

# Maxpar Human Helper T Cell Phenotyping Panel Kit

Catalog: 201318

Package size: 25 tests

Storage:

- Antibodies, buffers, and water: 4 °C. Do not freeze.
- Cell-ID Intercalator-Ir: -20 °C.

Contents:

- Maxpar® Cell Staining Buffer (500 mL)
- Maxpar Fix and Perm Buffer (25 mL)
- Maxpar Water (500 mL)
- Cell-ID™ Intercalator-Ir (125 µM; 25 µL)
- Maxpar antibodies (see table for panel)\*

\* The antibodies are provided in individual tubes, not a pre-mixed cocktail.

Target	Clone	Metal	Target	Clone	Metal
CCR6	G034E3	141Pr	CD161	HP-3G10	159Tb
CCR5	NP-6G4	144Nd	CD45RO	UCHL1	165Ho
CD8	RPA-T8	146Nd	CD25	2A3	169Tm
ICOS	C398.4A	151Eu	CXCR5	RF8B2	171Yb
CD45RA	HI100	153Eu	CD4	SK3	174Yb
CD3	UCHT1	154Sm	PD-1	EH12.2H7	175Lu
CXCR3	G025H7	156Gd	CD127	A019D5	176Yb
CCR4	L291H4	158Gd			

## Technical Information

**Description:** The Maxpar Human Helper T Cell Phenotyping Panel Kit is for the identification and phenotyping of human CD4+ helper T cell subsets, including T helper 1 (T<sub>H1</sub>), T<sub>H2</sub>, T<sub>H17</sub>, T<sub>H22</sub>, T follicular helper (T<sub>FH</sub>), and T regulatory (T<sub>REG</sub>). Differentiation of CD4+ T cells into functionally distinct helper T subsets is essential for normal immunoregulation. These subsets are specified by extrinsic and intrinsic cues, and the resultant cell populations acquire stable phenotypes defined by the expression of signature cytokines, master regulator transcription factors, and characteristic cell surface phenotypes. Originally, CD4+ T cells were viewed as having only two major fates: 1) T<sub>H1</sub> cells, which express T-bet and selectively produce interferon IFN $\gamma$  and 2) T<sub>H2</sub> cells, which express Gata3 and produce interleukin 4 (IL-4). Although this represented a simple model system for understanding basic principles in cellular immunology, the T<sub>H1</sub>/T<sub>H2</sub> paradigm failed to explain several facets of immunity and autoimmunity. The recognition of cells that selectively produce IL-17 and the transcription factor ROR $\gamma$ t (T<sub>H17</sub> cells) led to renewed interest in the topic of helper T cell differentiation. T<sub>REG</sub> cells are another CD4+ lineage with essential immunosuppressive functions that express the master transcription factor FoxP3. Newer fates for helper T cells, including T<sub>H22</sub> cells, continue to be identified, with nomenclature based on production of their signature cytokines. The newest lineage of CD4 T cells, T<sub>FH</sub> cells are crucial for providing B cell help by promoting class switching of B cells and are defined by the expression of master regulator Bcl-6 and effector cytokine IL-21, along with key surface molecules (PD-1, CXCR5, and ICOS).

**Recommended usage:** For staining with the Human Helper T Cell Phenotyping Panel Kit, cells should be prepared using standard techniques and stained according to the Maxpar Cell Surface Staining Protocol. Data collection is performed on a CyTOF® mass cytometer.

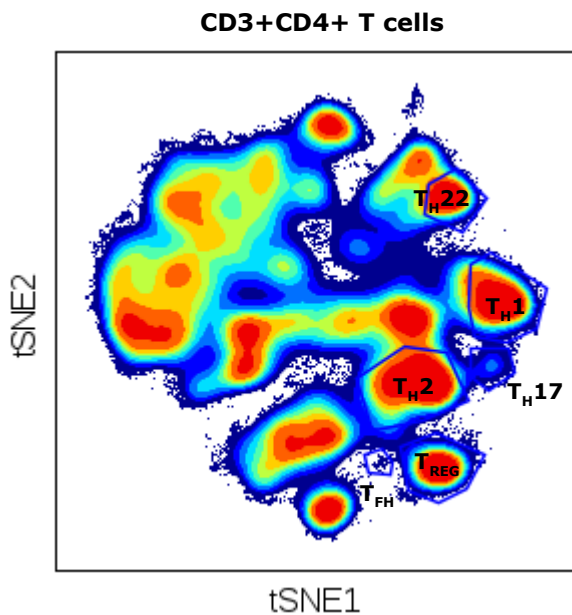
## References

Nakayama, S. et al. "Helper T cell diversity and plasticity." *Current Opinion in Immunology* 24 (2012): 297–302.

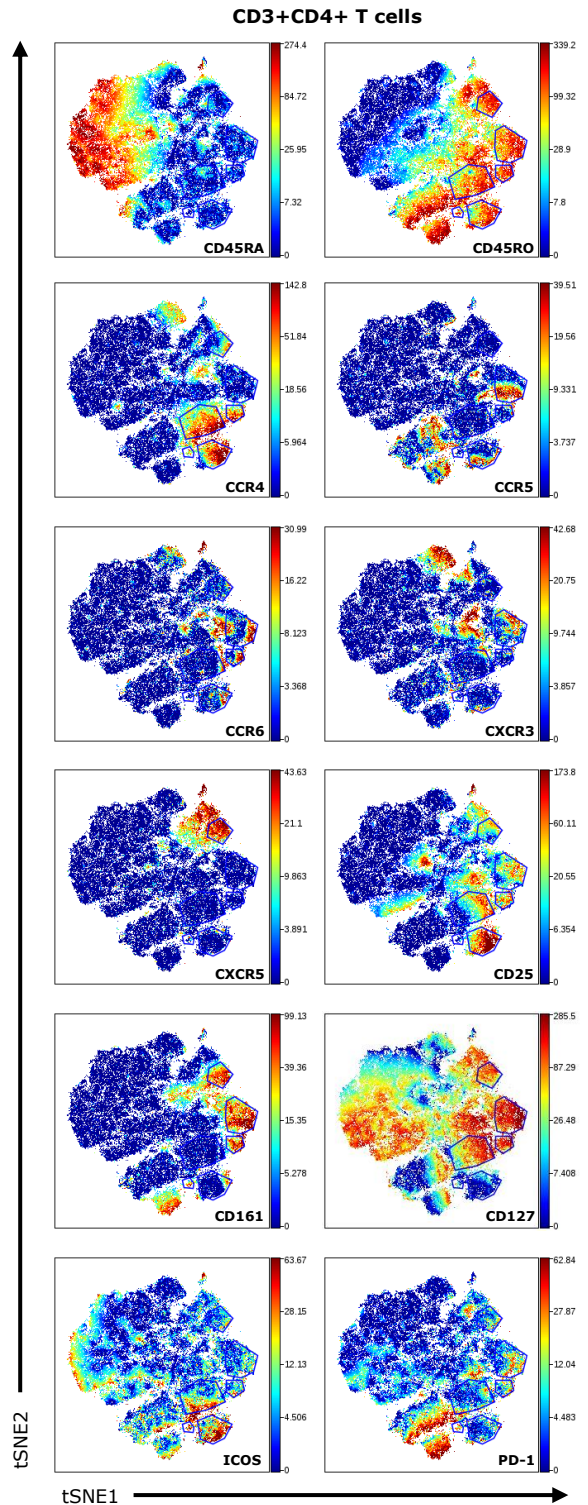
Amir, E.D. et al. "viSNE enables visualization of high dimensional single-cell data and reveals phenotypic heterogeneity of leukemia." *Nature Biotechnology* 31 (2013): 545–52.

**Human CD4+ Helper T Cell Population Surface Phenotypes**

Target	T <sub>H</sub> 1	T <sub>H</sub> 2	T <sub>H</sub> 17	T <sub>H</sub> 22	T <sub>FH</sub>	T <sub>REG</sub>
CCR6		-	+	+	-	
CCR5	+	-				
CD8	-	-	-	-	-	-
ICOS					+	
CD45RA						
CD3	+	+	+	+	+	+
CXCR3	+	-	-	-	-	
CCR4	-	+	+	+		
CD161			+			
CD45RO						
CD25	-	-	-	-	-	+
CXCR5					+	
CD4	+	+	+	+	+	+
PD-1					+	
CD127						lo



Human PBMC were stained with the Maxpar Human Helper T Cell Phenotyping Panel Kit. CD3+CD4+ helper T cells were manually gated and then analyzed with viSNE, clustering on all markers. viSNE projects the multidimensional distance between events resolved by markers in the panel kit into two dimensions (tSNE1 and tSNE2). Thus, tSNE1 and tSNE2 measure cell relatedness. The location of helper T cell populations on the viSNE plot corresponds to the location of populations gated manually according to the indicated phenotypes. Each viSNE plot is heat-mapped to the expression of the indicated marker.



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