Human IFNγ High Sensitivity ELISA Kit

Instructions for use

Catalogue numbers:
1x48 tests: 850.900.048
1x96 tests: 850.900.096
2x96 tests: 850.900.192

For research use only

Fast Track Your Research……

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Human IFNγ High Sensitivity ELISA KIT

1. Intended use

The Human high sensitivity IFNγ ELISA Kit is to be used for the in-vitro quantitative determination of interferon gamma (IFNγ) in human sera, plasmas, buffered solutions or cell culture media. The assay will recognize both natural and recombinant human IFNγ.

This kit has been configured for research use only.

2. Principle of the method

The IFNγ Kit is a solid phase sandwich Enzyme Linked-Immuno- Sorbent Assay (ELISA). A monoclonal antibody specific for IFNγ has been coated onto the wells of the microtiter strips provided. Samples, including standards of known IFNγ concentrations and unknowns are pipetted into these wells.
During the first incubation, the IFNγ antigen and a biotinylated monoclonal antibody specific for IFNγ are successively incubated.
After washing, the enzyme (streptavidin-peroxydase) is added. All the unbound enzyme is removed by washing and the first amplification step is performed by adding the Biotine-Tyramine reagent. Under the action of HRP, a biotine polymerisation reaction occurs in the region of the HRP linked to the detection antibody. After washing the second amplification step is performed and the polymerised biotine is revealed by a new streptavidin-HRP step. Finally after washing, the substrate is added. The intensity of this coloured product is directly proportional to the concentration of IFNγ present in the samples.

3. Reagents provided and reconstitution

Reagents (Store@2-8°C)	**Quantity 1x48 well kit** Cat no. 850.900.048	**Quantity 1x96 well kit** Cat no. 850.900.096	**Quantity 2x96 well kit** Cat no. 850.900.192	**Reconstitution**
96 well microtitre strip plate	1/2	1	2	Ready to use (Pre-coated)
Plastic plate covers	2	2	4	n/a
Standard: 25 pg/ml	1	2	4	Reconstitute as directed on the vial (see Assay preparation, section 8)
Standard Diluent (Buffer)	1 (25ml)	1 (25ml)	1 (25ml)	10x Concentrate, dilute in distilled water (see reagent preparation, section 8)
Biotinylated anti-IFNγ	1 (0.4ml)	1 (0.4ml)	2 (0.4ml)	Dilute in Biotinylated Antibody Diluent (see Assay preparation, section 8)
Biotinylated Antibody Diluent	1 (7.5ml)	1 (7.5ml)	1 (13ml)	Ready to use
Streptavidin-HRP	1 (5µl)	2 (5µl)	4 (5µl)	Add 0.5ml of HRP diluent prior to use (see Assay preparation, section 8)
Amplification Diluent	1 (25ml)	1 (25ml)	1 (25ml)	Ready to use
Amplifier*	1 (200µl)	1 (200µl)	2 (200µl)	Dilute in Amplification Buffer
HRP Diluent	1 (25ml)	1 (25ml)	2 (25ml)	Ready to use
Wash Buffer	1 (10ml)	1 (10ml)	2 (10ml)	200x Concentrate dilute in distilled water (see Assay preparation, section 8)
TMB Substrate	1 (11ml)	1 (11ml)	1 (24ml)	Ready to use
H_2SO_4 stop reagent	1 (11ml)	1 (11ml)	2 (11ml)	Ready to use

*Reagent contains ethyl alcohol

4. Materials required but not provided

- Microtiter plate reader fitted with appropriate filters (450nm required with optional 630nm reference filter)
- Microplate washer or wash bottle
- 10, 50, 100, 200 and 1,000µl adjustable single channel micropipettes with disposable tips
- 50-300µl multi-channel micropipette with disposable tips
- Multichannel micropipette reagent reservoirs
- Distilled water
- Vortex mixer
- Orbital shaker
- Miscellaneous laboratory plastic and/or glass, if possible sterile

5. Storage Instructions

Store kit reagents between 2 and 8°C. Immediately after use remaining reagents should be returned to cold storage (2-8°C). Expiry of the kit and reagents is stated on box front labels. The expiry of the kit components can only be guaranteed if the components are stored properly, and if, in case of repeated use of one component, the reagent is not contaminated by the first handling.

Wash Buffer: Once prepared store at 2-8°C for up to 1 week
Standard Diluent Buffer: Once prepared store at 2-8°C for up to 1 week
Standards : Once prepared use immediately and do not store
Biotinylated Secondary Antibody: Once prepared use immediately and do not store
Streptavidin-HRP: Once prepared use immediately and do not store

6. Specimen collection, processing & storage

Cell culture supernatants, serum, plasma or other biological samples will be suitable for use in the assay. Remove serum from the clot or red cells, respectively, as soon as possible after clotting and separation.

Cell culture supernatants: Remove particulates and aggregates by spinning at approximately 1000 x g for 10 min.

Serum: Avoid any inintentional stimulation of the cells by the procedure. Use pyrogen/endotoxin free collecting tubes. Serum should be removed rapidly and carefully from the red cells after clotting. For that, after clotting, centrifuge at approximately 1000 x g for 10 min and remove serum.

Plasma: EDTA,citrate and heparin plasma can be assayed. Spin samples at 1000 x g for 30 min to remove particulates. Harvest plasma.

Storage: If not analyzed shortly after collection, samples should be aliquoted (250-500µl) to avoid repeated freeze-thaw cycles and stored frozen at –70°C. Avoid multiple freeze-thaw cycles of frozen specimens.

Recommendation: Do not thaw by heating at 37°C or 56°C. Thaw at room temperature and make sure that sample is completely thawed and homogeneous before use. When possible avoid use of badly haemolysed or lipemic sera. If large amounts of particles are present these should be removed prior to use by centrifugation or filtration.

7. Safety & precautions for use

- Handling of reagents, serum or plasma specimens should be in accordance with local safety procedures , e.g.CDC/NIH Health manual : " Biosafety in Microbiological and Biomedical Laboratories" 1984
- Laboratory gloves should be worn at all times
- Avoid any skin contact with H_2SO_4 and TMB. In case of contact, wash thoroughly with water
- Do not eat, drink, smoke or apply cosmetics where kit reagents are used
- Do not pipette by mouth
- When not in use, kit components should be stored refrigerated or frozen as indicated on vials or bottles labels
- All reagents should be warmed to room temperature before use. Lyophilized standards should be discarded after use
- Once the desired number of strips has been removed, immediately reseal the bag to protect the remaining strips from deterioration
- Cover or cap all reagents when not in use
- Do not mix or interchange reagents between different lots
- Do not use reagents beyond the expiration date of the kit
- Use a clean disposable plastic pipette tip for each reagent, standard, or specimen addition in order to avoid cross contamination, for the dispensing of H_2SO_4 and substrate solution, avoid pipettes with metal parts
- Use a clean plastic container to prepare the washing solution
- Thoroughly mix the reagents and samples before use by agitation or swirling
- All residual washing liquid must be drained from the wells by efficient aspiration or by decantation followed by tapping the plate forcefully on absorbent paper. Never insert absorbent paper directly into the wells
- The TMB solution is light sensitive. Avoid prolonged exposure to light. Also, avoid contact of the TMB solution with metal to prevent colour development. Warning TMB is toxic avoid direct contact with hands. Dispose off properly
- If a dark blue colour develops within a few minutes after preparation, this indicates that the TMB solution has been contaminated and must be discarded. Read absorbance’s within 1 hour after completion of the assay
- When pipetting reagents, maintain a consistent order of addition from well-to-well. This will ensure equal incubation times for all wells
- Follow incubation times described in the assay procedure
- Dispense the TMB solution within 15 min of the washing of the microtitre plate

8. Assay Preparation

Bring all reagents to room temperature before use

8.1. Assay Design

Determine the number of microwell strips required to test the desired number of samples plus appropriate number of wells needed for running zeros and standards. Each sample, standard and zero should be tested **in duplicate**. Remove sufficient Microwell Strips for testing from the pouch immediately prior to use. Return any wells not required for this assay with desiccant to the pouch. Seal tightly and return to 2-8°C storage.

Example plate layout (example shown for a 6 point standard curve)

	Standards (pg/mL)		Sample Wells									
	1	2	3	4	5	6	7	8	9	10	11	12
A	25	25										
B	12.5	12.5										
C	6.25	6.25										
D	3.12	3.12										
E	1.56	1.56										
F	0.78	0.78										
G	zero	zero										
H												

All remaining empty wells can be used to test samples in duplicate

8.2. Preparation of Wash Buffer

Dilute the (200x) wash buffer concentrate 200 fold with distilled water to give a 1x working solution. Pour entire contents (10 ml) of the Washing Buffer Concentrate into a clean 2,000 ml graduated cylinder. Bring final volume to 2,000 ml with glass-distilled or deionized water. Mix gently to avoid foaming. Transfer to a clean wash bottle and store at 2°-8°C for up to 1 week.

8.3. Preparation of Standard Diluent Buffer

Add the contents of the vial (10x concentrate) to 225ml of distilled water before use.

This solution can be stored at 2-8°C for up to 1 week.

8.4. Preparation of Standard

Standard vials must be reconstituted with the volume of standard diluent shown on the vial immediately prior to use. This reconstitution gives a stock solution of 25 pg/ml of IFNγ. **Mix the reconstituted standard gently by inversion only**. Serial dilutions of the standard are made directly in the assay plate to provide the concentration range from 25 to 0.78 pg/ml. A fresh standard curve should be produced for each new assay.

- Immediately after reconstitution add 200µl of the reconstituted standard to wells A1 and A2, which provides the highest concentration standard at 25 pg/ml
- Add 100µl of Standard Diluent to the remaining standard wells B1 and B2 to F1 and F2
- Transfer 100µl from wells A1 and A2 to B1 and B2. Mix the well contents by repeated aspirations and ejections taking care not to scratch the inner surface of the wells
- Continue this 1:1 dilution using 100µl from wells B1 and B2 through to wells F1 and F2 providing a serial diluted standard curve ranging from 25 pg/ml to 0.78 pg/ml
- Discard 100µl from the final wells of the standard curve (F1 and F2)

Alternatively these dilutions can be performed in separate clean tubes and immediately transferred directly into the relevant wells.

8.5. Preparation of Samples

Normal sera and plasmas may be applied undiluted. Nevertheless, sera or plasmas from patients with various pathologies may be applied undiluted and diluted (to prevent too high concentrations). Please note that certain sera/plasma may induce false positive (for example, in reason to presence of anti-mouse anti-IgG antibody). A simple sample dilution (1:2) allows eliminating interference. As IFNγ concentrations may vary considerably in cell supernatant samples, it is not easy to recommend a dilution factor.

8.6. Preparation of Biotinylated anti-IFNγ

It is recommended this reagent is prepared immediately before use. Dilute the biotinylated anti- IFNγ with the biotinylated antibody diluent in an appropriate clean glass vial using volumes appropriate to the number of required wells. Please see example volumes below:

Number of wells required	Biotinylated Antibody (µl)	Biotinylated Antibody Diluent (µl)
16	40	1060
24	60	1590
32	80	2120
48	120	3180
96	240	6360

8.7. Preparation of Streptavidin-HRP solutions 1 and 2

It is recommended to centrifuge vial for a few seconds in a microcentrifuge to collect all the volume at the bottom.

Dilute the 5µl vial with 0.5ml of HRP diluent **immediately before use.** This pre-dilution will be used for Step 8 and step 13. Do-not keep this diluted vial for future experiments. Further dilute the HRP solution to volumes appropriate for the number of required wells in a clean glass vial. Please see example volumes below:

	Streptavidin-HRP solution 1 (Step 8)		Streptavidin-HRP solution 2 (Step 13)	
Number of wells required	Streptavidin-HRP (µl)	Streptavidin-HRP Diluent (ml)	Streptavidin-HRP (µl)	Streptavidin-HRP Diluent (ml)
16	20	1.980	40	1.960
32	40	3.960	80	3.920
48	60	5.940	120	5.880
96	120	11.880	240	11.760

8.8. Preparation of Amplifier

It is recommended this reagent is prepared immediately before use. Dilute the Amplifier with the Amplification diluent in an appropriate clean glass vial using volumes appropriate to the number of required wells. Please see example volumes below:

Number of wells required	Amplifier (µl)	Amplification Diluent (ml)
16	20	1.980
32	40	3.960
48	60	5.940
96	120	11.880

9. Method

We strongly recommend that every vial is mixed thoroughly without foaming prior to use except the standard vial which must be mixed gently by inversion only. Prepare all reagents as shown in section 8. Note: Final preparation of Biotinylated anti-IFNg (section 8.6) and Streptavidin-HRP (section 8.7) should occur immediately before use.

Assay Step		Details
1.	Addition	Add 100µl of each **standard, sample and zero** (Standard Diluent Buffer) in duplicate to appropriate number of wells
2.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for **1 hour**
3.	Wash	Remove the cover and wash the plate as follows: a) Aspirate the liquid from each well b) Dispense 0.3 ml of **1x washing solution** into each well c) Aspirate the contents of each well d) Repeat step b and c another two times
4.	Addition	Add 50µl of diluted **biotinylated anti-IFNγ** to all wells
5.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for **1 hour**
6.	Wash	Repeat wash step 3.
7.	Addition	Add 100µl of **Streptavidin-HRP solution 1** into all wells
8.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for **20 min**
9.	Wash	Repeat wash step 3.
10.	Addition	Add 100µl of diluted **Amplifier** to all wells
11.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for **15 min**
12.	Wash	Repeat wash step 3.
13.	Addition	Add 100µl of **Streptavidin-HRP solution 2** into all wells
14.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for **20 min**
15.	Wash	Repeat wash step 3.
16.	Addition	Add 100µl of ready-to-use **TMB Substrate Solution** into all wells
17.	Incubation	Incubate in the dark for **10-20 minutes*** at room temperature. Avoid direct exposure to light by wrapping the plate in aluminium foil
18.	Addition	Add 100µl of **H_2SO_4:Stop Reagent** into all wells
Read the absorbance value of each well (immediately after step 11.) on a spectrophotometer using 450 nm as the primary wavelength and optionally 630 nm as the reference wave length (610 nm to 650 nm is acceptable).		

*****_Incubation time of the substrate solution is usually determined by the ELISA reader performance. Many ELISA readers only record absorbance up to 2.0 O.D. Therefore the colour development within individual microwells must be observed by the analyst, and the substrate reaction stopped before positive wells are no longer within recordable range_

Note: In case of incubation without shaking the O.D values may be lower than with shaking; in this case let the color develop longer in order to obtain correct OD values

10. Data Analysis

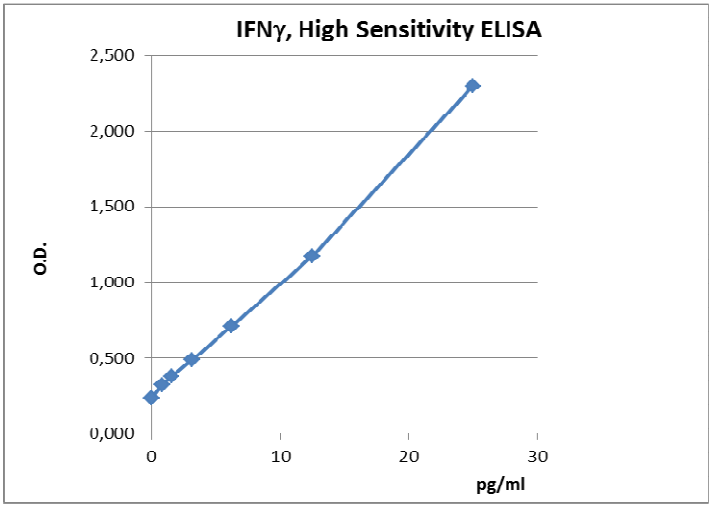
Calculate the average absorbance values for each set of duplicate standards and samples**.** Ideally duplicates should be within 20% of the mean.

Generate a linear standard curve by plotting the average absorbance of each standard on the vertical axis versus the corresponding Human IFNγ standard concentration on the horizontal axis.

The amount of IFNγ in each sample is determined by extrapolating OD values against IFNγ standard concentrations using the standard curve**.**

Example IFNγ Standard curve

Standard	IFNγ Conc pg/ml	OD (450nm) Mean	CV (%)
1	25	2.297	2.1
2	12.5	1.172	0.2
3	6.25	0.712	3.9
4	3.12	0.487	3.1
5	1.56	0.381	2.4
6	0.78	0.322	5.3
Zero	0	0.236	7.8



Note: curve shown above should not be used to determine results. Every laboratory must produce a standard curve for each set of microwell strips assayed.

11. Assay limitations

Do not extrapolate the standard curve beyond the maximum standard curve point. The dose-response is non-linear in this region and good accuracy is difficult to obtain. Concentrated samples above the maximum standard concentration must be diluted with Standard diluent or with your own sample buffer to produce an OD value within the range of the standard curve. Following analysis of such samples always multiply results by the appropriate dilution factor to produce actual final concentration.

The influence of various drugs on end results has not been investigated. Bacterial or fungal contamination and laboratory cross-contamination may also cause irregular results.

Improper or insufficient washing at any stage of the procedure will result in either false positive or false negative results. Completely empty wells before dispensing fresh Washing Buffer, fill with Washing Buffer as indicated for each wash cycle and do not allow wells to sit uncovered or dry for extended periods.

Disposable pipette tips, flasks or glassware are preferred, reusable glassware must be washed and thoroughly rinsed of all detergents before use.

As with most biological assays conditions may vary from assay to assay therefore **a fresh standard curve must be prepared and run for every assay.**

12. Performance Characteristics

12.1. Sensitivity

The sensitivity, minimum detectable dose of Human IFNγ using this Diaclone Human IFNγ High Sensitivity ELISA kit was found to be **<0.69 pg/ml**. This was determined by adding 3 standard deviations to the mean OD obtained when the zero standard was assayed 40 times.

12.2. Specificity

Ten specificities were tested with concentrations higher than IFNγ curve concentrations. No cross reaction was observed for concentrations ranging from 2500 to 78.12 pg/ml for IL-1α, IL-2, IL-8, IL-12p40, TNFα, CD95 Fas, TRAIL, ICAM-1, Gp130 and GM-CSF.

12.3. Precision

Two human serum pools, two human plasma pools and two cell culture media samples with various concentrations of IFNγ were tested for repeatability and reproductibility. Each assay was carried out with 3 duplicates of each sample. Three independent assays were performed. The intra-assay and inter-assay coefficient of variation has been calculated to be 3.9% and 8.6% respectively.

12.4. Dilution Parallelism

Two human serum pools, one human plasma pool and one cell culture medium samples with various concentrations of IFNγ were serially diluted in standard buffer diluent. Linearity was evaluated on 4 dilutions. The linear regression of samples versus the expected concentrations yielded a quote slope of 0.994.

12.5. Spike Recovery

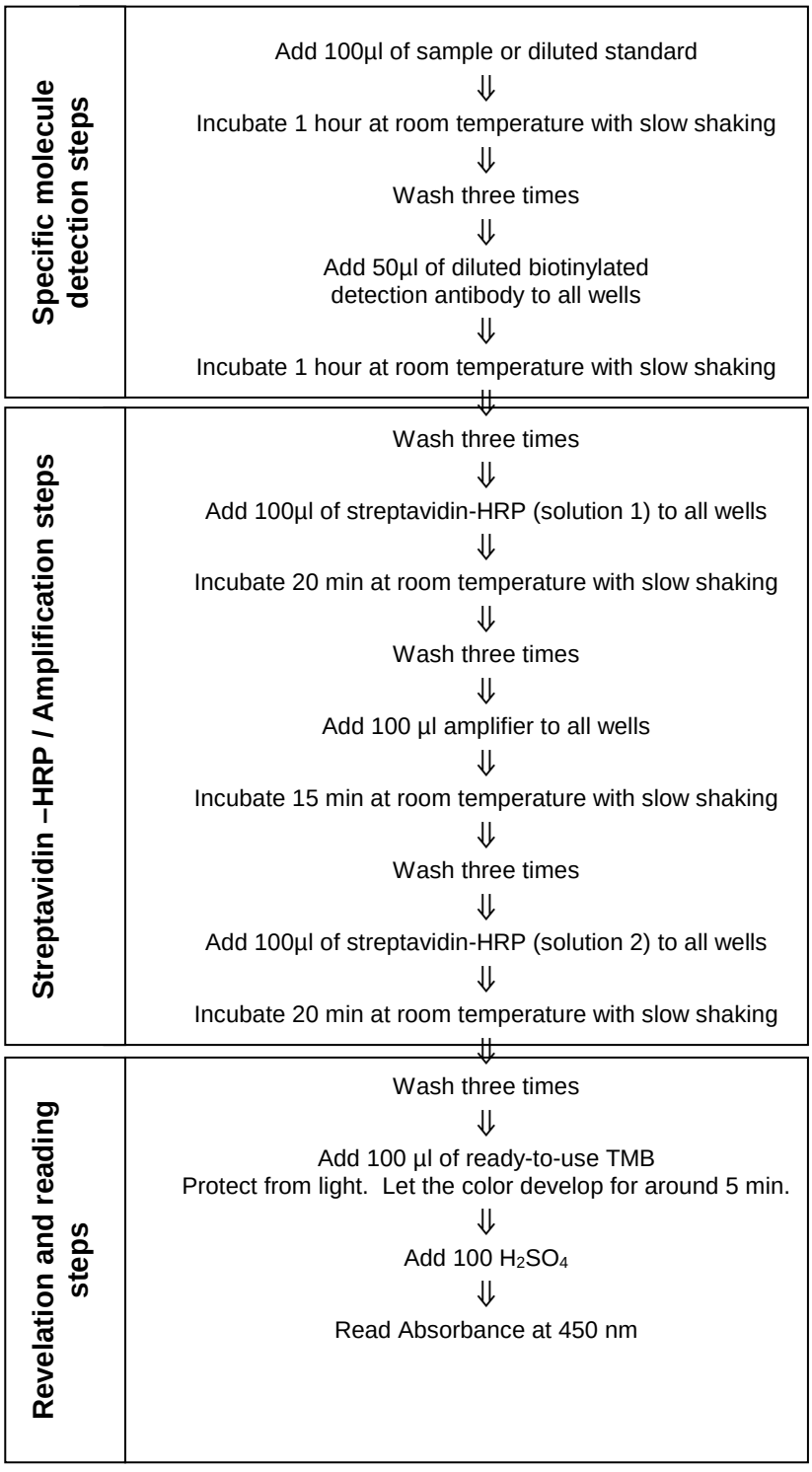
The spike recovery was evaluated by spiking two levels of IFNγ into three human serum pools, two plasma pools and two culture media. Recovery was evaluated with one test. Mean recoveries were 92% in sera (range values: 84-98%), 72% in plasma (Range values: 61-81%) and 108% in cell culture media (range values: 88-117%).

12.6. Expected Values

16 sera and 16 plasmas from healthy individual donors were tested undiluted and diluted in duplicates. Mean concentration of IFNγ in sera was 2.3 pg/ml (12 positives – range values of positive sera : 0.70 – 5.82 pg/ml) and in plasma is 1.89 pg/ml (13 positives – range values of positive plasmas : 0.89 – 5.08 pg/ml).

13. Assay Summary

Total procedure length : 3h00mn



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Diaclone SAS
1 Boulevard A.Fleming
25020 Besancon Cedex
France
Tel +33 381413838
Fax +33 381413636
Email: info@diaclone.com