Miltenyi Biotec

PepTivator® CMV pp65 – premium grade

human

6 nmol/peptide	130-093-438
60 nmol/peptide	130-093-435

Contents

1. Description

Components	**6 nmol/peptide PepTivator® CMV pp65 – premium grade** or **60 nmol/peptide PepTivator CMV pp65 – premium grade:** Pool of lyophilized peptides, consisting mainly of 15-mer sequences with 11 amino acids (aa) overlap, covering the complete sequence of the pp65 protein of human cytomegalovirus (CMV) strain AD169 (Swiss-Prot Acc. no. P06725).
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

The PepTivator CMV pp65 – premium grade mainly consists of 15-mer peptides with 11 aa overlap, covering the complete sequence of the pp65 protein of human cytomegalovirus (CMV). CMV is a member of the herpesvirus group and belongs to the subfamily of beta-herpesviruses. Between 50–85% of human adults are infected with CMV. Once infected, the virus persists in the organism. The infection is asymptomatic in healthy individuals, but in immunocompromised patients CMV can cause severe diseases.
CMV pp65 (65 kDa lower matrix phosphoprotein)[1], also known as glycoprotein 64 or UL83, is a virion tegument protein and the main component of the enveloped subviral particle. CMV pp65 is an immunodominant target of $CD4^+$ as well as $CD8^+$ T cell responses to CMV.[2] CMV pp65-specific T cells predominantly produce inflammatory cytokines like IFN-γ, IL-2, and TNF-α.
The PepTivator CMV pp65 – premium grade is especially developed for efficient *in vitro* stimulation of CMV pp65-specific $CD4^+$ and $CD8^+$ T cells as peptides of 15 amino acid length with 11 amino acid overlap represent an optimized solution for stimulating both $CD4^+$ and $CD8^+$ T cells in various applications.[3]

1.2 Applications

- Detection and analysis of CMV pp65–specific $CD4^+$ and $CD8^+$ effector/memory T cells in PBMCs, by MACS® Cytokine Secretion Assays, intracellular cytokine staining, or other technologies.
- Isolation of viable CMV pp65–specific $CD4^+$ T cells with the CD154 MicroBead Kit.
- Isolation of viable CMV pp65–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 immunotherapy in CMV infection.
- Generation of CMV pp65–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.

Miltenyi Biotec B.V. & Co. KG
Friedrich-Ebert-Straße 68, 51429 Bergisch Gladbach, Germany
Phone +49 2204 8306-0, Fax +49 2204 85197
macsde@miltenyi.com
www.miltenyibiotec.com

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2. Recommendations for *in vitro* restimulation of antigen-specific T cells with PepTivator® CMV pp65 – 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 (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-FITC (# 130-091-641). 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® CMV pp65 – 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® CMV pp65 – premium grade fill a sterile syringe (0.5 mL) with 200 µL of sterile water. To dissolve the 60 nmol PepTivator CMV pp65 – 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 CMV pp65 – 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/cm² (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; 5–7% 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.

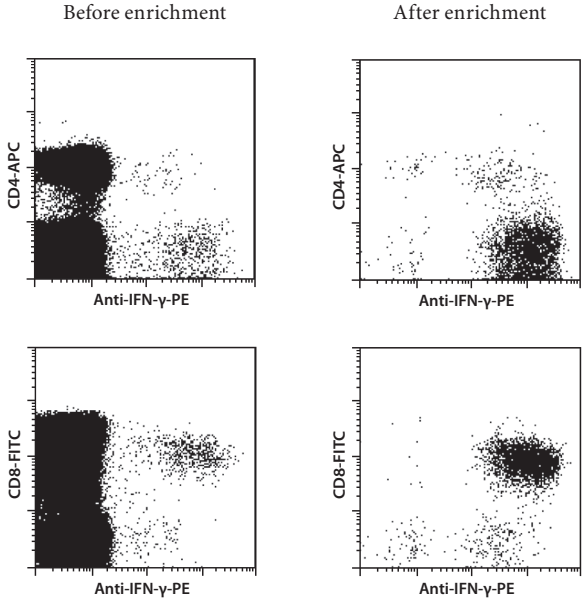
   To proceed with the Cytokine Secretion Assay, the CD154 or CD137 MicroBead Kits, or intracellular cytokine staining, please refer to the respective data sheet.

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

3. Examples

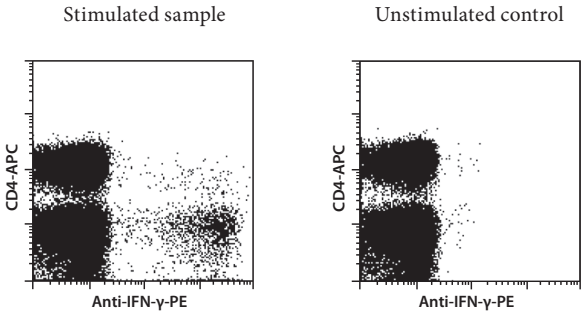
3.1 Detection and isolation of viable CMV pp65–specific T cells using MACS® IFN-γ Secretion Assay – Cell Enrichment and Detection Kit (PE)

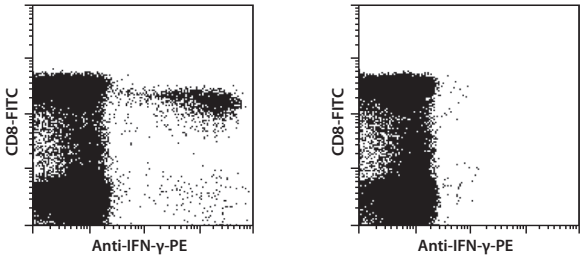
From a CMV+ donor 10^7 human PBMCs were restimulated for 4 hours with 20 µL/mL of reconstituted PepTivator CMV pp65 – premium grade. CMV pp65–specific cells were stained and magnetically enriched according to their secretion of IFN-γ using the IFN-γ Secretion Assay – Cell Enrichment and Detection Kit (PE) (# 130-054-201). T cells were counterstained for CD4 and CD8 expression. Cell debris and dead cells are excluded from the analysis based on scatter signals and PI fluorescence. IFN-γ secretion of viable lymphocytes is shown.



3.2 Detection of CMV pp65-specific T cells by intracellular staining with Anti-IFN-γ-PE

From a CMV+ donor 10^6 human PBMCs were restimulated for 6 hours with 20 µL/mL of reconstituted PepTivator CMV pp65 – premium grade and without antigen. After 2 hours 1 µg/mL brefeldin A was added. Cells were fixed, permeabilized, and CMV pp65-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. References

1. Pande, H. *et al.* (1984) Cloning and physical mapping of a gene fragment coding for a 64- kilodalton major late antigen of human cytomegalovirus. Proc. Natl. Acad. Sci. USA. 81: 4965–4969.
2. Kern, F. *et al.* (2002) Cytomegalovirus (CMV) phosphoprotein 65 makes a large contribution to shaping the T cell repertoire in CMV-exposed individuals. J. Infect. Dis. 185: 1709–1716.
3. 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.

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

For *in vitro* T cell stimulation (see 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

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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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