Miltenyi Biotec

PepTivator® EBV BZLF1 – premium grade

human

6 nmol/peptide	130-093-611
60 nmol/peptide	130-093-612

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1. Description

Components	**6 nmol/peptide PepTivator® EBV BZLF1 – premium grade** or **60 nmol/peptide PepTivator EBV BZLF1 – premium grade:** Pool of lyophilized peptides, consisting mainly of 15-mer sequences with 11 amino acids (aa) overlap, covering the complete sequence of the BZLF1 protein of Epstein-Barr virus strain B95-8 (Swiss-Prot Acc. no. P03206).
Capacity	6 nmol (approximately 10 µg) per peptide for stimulation of up to 10^8 total cells or 60 nmol (approximately 100 µg) per peptide for 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. Usually the primary infection is asymptomatic, but some individuals develop an infectious mononucleosis, a self-limiting lymphoproliferative disease. Once infected, the virus persists for life as a latent infection of B cells. Latent infection by EBV is associated with cancers of epithelial and B cell origin. T cells are essential for the control of the outgrowth of EBV-infected B cells, as increased numbers of EBV-associated malignancies are observed in immunocompromised patients. In solid organ and hematopoietic stem cell transplantation patients with T cell dysfunction are at risk to develop the life-threatening post–transplant lymphoproliferative disease (PTLD).
BZLF1 activates the promoter of an EBV gene and plays a key role in the switch from latent to productive infection of EBV.
BZLF1-specific $CD4^+$ and $CD8^+$ T cells have been found in EBV-infected individuals.[1-4]

The PepTivator® EBV BZLF1 – premium grade is specially developed for efficient *in vitro* stimulation of EBV BZLF1-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.[4] Stimulation of T cells with PepTivator EBV BZLF1 – premium grade causes the secretion of effector cytokines and upregulation of activation markers, which then allows the detection or isolation of EBV BZLF1–specific T cells. Quantitative, phenotypical, or functional analysis of EBV BZLF1–specific T cell immunity can provide important information on the natural course of immune responses in healthy or immunocompromised individuals.

1.2 Applications

- Detection and analysis of EBV BZLF1-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 EBV BZLF1-specific $CD4^+$ T cells with the CD154 MicroBead Kit.
- Isolation of viable EBV BZLF1–specific $CD4^+$ and $CD8^+$ T cells using MACS Cytokine Secretion Assay – Cell Enrichment and Detection Kits or the CD137 MicroBead Kitfor *in vitro* generation of T cell lines/clones for research on immunotherapy in EBV infection.
- Generation of EBV BZLF1-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 dendritic cell vaccination.

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2. Recommendations for *in vitro* restimulation of antigen-specific T cells with PepTivator® EBV BZLF1 – premium grade

2.1 Cell preparation

For induction of cytokine secretion by antigen-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.

2.2 Reagent requirements

- Culture medium, e.g., RPMI 1640 (# 130-091-440) containing 5% human serum, e.g., autologous or AB serum.
  ▲ **Note:** Do not use BSA or FCS because of non-specific stimulation.
- (Optional) Cytokine Secretion Assay Kit. For additional reagent and instrument requirements refer to the data sheet of the respective Cytokine Secretion Assay.
- (Optional) Intracellular cytokine staining, e.g., with Anti-IFN-γ-PE (# 130-091-653). For additional reagent requirements refer to the respective data sheet. For more information on other fluorochrome-conjugates see www.miltenyibiotec.com.
- (Optional) Intracellular cytokine staining of activated $CD4^+$ T cells by using, for example, the CD154/IFN-γ/CD4 Detection Kit (# 130-092-814).
- (Optional) CD154 MicroBead Kit (# 130-092-658). For details see the CD154 MicroBead Kit data sheet.
- (Optional) CD137 MicroBead Kit (# 130-093-476). For details see the CD137 MicroBead Kit data sheet.
- (Optional) CytoStim for restimulation of human T cells (# 130-092-172, # 130-092-173). For details see the CytoStim data sheet.
- (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 BZLF1 – 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 BZLF1 – premium grade fill a sterile syringe (0.5 mL) with 200 µL of sterile water. To dissolve the 60 nmol PepTivator EBV BZLF1 – 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 BZLF1 – 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 *In vitro* restimulation of antigen-specific T cells

▲ Always include a negative control (without antigen) in the experiment. A positive control (e.g. 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/cm^2 (see 5. Appendix: Flask and dish sizes for *in vitro* T cell stimulation).
3. Mix the reconstituted PepTivator Peptide Pool thoroughly. Add 20 µL of peptide pool stock solution per mL cell suspension. Mix carefully and incubate cells at 37 °C; 5% CO_2. The final concentration of peptide pool 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. References

1. Bogedain, C. *et al.* (1995) Specific cytotoxic T lymphocytes recognize the immediate-early transactivator Zta of Epstein-Barr virus. J. Virol. 69: 4872–4879.
2. Saulquin, X. *et al.* (2000) A global appraisal of immunodominant CD8 T cell responses to Epstein-Barr virus and cytomegalovirus by bulk screening. Eur. J. Immunol. 30: 2531–2539.
3. Precopio, M. L. *et al.* (2003) Differential kinetics and specificity of EBV-specific $CD4^+$ and $CD8^+$ T cells during primary infection. J. Immunol. 170: 2590–2598.
4. Tynan, F. E. *et al.* (2005) The immunogenicity of a viral cytotoxic T cell epitope is controlled by its MHC-bound conformation. J. Exp. Med. 202: 1249–1260.
5. Kiecker, F. *et al.* (2004) Analysis of antigen-specific T-cell responses with synthetic peptides — what kind of peptide for which purpose? Hum. Immunol. 65: 523–536.

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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