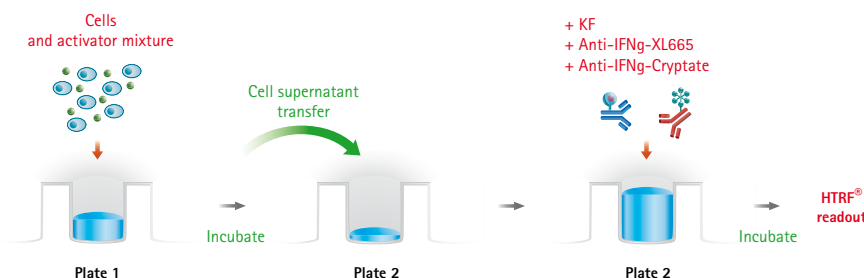


## 2. Background

IFN $\gamma$ , also called type II interferon, is a homodimeric glycoprotein of 21-24 kDa. In contrast to type I interferons which are produced by various types of cells, IFN $\gamma$  production is restricted to T and NK cells. IFN $\gamma$  synthesis occurs in the cytokine cascade upon T cell signaling by IL-12 and IL-18 from macrophages. During an infection course, IFN $\gamma$  is secreted by cytotoxic CD8 T cells as well as by a subset of helper T cells, namely Th1 cells. Th1 cells produce IL-2, IFN $\gamma$ , and TNF $\beta$  but no IL-4 or IL-10, whereas Th2 cells produce IL-4, IL-5 and IL-10 but little or no IFN $\gamma$ . IFN $\gamma$  orientates the immune response towards the cellular inflammatory pathway by enhancing monocytes/macrophages functions such as endocytosis/phagocytosis, inflammatory cytokines production (TNF $\alpha$ , IL-1 $\beta$ ) and by increasing HLA molecules expression. IFN $\gamma$  also acts on B cells by influencing immunoglobulin heavy chain switching, B cells activation and synergistically with IL-2, promotes B cells proliferation. Finally IFN $\gamma$  induces T cells differentiation and enhances NK activities. Despite IFN $\gamma$  displays no molecular homology with type I interferons, it shares anti-viral and anti-proliferative properties.

## 3. Supernatant assay protocol

The supernatant assay protocol must be run in two distinct microplates : i) a culture plate for cell stimulation and ii) an assay plate in which cytokine detection is carried out.



### 3.1. Supplied reagents and preparation

Allow the reagents to warm up at room temperature for at least 30 mins before reconstitution.

Supplied reagents	Reagent reconstitution (stock solutions)	Working solutions
Anti-IFN $\gamma$ -Cryptate 1 vial of 1mL, frozen	No reconstitution. Ready to be diluted (store at -20°C)	⇒ Thaw each vial and dilute each stock solution of conjugate 1/100 in reconstitution buffer (e.g. for 10,000 tests: 0.5 mL of conjugate reagent + 49.5 mL of reconstitution buffer). Mix gently
Anti-IFN $\gamma$ -XL665 1 vial of 1mL, frozen		
IFN $\gamma$ calibrator. Concentrated recombinant IFN $\gamma$ . 2 vials, lyophilized	See label indications for reconstitution volume. Mix gently after reconstitution.	⇒ See calibration curve preparation for further dilution
IFN $\gamma$ control. Concentrated recombinant IFN $\gamma$ . 1 vial, lyophilized. See label indications for concentration after reconstitution.		
<p>Reconstitution buffer (200 mL) 50 mM Phosphate buffer, pH 7.0, 0.8M KF, 0.2 % BSA (frozen)</p> <p>Diluent (20 mL) 50 mM Phosphate buffer, pH 7.0, 0.2 % BSA, 0.02 % NaN<sub>3</sub>, preservatives (frozen)</p> <p><b>Note : Supplementary IFN<math>\gamma</math> maximum calibrator (ref 62IFNCDA) and diluent (ref 62DL1DDD) can be obtained separately on request.</b></p>		

**Precaution :** HTRF<sup>®</sup> reagent concentrations have been set for optimal assay performances. Note that any dilution or improper use of the XL665 and Cryptate-conjugates will impair the assay's quality.

### 3.2. Reagent storage and stability

All reagents, except Cryptate and XL665 conjugates, can be stored at 2-8°C until reconstituted. Conjugate working solutions and conjugate stock solutions are stable for one week at 4°C and they can be refrozen (at -80°C) and thawed one more time.

IFN $\gamma$  is not stable once reconstituted. Always use fresh made IFN $\gamma$  solutions and discard unused reagent. Two vials are supplied with the kit.

### 3.3. Calibration curve preparation

Reconstitute the maximum calibrator according to the indications printed on the label and follow the dilution sequence shown in the following table to constitute the calibration curve. Dilution must be carried out with the diluent (or with freshly made PO<sub>4</sub> 50 mM, BSA 0.1% pH7).

Calibrator	Preparation	Calibrator concentration in pg/mL
Cal 7	150 $\mu$ L max. calibrator + 450 $\mu$ L diluent	1500
Cal 6	300 $\mu$ L Cal 7 + 300 $\mu$ L diluent	750
Cal 5	300 $\mu$ L Cal 6 + 300 $\mu$ L diluent	375
Cal 4	300 $\mu$ L Cal 5 + 300 $\mu$ L diluent	187,5
Cal 3	300 $\mu$ L Cal 4 + 300 $\mu$ L diluent	93,75
Cal 2	300 $\mu$ L Cal 3 + 300 $\mu$ L diluent	46,87
Cal 1	300 $\mu$ L Cal 2 + 300 $\mu$ L diluent	23,4
Cal 0	300 $\mu$ L diluent	0

### 3.4. Sample preparation

Dilute all samples to be assayed with the diluent (or with freshly made PO<sub>4</sub> 50 mM, BSA 0.1% pH7). Consecutive dilutions should be made within the 0 to 1500 pg/mL range (working solution).

### 3.5. Assay protocol for 384-well low volume plate (20 $\mu$ L)

- Dispense the reagents in the following order :
- 10  $\mu$ L standard or sample \*
- 5  $\mu$ L anti-IFN $\gamma$  Cryptate
- 5  $\mu$ L anti-IFN $\gamma$  XL665

\* For negative control, replace the first reagent by 10  $\mu$ L of diluent.

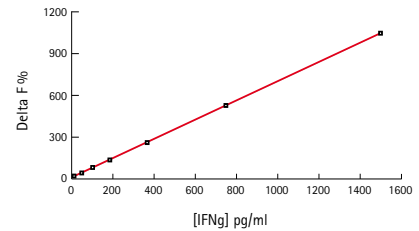
- Cover the plate with a plate sealer and incubate at room temperature for 18 - 20 hours.
- Remove the plate sealer and read on a compatible HTRF<sup>®</sup> reader (more information about compatible reader at [htrf-assays.com/readers](http://htrf-assays.com/readers)).

### 3.6. Data reduction and example of a calibration curve

This data should not be substituted for that obtained in the laboratory.

	A (665nm)	B (620nm)	Ratio (1)	Mean Ratio (2)	CV % (3)	Delta F % (4)
Negative control	2081 1939	42102 42075	494 461	478	4.9%	
<b>[IFN<math>\gamma</math>] pg/mL</b>						
23.4	2320 2406	42875 43671	541 551	546	1.3%	14
46.9	2589 2729	42354 43645	611 625	618	1.6%	29
93.8	3479 3454	44841 43898	776 787	781	1.0%	64
187.5	4749 4719	43099 43837	1102 1077	1089	1.6%	128
375	7022 6649	42486 41762	1653 1592	1622	2.6%	240
750	11580 12210	42401 42746	2731 2856	2794	3.2%	485
1500	20904 20934	42094 42945	4966 4875	4920	1.3%	930
IFN $\gamma$ control	5601 5704	43889 44189	1276 1291	1284	0.8%	169

- Ratio =  $\frac{A_{665nm}}{B_{620nm}} \times 10^4$
- Mean Ratio =  $\frac{\sum \text{Ratios}}{2}$
- CV =  $\frac{\text{Std deviation}}{\text{Mean ratio}} \times 100$
- Delta F =  $\frac{\text{Calibrator or sample Ratio} - \text{Ratio}_{\text{neg}}}{\text{Ratio}_{\text{neg}}} \times 100$   
(Ratio<sub>neg</sub> = negative control)



### 3.7. Analytical characteristics

Limit detection (dose of mean zero + 2 SD)	Hook effect	Linear range
< 10 pg/mL	90,000 pg/mL	up to 5,000 pg/mL

This immunoassay is calibrated against the NIBSC/WHO standard IFN $\gamma$  82/587. To convert sample values obtained with HTRF<sup>®</sup> IFN $\gamma$  kit to equivalent NIBSC units, use the equation below :

$$\text{NIBSC/WHO (82/587) equivalent value (U/mL)} = 0,019 \times \text{IFN}\gamma \text{ value (pg/mL)}$$

### 3.8. Assay flexibility and miniaturization

When used as suggested, the kit will provide sufficient reagents for 20,000 tests using a 384- well low volume plate in 20  $\mu$ L final assay volume (HTRF<sup>®</sup> packaged basis).

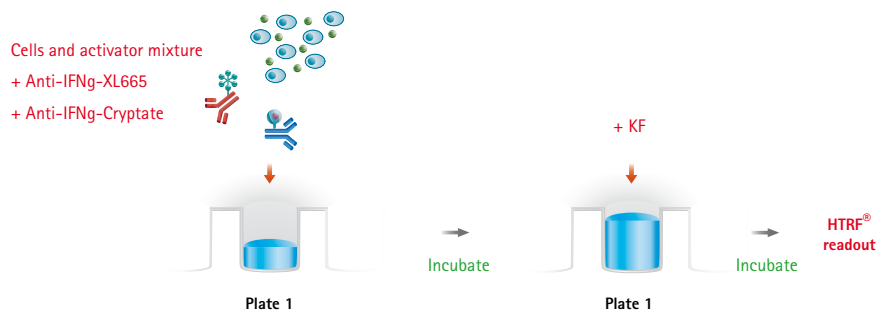
To move to other plate formats (96 half-well or 1536-well) and final volumes (100  $\mu$ L to less than 10  $\mu$ L), the volume of each assay component is simply proportionally adjusted in order to maintain the reagent concentrations as for the 20  $\mu$ L final assay volume. For instance, in the case of the 1536-well format in 10  $\mu$ L final volume, half as much material per well is used, thereby allowing 40,000 tests to be run. The performances of the HTRF<sup>®</sup> assay remain the same whatever the level of miniaturization.

Assay components	Volume proportion	Assay format		
		1536-well (10 $\mu$ L)	384-well low volume (20 $\mu$ L)	96 half-well (100 $\mu$ L)
Sample	2 volumes	5 $\mu$ L	10 $\mu$ L	50 $\mu$ L
XL665 conjugate	1 volume	2.5 $\mu$ L	5 $\mu$ L	25 $\mu$ L
Cryptate conjugate	1 volume	2.5 $\mu$ L	5 $\mu$ L	25 $\mu$ L
	Bulk size	40,000 tests	20,000 tests	4,000 tests

Plate references : 96 half-well plate (Costar # 3694 or equivalent), 384-well low volume plate (Greiner # 784076), 1536-well (Greiner # 782086).

## 4. Cell-based assay protocol

In this protocol, reagent preparation and distribution have been modified in order to allow the direct measurement of IFN $\gamma$  on stimulated cells. This protocol is particularly well adapted to secondary screening.



## 4.1. Reagent preparation

Anti-IFN $\gamma$ - Cryptate	⇒	Thaw each vial and dilute each stock solution of conjugate 1/40 in culture medium (i.e. for 10,000 tests : 0.5 mL of conjugate + 19.5 mL of <b>culture medium</b> ).
Anti-IFN $\gamma$ - XL665	⇒	
IFN $\gamma$ calibrator	⇒	<ul style="list-style-type: none"> <li>Calculate the reconstitution volume by dividing the reconstitution volume indicated on the label of the vial by 1.67 (i.e. if 500 <math>\mu</math>L is printed on the calibrator label, the reconstitution volume will be 299.4 <math>\mu</math>L).</li> <li>Use <b>culture medium</b> NOT WATER to reconstitute both calibrator and control.</li> </ul>
IFN $\gamma$ control	⇒	
Reconstitution buffer 50 mM Phosphate buffer, pH 7.0, 0.8M KF	⇒	Ready to use : in the cell-based assay, the reconstitution buffer is not used for conjugate reconstitution. It is added as KF buffer at the end of the incubation to allow HTRF <sup>®</sup> readout.

## 4.2. Reagent storage and stability

Refer to § 3.2.

## 4.3. Calibration curve preparation

Reconstitute the maximum calibrator with the culture medium volume indicated on the label, divided by 1.67. Follow the same dilution sequence as shown in the table in § 3.3., **replacing the diluent by culture medium**.

## 4.4. Sample preparation

Cell density optimization is a key step in the IFN $\gamma$  cell-based assay. Typically, the level of IFN $\gamma$  produced by cells must fall within the 100-1500 pg/mL range. Optimization consists of testing a broad range of cell concentrations (e.g. between 100 and 20,000 cells per well) in the presence or the absence of a direct activator of IFN $\gamma$  production, e.g. 1 ng/mL PMA and 500 ng/mL ionomycin. In practice, resuspend the cells in the culture medium supplemented with the activator(s) or inhibitor(s) so that the desired number of cells will be dispensed under 6  $\mu$ L.

## 4.5. Cell-based assay protocol for 384-well low volume plate (20 $\mu$ L final)

Dispense the reagents in the following order:

- 6  $\mu$ L standard or cell suspension
- 2  $\mu$ L anti-IFN $\gamma$  Cryptate
- 2  $\mu$ L anti-IFN $\gamma$  XL665

\* For negative control, replace the first reagent by 6  $\mu$ L of culture medium.

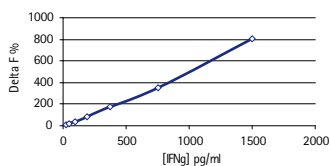
- Incubate the plate for 18 to 24 hours at 37°C in a CO<sub>2</sub> incubator with a fully humidified atmosphere.
- Add 10  $\mu$ L of reconstitution buffer.
- Read on a compatible HTRF<sup>®</sup> reader (more information about compatible reader at [htrf-assays.com/readers](http://htrf-assays.com/readers)).

## 4.6. Case study : IFN $\gamma$ quantification in peripheral blood mononucleated cells (PBMC)

- PBMC were separated on a ficoll density gradient (d=1.077) (Sigma). Cells were washed twice and viability was evaluated by trypan blue dye exclusion. Cells were then resuspended in RPMI1640 culture medium complemented with 10% heat inactivated calf serum, and stimulated with 1 ng/mL PMA and 500 ng/mL ionomycin.
- A graduated number of cells per well were distributed in 6  $\mu$ L of culture medium including PMA and ionomycin activators, according to the cell-based assay protocol described above.

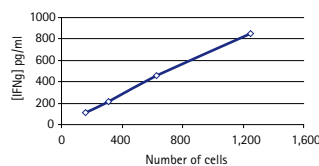
IFN $\gamma$  calibration curve

[IFN $\gamma$ ] pg/mL	Delta F % (Overnight incubation, readout after KF addition)
23.4	12
46.87	21
93.75	41
187.5	83
375	180
750	352
1500	805



IFN $\gamma$  quantification in PBMC

Number of cells / well	[IFN $\gamma$ ] pg/mL
1,250	853.3
625	455.2
300	214.1
150	107.6



The data shows that the co-incubation of the stimulated cells with the labeled antibody pair does not alter HTRF<sup>®</sup> readout or assay performances. IFN $\gamma$  quantification is proportional to the number of cells per well. In this example, the cell density selected for a secondary screen to determine inhibitors of IFN $\gamma$  production would be 1,250 cells/well. In all instances, cell density should be carefully optimized, as the secretion of IFN $\gamma$  may vary between cell types.