**For Research Use Only.
Not for use in diagnostic procedures.**

T-Select MHC Tetramer

HLA-DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer -YLYQLSPPITWPL (20 tests)

For Research Use Only. Not for use in diagnostic procedures. These T-Select MHC Tetramers use patented technology (application no. PCT/JP2014/00053) of Tokyo Medical and Dental University.

Background

T lymphocytes play a central role in immune system. Total T cell and T cell subset counts are measured by detection of various cell surface molecules. Enumeration of $CD4^+$ antigen-specific T cells requires cognate recognition of the T cell receptor (TCR) by a class II MHC/peptide complex. This can be done using T-Select MHC class II Tetramers which are composed of four MHC class II molecules each bound to the specific peptide and conjugated with a fluorescent protein. Thus, T-Select MHC Tetramer assays allow quantitation of the total T cell population specific for a given peptide complexed with a particular MHC molecule. Furthermore, since binding does not depend on functional pathways, this population includes specific $CD4^+$ T cells regardless of functional status. Measurements may be performed in whole blood or isolated lymphocyte/mononuclear cell preparations. In some cases where frequency is low, it may be necessary to perform an *in vitro* cell expansion. Specific cell staining is accomplished by incubating the sample with the T-Select MHC Tetramer reagent, then washing away excess Tetramer. The number of Tetramer positive lymphocytes is then determined by flow cytometry.

This Tetramer reagent comprises human class II HLA-DRB1*01:01 and epitope peptide derived from Human T cell leukemia virus type 1 tax protein (HTLV-1 Tax), and it can detect HLA-DRB1*01:01-restricted HTLV-1 Tax-specific $CD4^+$ T cells by flow cytometry.

HTLV-1 is the causative agent of a highly aggressive $CD4^+$ T cell malignancy, adult T cell leukemia/lymphoma (ATL). Approximately 5% of HTLV-1–seropositive individuals develop ATL, and another 2–3% develop a slow progressive neurologic disorder known as HTLV-1–associated myelopathy/tropical spastic paraparesis (HAM/TSP) or various chronic inflammatory diseases but the majority of HTLV-1–infected individuals remain asymptomatic throughout their lives. This virus has infected 10–20 million people worldwide, especially in southern Japan, Caribbean basin, South America, Melanesia, and equatorial Africa.

For induction and maintenance of virus-specific CTLs, virus-specific $CD4^+$ helper T cell (Th) responses are required in many virus infections. However, there are only a few reports of HTLV-1–specific Th cell responses, presumably because of their susceptibility to HTLV-1 infection *in vivo* and *in vitro*. Therefore, it is important to clarify the role of HTLV-1–specific $CD4^+$ T cells in HTLV-1 infection for understanding HTLV-1–specific T cell immunity in HTLV-1-infected individuals and for developing new vaccine strategies to prevent onset or recurrence of ATL. Tamai Y, *et al.* (Department of Immunotherapeutics, Tokyo Medical and Dental University) identified a novel HLA-DRB1*01:01-restricted epitope, $Tax_{155–167}$, recognized by HTLV-1–specific $CD4^+$ Th1-like cells and elucidated possibility that Tax-specific $CD4^+$ T cells may augment the graft-versus-Tax effects via efficient induction of Tax-specific $CD8^+$ T cell responses in ATL patients with complete remission after allogeneic hematopoietic stem cell transplantation.

A Tetramer, which is constructed with the same allele (HLA-DRB1*01:01) of interest and an irrelevant peptide, may be used as a negative control Tetramer.

References for This Product

1) Jacobson S, *et al*. *J Immunol* **146**: 1155-1162 (1991)
2) Kannagi M, *et al. J Virol* **66**: 2928-2933 (1992)
3) Greten FT, *et al*. PNAS **95**: 7568-7573 (1998)
4) Harashima N, *et al. Cancer Res* **64**: 391-399 (2004)
5) Goon PK, *et al*. *J Immunol* **172**: 1735-1743 (2004)
6) Harashima N, *et al. J Virol* **79**: 10088-10092 (2005)
7) Tamai Y, *et al*. *J Immunol* **190**: 4382-4392 (2013)

HLA Restriction

HLA-DRB1*01:01

Origin and Sequence of This Epitope

Human T cell leukemia virus type 1 (HTLV-1)
Tax protein (155-167 aa, YLYQLSPPITWPL)

Usage

This reagent is for use with standard flow cytometry methodologies.

MEDICAL & BIOLOGICAL LABORATORIES CO., LTD.
URL http://ruo.mbl.co.jp
e-mail support@mbl.co.jp

Reagents

200 μL liquid - 10 μL/test
The Tetramer is dissolved in an aqueous buffer containing 0.5 mM EDTA, 0.2% BSA, 10 mM Tris-HCl (pH 8.0), 150 mM NaCl, and 0.09% NaN_3.

Conjugates

TS-M815-1
Streptavidin-Phycoerythrin (SA-PE)
Excites at 486-580 nm
Emits at 586-590 nm

TS-M815-2
Streptavidin-Allophycocyanin (SA-APC)
Excites at 633-635 nm
Emits at 660-680 nm

References for T-Select MHC Tetramer

Altman JD, *et al. Science* **274**: 94-96 (1996)
McMichael AJ, *et al. J Exp Med* **187**: 1367-1371 (1998)
Bodinier M, *et al. Nat Med* **6**: 707-710 (2000)

Evidence of Deterioration

Any change in the physical appearance of this reagent may indicate deterioration and the reagent should not be used. The normal appearance is a clear, colorless to pink (SA-PE), or light blue (SA-APC).

Storage Conditions

Store at 2 to 8°C. Do not freeze. Minimize exposure to light. The expiration date is indicated on the vial label.

Statement of Warnings

1. This reagent contains 0.09% sodium azide. Sodium azide under acidic conditions yields hydrazoic acid, an extremely toxic compound. Azide compounds should be flushed with running water while being discarded. These precautions are recommended to avoid deposits in metal piping in which explosive conditions can develop. If skin or eye contact occurs, wash excessively with water.
2. Specimens, samples and material coming in contact with them should be handled as if capable of transmitting infection and disposed of with proper precautions.
3. Never pipette by mouth and avoid contact of samples with skin and mucous membranes.
4. Minimize exposure of reagent to light during storage or incubation.
5. Avoid microbial contamination of reagent or erroneous results may occur.
6. Use Good Laboratory Practices (GLP) when handling this reagent.

Materials Required But Not Supplied

- 12 x 75 mm polypropylene test tubes
- Transfer pipettes
- Pipettors and disposable pipette tips
- Vortex mixer
- Centrifuge capable of 150 x g or 400 x g
- Aspirator
- PBS
- Red blood cell lysis reagent
- Anti-CD4-FITC, Beckman Coulter, Inc., PN A07750
- 7-AAD Viability Dye, Beckman Coulter, Inc., PN A07704
- Clear Back (human FcR blocking reagent), MBL, PN MTG-001

Procedure for Whole Blood

1. Collect blood by venipuncture into a blood collection tube containing an appropriate anti-coagulant.
2. Add 10 μL of T-Select MHC Tetramer to each 12 x 75 mm test tube.
3. Add 200 μL of whole blood into each test tube.
4. Vortex gently.
5. Incubate for 30-60 minutes at 2-8°C or room temperature (15-25°C) protected from light.
6. Add any additional antibodies (e.g. anti-CD4) and vortex gently.
7. Incubate for 30 minutes at 2-8°C protected from light.
8. Lyse red blood cells using commercially available reagents.
9. Prepare samples according to description of the package insert.
10. Store prepared samples at 2-8°C protected from light for a minimum of 1 hour (maximum 24 hours) prior to analysis by flow cytometry.

Procedure for Peripheral Blood Mononuclear Cells

1. Prepare peripheral blood mononuclear cells (PBMC) according to established procedures. Cells should be re-suspended at a concentration of 2 x 10^7 cells/mL. 50 μL of sample is required for each T-Select MHC Tetramer determination.
2. Add 10 μL of Clear Back (human FcR blocking reagent, MBL, PN MTG-001) to each 12 x 75 mm test tube.
3. Add 50 μL of PBMC into each test tube (e.g. 1 x 10^6 cells per tube).
4. Incubate for 5 minutes at room temperature (15-25°C).
5. Add 10 μL of T-Select MHC Tetramer and vortex gently.
6. Incubate for 30-60 minutes at 2-8°C or room temperature (15-25°C) protected from light.
7. Add any additional antibodies (e.g. anti-CD4) and vortex gently.
8. Incubate for 30 minutes at 2-8°C protected from light.
9. Add 3 mL of PBS or FCM buffer (2% FCS/0.09% NaN_3/PBS).

10. Centrifuge tubes at 400 x g for 5 minutes.
11. Aspirate or decant the supernatant.
12. Resuspend the pellet in 500 μL of PBS with 0.5% formaldehyde.
13. Store prepared samples at 2-8°C protected from light for a minimum of 1 hour (maximum 24 hours) prior to analysis by flow cytometry.

Limitations

1. For optimal results with whole blood, retain specimens in blood collection tubes at room temperature, while rocking, prior to staining and analyzing. Refrigerated specimens may give aberrant results.
2. Recommended cell viability for venous blood specimens is > 90%.
3. Prolonged exposure of cells to lytic reagents may cause white blood cell destruction and loss of cells in the population of interest.
4. All red blood cells may not lyse under the following conditions: nucleated red blood cells, abnormal protein concentration or hemoglobinopathies. This may cause falsely decreased results due to unlysed red blood cells being counted as leukocytes.

Technical Hints

A. If PBMC culture is needed, we recommend the use of heparin as an anti-coagulant.
B. Clear Back reagent (human FcR blocking reagent) may effectively block non-specific binding caused by macrophages or endocytosis, resulting in clear staining when cells are stained with MHC Tetramer and antibodies. Please refer to the data sheet (MBL, PN MTG-001) for details.
C. A Tetramer which is constructed with the same allele of interest and an irrelevant peptide may be used as a negative control.
D. The use of CD45 antibody and gating of the lymphocyte population are recommended in order to reduce contamination of unlysed or nucleated red blood cells in the gate.
E. Apoptotic, necrotic, and/or damaged cells are sources of interference in the analysis of viable cells by flow cytometry. Cell viability should be determined by 7-aminoactinomycin D (7-AAD) staining; intact viable cells remain unstained (negative).
F. Cells do not require fixation prior to analysis if the stained cells are analyzed by flow cytometry within several hours.

Related Products

T-Select Human class II Tetramers

TS-M815-1 HLA-DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer-PE
TS-M815-2 HLA-DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer-APC
TS-M801-1 HLA-DRB1*01:01 human $CLIP_{103-117}$ Tetramer-PE
TS-M801-2 HLA-DRB1*01:01 human $CLIP_{103-117}$ Tetramer-APC
TS-M802-1 HLA-DRB1*01:01 HIV $gag_{295-307}$ Tetramer-PE
TS-M802-2 HLA-DRB1*01:01 HIV $gag_{295-307}$ Tetramer-APC
TS-M803-1 HLA-DRB1*01:01 EBV $EBNA1_{515-527}$ Tetramer-PE
TS-M803-2 HLA-DRB1*01:01 EBV $EBNA1_{515-527}$ Tetramer-APC
TS-M804-1 HLA-DRB1*01:01 Influenza $HA_{306-318}$ Tetramer-PE
TS-M804-2 HLA-DRB1*01:01 Influenza $HA_{306-318}$ Tetramer-APC
TS-M805-1 HLA-DRB1*04:05 human $CLIP_{103-117}$ Tetramer-PE
TS-M805-2 HLA-DRB1*04:05 human $CLIP_{103-117}$ Tetramer-APC
TS-M806-1 HLA-DRB1*04:05 Influenza $HA_{306-318}$ Tetramer-PE
TS-M806-2 HLA-DRB1*04:05 Influenza $HA_{306-318}$ Tetramer-APC
TS-M809-1 HLA-DRB1*04:01 human $CLIP_{103-117}$ Tetramer-PE
TS-M809-2 HLA-DRB1*04:01 human $CLIP_{103-117}$ Tetramer-APC
TS-M810-1 HLA-DRB1*04:01 Influenza $HA_{306-318}$ Tetramer-PE
TS-M810-2 HLA-DRB1*04:01 Influenza $HA_{306-318}$ Tetramer-APC

T-Select Human class I Tetramers

TS-M017-1 HLA-A*0201 HTLV-1 Tax_{11-19} Tetramer-PE
TS-M019-1 HLA-A*0201 HTLV-1 $Tax_{178-186}$ Tetramer-PE
TS-M018-1 HLA-A*2402 HTLV-1 $Tax_{301-309}$ Tetramer-PE
TS-M020-1 HLA-A*2402 HTLV-1 Tax_{12-20} Tetramer-PE
TS-M021-1 HLA-A*2402 HTLV-1 $Tax_{187-195}$ Tetramer-PE
TS-M022-1 HLA-A*2402 HTLV-1 Env_{11-19} Tetramer-PE
TS-M023-1 HLA-A*1101 HTLV-1 Tax_{88-96} Tetramer-PE
TS-M024-1 HLA-A*1101 HTLV-1 $Tax_{272-280}$ Tetramer-PE

T-Select Mouse class II Tetramers

TS-M704-1 $I\text{-}A^b$ MOG_{35-55} Tetramer-PE
TS-M704-2 $I\text{-}A^b$ MOG_{35-55} Tetramer-APC
TS-M705-1 $I\text{-}A^b$ $FMLV_{123-141}$ Tetramer-PE
TS-M706-1 $I\text{-}A^b$ $E\alpha_{52-68}$ Tetramer-PE
TS-M707-1 $I\text{-}A^b$ $ESAT\text{-}6_{1-20}$Tetramer-PE
TS-M710-1 $I\text{-}A^b$ $OVA_{323-339}$ Tetramer-PE
TS-M710-2 $I\text{-}A^b$ $OVA_{323-339}$ Tetramer-APC

T-Select Peptides

TS-M815-P HLA-DRB1*01:01 HTLV-1 $Tax_{155-167}$ peptide
TS-M701-P $I\text{-}A^b$ HBc helper peptide
TS-M702-P $I\text{-}A^d$ Tetanus toxin p30 helper peptide
TS-M703-P $I\text{-}A^b/I\text{-}A^d$ $OVA_{323-339}$ helper peptide
TS-M704-P $I\text{-}A^b$ MOG_{35-55} peptide
TS-M707-P $I\text{-}A^b$ $ESAT\text{-}6_{1-20}$ peptide
TS-M708-P $I\text{-}A^k$ HEL peptide
TS-M801-P HLA-DRB1*01:01 human $CLIP_{103-117}$ peptide
TS-M802-P HLA-DRB1*01:01 HIV $gag_{295-307}$ peptide
TS-M803-P HLA-DRB1*01:01 EBV $EBNA1_{515-527}$ peptide
TS-M804-P HLA-DRB1*01:01 Influenza $HA_{306-318}$ peptide

Kit

AM-1005M	IMMUNOCYTO Cytotoxicity Detection Kit
4844	IMMUNOCYTO CD107a Detection Kit
8223	IMMUNOCYTO IFN-γ ELISPOT Kit

Others

A07750	Anti-CD4 (Human) mAb-FITC
A07704	7-AAD Viability Dye
MTG-001	Clear Back (Human FcR blocking reagent)

Please check our web site (http://ruo.mbl.co.jp) for up-to-date information on products and custom MHC Tetramers.

Experimental Data

These data were kindly provided by Dr. Atsuhiko Hasegawa, Department of Immunotherapeutics, Tokyo Medical and Dental University.

Aliquots of the freshly isolated PBMCs (1 x 10^6 cells) from HLA-DRB1*01:01-positive HTLV-1 carrier or non-carrier were stained with DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer (MBL, PN TS-M815-1), CD3 antibody, and CD4 antibody (Figure 1). The helper T cell population was defined by CD3 positive gate and CD4 positive gate. Data indicate percentages of DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer positive cells in CD3 and CD4 positive T cells.

PBMCs (1 x 10^6 cells) were cultured with 100 nM of HTLV-1 $Tax_{155-167}$ peptide (YLYQLSPPITWPL, MBL, PN TS-M815-P) in the presence of 10 U/mL recombinant human IL-2 and 20% (v/v) FCS. After 13-14 days, aliquots of these cells were stained with DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer (MBL, PN TS-M815-1), CD3 antibody, and CD4 antibody (Figure 2).

DRB1*01:01 HTLV-1 $Tax_{155-167}$ Tetramer-positive cells were detected in an HLA-DRB1*01:01-positive HTLV-1 carrier but not detected in non-carrier.

Figure 1

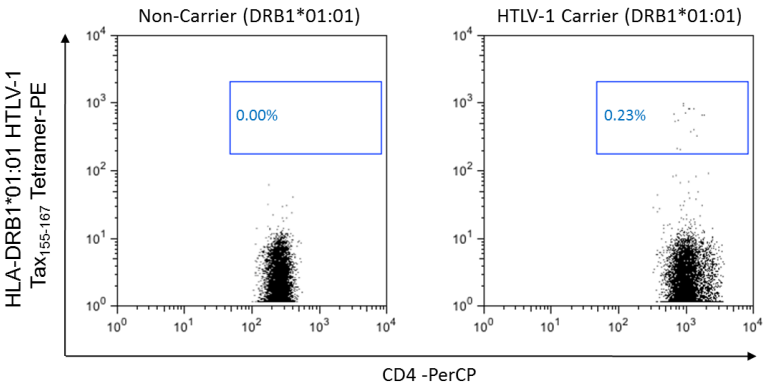
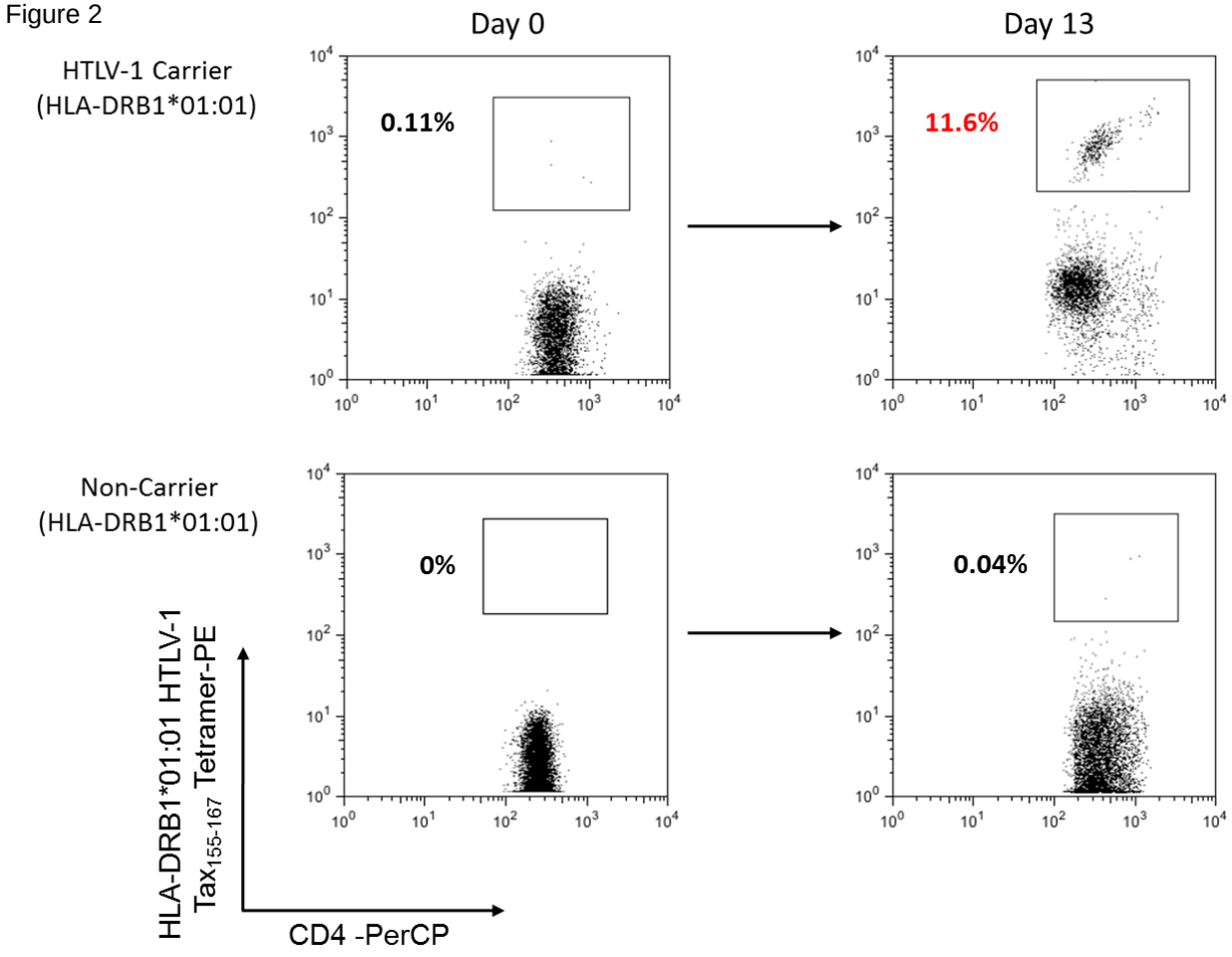


Figure 2



T-Select MHC Tetramers use patented technology (US patent No. 5,635,363, French application No. FR9911133, and Japanese patent No. P3506384) of Beckman Coulter, Inc..
MBL manufactures and distributes these products under license from Beckman Coulter, Inc..