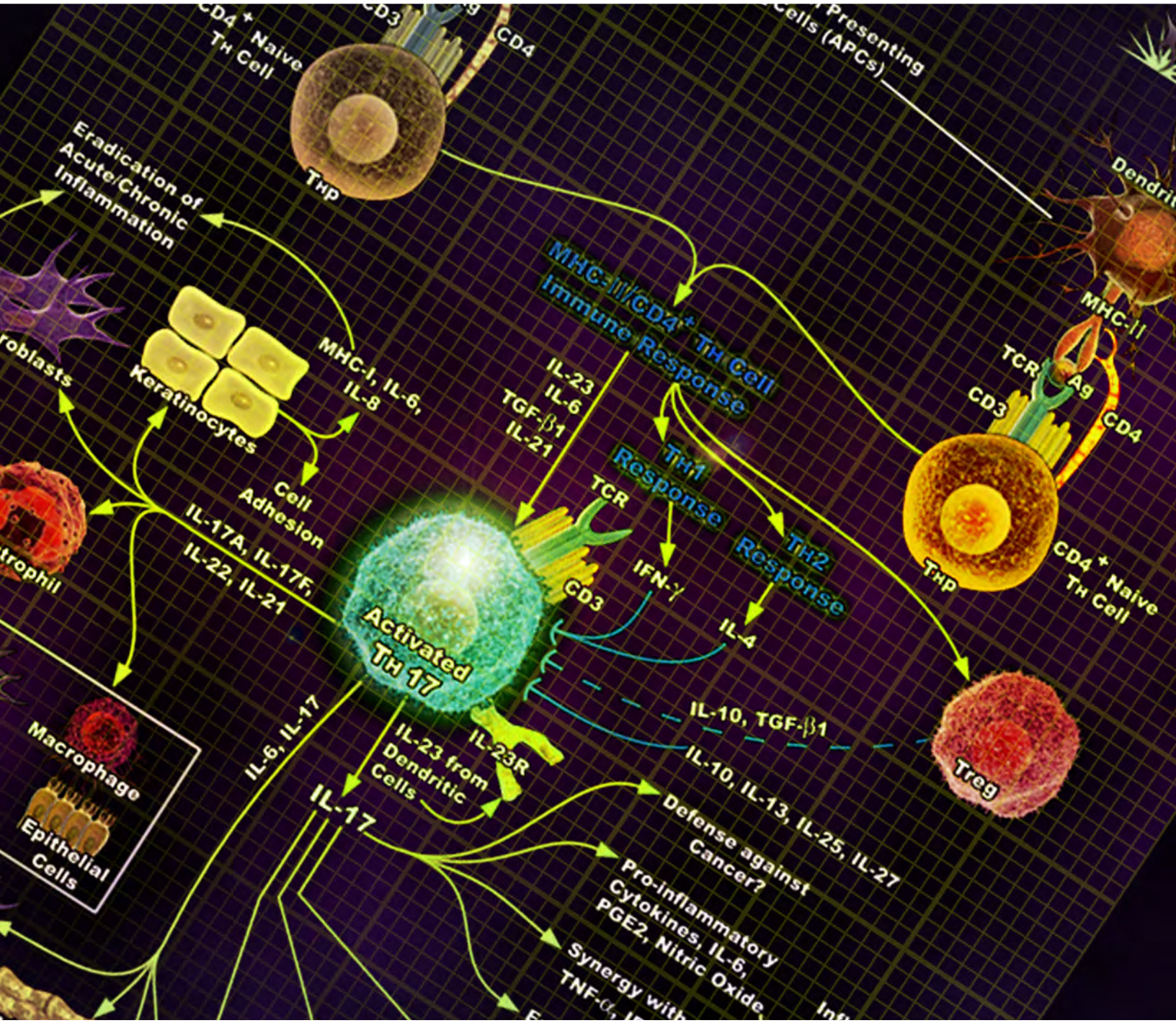
Th17 Research Products



BioLegend®

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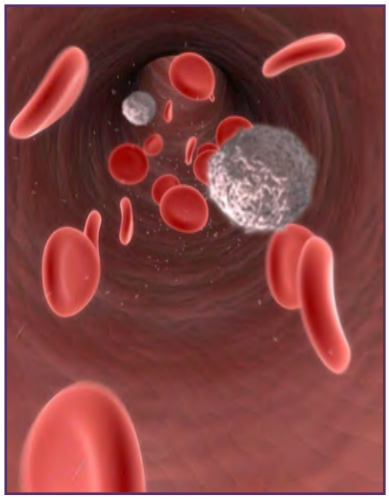
WORLD-CLASS QUALITY — SUPERIOR CUSTOMER SUPPORT — OUTSTANDING VALUE

CD4$^+$ T helper



CD4$^+$ T helper cells are the main drivers of the adaptive immune responses against pathogens. Almost twenty years after the initial paradigm of a polarized Th1 or Th2 response, a new CD4$^+$ T helper subset, named T helper 17 (Th17), was characterized based on cellular responsiveness to IL-23, but not IL-12, and production of IL-17A. Th17 cells develop independently from Th1 and Th2 cells, requiring a distinct panel of cytokines to drive their development, including TGF-β, IL-1β, IL-6, IL-21, and IL-23. These Th17 cells have now been identified as having important roles in autoimmunity, anti-microbial immunity, inflammation and tissue injury.

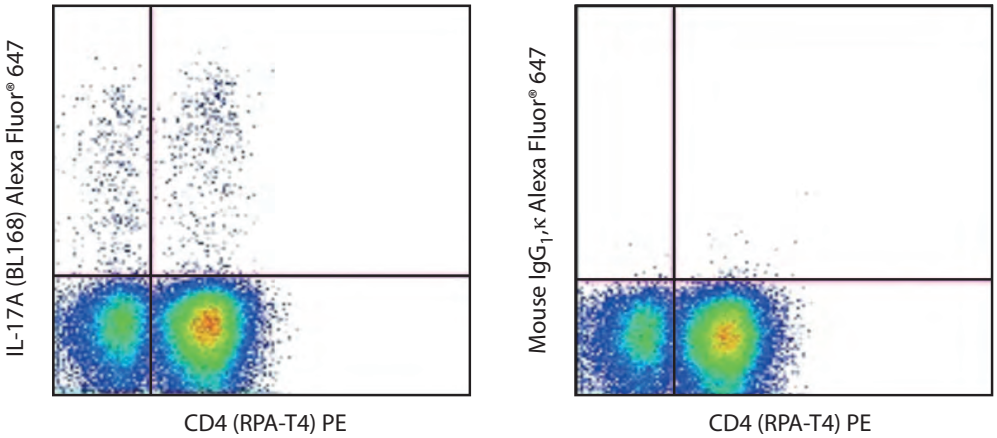
BioLegend is proud to provide a variety of high-quality reagents for the study of Th17 cells, including fluorochrome-conjugated antibodies, LEAF™ (Low-Endotoxin, Azide-Free) biofunctional antibodies, recombinant proteins quality tested by bioassay, complete ELISA kits with pre-coated plates, and ELISA sets.

Th17 Cell Markers

Surface Expression	Cytokines Produced	Transcription Factors
IL-1R1	IL-17A	RORγt
IL-12RB1	IL-17F	RORα
IL-13Rα1	IL-17A/F	STAT-3
IL-23R	IL-21	
CCR6 (human)	IL-22	
CD3		
CD4		
CD161 (human)		

Human Th17 Flow™ Kit (CD3 FITC/CD4 PE/IL-17 Alexa Fluor® 647)

BioLegend's Human Th17 Flow™ Kit is designed and formulated specifically for one-step intracellular immunofluorescent staining and flow cytometric analysis of Th17 cells in a mixed cell population. This kit is composed of fluorochrome-conjugated anti-human CD3, CD4 and IL-17A antibodies, isotype controls, and the critical buffers. It is cost-effective and easy to use for the identification of Th17 cells.



PMA/ionomycin-stimulated (6hr) human peripheral blood lymphocytes stained with Human Th17 Flow™ kit. Dot plot analysis is derived from CD3$^+$ gated cell population.

Recommended Th17 Panels for Flow Cytometry

Human

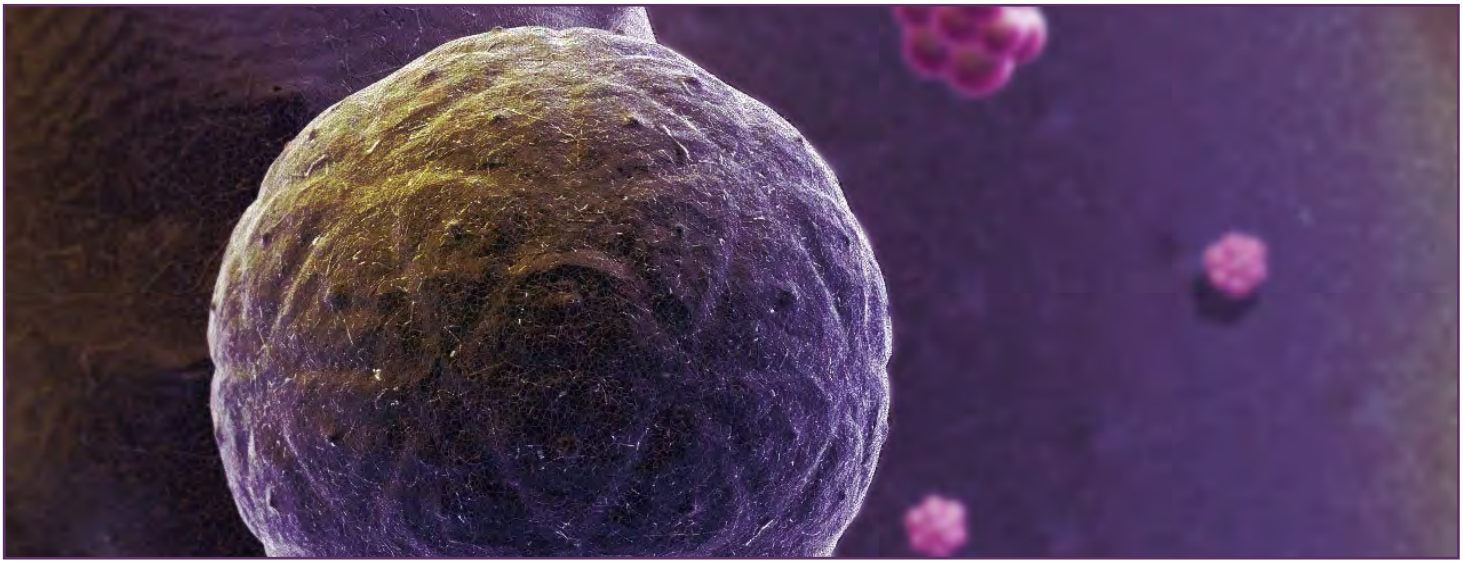
4-color		**6-color**		**9-color FLEX***	
Antibody	Cat. No.	Antibody	Cat. No.	Antibody	Cat. No.
CD3 FITC	300406	CD3 Pacific Blue™	300431	CD3 Alexa Fluor® 700	300424
CD4 PE/Cy7	317414	CD4 PE/Cy7	317414	CD4 PE/Cy7	317414
IL-17A Alexa Fluor® 647	512310	CCR6 Alexa Fluor® 488	335501	CCR6 Alexa Fluor® 488	335501
IL-22 PE	515303	IL-17A PerCP/Cy5.5	512314	CD161 PerCP/Cy5.5	339908
		IL-21 Alexa Fluor® 647	513006	IL-17A Pacific Blue™	512312
		IL-22 PE	515303	IL-22 PE	515303
				APC– open	
				PerCP – open	
				APC/Cy7 – open	

Mouse

4-color		**6-color**		**9-color FLEX***	
Antibody	Cat. No.	Antibody	Cat. No.	Antibody	Cat. No.
CD3 FITC	100306	CD3 Pacific Blue™	100334	CD3 Alexa Fluor® 700	100216
CD4 PE/Cy7	100422	CD4 PE/Cy7	100422	CD4 PE/Cy7	100422
IL-17A PE	506904	IL-17A PerCP/Cy5.5	506920	IL-17A PerCP/Cy5.5	506920
IL-22 Alexa Fluor® 647	516406	IL-17F Alexa Fluor® 488	517006	IL-17F Alexa Fluor® 488	517006
		IL-21 Alexa Fluor® 647	516803	IL-21 Alexa Fluor® 647	516803
		IL-22 PE	516404	IL-22 PE	516404
				Pacific Blue™ - open	
				PerCP – open	
				PE/Cy7 – open	

*FLEX panels are designed for optimal flexibility on instruments capable of 9+ colors, by allowing several open detectors in order for users to plug in their antibodies of choice. All panels may require titration and optimization of antibodies. Be sure to verify panel suitability for your instrument settings.

Contact **techserv@biolegend.com** or **1-858-768-5801** for support or assistance with customized panels.

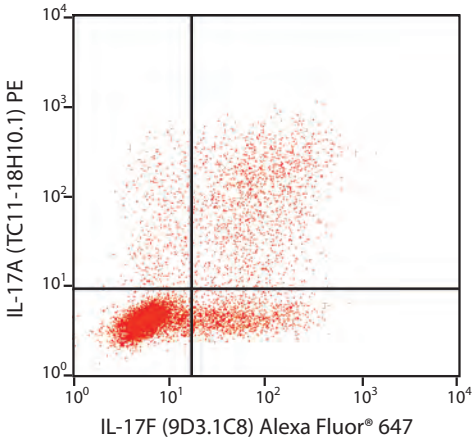


Th17 Cytokines:

IL-17A

IL-17A is the founding member of the IL-17 family, a group of six structurally related pro-inflammatory cytokines. IL-17A, secreted by the activated $CD4^+$ Th17 cell subpopulation, elicits multiple biological activities on a variety of cells, including: the induction of IL-6, IL-8, G-CSF, and PGE2 production in epithelial, endothelial, or fibroblasts; the enhancement of surface expression of ICAM-1 in fibroblasts; activation of NF-κB and costimulation of T cell proliferation. Recent studies demonstrated that, in mice, activated IL-17-secreting $CD4^+$ helper T cells (Th17 cells) mediate an autoimmune arthritis that clinically and immunologically resembles rheumatoid arthritis (RA). Human IL-17A shows 63%, 63%, and 72% amino acid sequence homology with rat IL-17A, mouse IL-17A, and a protein encoded by the ORF13 gene of herpesvirus Saimiri (HVS), respectively.

Flow Cytometric Analysis of Th17 cells with IL-17A and IL-17F Antibodies

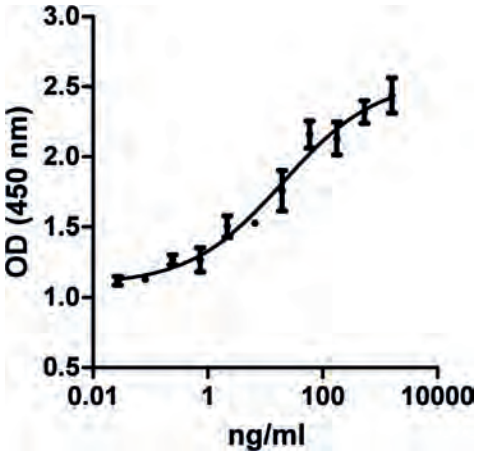


PdBU/ionomycin-stimulated (5 hours) Th17 polarized $CD4^+$ T cells from C57BL/6 mouse lymph nodes were intracellularly stained with IL-17A (clone TC11-18H10.1) PE and IL-17F (clone 9D3.1C8) Alexa Fluor® 647.

IL-17F

Interleukin 17F (IL-17F) is a 37 kD IL-17 family member. The IL-17 family consists of six members, including IL-17 (also called IL-17A), IL-17B, IL-17C, IL-17D, IL-17E (also called IL-25), and IL-17F. IL-17F shares the strongest similarity to IL-17A and forms a homodimer or heterodimer with IL-17A. It is produced by Th17 cells, mast cells, basophils, and epithelial cells. IL-17F is an important regulator of inflammatory responses. It is involved in host defense against mucoepithelial infection by Staphylococcus aureus and Citrobacter rodentium. Over-expression of the IL-17F gene in the airways of mice is associated with airway neutrophilia, the induction of many cytokines, an increase in airway hyper-reactivity, and mucus hyper-secretion. IL-17F is also involved in cancer immunity and autoimmune responses. IL-17F, like IL-17A, depends on IL-17R for its signaling *in vitro* and *in vivo*. P38 MAPK, ERK1/2, Act1 (NF-KB activator protein 1), and TRAF6 are involved in IL-17F signaling.

Bioassay for Recombinant Human IL-17A/IL-17F Heterodimer

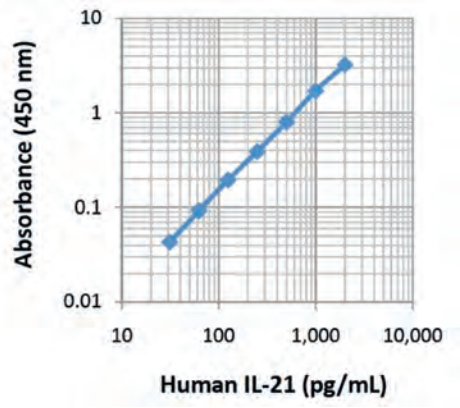


Induction of IL-6 in human skin fibroblasts by IL-17A/F heterodimer.

IL-21

IL-21 is a 17 kD member of the common γ chain family of cytokines and mainly produced by $CD4^+$ T subsets, including Th17, follicular helper T cells (TFH), Th2, memory $CD4^+$ T cells, and NKT cells. IL-21 signals through a heterodimeric receptor complex containing IL-21R and the common cytokine receptor γ chain (CD132). IL-21 has effects on T, B, NK, and myeloid cells, regulates both humoral and cell-mediated immunity. It has been reported that IL-21 is able to enhance the expansion of Th17 cells via the induction of IL-23R, and cooperates with IL-7 or IL-15 to promote $CD8^+$ T cell expansion. IL-21 regulates Ig production by driving the differentiation of B cells to antibody-producing plasma cells, and is involved in the development of follicular helper T cells (TFH). In addition, IL-21 exerts a negative effect on lymphoid and myeloid cells, including induction of B cell apoptosis and inhibition of dendritic cell maturation and function. The type of actions mediated by IL-21 is presumably determined by its biological context, specific activation state of the target cells, as well as the cytokine milieu. IL-21/IL-21R system is involved in the pathogenesis of various autoimmune diseases and anti-tumor effects.

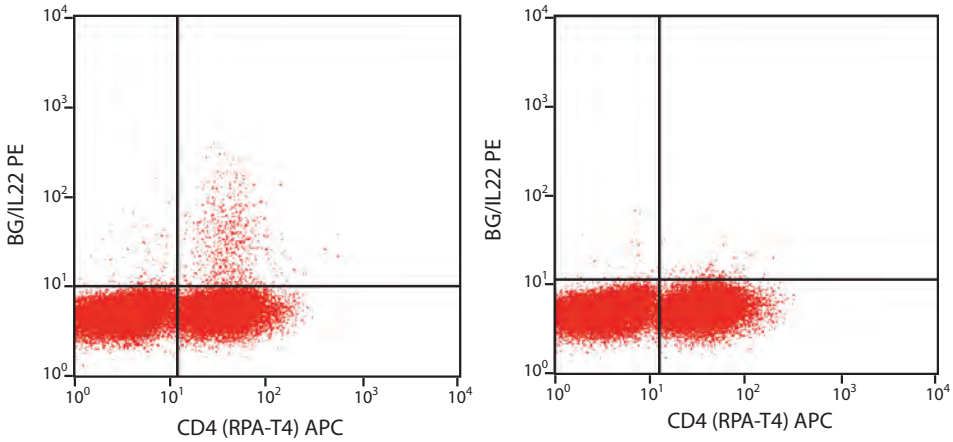
LEGEND MAX™ Human IL-21 ELISA Kit with Pre-coated Plates



IL-22

IL-22 is a cytokine structurally related to IL-10. Mouse IL-22 consists of 179 amino acids and has a predicted molecular weight of 20 kD. It is expressed by activated T cells, primarily Th17 cells, lymphoid tissue inducer cells (LTi), and subsets of natural killer cells. It has been reported that aryl hydrocarbon receptor (AhR) expression is essential for the production of IL-22 by TCRγδ T cells. AhR activation increases Th17 polarization and induces IL-22 production. IL-22 functions by engaging the heterodimeric IL-22 receptor (IL-22R) complex, consisting of two receptor subunits: IL-22R1 and IL-10Rβ. IL-22 acts on non-hematopoietic tissue cells, such as epithelial cells of the digestive and respiratory systems and keratinocytes of the skin. IL-22 is involved in inflammatory processes such as dermal inflammation, psoriasis, inflammatory bowel disease, hepatitis, and Crohn's disease. Moreover, it plays a critical role in mucosal immunity and the wound healing process.

Specific Detection of IL-22 in Activated Human Cells



PMA+ionomycin-stimulated (6 hours) human peripheral blood lymphocytes were intracellularly stained with IL-22 (clone BG/IL22) PE and CD4 (clone RPA-T4) APC (left) or blocked with BioLegend recombinant human IL-22 prior to staining (right).

Human Th17 Related Antibodies (LEAF™: Low Endotoxin, Azide-Free)

Specificity	Clone	Purified	Biotin	LEAF™	FITC	PE	PE/Cy5	PE/Cy7	APC	APC/Cy7	Alexa Fluor® 488	Alexa Fluor® 647	Alexa Fluor® 700	Pacific Blue™	PerCP	PerCP/Cy5.5
CD3	HIT3A	x	x	x	x	x	x	x	x	x	x	x	x	x		x
	OKT3	x		x	x	x			x		x	x		x		
	SK7	x	x			x		x	x	x	x				x	x
	UTCH1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CD4	OKT4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	RPA-T4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	SK3	x	x		x	x		x	x	x	x			x		x
CD38	HIT2	x	x		x	x	x	x	x		x	x	x		x	x
CD161	HP-3G10	x			x	x						x				x
CD194 (CCR4)	TG6/CCR4							x				x				x
CD254 (TRANCE, RANKL)	MIH24	x	x			x										
CD360 (IL-21R)	2G1-K12	x		x		x			x							
CCR6 (CD196)	TG7/CCR6	x				x					x	x		x		x
Integrin β7	FIB504	x	x	x	x	x			x							
IL-1RA	JK1RA-1	x														
	Poly5095		x													
IL-6	MQ2-13A5	x		x	x	x			x							
	MQ2-39C3	x	x													
IL-12/IL-23 p40	C11.5	x		x	x	x			x		x	x		x		
	C8.3	x		x												
	C8.6		x	x												
IL-13	JES10-5A2	x		x		x			x							x
	Poly5020		x													
IL-17A	BL127	x		x												
	BL168	x			x	x		x		x	x	x	x	x		x
	BL23	x	x													
IL-21	7H20-I19-M3	x	x													
	5H3-O12-L23	x	x													
IL-22	BG/L22					x										
RORa	Poly6388	x														
RORγ	4F3-3C8-2B7	x														
	RORg2	x														
STAT3	Poly6246	x														

ELISA Kits and Sets

LEGEND MAX™
ELISA Kit with Pre-coated Plates

Human

IL-4	IL-17A	IL-23	TGFβ1
IL-6	IL-17F	IL-27	TNF-α
IL-9	IL-21	GM-CSF	sCTLA-4
IL-10	IL-22	IFN-γ	

Mouse

IL-4	IL-17A	IL-22	GM-CSF
IL-6	IL-17F	IL-23	IFN-γ
IL-10	IL-21	(p19/p40)	TNF-α

Rat

IL-6

ELISA MAX™
Deluxe Sets

Human

IL-4	IL-12/IL-23 (p40)	GM-CSF
IL-6	IL-17A	IFN-γ
IL-9	IL-21	TNF-α
IL-10	IL-22	

Mouse

IL-4	IL-12/IL-23 (p40)	IL-25 (IL-17E)
IL-6	IL-17A	GM-CSF
IL-9	IL-22	IFN-γ
IL-10	IL-23 (p19/p40)	TNF-α

ELISA MAX™
Standard Sets

Human

IL-4	GM-CSF
IL-6	IFN-γ
IL-10	TNF-α
IL-12/IL-23 (p40)	

Mouse

IL-4	IL-17A
IL-6	GM-CSF
IL-10	IFN-γ
IL-12/IL-23 (p40)	TNF-α

Mouse Th17 Related Antibodies

Specificity	Clone	Purified	Biotin	LEAF™	FITC	PE	PE/Cy5	PE/Cy7	APC	APC/Cy7	Alexa Fluor® 488	Alexa Fluor® 647	Alexa Fluor® 700	Pacific Blue™	PerCP	PerCP/Cy5.5	APC/Cy5.5
CD3	17A2	x		x	x	x		x		x	x	x	x	x		x	
CD3ε	145-2C11	x	x	x	x	x	x	x	x	x	x	x		x	x	x	
CD4	GK1.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	X	x
	H129.19	x		x	x	x	x										
	RM4-5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Rm4-4	x			x	x											
CD38	90	x	x		x	x	x	x	x		x	x		x			
CD121a (IL-1R)	JAMA-147	x	x			x			x								
CD126 (IL-6R)	D7715A7	x	x	x		x											
CD194 (CCR4)	2G12	x	x			x		x	x								
CD254 (TRANCE, RANKL)	IK22/5	x	x	x		x											
CCR6 (CD196)	29-2L17	x				x		x	x			x					x
Integrin β7	FIB27	x		x	x	x										x	
IL-6	MP5-20F3	x		x		x											
	MP5-32C11	x	x														
IL-12/IL-23 p40	C15.6	x		x		x			x								
	C17.8		x	x													
	C18.2	x															
IL-17A	TC11-18H10.1	x		x	x	x		x	x		x	x	x	x		x	
	TC11-8H4		x	x													
IL-17F	8F5.1A9											x					
	9D3.1C8										x						
	9D3.1C8					x						x					
IL-21	5H3-O12-L23	x	x														
	7H20-I19-M3	x	x														
	BL25168											x					
	4A9	x				x	x		x								
IL-22	Poly5164					x						x					
RORα	Poly6388	x															
RORγ	4F3-3C8-2B7	x															
	RORg2	x															
STAT3	Poly6246	x															

Recombinant Proteins

Human

Description	Cat. No.	Description	Cat. No.
IL-6 (carrier-free)	570804	IL-17A/IL-17F heterodimer (carrier-free)	580608
IL-6 (ELISA Standard)	570809	IL-17F (carrier-free)	570606
IL-12/IL-23 (p40) (ELISA Standard)	572109	IL-21 (ELISA Standard)	571209
IL-13 (carrier-free)	571104	IL-22 (carrier-free)	571308
IL-13 (ELISA Standard)	571109	IL-23 (carrier-free)	574102
IL-17A (carrier-free)	570506	TGF-β1 (carrier-free)	580708
IL-17A (ELISA Standard)	570509		

Mouse

Description	Cat. No.	Description	Cat. No.
IL-6 (carrier-free)	575708	IL-17A (ELISA Standard)	576009
IL-6 (ELISA Standard)	575709	IL-17A/F heterodimer (carrier-free)	566204
IL-12/IL-23 (p40) (ELISA Standard)	576909	IL-22 (carrier-free)	576208
IL-12 (p40 homodimer)	563801	IL-23 (carrier-free)	589002
IL-13 (carrier-free)	575908		
IL-17A (carrier-free)	576012		

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