Human IFN-γ/IL-2/TNF-α FluoroSpot kit
Product Code: FSP-010209-10

CONTENTS:

- Pre-coated plates, mAb 1-D1K, MT2A91/2C95, TNF3/4 (10 plates)
- **Detection antibodies**
  - anti-IFN-γ mAb 7-B6-1-FS-FITC (600 μl)
  - anti-IL-2 mAb MT8G10-biotin: 0.5 mg/ml (250 μl)
  - anti-TNF-α mAb TNF5-BAM (600 μl)
- **Fluorophore conjugated detection reagents**
  - anti-FITC-490 (600 μl)
  - SA-550 (600 μl)
  - anti-BAM-640 (600 μl)
- Co-stimulator anti-CD28 mAb CD28-A (500 μl)
  - Concentration: 0.1 mg/ml
- Positive control anti-CD3 mAb CD3-2 (100 μl)
- Fluorescence enhancer-II (125 ml)

MT8G10-biotin is supplied in sterile filtered (0.2 μm) PBS with 0.02% sodium azide. Anti-CD28 and anti-CD3 mAbs are supplied in sterile filtered (0.2 μm) PBS. 7-B6-1-FS-FITC, TNF5-BAM, anti-FITC-490, SA-550, anti-BAM-640 and Fluorescence enhancer-II contain 0.002% Kathon CG.

**STORAGE:**
Shipped at ambient temperature. On arrival all reagents should be stored refrigerated at 4-8°C. Plates should be stored at room temperature.
The protocol describes triple staining for the detection of human IFN-γ, IL-2, and TNF-α. Cells +/- stimuli are added and secreted IFN-γ, IL-2, and TNF-α will be captured by the specific mAbs. After cell removal, spots are detected in two steps. First, a mixture of 7-B6-1-FS-FITC (IFN-γ), MT8G10-biotin (IL-2) and TNF5-BAM (TNF-α) is added, then a mixture of anti-FITC-490 (IFN-γ), SA-550 (IL-2) and anti-BAM-640 (TNF-α).

A **Preparation of plate (sterile conditions)**
1. Remove the plate from the sealed package and wash 4 times with sterile PBS (200 μl/well).
2. Add 200 μl/well of sterile medium containing 10% of the same serum as used for the cell suspensions. Incubate for at least 30 minutes at room temperature to condition the membrane.

B **Incubation of cells in plate (sterile conditions)**
1. Remove the medium and add the stimuli followed by the cell suspension. Alternatively, cells and stimuli can be mixed before addition to the plate. The mAb CD28-A can be included (at 0.1 μg/ml) to enhance antigen-specific stimulation. As a positive control for cytokine production, the mAb CD3-2 is recommended in a dilution of 1:1000.
2. Put the plate in a 37°C humidified incubator with 5% CO₂ and incubate 18-72 hours. Do not move the plate during this time and take measures to avoid evaporation (e.g. by wrapping the plate in aluminium foil).

C **Detection of spots**
1. Remove the cells by emptying the plate and wash 5 times with PBS, 200 μl/well.
2. In the same tube, dilute the detection antibodies 7-B6-1-FS-FITC 1:200, MT8G10-biotin to 1 μg/ml and TNF5-BAM 1:200 in PBS containing 0.1% bovine serum albumin (PBS-0.1% BSA). Filter the antibody solution using a 0.2 μm, low protein binding filter. Add 100 μl/well and incubate for 2 hours at room temperature.
3. Wash as above (step C1).
4. In the same tube, dilute the anti-FITC-490 1:200, SA-550 1:200 and anti-BAM-640 1:200 in PBS-0.1% BSA. Filter the solution using a 0.2 μm, low protein binding filter and add 100 μl/well. Incubate for 1 hour at room temperature. From this step on, cover the plate to limit light exposure.
5. Wash as above (step C1).
6. Empty the plate and add 50 μl/well of Fluorescence enhancer and leave the plate for 15 minutes at room temperature.
7. Empty the plate and remove residual Fluorescence enhancer by firmly tapping the plate against clean paper towels.
8. Remove the underdrain (the soft plastic under the plate). Leave the plate in the dark to dry; plate should be completely dry before analysis. Inspect and count spots in a FluoroSpot reader. Store plate in the dark at room temperature.
Hints and comments

These suggestions are based on the detection of antigen-specific immune responses using PBMC. If using T-cell clones, mixtures of separated cell fractions etc., other protocols may have to be considered.

Co-stimulation with anti-CD28

Anti-CD28 mAb provides a co-stimulatory signal to antigen-specific responses by binding to CD28 on T cells. Addition of anti-CD28 mAb to the cell culture can be used to enhance antigen-specific responses. Further optimization may be necessary, depending on which cells and stimuli are used. Too high concentration of anti-CD28 mAb may result in an elevation of non-specific cytokine secretion. The co-stimulatory effects of anti-CD28 mAb, as well as a possible impact on non-specific spots, can be assessed by comparing cells cultured with or without anti-CD28 mAb.

Plates

The IPFL plates included in the kit have a low fluorescent PVDF-based membrane. The underdrain can be left on the plate all along, but then plates require a longer drying time before spots can be counted (step C8).

Plate washing

Washing of plates can be done using a multi-channel micropipette. In washing steps not requiring sterile conditions (C1-C5), a regular ELISA plate washer can also be used, provided that the washing head is adapted to the ELISpot/FluoroSpot plates.

Serum

The serum should be selected to support cell culture and give low background staining. We recommend the use of fetal calf serum. Alternatively serum-free medium evaluated for cell culture can be used.

Cells

Both freshly prepared and cryopreserved cells may be used in the assay. However it is recommended that the latter are rested for at least one hour to allow removal of cell debris. To decrease background TNF-α spots, a subsequent resting overnight is recommended after removal of cell debris. Triplicates or duplicates of 250,000 cells per well are often used to assess antigen-specific responses. For polyclonal activators, the cell number may have to be reduced to avoid confluent spot formation. Protocols with other incubation times have to be established by the user.

Assay controls

The number of cells responding to antigen stimulation is often compared to the number of cells spontaneously secreting cytokine which is determined by incubating the same number of cells in the absence of stimuli. A polyclonal activator such as anti-CD3 mAb (included in the kit) or phytohemagglutinin (1-10 μg/ml) is often included as a control for cell viability and functionality of the assay.

Buffers

PBS for washing and dilution should be filtered (0.2 μm) for optimal results. We do not recommend the inclusion of Tween or other detergents in the washing and incubation buffers.

Detection reagents

To reduce unspecific background it is recommended to filter the working dilution of detection reagents. Use a 0.2 μm, low protein binding filter.

Analysis

We recommend the use of an automated FluoroSpot reader equipped with filters for FITC (excitation 490 nm/ emission 510 nm), Cy3 (excitation 550 nm/ emission 570 nm) and Cy5 (excitation 640 nm/ emission 660 nm). Filters should have high specificity to avoid bleed-through artifacts. IFN-γ spots are analyzed with FITC filter, IL-2 spots with Cy3 filter and TNF-α spots using a Cy5 filter. Fluorescent spots may fade due to excessive exposure to light and it is recommended to analyze the plate within one week of development.
NOTE; for research use only.

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