Miltenyi Biotec

PepTivator® EBV LMP1 1 – premium grade

human

6 nmol/peptide	130-095-930
60 nmol/peptide	130-095-931

Contents

1. Description

Components	**6 nmol/peptide PepTivator® EBV LMP1 – premium grade** or **60 nmol/peptide PepTivator® EBV LMP1 – premium grade:** Pool of lyophilized peptides, consisting mainly of 15-mer sequences with 11 amino acids overlap, covering the complete sequence of the human LMP1 protein of Epstein-Barr virus strain B95-8 (Swiss-Prot Acc. no. P03230).
Capacity	6 nmol (approximately 10 µg) per peptide for the stimulation of up to 10^8 total cells or 60 nmol (approximately 100 µg) per peptide for the stimulation of up to 10^9 total cells.
Product format	Lyophilized peptides containing stabilizer.
Purity	Each peptide >80%, peptides are individually purified by HPLC. Low endotoxin.
Storage	Store lyophilized product at –20 °C. The expiration date is indicated on the vial label.

This product contains no preservative and is sterile filtered; always handle under aseptic conditions.

1.1 Background information

Epstein-Barr virus (EBV) is a human γ-herpesvirus with B cell growth–transforming ability and lymphomagenic potential. More than 90% of human adults are infected with EBV. In healthy individuals, EBV typically establishes a persistent latent infection in which the virus can be detected in resting, non-proliferating peripheral B lymphocytes. Expression of the viral protein latent membrane protein 1 (LMP1) is important for the maintaince of the latency phase. T cells are essential for the control of the outgrowth of EBV infected B cells. In EBV-associated malignancies, such as nasopharyngeal carcinoma and Hodgkin's lymphoma, LMP1 is found to be one of a restricted number of expressed viral proteins.

The PepTivator® EBV LMP1 – premium grade has been specially developed for efficient *in vitro* stimulation of LMP1-specific $CD4^+$ and $CD8^+$ T cells, as peptides of 15 amino acid length with 11 amino acid overlap represent the optimized solution for stimulating both $CD4^+$ and $CD8^+$ T cells in various applications. Stimulation of T cells with PepTivator EBV LMP1 – premium grade causes the secretion of effector cytokines and upregulation of activation markers, which then allows the detection or isolation of LMP1-specific T cells. Quantitative, phenotypical, or functional analysis of LMP1-specific T cell immunity can provide important information on the natural course of immune responses in healthy or diseased individuals.

1.2 Applications

- Detection and analysis of LMP1-specific $CD4^+$ and $CD8^+$ effector/memory T cells, for example, in PBMCs, by MACS® Cytokine Secretion Assays, intracellular cytokine staining, or other technologies.
- Isolation of viable LMP1-specific $CD4^+$ T cells with the CD154 MicroBead Kit.
- Isolation of viable LMP1-specific $CD4^+$ and $CD8^+$ T cells using MACS Cytokine Secretion Assay – Cell Enrichment and Detection Kits or the CD137 MicroBead Kit for *in vitro* generation of T cell lines/clones for research on tumor immunotherapy.
- Generation of LMP1-specific $CD4^+$ and $CD8^+$ effector/memory T cells from naive T cell populations for research on immunotherapy and vaccination.
- Pulsing of antigen-presenting cells for research on, for example, dendritic cell vaccination.

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2. Recommendations for *in vitro* restimulation of EBV LMP1–specific T cells with PepTivator® EBV LMP1 – premium grade

2.1 Cell preparation

For induction of cytokine secretion by LMP1-specific T cells, best results are achieved by stimulation of fresh PBMCs, whole blood, or other leukocyte containing single-cell preparations from tissues or cell lines. Alternatively, frozen cell preparations can be used.

▲ **Note:** Remove platelets after density gradient separation. Resuspend cell pellet, fill tube with buffer, and mix. Centrifuge at 200×g for 10–15 minutes at 20 °C. Carefully remove supernatant.

▲ **Note:** PBMCs may be stored overnight. The cells should be resuspended and incubated in culture medium as described in 2.4, steps 1–3, but without addition of antigen. The antigen is then added to the culture on the next day.

For details about cell preparation refer to the protocols section at www.miltenyibiotec.com/protocols.

2.2 Reagent requirements

- Culture medium, e.g., TexMACS™ Medium (# 130-097-196) or RPMI 1640 (# 130-091-440) containing 5% human serum, e.g., autologous or AB serum.

  ▲ **Note:** Do not use bovine serum albumin (BSA) or fetal bovine serum (FBS) because of non-specific stimulation.
- (Optional) Cytokine Secretion Assay Kit.
- (Optional) Antibodies or kits for intracellular cytokine staining, e.g., Anti-IFN-γ-PE (# 130-091-653) or the CD154/IFN-γ/CD4 Detection Kit (# 130-092-814). For more information on other fluorochrome-conjugates refer to www.miltenyibiotec.com.
- (Optional) CD154 MicroBead Kit (# 130-092-658) or CD137 MicroBead Kit (# 130-093-476).
- (Optional) CytoStim for restimulation of human T cells (# 130-092-172, # 130-092-173).
- (Optional) PepTivator CEF MHC Class I Plus – premium grade (# 130-098-426) as a peptide-specific positive control.

2.3 Recommendations for reconstitution of PepTivator® EBV LMP1 – premium grade

1. For reconstitution of the lyophilized peptide pool take the vial from –20 °C and warm-up to room temperature.
   ▲ **Note:** Do not open the vial by removing the rubber stopper.
2. To dissolve the 6 nmol PepTivator® EBV LMP1 – premium grade fill a sterile syringe (0.5 mL) with 200 µL of sterile water. To dissolve the 60 nmol PepTivator EBV LMP1 – premium grade fill a sterile syringe (5 mL) with 2 mL of sterile water.
3. Slowly inject the water with a sterile needle through the center of the rubber stopper into the vial containing the lyophilized peptide pool.
4. Vortex the solution to completely dissolve the lyophilized peptide pool.
   The concentration of the stock solution of PepTivator EBV LMP1 – premium grade is 30 nmol (approximately 50 µg) of each peptide per mL.
5. Remove the rubber stopper and aspirate the stock solution with a pipette.
6. To avoid repeated freeze-thaw cycles prepare working aliquots from the stock solution.
7. Store the working aliquots at –80 °C.

2.4 Recommendations for *in vitro* restimulation of LMP1-specific T cells

▲ Always include a negative control (without antigen) in the experiment. A positive control (e.g. a sample stimulated with CytoStim) may also be included.

1. Wash cells by adding medium, centrifuge at 300×g for 10 minutes. Aspirate supernatant.
2. Resuspend cells in culture medium at 10^7 cells/mL. Plate cells in dishes at a density of 5×10^6 cells/cm² (refer to 4. Appendix: Flask and dish sizes for *in vitro* T cell stimulation).
3. Mix the reconstituted PepTivator EBV LMP1 – premium grade thoroughly. Add 20 µL of PepTivator EBV LMP1 – premium grade stock solution per mL cell suspension. Mix carefully and incubate cells at 37 °C; 5–7% CO_2.

   The final concentration of PepTivator EBV LMP1 – premium grade in the cell suspension is 0.6 nmol (approximately 1 µg) of each peptide/mL.

   Cytokine Secretion Assay: Incubate cells for 3–6 hours.

   CD154 MicroBead Kit: Incubate cells for 4–16 hours.

   CD137 MicroBead Kit: Incubate cells for 16–24 hours.

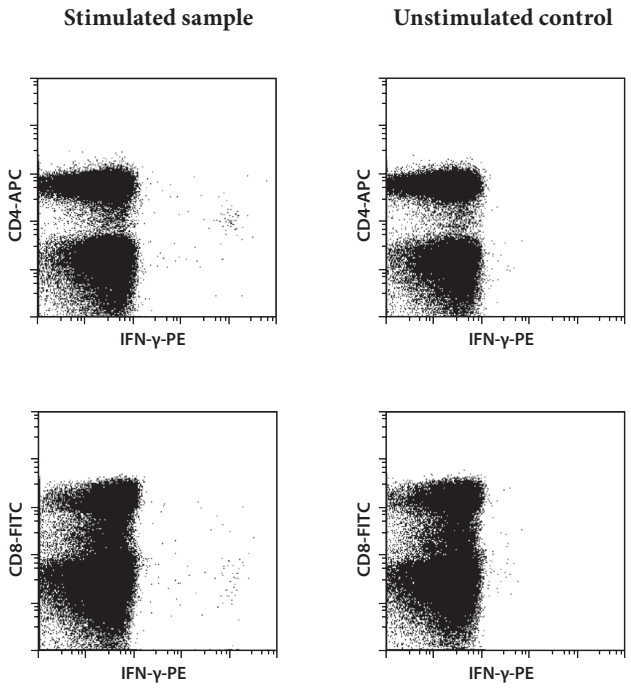
   Intracellular cytokine staining antibodies or kits, e.g., CD154/IFN-γ/CD4 Detection Kit: Incubate cells for 2 hours, then add 1 µg/mL brefeldin A and incubate for further 4 hours.
4. Collect cells carefully by using a cell scraper, or by pipetting up and down when working with smaller volumes. Rinse the dish with cold buffer. Check microscopically for any remaining cells, if necessary, rinse the dish again.

   To proceed with the Cytokine Secretion Assay, the CD154 or CD137 MicroBead Kits, or intracellular cytokine staining, please refer to the respective data sheet.

   ▲ **Note:** When preparing cells for **intracellular cytokine staining,** fixed cells may be stored at 2–8 °C for up to 1 week.

3. Example of EBV LMP1–specific T cell detection by intracellular staining with Anti-IFN-γ-PE

From an EBV$^+$ donor 10^6 human PBMCs were restimulated for 6 hours with 20 µL/mL of reconstituted PepTivator EBV LMP1 – premium grade and without antigen. After 2 hours 1 µg/mL brefeldin A was added. Cells were fixed, permeabilized, and LMP1-specific cells were intracellularly stained with Anti-IFN-γ-PE (# 130-091-653). T cells were counterstained for CD4 and CD8 expression. IFN-γ production of lymphocytes is shown.



4. Appendix: Flask and dish sizes for *in vitro* T cell stimulation

For *in vitro* T cell stimulation (refer to 2.4) the cells should be resuspended in culture medium, containing 5% of human serum, at a dilution of 10^7 cells/mL. The cells should be plated at a density of 5×10^6 cells/cm². Both the dilution and the cell density are important to assure optimum stimulation.

The following table lists culture plate, dish and flask sizes suitable for different cell numbers. It also indicates the appropriate amount of medium to add.

Total cell number	Medium volume to add	Culture plate	Well diameter
0.15×10^7	0.15 mL	96 well	0.64 cm
0.50×10^7	0.50 mL	48 well	1.13 cm
1.00×10^7	1.00 mL	24 well	1.60 cm
2.00×10^7	2.00 mL	12 well	2.26 cm
5.00×10^7	5.00 mL	6 well	3.50 cm
Total cell number	**Medium volume to add**	**Culture dish**	**Dish diameter**
4.5×10^7	4.5 mL	small	3.5 cm
10.0×10^7	10.0 mL	medium	6 cm
25.0×10^7	25.0 mL	large	10 cm
50.0×10^7	50.0 mL	extra large	15 cm
Total cell number	**Medium volume to add**	**Culture flask**	**Growth area**
12×10^7	12 mL	50 mL	25 cm²
40×10^7	40 mL	250 mL	75 cm²
80×10^7	80 mL	720 mL	162 cm²
120×10^7	120 mL	900 mL	225 cm²

Refer to **www.miltenyibiotec.com** for all data sheets and protocols. Miltenyi Biotec provides technical support worldwide. Visit www.miltenyibiotec.com/local to find your nearest Miltenyi Biotec contact.

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