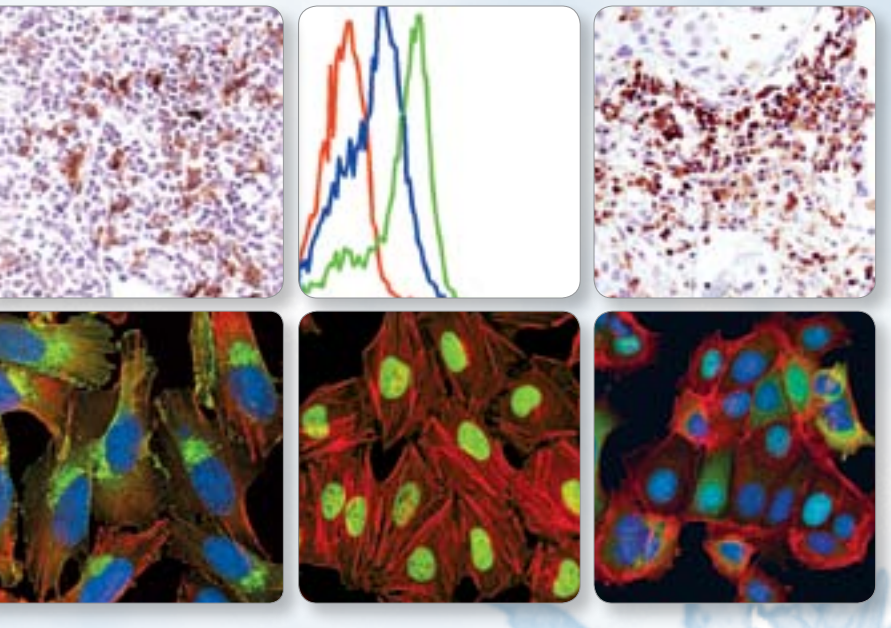
UNPARALLELED PRODUCT QUALITY, VALIDATION, AND TECHNICAL SUPPORT



Antibodies and Kits for Immunology

Cell Signaling TECHNOLOGY®

XP® Monoclonal Antibodies

one antibody, multiple applications™

XP® monoclonal antibodies are a line of high quality rabbit monoclonal antibodies exclusively available from Cell Signaling Technology (CST). Any product labeled with XP has been carefully selected based on superior performance in the most relevant research applications.

XP monoclonal antibodies are generated using XMT® technology, a proprietary method developed at CST. This technology provides access to a broad range of antibodies unattainable with traditional monoclonal technologies, allowing more comprehensive screening and the identification of XP monoclonal antibodies with:

eXceptional specificity

As with all CST™ antibodies, the antibody is specific to your target of interest, saving you valuable time and resources.

+eXceptional sensitivity

The antibody will provide a stronger signal for your target protein in cells and tissues, allowing you to monitor expression of low levels of endogenous proteins, saving you valuable materials.

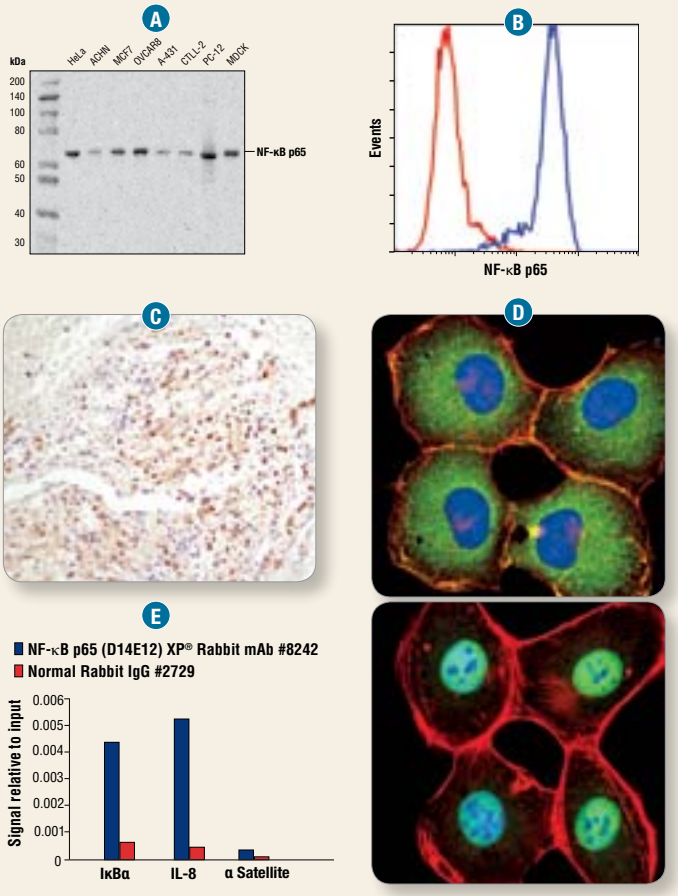
+eXceptional stability and reproducibility

XMT technology combined with our stringent quality control ensures maximum lot-to-lot consistency and the most reproducible results.

=eXceptional Performance™

XMT technology coupled with our extensive antibody validation and stringent quality control delivers XP monoclonal antibodies with eXceptional Performance in the widest range of research applications.

NF-κB p65 (D14E12) XP® Rabbit mAb #8242 is an example of an antibody with superior performance in a wide range of tested applications.



NF-κB p65 (D14E12) XP® Rabbit mAb #8242: Western blot analysis (**A**) of extracts from various cell lines using #8242. Flow cytometric analysis (**B**) of HeLa cells using #8242 (blue) compared to concentration-matched Rabbit (DA1E) mAb IgG XP® Isotype Control #3900 (red). IHC analysis (**C**) of paraffin-embedded human chronic cholecystitis using #8242. Confocal IF analysis (**D**) of HT-1080 cells, untreated (upper) or treated with hTNF-α #8902 (20 ng/ml, 20 min; lower), using #8242 (green). Actin filaments were labeled with DY-554 phalloidin (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye). Chromatin immunoprecipitations (**E**) were performed with cross-linked chromatin from 4 x 10^6 HeLa cells treated with hTNF-α #8902 (30 ng/ml, 1 hr) and either 5 µl of #8242 or 2 µl of Normal Rabbit IgG #2729 using SimpleChIP® Enzymatic Chromatin IP Kit (Magnetic Beads) #9003. The enriched DNA was quantified by real-time PCR using SimpleChIP® Human IκBα Promoter Primers #5552, human IL-8 promoter primers, and SimpleChIP® Human α Satellite Repeat Primers #4486. The amount of immunoprecipitated DNA in each sample is represented as signal relative to the total amount of input chromatin, which is equivalent to one.

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The interface between antigen presenting cells and lymphocytes is called the immunological synapse. Depicted here, this junction is formed between an antigen presenting dendritic cell (brown) and a naïve T cell (green).

Antibodies and Kits for

Immunology

Immunology is a diverse branch of scientific study focusing on the immune system; it can be divided into three major sections: cytokine signaling, innate immunity, and lymphocyte signaling.

Cytokine Signaling

The Janus kinase (Jak)-signal transducer and activator of transcription (Stat) pathway is a central component of cytokine receptor signaling cascades, regulating the growth, survival, proliferation, and differentiation of hematopoietic cells. The Jak-Stat pathway also mediates signaling induced by a wide variety of ligands including growth factors, hormones, and neurotransmitters. Mammals express four Jak tyrosine kinases (Jak1-3 and Tyk2) and seven Stat transcription factors (Stat1-4, 5A, 5B, and 6). Research studies have implicated alterations in Jak-Stat signaling in tumor formation and progression in immune cells[1-6]. Investigators have found that mutations in Jak proteins and constitutive activation of Jaks or Stats, particularly Stat3, 5, or 6, play a role in tumorigenesis[1-6]. Cell Signaling Technology (CST) offers the highest quality antibodies that have been validated in multiple applications, as well as bioactive cytokines to support the investigation of Jak and Stat signaling cascades.

Innate Immunity

The innate arm of the immune system consists of a host of immune cells and resistance mechanisms that act as the first line of defense against invading pathogens. The toll-like receptors (TLRs) are a family of evolutionarily conserved pattern recognition receptors (PRRs) that recognize the pathogen-associated molecular patterns (PAMPs) found in microbial pathogens. TLR signaling in innate immune cells, particularly dendritic cells, leads to their activation and subsequent induction of adaptive immune responses. Activation of TLRs through ligand binding triggers a signaling cascade involving a variety of intracellular signaling adaptors including MyD88, IRAKs, and TRAF6, which leads to the activation of the MAP Kinase, NF-κB, and IRF signaling pathways that mediate inflammation. CST™ antibodies against TLRs and other proteins involved in the innate immune response allow analysis of host cell responses to pathogen invasion.

Lymphocyte Signaling

B and T lymphocytes mediate the humoral and cell-mediated immune responses, respectively, which make up the adaptive arm of the immune system. B cells mature in the bone marrow and differentiate into antibody-secreting plasma cells. In contrast, T cells are thymus-derived, and as effector cells, orchestrate cell-mediated immunity. Signaling through the B cell receptor and T cell receptor involves activation of a number of Src family tyrosine kinases (Blk, Fyn, and Lyn in B cells, and Fyn and Lck in T cells), which are responsible for phosphorylation of the receptor-associated immunoreceptor tyrosine-based activation motifs (ITAMs). Phosphorylated ITAMs act as docking sites for Syk family tyrosine kinases (Syk in B cells and Zap-70 in T cells). Activated Syk kinases amplify signals through phosphorylation of downstream adaptor proteins, thereby initiating a cascade of intracellular signaling molecules. In addition to mediating cell activation, lymphocyte receptor signaling drives B and T cell development, differentiation, proliferation, and survival. The highest quality CST™ antibodies are available for the examination of both B and T cell immune responses at all levels of upstream and downstream signaling. Many are conjugated to Alexa Fluor® and other dyes for use in flow cytometry and immunofluorescent applications.

1 Catlett-Falcone, R. et al. (1999) *Immunity* 10, 105-115.
2 James, C. et al. (2005) *Nature* 434, 1144-1148.
3 Das, S. et al. (2007) *Prostate* 67, 1550-1564.
4 Flex, E. et al. (2008) *J. Exp. Med.* 205, 751-758.
5 Lee, H. et al. (2009) *Cancer Cell* 15, 283-293.
6 Chen, H.H. et al. (2012) *Int. J. Radiat. Oncol. Biol. Phys.* 82, 658-666.

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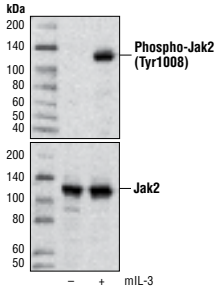
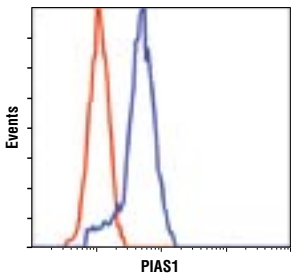
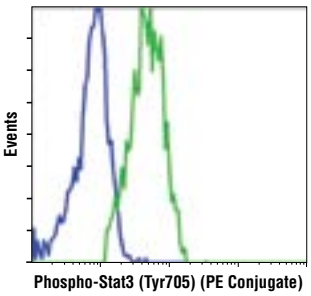
Cytokine Signaling



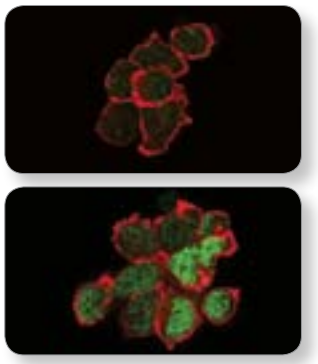
Phospho-Jak2 (Tyr1008) (D4A8) Rabbit mAb #8082: Western blot analysis of extracts from BaF3 cells, untreated (-) or treated (+) with mIL-3 #8923 (10 ng/ml, 5 min), using #8082 (upper) and total Jak2 (D2E12) XP® Rabbit mAb #3230 (lower).



PIAS1 (D33A7) XP® Rabbit mAb #3550: Flow cytometric analysis of HeLa cells using #3550 (blue) compared to a nonspecific negative control antibody (red).



Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (PE Conjugate) #8119: Flow cytometric analysis of Jurkat cells, untreated (blue) or treated with hIFN-α1 #8927 (green), using #8119.



Phospho-Stat4 (Tyr693) (D2E4) Rabbit mAb #4134: Confocal IF analysis of NK-92 cells, starved of IL-2 (5 hr) and either untreated (upper) or IL-12-treated (50 ng/ml, 15 min; lower), using #4134 (green) and β-Actin (8H10D10) Mouse mAb #3700 (red).

Jak/Stat Signaling

			Applications	Reactivity
	#3331	Phospho-Jak1 (Tyr1022/1023) Antibody	W	H, M, (R, B)
	#3344	Jak1 (6G4) Rabbit mAb	W, IP, IHC-P	H, M, R, (Mk, Dg, Pg)
	#3332	Jak1 Antibody	W	H, M, (R, B)
	#3774	Phospho-Jak2 (Tyr221) Antibody	W	H, M, (R)
	#4406	Phospho-Jak2 (Tyr1007) (D15E2) Rabbit mAb	W	H, M, (R, Mk, B)
	#3776	Phospho-Jak2 (Tyr1007/1008) (C80C3) Rabbit mAb	W	H, M, R, (Mk, B)
	#3771	Phospho-Jak2 (Tyr1007/1008) Antibody	W, IP	H, M, (R, B)
New	#8082	Phospho-Jak2 (Tyr1008) (D4A8) Rabbit mAb	W, F	H, M, (R, Mk, X, B, Pg)
XP	#3230	Jak2 (D2E12) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R, (Hm, Mk, C, X, B, Dg, Pg)
XP	#4040	Jak2 (D2E12) XP® Rabbit mAb (Biotinylated)	W, F	H, M, R
XP	#4089	Jak2 (D2E12) XP® Rabbit mAb (Sepharose Bead Conjugate)	IP	H, M, R, (Mk)
	#6235	SignalSilence® Jak2 siRNA I		H
	#5031	Phospho-Jak3 (Tyr980/981) (D44E3) Rabbit mAb	W	H, M, (Mk)
New	#8863	Jak3 (D7B12) Rabbit mAb	W	H, M, R
New	#8827	Jak3 (D1H3) Rabbit mAb	W, IP, IF-IC	H, (Mk)
	#3775	Jak3 Antibody	W	H
	#5481	Jak3 (5H2) Mouse mAb	W	H
XP	#3550	PIAS1 (D33A7) XP® Rabbit mAb	W, IF-IC, F	H, M, R, Mk
	#4164	PIAS3 Antibody	W	H, M, R, Mk
	#3950	SOCS1 (A156) Antibody	W	H, M, R, Mk, (Dg)
	#2779	SOCS2 Antibody	W, IP	H, M, R
	#2932	SOCS3 (L210) Antibody	W	H, M, R, (Mk, B, Dg)
	#2923	SOCS3 Antibody	W	H, M, R
	#8105	SignalSlide® Phospho-Stat1/3/5 IHC Controls		
	#8113	SignalStain® Phospho-Stat IHC Sampler Kit		
New	#7649	Phospho-Stat1 (Tyr701) (D4A7) Rabbit mAb	W, IP, IF-IC, F, ChIP	H, M, R, (Mk)
	#9167	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb	W, IP, IHC-P, IHC-F, IF-IC, F, ChIP	H, M
	#9174	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M
New	#8183	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (Alexa Fluor® 555 Conjugate)	IF-IC	H, M
New	#8009	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M
New	#8062	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (PE Conjugate)	F	H, M
New	#5375	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (Biotinylated)	W	H, M
	#5167	Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (Sepharose Bead Conjugate)	IP	H, M
	#9171	Phospho-Stat1 (Tyr701) Antibody	W, IP, ChIP	H, M, R, (B, Dg)
	#9177	Phospho-Stat1 (Ser727) Antibody	W, IF-IC, F, ChIP	H, M, R, (B)
	#9175	Stat1 (42H3) Rabbit mAb	W, IHC-P	H, Mk
	#9172	Stat1 Antibody	W, IP, ChIP	H, M, R, Mk, (B, Dg)
	#9176	Stat1 (9H2) Mouse mAb	W, IP	H, (B)
	#9173	Stat1 Control Cell Extracts		
	#6331	SignalSilence® Stat1 siRNA I		H, (M)
	#6544	SignalSilence® Stat1 siRNA II		H
	#4441	Phospho-Stat2 (Tyr690) Antibody	W	H, (R, B)
	#4597	Stat2 Antibody (Mouse Specific)	W	M
	#2523	Acetyl-Stat3 (Lys685) Antibody*	W	H, (M, R)
XP	#9145	Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb	W, IP, IHC-P, IHC-F, IF-IC, F, ChIP	H, M, R, Mk, (Hm, B, Pg)

Selected Product References:

#3331 Phospho-Jak1 (Tyr1022/1023) Antibody: Okumura, M. et al. (2011) *Biochem Pharmacol.* 82, 1720-1730. (W) / Zhang, W.N. et al. (2012) *J. Biol. Chem.* 287, 382-392. (W)

#3344 Jak1 (6G4) Rabbit mAb: Okumura, M. et al. (2011) *Biochem Pharmacol.* 82, 1720-1730. (W)

#3332 Jak1 Antibody: Zhang, W.N. et al. (2012) *J. Biol. Chem.* 287, 382-392. (W)

#3774 Phospho-Jak2 (Tyr221) Antibody: Okumura, M. et al. (2011) *Biochem Pharmacol.* 82, 1720–1730. (W)

#3776 Phospho-Jak2 (Tyr1007/1008) (C80C3) Rabbit mAb: Ahluwalia, M. et al. (2010) *J. Thromb. Haemost.* 8, 2252-2261. (W)

#9167 Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb: Hebel, K. et al. (2011) *J. Immunol.* 187, 5627-5635. (W)

#9171 Phospho-Stat1 (Tyr701) Antibody: Zimnik, S. et al. (2009) *Nucleic Acids Res.* 37, e30. (W) / Lee, J. et al. (2011) *Oncogene* 31, 1242-1253. (W)

#9172 Stat1 Antibody: Zimnik, S. et al. (2009) *Nucleic Acids Res.* 37, e30. (W)

#4441 Phospho-Stat2 (Tyr690) Antibody: Lee, J. et al. (2011) *Oncogene* 31, 1242-1253. (W)

#2523 Acetyl-Stat3 (Lys685) Antibody: Nie, Y. et al. (2009) *Nat. Cell Biol.* 11, 492-500. (W)

#9145 Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb: Ernst, M.B. et al. (2009) *J. Neurosci.* 29, 11582-11593. (IHC-F) / Ahluwalia, M. et al. (2010) *J. Thromb. Haemost.* 8, 2252-2261. (W) / Mainardi, M. et al. (2010) *Proc. Natl. Acad. Sci. U.S.A.* 107, 16673-16678. (IF-F) / Yao, Z. et al. (2010) *Proc. Natl. Acad. Sci. U.S.A.* 107, 15535-15540. (W) / Stairs, D.B. et al. (2011) *Cancer Cell* 19, 470-483. (IF-IC) / Surdziel, E. et al. (2011) *Blood* 117, 4338-4348. (W) / Anand, S. et al. (2011) *Blood* 118, 1610-1621. (W) / Matsuyama, H. et al. (2011) *Blood* 118, 6881-6892. (W)

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing

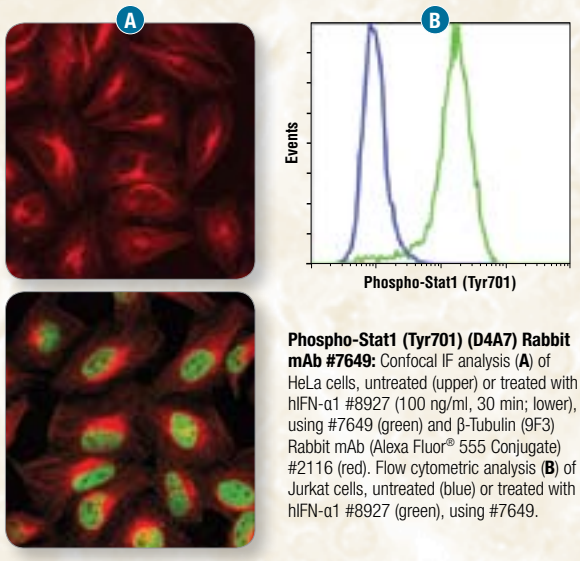
* detects transfected levels only / ** detects recombinant protein only

			Applications	Reactivity
XP®	#4323	Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M, R, Mk
XP®	#4324	Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M, R, Mk
New XP®	#8119	Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (PE Conjugate)	F	H, M, R, Mk
XP®	#4093	Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (Biotinylated)	W	H, M, R, Mk
XP®	#4074	Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (Sepharose Bead Conjugate)	IP	H, M, R, Mk
	#9131	Phospho-Stat3 (Tyr705) Antibody	W, IP, IF-IC, ChIP	H, M, R, Mk, (C, B, Dg)
	#4113	Phospho-Stat3 (Tyr705) (M9C6) Mouse mAb	W, IP, IHC-P, IF-IC, F	H, M, R, Mk
	#9138	Phospho-Stat3 (Tyr705) (3E2) Mouse mAb	W, IP, F	H, M, (R, B)
	#9134	Phospho-Stat3 (Ser727) Antibody	W, IP, IF-IC, ChIP	H, M, R, (B)
	#9136	Phospho-Stat3 (Ser727) (6E4) Mouse mAb	W	H, M
	#4904	Stat3 (79D7) Rabbit mAb	W, IP, IHC-P, ChIP	H, M, R, Mk
	#4368	Stat3 (79D7) Rabbit mAb (Sepharose Bead Conjugate)	IP	H, M, R, Mk
	#8719	Stat3α Antibody	W, IP	H, M, R, Hm, Mk, B, Pg, (Dg)
	#9132	Stat3 Antibody	W, IP, IHC-P, ChIP	H, M, R, Mk, (B)
	#9139	Stat3 (124H6) Mouse mAb	W, IP, IHC-P, IF-IC, F, ChIP	H, M, R, Mk
	#9133	Stat3 Control Cell Extracts		
	#6580	SignalSilence® Stat3 siRNA I		H
	#6582	SignalSilence® Stat3 siRNA II		H
	#6353	SignalSilence® Stat3 siRNA I (Mouse Specific)		M
	#6354	SignalSilence® Stat3 siRNA II (Mouse Specific)		M
New	#4134	Phospho-Stat4 (Tyr693) (D2E4) Rabbit mAb	W, IP, IF-IC, F, ChIP	H, (M, R, Mk, Pg)
	#5267	Phospho-Stat4 (Tyr693) Antibody	W, IP, ChIP	H, (M, R)
	#2653	Stat4 (C46B10) Rabbit mAb	W, ChIP	H, M, R
	#5097	Stat4 (2A2) Mouse mAb	W, IP	H
XP®	#4322	Phospho-Stat5 (Tyr694) (D47E7) XP® Rabbit mAb	W, IP, IF-IC, F	H, M, (R, Mk, B)
	#9359	Phospho-Stat5 (Tyr694) (C11C5) Rabbit mAb	W, IP, IHC-P, F	H, M, (R, Mk, B)
	#9314	Phospho-Stat5 (Tyr694) (C71E5) Rabbit mAb	W, IHC-P, IF-IC, F	H, M, (R, Mk, B)
	#3939	Phospho-Stat5 (Tyr694) (C71E5) Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M, (R, Mk, B)
	#9365	Phospho-Stat5 (Tyr694) (C71E5) Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M, (R, Mk, B)
	#9351	Phospho-Stat5 (Tyr694) Antibody	W, F, ChIP	H, M, (R, B)
	#9356	Phospho-Stat5 (Tyr694) (14H2) Mouse mAb	W, IP	H, M, (R)
	#9358	Stat5 (3H7) Rabbit mAb	W, IP, ChIP	H, M, R
	#4459	Stat5 (3H7) Rabbit mAb (Biotinylated)	W	H, M, R
	#9363	Stat5 Antibody	W, IP, ChIP	H, M, R, Mk
	#6275	SignalSilence® Stat5 siRNA I		H
	#6298	SignalSilence® Stat5 siRNA II		H
	#4807	Stat5a (4H1) Mouse mAb	W, IP, F	H
	#9353	Stat5 Control Cell Extracts		
	#9364	Phospho-Stat6 (Tyr641) (C11A12) Rabbit mAb	W	H, (Mk)
	#9361	Phospho-Stat6 (Tyr641) Antibody	W, IP, IF-IC, F	H, (B)
	#9362	Stat6 Antibody	W, IP	H, M, R, (B)
	#6358	SignalSilence® Stat6 siRNA I		H
	#9321	Phospho-Tyk2 (Tyr1054/1055) Antibody	W	H, (M, R)
	#9312	Tyk2 Antibody	W, IP	H

Stat1

The Stat1 transcription factor is activated in response to a large number of ligands and is essential for responsiveness to IFN-α and IFN-γ. Phosphorylation of Stat1 at Tyr701 induces Stat1 dimerization, nuclear translocation, and DNA binding. Stat1 protein exists as a pair of isoforms, Stat1α (91 kDa) and the splice variant Stat1β (84 kDa). In most cells, both isoforms are activated by IFN-α, but only Stat1α is activated by IFN-γ. Researchers have found that inappropriate activation of Stat1 occurs in many tumors.[1] In addition to tyrosine phosphorylation, Stat1 is also phosphorylated at Ser727 through a p38 mitogen-activated protein kinase (MAPK)-dependent pathway in response to IFN-α and other cellular stresses. Serine phosphorylation may be required for the maximal induction of Stat1-mediated gene activation.

[1] Frank, D.A. (1999) *Mol. Med.* 5, 432-456.



Phospho-Stat1 (Tyr701) (D4A7) Rabbit mAb #7649: Confocal IF analysis (**A**) of HeLa cells, untreated (upper) or treated with hIFN-α1 #8927 (100 ng/ml, 30 min; lower), using #7649 (green) and β-Tubulin (9F3) Rabbit mAb (Alexa Fluor® 555 Conjugate) #2116 (red). Flow cytometric analysis (**B**) of Jurkat cells, untreated (blue) or treated with hIFN-α1 #8927 (green), using #7649.

Selected Product References:

#4323 Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (Alexa Fluor® 488 Conjugate): Qu, P. et al. (2009) *J. Immunol.* 182, 1648-1659. (F) / Anand, S. et al. (2011) *Blood* 118, 1610-1621. (F)

#9131 Phospho-Stat3 (Tyr705) Antibody: Stairs, D.B. et al. (2011) *Cancer Cell* 19, 470-483. (W) / Zhang, W.N. et al. (2012) *J. Biol. Chem.* 287, 382-392. (W)

#9134 Phospho-Stat3 (Ser727) Antibody: Lee, J. et al. (2011) *Oncogene* 31, 1242-1253. (W)

#9136 Phospho-Stat3 (Ser727) (6E4) Mouse mAb: Turner, N.A. et al. (2009) *Am. J. Physiol. Heart Circ. Physiol.* 297, H1117-1127. (W)

#4904 Stat3 (79D7) Rabbit mAb: Ahluwalia, M. et al. (2010) *J. Thromb. Haemost.* 8, 2252-2261. (W)

#9132 Stat3 Antibody: Mainardi, M. et al. (2010) *Proc. Natl. Acad. Sci. U.S.A.* 107, 16673-16678. (IF-F)

#9139 Stat3 (124H6) Mouse mAb: Yao, Z. et al. (2010) *Proc. Natl. Acad. Sci. U.S.A.* 107, 15535-15540. (W) / Matsuyama, H. et al. (2011) *Blood* 118, 6881-6892. (W, ChIP)

#9359 Phospho-Stat5 (Tyr694) (C11C5) Rabbit mAb: Lee, J. et al. (2011) *Oncogene* 31, 1242-1253. (W)

#9351 Phospho-Stat5 (Tyr694) Antibody: Weisberg, E. et al. (2011) *PLoS One* 6, e25351. (W)

#9358 Stat5 (3H7) Rabbit mAb: Weisberg, E. et al. (2011) *PLoS One* 6, e25351. (W)

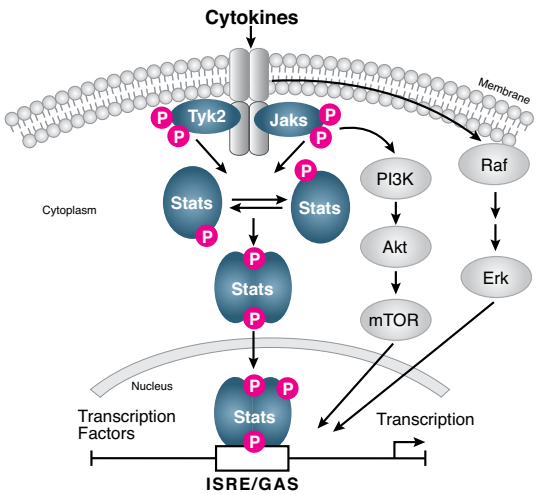
#9363 Stat5 Antibody: Mandal, M. et al. (2011) *Nat. Immunol.* 12, 1212-1220. (W)

#9361 Phospho-Stat6 (Tyr641) Antibody: Lee, J. et al. (2011) *Oncogene* 31, 1242-1253. (W)

#9362 Stat6 Antibody: Matsuyama, H. et al. (2011) *Blood* 118, 6881-6892. (W)

Cytokine Signaling

Jak/Stat Signaling



Cytokine signaling is integral to an efficient immune response. A key pathway involved in cytokine signaling is the Janus kinase-signal transducer and activator of transcription (Jak/Stat) pathway. Jaks and Stats regulate growth, survival, differentiation, and pathogen resistance. Cytokine binding induces receptor dimerization, thereby activating the associated Jaks which undergo autophosphorylation and subsequently phosphorylate the receptor. These phosphorylated sites serve as docking sites for the SH2 domain-containing Stats, such as Stat3, and for SH2-containing proteins and adaptors that link the receptor to MAP Kinase, PI3 Kinase/Akt, and other cellular pathways. Receptor-bound Stats phosphorylated by Jaks dimerize and translocate to the nucleus where they regulate target gene transcription.

Jak/Stat Utilization Table

The Jak/Stat Utilization Table tabulates the combinatorial use of tyrosine kinases and Stat proteins in cytokine/growth factor signaling.

Ligand	Receptor	Jak-Kinase	Other Tyrosine Kinases	Stat Family Members
IL-6	IL-6Rα+gp130	Jak1,2, Tyk2	Hck	Stat1, Stat3
IL-11	IL-11R+gp130	Jak1,2, Tyk2	Src, Yes	Stat3
CNTF, CT-1, LIF, OSM	CNTFR+gp130, CT-1R+gp130, LIFR+gp130, OSMR+gp130	Jak1,2, Tyk2	Src family	Predominant: Stat3 / Secondary: Stat1,5
G-CSF	G-CSFR	Jak2, Tyk2	Lyn	Stat3
IL-12 (p40+p35)	IL-12Rβ1+IL-12Rβ2	Jak2, Tyk2	Lck	Stat4
Leptin	LeptinR	Jak2	not determined	Stat3,5,6
IL-3	IL-3Rα+βc	Jak2	Fyn, Hck, Lyn	Stat3,5,6
IL-5	IL-5R+βc	Jak2	Btk	Stat3,5,6
GM-CSF	GM-CSFR+βc	Jak2	Hck, Lyn	Stat3,5
Angiotensin	GPCR	Jak2, Tyk2		Stat1,2,3
Serotonin	GPCR	Jak2		Stat3
α-Thrombin	GPCR	Jak2		Stat1,3
Chemokines	CXCR4	Jak2,3		
IL-2	IL-2Rα+IL-2Rb+γc	Jak1,2,3	Fyn, Hck, Lck, Syk, Tec	Stat3,5
IL-4	IL-4Rα+γc or IL-4Rα+IL-13Rα1	Jak1,3	Lck, Tec	Stat6
IL-7	IL-7R+γc	Jak1,3	Lyn	Stat3,5
IL-9	IL-9R+γc	Jak1,3	not determined	Stat1,3,5
IL-13	IL-13Rα1+ IL-4Rα	Jak1,2, Tyk2	Ctk	Stat6
IL-15	IL-15Rα+IL-2Rβ+γc	Jak1,3	Lck	Stat3,5
IL-19	IL-20Rα+IL-20Rβ	Jak1, ?		Stat3
IL-20	IL-20Rα+IL-20Rβ, IL-22R+IL-20Rβ	Jak1, ?		Stat3
IL-21	IL-21R+γc	Jak1,3		Stat1,3,5
IL-22	IL-22R+IL-10Rβ	Jak1, Tyk2		Stat1,3,5
IL-23 (p40+p19)	IL-12Rβ1+IL-23R	Jak2	Tyk2	Stat4
IL-24	same as IL-20	Jak1, ?		Stat3
IL-26	IL-20Rα+IL-10Rβ	Jak1, Tyk2		Stat3
IL-27 (EBI3+p28)	gp130+WSX1	Jak1,2, Tyk2		Stat1,2,3,4,5
IL-28A, IL-28B, IL-29	IL-28R+IL-10Rβ	Jak1, Tyk2		Stat1,2,3,4,5
IL-31	IL-31Rα+OSMR	Jak1,2, Tyk2		Stat1,3,5
IL-35 (p35+EBI3)	gp130+WSX1	Jak1,2, Tyk2		Stat1,3,5
GH	GHR	Jak2	Src family	Stat3,5 (mainly Stat5a)
Tpo	TpoR (c-Mpl)	Jak2, Tyk2	Lyn	Stat1,3,5
Epo, Pro	EpoR, ProlactinR	Jak2	Src Family	Stat5 (mainly Stat5a)
Interferon (IFNα/β)	IFNAR1+IFNAR2	Jak1, Tyk2	Lck	Predominant: Stat1,2 / Secondary: Stat3,4,5
IFN-γ	IFN-gR1+IFN-γR2	Jak1, Jak2	Hck, Lyn	Stat1
IL-10	IL-10Rα+IL-10Rβ	Jak1, Tyk2	not determined	Stat1,3,5
TLSP	TLSPR and IL-7R	Jak1, possibly Jak2	not determined	Stat3,5
EGF	EGFR	Jak1	EGFR, Src	Stat1,3,5
PDGF	PDGFR	Jak1,2	PDGFR, Src	Stat1,3,5

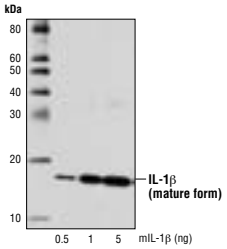
APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing
* detects transfected levels only / ** detects recombinant protein only

Cytokines

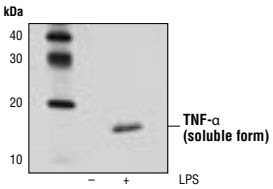
		Applications	Reactivity
	#3432 Cytokine Receptor Common β-Chain Antibody	W	H, M, R, Mk, Mi
	#3732 GP130 Antibody	W	H, M, Mk
	#3110 IFN-α (6B18) Mouse mAb**	W	H
	#3115 IFN-α (8C21) Mouse mAb**	W	H
	#3159 IFN-γ (3F1E3) Mouse mAb**	W, IP, E-P	H
	#3865 IL-1RA (20D8) Mouse mAb	W	H
	#2021 Cleaved IL-1β (Asp116) Antibody	W	H
	#2022 IL-1β Antibody	W	H, M
New	#8689 IL-1β Antibody (Mouse Specific)	W	M
	#5370 IL-2Rα Antibody	W	H
	#4198 IL-2Rβ Antibody*	W	H
	#5418 LGALS1 Antibody	W	H, M, R, (Mk)
	#2027 MCP-1 Antibody	W	H, (Mk)
	#2029 MCP-1 Antibody (Mouse Specific)	W	M
	#2988 RANTES (P20) Antibody	W	H, (Mk)
	#2987 RANTES (R40) Antibody	W	H, (Mk)
	#2989 RANTES Antibody (Rodent Specific)*	W, IP	M, (R)
	#3530 SDF1 (D32F9) Rabbit mAb**	W, IP	H, R, (M)
	#3740 SDF1 Antibody**	W	H, M, R
	#6945 TNF-α (D5G9) Rabbit mAb	W, IP	H
	#3707 TNF-α Antibody	W, IP	H, M
New	#7321 Human TNF-α Neutralizing (D1B4) Rabbit mAb	N	H

Selected Product References:

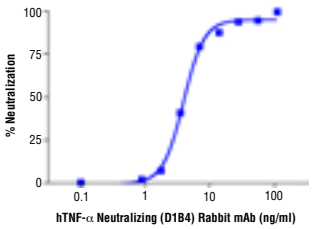
#2021 Cleaved IL-1β (Asp116) Antibody: Lee, J. et al. (2011) *Oncogene* 31, 1242-1253. (W)



IL-1β Antibody (Mouse Specific) #8689: Western blot analysis of increasing concentrations of mIL-1β #5204 using #8689.



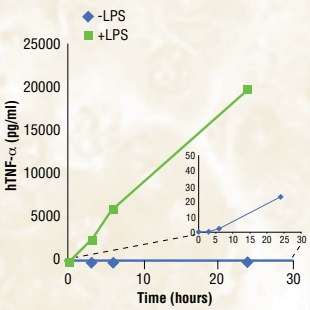
TNF-α (D5G9) Rabbit mAb #6945: Western blot analysis of extracts from the media of THP-1 cells differentiated with TPA #4174 (80 nM, overnight), with or without LPS (1 µg/ml, overnight), using #6945.



Human TNF-α Neutralizing (D1B4) Rabbit mAb #7321: The neutralization ability of #7321 on hTNF-α-induced cell cytotoxicity was assessed by adding increasing concentrations of antibody with 1 ng/ml of hTNF-α #8902, before addition to L-929 cells in the presence of 1 µg/ml actinomycin D. After 24 hr incubation, viable cells were stained and % neutralization was calculated.

New SignalKine™ Sandwich ELISA Kits

SignalKine™ Sandwich ELISA Kits (targeting human TNF-α and human IL-4) are solid phase sandwich enzyme-linked immunosorbent assays (ELISA) that detect active human TNF-α or IL-4 in serum, plasma, and cell culture supernatants.



Time course of TNF-α secretion from THP-1 cells after LPS treatment. THP-1 cells were treated with TPA #4174 (16 nM, 18 hr) to induce differentiation. Addition of LPS (1 µg/ml) results in an increase of hTNF-α levels in the supernatant collected after 3, 6, and 24 hr compared with untreated cells. Inset: Low picogram levels of hTNF-α in the untreated sample are detected by the kit at 24 hr.

SignalKine™ Sandwich ELISA Kits

New	#7289	SignalKine™ Human TNF-α Sandwich ELISA Kit
New	#8668	SignalKine™ Human TNF-α Chemiluminescent Sandwich ELISA Kit
New	#8669	SignalKine™ Human IL-4 Sandwich ELISA Kit

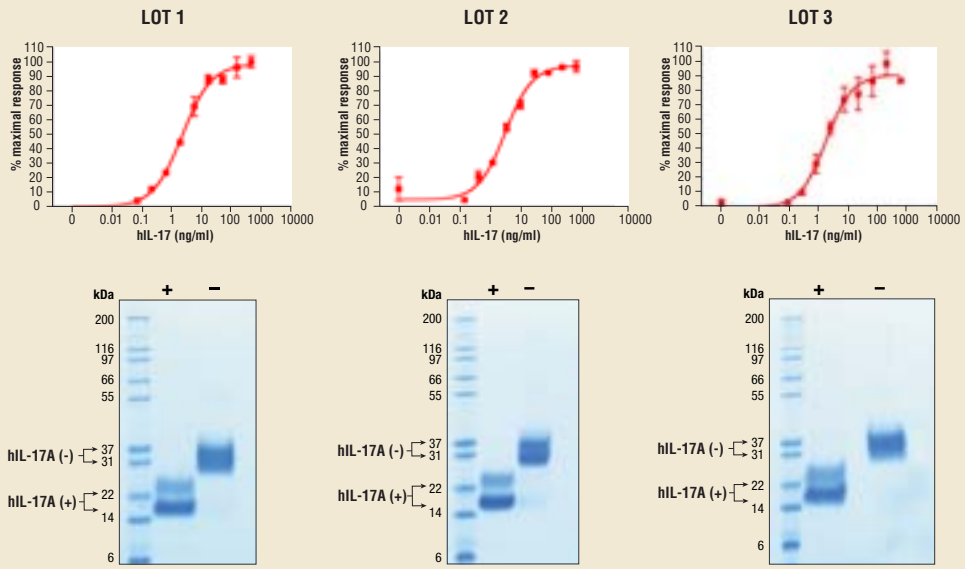
The Benefits of SignalKine™ Sandwich ELISA Kits include:

- Kits contain CST™ rabbit monoclonal antibodies developed using our superior rabbit monoclonal technology, ensuring the highest quality products and the most accurate research results.
- Capture antibody, detection antibody, and recombinant standard are developed in-house, minimizing the need for optimization.
- An optimized research protocol is provided with each kit, saving your valuable time.
- Kits contain low volume microwells that require less sample than similarly available kits, saving your precious reagents.
- Technical support is provided by the scientists who developed and validated the kits and know them best.

Bioactive Cytokines and Growth Factors

The world's highest quality antibody provider has extended its expertise to Cytokine and Growth Factor production.

Lot-to-Lot Consistency of Human Interleukin-17A (hIL-17A) #8928



Comparison of purity and bioactivity of three independent lots of Human Interleukin-17A (hIL-17A) #8928:
The production of IL-6 by primary human fibroblasts cultured with increasing concentrations of hIL-17A. Media from cells incubated with hIL-17A for 48 hours was collected and assayed for IL-6 by ELISA and percent maximal response was determined (upper panels). The purity of recombinant hIL-17A was determined by SDS-PAGE using 6 µg reduced (+) and non-reduced (-) hIL-17A and staining overnight with Coomassie Blue (lower panels).

Quality

- Most are greater than 98% pure as demonstrated by SDS-PAGE.
- Endotoxin levels are tested by the LAL assay and are less than 0.01 ng/µg cytokine.
- Purity is demonstrated by SDS-PAGE of reduced and non-reduced protein.
- ED_{50} or maximum 50% response is determined by a standard cell based assay for every lot.
- Several lots are tested side-by-side to ensure consistent bioactivity.
- Bioactivity and purity data are shown on each product webpage and datasheet.

Consistency

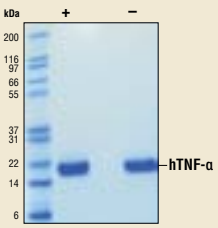
- Strict specifications are set and enforced.
- Each lot is compared to previous lots for consistency in purity and bioactivity.
- Lyophilized lots are quality assured for sterility and bioactivity.

Dependability

- Products are produced in-house and ready to ship.
- Products are available in multi-milligram sizes.
- Most customers receive overnight delivery.
- Technical support is provided by the same scientist who produce the products and know them best.

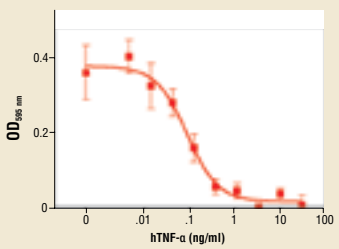
Human Tumor Necrosis Factor-α (hTNF-α) #8902

Purity



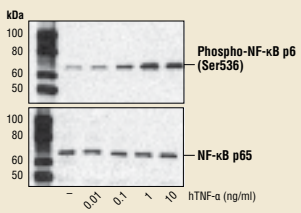
The purity of hTNF-α was determined by SDS-PAGE of 6 µg reduced (+) and non-reduced (-) hTNF-α and staining overnight with Coomassie Blue.

Bioactivity



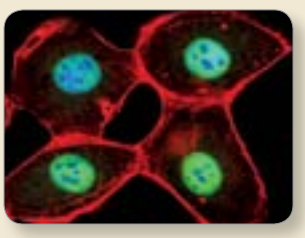
The viability of L-929 cells treated with increasing concentrations of hTNF-α in the presence of 2 ng/ml actinomycin D was determined. Cells were stained with crystal violet at the end of treatment and the OD_{595} was determined.

Downstream Signaling



Western blot analysis of extracts from HeLa cells treated with hTNF-α (increasing concentrations, 20 min), using Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb #3033 (upper) and NF-κB p65 Antibody #3034 (lower).

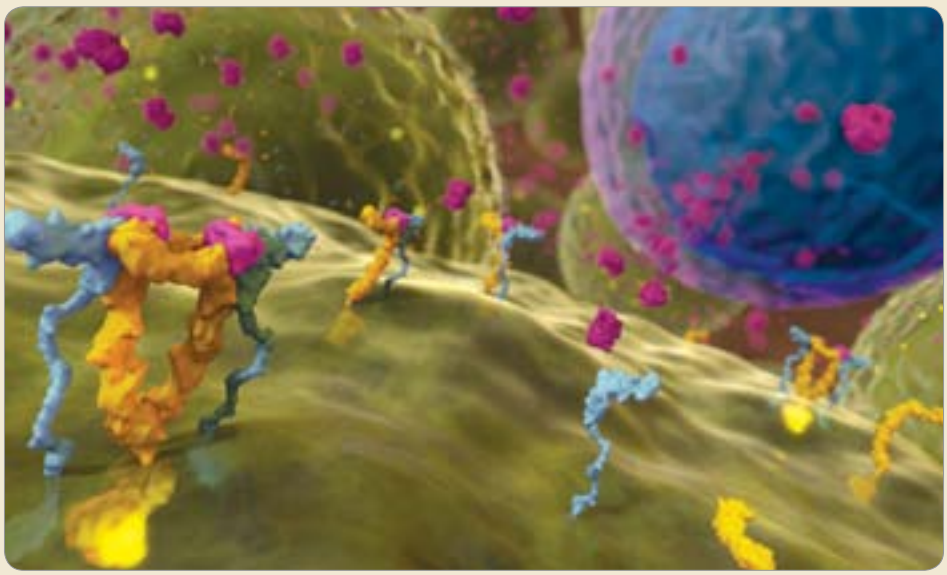
Downstream Signaling



Confocal IF analysis of HT-1080 cells treated with hTNF-α (20 ng/ml, 20 min), using NF-κB p65 (D14E12) XP® Rabbit mAb #8242 (green). Actin filaments were labeled with DY-554 phalloidin (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / **(-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing
* detects transfected levels only / ** detects recombinant protein only

New #5235 Human Betacellulin (hBTC)
New #8445 Human C-C Motif Chemokine 3 (hCCL3/MIP-1-α)
#3583 Human CD40 Ligand (hCD40L)
#5717 Human Cystatin C (hCystatin C)
#8916 Human Epidermal Growth Factor (hEGF)
New #5331 Mouse Epidermal Growth Factor (mEGF)
#5493 Human Epigen
New #6980 Human Erythropoietin (hEPO)
#5494 Human Epiregulin
#5452 Human $_{His6}$Fas Ligand/TNFSF6 (h$_{His6}$FasL)
New #8910 Human Basic Fibroblast Growth Factor (hFGF basic/FGF2)
#5234 Human FGF acidic (hFGF acidic)
#5414 Mouse Basic Fibroblast Growth Factor (mFGF basic/FGF2)
#8924 Human Fms-related Tyrosine Kinase 3 Ligand (hFLT3L)
#8930 Human Granulocyte Colony Stimulating Factor (hG-CSF)
#8922 Human Granulocyte Macrophage Colony Stimulating Factor (hGM-CSF)
#5191 Mouse Granulocyte Macrophage Colony Stimulating Factor (mGM-CSF)
#8927 Human Interferon-α1 (hIFN-α1)
#8901 Human Interferon-γ (hIFN-γ)
New #5222 Mouse Interferon-γ (mIFN-γ)
#8917 Human Insulin-like Growth Factor I (hIGF-I)
New #9897 Mouse Insulin-like Growth Factor I (mIGF-I)
New #5238 Human Insulin-like Growth Factor II (hIGF-II)
#5236 Human Interleukin-1α (hIL-1α)
#5273 Mouse Interleukin-1α (mIL-1α)
#8900 Human Interleukin-1β (hIL-1β)
#5204 Mouse Interleukin-1β (mIL-1β)
#8907 Human Interleukin-2 (hIL-2)
#5454 Human Interleukin-2 (hIL-2) (mammalian derived)
#5201 Mouse Interleukin-2 (mIL-2)
#8918 Human Interleukin-3 (hIL-3)
#8923 Mouse Interleukin-3 (mIL-3)
#8919 Human Interleukin-4 (hIL-4)
#5208 Mouse Interleukin-4 (mIL-4)
#8904 Human Interleukin-6 (hIL-6)
New #5216 Mouse Interleukin-6 (mIL-6)
New #8170 Human Interleukin-7 (hIL-7)
#5217 Mouse Interleukin-7 (mIL-7)
New #8921 Human Interleukin-8 (hIL-8)
#8903 Human Interleukin-10 (hIL-10)
#5358 Human Interleukin-10 (hIL-10) (mammalian derived)
New #5261 Mouse Interleukin-10 (mIL-10)
#8905 Human Interleukin-13 (hIL-13)
#5242 Mouse Interleukin-13 (mIL-13)
#8928 Human Interleukin-17A (hIL-17A)
#5227 Mouse Interleukin-17A (mIL-17A)
New #8846 Human Interleukin-17A/F Heterodimer (hIL-17A/F)
New #9584 Mouse Interleukin-17B (mIL-17B)
#8906 Human Interleukin-17F (hIL-17F)
#8920 Human Interleukin-21 (hIL-21)
#8931 Human Interleukin-22 (hIL-22)
#5224 Mouse Interleukin-22 (mIL-22)
New #5725 Mouse $_{His6}$Interleukin-27 (m$_{His6}$IL-27)
#5164 Human Interleukin-28A (hIL-28A/IFN-λ2)
New #8796 Human Interleukin-28B (hIL-28B/IFN-λ3)
#5183 Human Interleukin-29 (hIL-29)
New #5719 Human Leptin/OB (hLeptin)
#8929 Human Macrophage Colony Stimulating Factor (hM-CSF)
New #5228 Mouse Macrophage Colony Stimulating Factor (mM-CSF)
#5221 Human β-Nerve Growth Factor (hβ-NGF)
#5218 Human Neuregulin-1 (hNRG-1)
New #5237 Human Neurotrophin-3 (hNT-3)
New #5592 Human Neurotrophin-4 (hNT-4)
New #5367 Human Oncostatin M (hOSM)
#5371 Mouse Oncostatin M (mOSM)
#8912 Human Platelet-Derived Growth Factor BB (hPDGF-BB)
#8913 Human Platelet-Derived Growth Factor AA (hPDGF-AA)
#8925 Human Stem Cell Factor (hSCF)
New #5223 Mouse Stem Cell Factor (mSCF)
New #5712 Human Stromal Cell-derived Factor 1β/CXCL12 (hSDF1β)
#5495 Human Transforming Growth Factor α (hTGF-α)
#5154 Human Latent Transforming Growth Factor β1 (hLatent TGF-β1)
#8915 Human Transforming Growth Factor β1 (hTGF-β1)
#5231 Mouse Transforming Growth Factor β1 (mTGF-β1)
#8406 Human Transforming Growth Factor β2 (hTGF-β2)
#8425 Human Transforming Growth Factor β3 (hTGF-β3)
#8902 Human Tumor Necrosis Factor-α (hTNF-α)
#4698 Mouse $_{His6}$Tumor Necrosis Factor-α (m$_{His6}$TNF-α)
#5178 Mouse Tumor Necrosis Factor-α (mTNF-α)
New #8230 Human Lymphotoxin-α/TNF-β/TNFSF1 (hLT-α)
New #8460 Human $_{His6}$41BB Ligand/TNFSF9 (h$_{His6}$4-1BBL)
New #5413 Human $_{His6}$BAFF/TNFSF13B (h$_{His6}$BAFF)
New #5233 Human BAFF/TNFSF13B (hBAFF)
New #8012 Human $_{His6}$Thymic Stromal Lymphopoietin (h$_{His6}$TSLP)
#5314 Mouse Vascular Endothelial Growth Factor-120 (mVEGF$_{120}$)
#8908 Human Vascular Endothelial Growth Factor-121 (hVEGF$_{121}$)
#5211 Mouse Vascular Endothelial Growth Factor-164 (mVEGF$_{164}$)
New #5874 Rat Vascular Endothelial Growth Factor-164 (rVEGF$_{164}$)
#8065 Human Vascular Endothelial Growth Factor-165 (hVEGF$_{165}$)



IL-6 (pink) is a potent inducer of the acute phase response and is produced by T cells, macrophages, fibroblasts, endothelial, and other cells. IL-6 induces proliferation and differentiation and, in concert with TGF-β, is important for developing Th17 responses. IL-6 binds to IL-6Rα (light blue) inducing gp130 (yellow) homodimerization. gp130 homodimerization triggers the Jak/Stat cascade and the SHP2/Erk MAP Kinase cascade. IL-6, through increasing expression of proangiogenic VEGF, may contribute to metastatic breast cancer.

REACTIVITY KEY:
H human / **M** mouse / **R** rat / **Hm** hamster / **Mk** monkey / **C** chicken / **Mi** mink / **Dm** D. melanogaster / **X** Xenopus / **Z** zebra fish / **B** bovine / **Dg** dog / **Pg** pig / **Sc** S. cerevisiae / **Ce**=C. elegans
All all species expected / **( )** 100% sequence homology

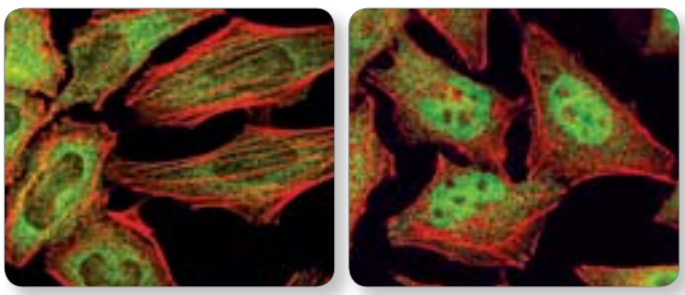
Cytokine Signaling

NF-κB

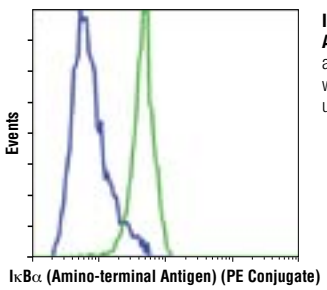
			Applications	Reactivity
	#3045	Acetyl-NF-κB p65 (Lys310) Antibody*	W, IP	H, M, (R, Mk, B, Dg)
	#3039	Phospho-NF-κB p65 (Ser468) Antibody	W, IP	H, M, R
	#3033	Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb	W, IP, IF-IC, F	H, M, R, Hm, Mk, Pg, (Dg)
	#4886	Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M, R, Hm, Mk, Pg, (Dg)
	#4887	Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M, R, Hm, Mk, Pg, (Dg)
	#5733	Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb (PE Conjugate)	F	H, M, R, Hm, Mk, Pg, (Dg)
	#4025	Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb (Biotinylated)	W	H, M, R, Hm, Mk, Pg, (Dg)
	#3031	Phospho-NF-κB p65 (Ser536) Antibody	W	H, M, R, Mk, (Dg, Pg)
	#3036	Phospho-NF-κB p65 (Ser536) (7F1) Mouse mAb	W	H, M, R, Mk, Mi, (Dg)
New XP®	#8242	NF-κB p65 (D14E12) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F, ChIP	H, M, R, Hm, Mk, Dg
	#4764	NF-κB p65 (C22B4) Rabbit mAb	W, IHC-P, IF-IC, F	H, M, R, Mk, B, (Dg)
	#3034	NF-κB p65 Antibody	W, IP	H, M, R, Hm, Mk, Mi, (Dg)
	#6956	NF-κB p65 (L8F6) Mouse mAb	W, IP, IHC-P, IF-IC, F, ChIP	H, M, R, Hm, Mk, Mi, B, Dg, Pg
	#6261	SignalSilence® NF-κB p65 siRNA I		H
	#6534	SignalSilence® NF-κB p65 siRNA II		H
New	#6337	SignalSilence® NF-κB p65 siRNA I (Mouse Specific)		M, (R)
New	#6339	SignalSilence® NF-κB p65 siRNA II (Mouse Specific)		M
	#4810	Phospho-NF-κB2 p100 (Ser866/870) Antibody*	W, IP	H, M, (R, B, Dg)
	#3017	NF-κB2 p100/p52 (18D10) Rabbit mAb (Human Specific)	W, IHC-P, F	H, Mk
	#4882	NF-κB2 p100/p52 Antibody	W, IP	H, M, R, Mk
	#4806	Phospho-NF-κB p105 (Ser933) (18E6) Rabbit mAb	W, IP	H, M, R, Mk
	#4808	Phospho-NF-κB p105 (Ser933) (178F3) Rabbit mAb (IHC Specific)	IHC-P	H
	#4717	NF-κB1 p105 Antibody	W, IP	H, M, R, Mk, Mi, B, Pg
	#3035	NF-κB1 p105/p50 Antibody	W, IP, ChIP	H, Mk
	#9243	NF-κB Control Cell Extracts		
	#9777	Pirin (1E8) Rat mAb	W, IP, F	H, M, R, Hm, Mk, B
XP®	#5025	Phospho-RelB (Ser552) (D41B9) XP® Rabbit mAb	W, IP, IF-IC, F	H, M, (R, Mk, B, Dg)
	#4999	Phospho-RelB (Ser552) Antibody	W, IP, IF-IC, F	H, M, (R, Mk, B, Dg)
	#4922	RelB (C1E4) Rabbit mAb	W, IP	H, M, R, Mk
	#4954	RelB Antibody	W, IP	H, M, R, Mk
	#4774	c-Rel (G57) Antibody	W	H, M, R, (Mk, Dg)
	#4727	c-Rel Antibody	W, IP, IHC-P, IF-IC, F	H, Mk

IκB

			Applications	Reactivity
	#2859	Phospho-IκBα (Ser32) (14D4) Rabbit mAb	W, IP	H, M, R, Mk, (B, Dg, Pg)
	#5209	Phospho-IκBα (Ser32) (14D4) Rabbit mAb (Biotinylated)	W	H, M, R, Mk, (Pg)
	#9246	Phospho-IκBα (Ser32/36) (5A5) Mouse mAb	W, IP, IHC-P	H, M, R, Mk, (B), Dg, (Pg)
	#4088	Phospho-IκBα (Ser32/36) (5A5) Mouse mAb (Sepharose Bead Conjugate)	IP	H, M, R, Mk, Dg, (B, Pg)
	#4812	IκBα (44D4) Rabbit mAb	W, IP	H, M, R, Hm, Mk, Mi
	#9242	IκBα Antibody	W, IP	H, M, R, Mk, B, Dg, Pg
	#4814	IκBα (L35A5) Mouse mAb (Amino-terminal Antigen)	W, IP, IHC-P, IF-IC, F	H, M, R, Mk, B, Pg
	#5743	IκBα (L35A5) Mouse mAb (Amino-terminal Antigen) (Alexa Fluor® 488 Conjugate)	F	H, M, R, Mk, B, Pg
New	#7523	IκBα (L35A5) Mouse mAb (Amino-terminal Antigen) (PE Conjugate)	F	H, M, R, Mk, B, Pg
New	#7543	IκBα (L35A5) Mouse mAb (Amino-terminal Antigen) (Biotinylated)	W	H, M, R, Mk, B, Pg
	#4078	IκBα (L35A5) Mouse mAb (Amino-terminal Antigen) (Sepharose Bead Conjugate)	IP	H, M, R, Mk, B, Pg
	#9247	IκBα (112B2) Mouse mAb (Carboxy-terminal Antigen)	W, IP	H, M, R, Mk
	#6327	SignalSilence® IκBα siRNA I		H, (M, R, Mk)
	#4921	Phospho-IκBβ (Thr19/Ser23) Antibody (Human Specific)	W	H, (Mk, Dg)
New	#8635	IκBβ (7B4) Mouse mAb	W	H
	#9248	IκBβ Antibody	W	H, M, R, Mk
	#4924	Phospho-IκBε (Ser18/22) Antibody	W	H, M, R, (B, Dg)
	#9249	IκBε Antibody	W	H, M, R, Mk
	#9244	IκB-ζ Antibody	W, IP	H



c-Rel Antibody #4727: Confocal IF analysis of HeLa cells, untreated (left) or treated with hTNF-α #8902 (20 ng/ml, 20 min; right), using #4727 (green). Actin filaments were labeled with DY-554 phalloidin (red).

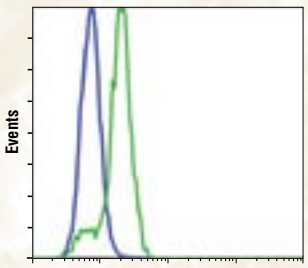


IκBα (L35A5) Mouse mAb (Amino-terminal Antigen) (PE Conjugate) #7523: Flow cytometric analysis of HeLa cells, untreated (blue) or treated with Calyculin A #9902 and hTNF-α #8902 (green), using #7523.

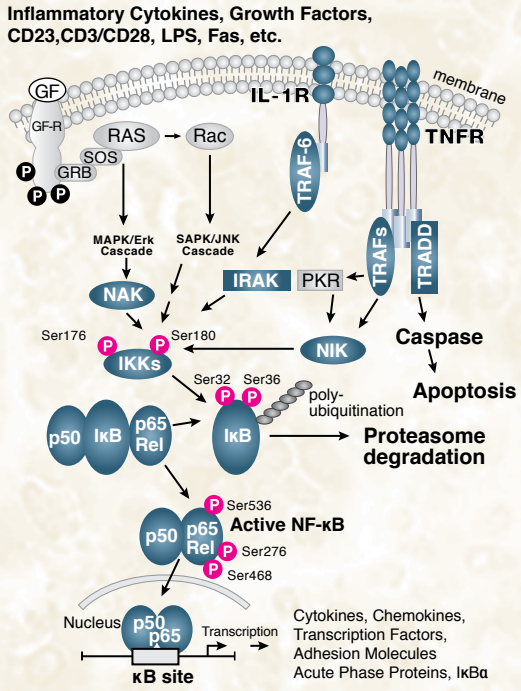
APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing
* detects transfected levels only / ** detects recombinant protein only

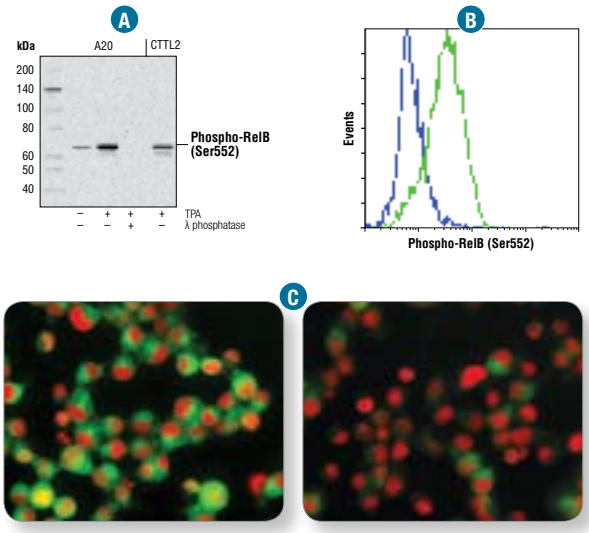
NF-κB

Nuclear factor-κB (NF-κB)/Rel proteins include NF-κB2 p52/p100, NF-κB1 p50/p105, c-Rel, RelA/p65, and RelB. These proteins function as dimeric transcription factors that control genes regulating a broad range of biological processes including innate and adaptive immunity, inflammation, stress responses, B cell development, and lymphoid organogenesis. In the canonical pathway, NF-κB/Rel proteins are bound to and inhibited by IκB proteins in the cytoplasm. Proinflammatory cytokines, LPS, growth factors, and antigen receptors activate the IKK complex (IKKα, IKKβ, and IKKγ/NEMO), which phosphorylates IκB proteins. Phosphorylation of IκB leads to its ubiquitination and proteasomal degradation, freeing NF-κB/Rel complexes. Active NF-κB/Rel complexes are further activated by phosphorylation and translocate to the nucleus where, either alone or in combination with other transcription factors, they induce target gene expression. In the noncanonical NF-κB pathway, NF-κB2 p100/RelB complexes are inactive in the cytoplasm. Signaling through a subset of receptors including LTβR, CD40, and BR3 activates the kinase NIK, which in turn activates IKKα complexes that phosphorylate C-terminal residues in NF-κB2 p100. Phosphorylation of NF-κB2 p100/RelB leads to its ubiquitination and proteasomal processing to NF-κB2 p52, creating transcriptionally competent NF-κB p52/RelB complexes that translocate to the nucleus and induce target gene expression.



Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb (Alexa Fluor® 488 Conjugate) #4886: Flow cytometric analysis of HeLa cells, untreated (blue) or treated with hTNF-α #8902 (green), using #4886.





Phospho-RelB (Ser552) (D41B9) XP® Rabbit mAb #5025: Western blot analysis (**A**) of extracts from A20 and CTTL2 cells, untreated or treated with TPA #4174 (200 nM, 30 min) alone or with λ phosphatase, using #5025. Flow cytometric analysis (**B**) of Raji cells, untreated (blue) or treated with TPA #4174 (green), using #5025. Confocal IF analysis (**C**) of Raji cells, treated with TPA #4174 (left) or serum-starved (right) using #5025 (green). Red = Propidium Iodide (PI)/RNase #4087 (fluorescent DNA dye).

Selected Product References:

#2859 Phospho-IκBα (Ser32) (14D4) Rabbit mAb: Wang, H. et al. (2009) *J. Immunol.* 183, 4755-4763. (IHC-F) / Xie, S. et al. (2010) *J. Immunol.* 184, 2289-2296. (W)

#9246 Phospho-IκBα (Ser32/36) (5A5) Mouse mAb: Mabilleau, G. and Sabokbar, A. (2009) *PLoS ONE* 4, e4173. (W) / Tokunaga, F. et al. (2009) *Nat. Cell Biol.* 11, 123-132. (W) / Chiron, D. et al. (2009) *J. Immunol.* 182, 4471-4478. (W) / Turner, N.A. et al. (2009) *Am. J. Physiol. Heart Circ. Physiol.* 297, H1117-1127. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#4812 IκBα (44D4) Rabbit mAb: Dai, P. et al. (2009) *J. Immunol.* 182, 3450-3460. (W) / Xie, S. et al. (2010) *J. Immunol.* 184, 2289-2296. (W) / Palkowitsch, L. et al. (2011) *J. Biol. Chem.* 286, 7522-7534. (W)

#4814 IκBα (L35A5) Mouse mAb (Amino-terminal Antigen): Dai, P. et al. (2009) *J. Immunol.* 182, 3450-3460. (W) / Barisic, S. et al. (2010) *Biochem. Pharmacol.* 80, 439-447. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#5743 IκBα (L35A5) Mouse mAb (Amino-terminal Antigen) (Alexa Fluor® 488 Conjugate): Katzman, S.D. et al. (2010) *Proc. Natl. Acad. Sci. U.S.A.* 107, 18085-18090. (F)

#3035 NF-κB1 p105/p50 Antibody: Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#4882 NF-κB2 p100/p52 Antibody: Lu, Y.C. et al. (2009) *J. Immunol.* 182, 7212-7221. (W) / Razani, B. et al. (2010) *Sci. Signal.* 3, ra41. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#3033 Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb: Yadav, U.C. et al. (2009) *Invest. Ophthalmol. Vis. Sci.* 50, 2276-82. (IF-P) / Dai, P. et al. (2009) *J. Immunol.* 182, 3450-60. (W) / Milsom, M.D. et al. (2009) *Blood* 113, 5111-20. (W) / Liu, M. et al. (2009) *Am. J. Pathol.* 174, 1910-20. (W) / Solt, L.A. et al. (2009) *J. Biol. Chem.* 284, 27596-27608. (W) / Yamanaka, Y. et al. (2009) *Blood* 114, 3265-75. (W) / Wang, H. et al. (2009) *J. Immunol.* 183, 4755-63. (IHC-F) / Xie, S. et al. (2010) *J. Immunol.* 184, 2289-2296. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W) / Dental, C. et al. (2011) *J. Virol.* 86, 1090-1096. (F) / Stairs, D.B. et al. (2011) *Cancer Cell* 19, 470-483. (W)

#4887 Phospho-NF-κB p65 (Ser536) (93H1) Rabbit mAb (Alexa Fluor® 647 Conjugate): Kalland, M.E. et al. (2011) *J. Immunol.* 187, 5233-5245. (F)

#4764 NF-κB p65 (C22B4) Rabbit mAb: Hideshima, T. et al. (2009) *Blood* 113, 5228-5236. (W, IHC-P) / Xie, S. et al. (2010) *J. Immunol.* 184, 2289-2296. (W) / Stairs, D.B. et al. (2011) *Cancer Cell* 19, 470-483. (W, IF-IC) / Ikner, A. and Ashkenazi, A. (2011) *J. Biol. Chem.* 286, 21546-21554. (W)

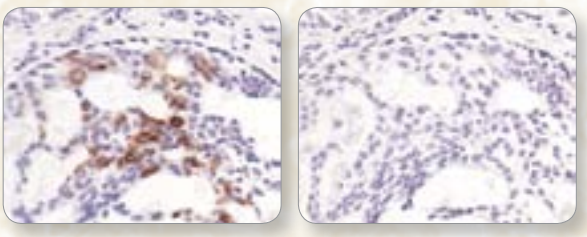
#4922 RelB (C1E4) Rabbit mAb: Xie, S. et al. (2010) *J. Immunol.* 184, 2289-2296. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#4727 c-Rel Antibody: Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

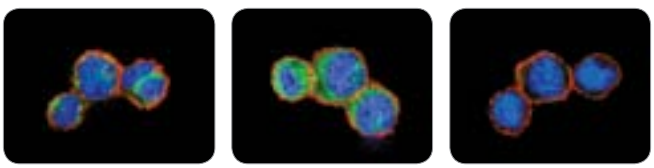
Cytokine Signaling

IKK

The NF-κB/Rel transcription factors are present in the cytosol in an inactive state, complexed with the inhibitory IκB proteins. Most agents that activate NF-κB do so through a common pathway based on phosphorylation-induced, proteasome-mediated degradation of IκB. The key regulatory step in this pathway involves activation of a high molecular weight IκB kinase (IKK) complex, whose catalysis is generally carried out by three tightly associated IKK subunits. IKKα and IKKβ serve as the catalytic subunits of the complex and IKKγ serves as the regulatory subunit. Activation of IKK depends upon phosphorylation; Ser177 and Ser181 in the activation loop of IKKβ (Ser176 and Ser180 in IKKα) are the specific sites whose phosphorylation causes conformational changes resulting in kinase activation.



Phospho-IKKα/β (Ser176/180) (16A6) Rabbit mAb #2697: IHC analysis of paraffin-embedded human breast carcinoma using #2697 in the presence of control peptide (left) or Phospho-IKK-α/β (Ser176/180) Blocking Peptide #1023 (right).



Phospho-TBK1/NAK (Ser172) (D52C2) XP® Rabbit mAb #5483: Confocal IF analysis of THP-1 cells differentiated with TPA #4174 (80 nM, overnight; left), followed by treatment with LPS (1 µg/ml, 1 hr; center) or LPS with λ phosphatase treatment (right) using #5483 (green). Actin filaments were labeled with DY-554 phalloidin (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

Selected Product References:

#2078 Phospho-IKKα (Ser176)/IKKβ (Ser177) (C84E11) Rabbit mAb: Sarkar, S. et al. (2011) *Mol. Cell Biol.* 31, 602-615. (W)

#2697 Phospho-IKKα/β (Ser176/180) (16A6) Rabbit mAb: Barisic, S. et al. (2010) *Biochem. Pharmacol.* 80, 439-447. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#2682 IKKα Antibody: Razani, B. et al. (2010) *Sci. Signal.* 3, ra41. (W) / Pallotta, M.T. et al. (2011) *Nat. Immunol.* 12, 870-878. (W) / Sarkar, S. et al. (2011) *Mol. Cell Biol.* 31, 602-615. (W) / Kwong, C. et al. (2011) *J. Immunol.* 186, 1781-1789. (W)

#2370 IKKβ (2C8) Rabbit mAb: Barisic, S. et al. (2010) *Biochem. Pharmacol.* 80, 439-447. (W) / Sarkar, S. et al. (2011) *Mol. Cell Biol.* 31, 602-615. (W)

#2684 IKKβ Antibody: Pallotta, M.T. et al. (2011) *Nat. Immunol.* 12, 870-878. (W)

#2685 IKKγ Antibody: Sarkar, S. et al. (2011) *Mol. Cell Biol.* 31, 602-615. (W)

#2695 IKKγ (DA10-12) Mouse mAb: Biton, S. and Ashkenazi, A. (2011) *Cell* 145, 92-103. (W)

#4994 NIK Antibody: Razani, B. et al. (2010) *Sci. Signal.* 3, ra41. (W, IP)

NF-κB Regulating Proteins

			Applications	Reactivity
	#5630	A20/TNFAIP3 (D13H3) Rabbit mAb	W, IP	H, M, R, Mk
	#4664	ABIN-1 Antibody	W, IP	H, M, R, (Mk)
	#6603	SignalSilence® ABIN-1 siRNA I		H
	#6609	SignalSilence® ABIN-1 siRNA II		H
New	#5650	BCL6 (D65C10) Rabbit mAb	W, IP	H, M
	#4237	Bcl10 (C78F1) Rabbit mAb	W, IP	H, M, R, (Mk)
	#5189	Phospho-CARD11 (Ser652) Antibody	W	H, M, R, (Mk)
	#4435	CARD11 (1D12) Rabbit mAb	W	H, M, (R, Mk)
	#4440	CARD11 Antibody	W	H, M, R
	#4500	Phospho-CYLD (Ser418) Antibody	W	H
New	#8462	CYLD (D1A10) Rabbit mAb	W, IP	H, M, R, Mk, (Hm, Dg)
	#4495	CYLD Antibody	W, IP	H, Mk
	#2884	ERC1 (P85) Antibody	W, IP	H, M, R, (Mk)
	#2885	ERC1α (D1055) Antibody	W, IP	H
	#2078	Phospho-IKKα (Ser176)/IKKβ (Ser177) (C84E11) Rabbit mAb	W	H, M, (R, Mk, B)
	#2697	Phospho-IKKα/β (Ser176/180) (16A6) Rabbit mAb	W, IHC-P, IHC-F	H, M, R, Mk, (B)
	#2694	Phospho-IKKα/β (Ser176/180) Antibody II	W	H, M, R, Mk
	#2682	IKKα Antibody	W, IP	H, M, R, Mk, (B)
	#6372	SignalSilence® IKKα siRNA I		H, (M, R, Mk)
	#6373	SignalSilence® IKKα siRNA II		H, (M, R, Mk)
New	#8943	IKKβ (D30C6) Rabbit mAb	W, IP	H, M, R, Mk
	#2370	IKKβ (2C8) Rabbit mAb	W	H, M, R, Mk
	#2684	IKKβ Antibody	W	H, Mk
	#2678	IKKβ (L570) Antibody	W, IP	H, M, R, Hm, Mk, B
	#6377	SignalSilence® IKKβ siRNA I		H
	#6378	SignalSilence® IKKβ siRNA II		H
	#2689	Phospho-IKKγ (Ser376) Antibody	W	H
	#2685	IKKγ Antibody	W, IHC-P	H, M, R, Mk
	#2695	IKKγ (DA10-12) Mouse mAb	W	H, R
XP®	#3416	IKKε (D61F9) XP® Rabbit mAb	W, IP, IF-IC, F	M, R
	#2905	IKKε (D20G4) Rabbit mAb	W, IP	H, (Mk)
	#2690	IKKε Antibody	W	H, M, R
	#2494	MALT1 Antibody	W, IP	H, M, R
	#5321	MDA-5 (D74E4) Rabbit mAb	W, IP	H, M
	#4110	MDA-5 (R470) Antibody	W, IP	H
	#4994	NIK Antibody	W, IP	H, M, (R, Mk, B)
	#6996	RAGE 1 (D1A12) Rabbit mAb	W	H, (Mk)
	#4800	RAGE 1 Antibody	W, IHC-P	H, (Mk)
	#4679	RAGE Antibody	W	H, M, R, (Mk)
XP®	#3493	RIP (D94C12) XP® Rabbit mAb	W, IP, IF-IC, F	H, M, R, Hm, Mk
	#4926	RIP Antibody	W	H, Mk
	#4364	Phospho-RIP2 (Ser176) Antibody	W, IP	H, M, (R)
	#4982	RIP2 Antibody	W	H, M, R, Mk
	#8605	SINTBAD (D1A5) Rabbit mAb	W, IP	H, M, R, (Mk, B)
XP®	#5483	Phospho-TBK1/NAK (Ser172) (D52C2) XP® Rabbit mAb	W, IP, IF-IC, F	H, (M, R, Mk, X, B, Dg)
	#3504	TBK1/NAK (D1B4) Rabbit mAb	W, IP	H, M, R, Mk
	#3013	TBK1/NAK Antibody	W, IP	H, M, R, Mk
	#5206	TAK1 (D94D7) Rabbit mAb	W, IP	H, M, R

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing

* detects transfected levels only / ** detects recombinant protein only

TNFR Family and Adaptors

			Applications	Reactivity
	#4756	DcR1 Antibody	W	H, M, R
	#4741	DcR2 Antibody	W	H
	#4758	DcR3 Antibody	W	H, M, R
	#3254	DR3 Antibody	W	H
New XP®	#8074	DR5 (D4E9) XP® Rabbit Ab	W, IP, IF-IC	H
New	#7616	Phospho-DR6 (Ser562) Antibody	W	H, M, R
	#4233	Fas (C18C12) Rabbit mAb	W, IHC-P	H
New	#8023	Fas (4C3) Mouse mAb	W, IP, IF-IC, F	H
	#4273	FasL Antibody	W	H
	#4845	RANK Antibody	W	H, M, R
	#3959	RANK Ligand (R2) Antibody*	W, IP	H, (Mk, B, Pg)
	#4816	RANK Ligand (L300) Antibody	W, IP	H, M, (R, Mk, B, Pg)
	#3736	TNF-R1 (C25C1) Rabbit mAb	W, IP	H
	#3727	TNF-R2 Antibody	W, IP	H, M, R, (Mk)
	#3684	TRADD (7G8) Rabbit mAb	W, IP	H
	#3694	TRADD Antibody	W, IP, F	H, M, R, Mk
	#3219	TRAIL (C92B9) Rabbit mAb	W, IP, IHC-P, IF-IC, F	H
	#4437	TWEAK Antibody**	W	H, (M, Mk)
	#4403	TWEAK Receptor/Fn14 Antibody	W, IP	H, M, R, B

TRAF

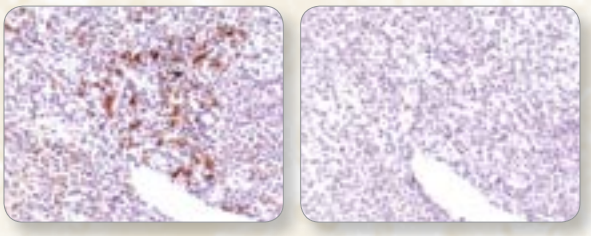
	#2141	TANK Antibody	W, IP	H, M, R, (Mk, B, Dg)
	#4715	TRAF1 (45D3) Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, (Mk)
	#4710	TRAF1 (1F3) Rat mAb	W, IP, IHC-P, IF-IC	H, M, R
	#4712	TRAF2 Antibody	W	H, M, R, Mk
	#4724	TRAF2 (C192) Antibody	W, IP	H, M, Mk
	#4729	TRAF3 Antibody	W	H, M, R, Mk
New	#8028	TRAF6 (D21G3) Rabbit mAb	W, IP	H, Mk

Oxidative Stress

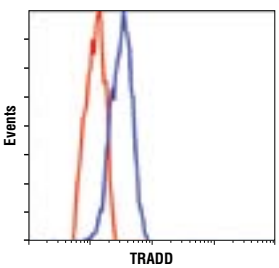
New	#9896	Cox1 (D2G6) Rabbit mAb	W, IP	H, M
	#4841	Cox1 Antibody	W, IP, F	H, M, R, Mk
	#4842	Cox2 Antibody	W, IHC-P	H, M, (R)
	#3286	GPX1 (C8C4) Rabbit mAb	W	H
	#3206	GPX1 Antibody	W, IP	H
XP®	#3434	Hydroxy-HIF-1α (Pro564) (D43B5) XP® Rabbit mAb	W, IP, IF-IC	H, (M, R, Mk, C, X, Z, Pg)
	#3716	HIF-1α Antibody	W	H
XP®	#5537	HIF-1β/ARNT (D28F3) XP® Rabbit mAb	W, IP, IHC-P	H, M, R, Mk
	#3414	HIF-1β/ARNT (C15A11) Rabbit mAb	W, IP, IF-IC	H, Mk
	#3718	HIF-1β/ARNT Antibody	W, IF-IC	H, M, R, Mk
New	#7096	HIF-2α (D9E3) Rabbit mAb	W	H
	#5853	HO-1 (D60G11) Rabbit mAb	W, IP	H, (Mk)
	#5061	HO-1 (P249) Antibody	W	H, M
	#2977	iNOS Antibody	W	M, (H)
	#2982	iNOS Antibody (Mouse Specific)	W, IP	M
	#3187	NQO1 (A180) Mouse mAb	W, IHC-P, IF-IC	H
New	#8882	NRF2 (D1C9) Rabbit mAb	W, IP	H, M
	#4311	Phospho-p40phox (Thr154) Antibody	W	H, M
	#4312	p47phox Antibody	W, IP	H, (Mk)

TNFR and TRAF

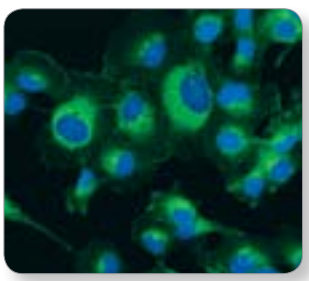
The Tumor Necrosis Factor Receptor (TNFR) family that includes TNF-R1, TNF-R2, Fas, DR3, DR4, DR5, and DR6, plays an important role in the regulation of apoptosis in various physiological systems. These receptors are activated by a family of cytokines that includes TNF, FasL, and TRAIL. They are characterized by a highly conserved extracellular region containing cysteine-rich repeats and a conserved intracellular region of about 80 amino acids termed the death domain (DD). The DD is important for transducing the death signal by recruiting other DD-containing adaptor proteins (FADD, TRADD, RIP) to the death-inducing signaling complex (DISC), resulting in the activation of caspases. TNFR family members activate NF-κB signaling in response to immune stimuli. TNF receptor-associated factors (TRAFs) are adaptor proteins that interact with TNFR family members. There are six known TRAFs in mammals. The cellular response is context dependent, varying with the particular TRAF involved and its specific binding partner.



TRAF1 (45D3) Rabbit mAb #4715: IHC analysis of paraffin-embedded human tonsil using #4715 in the presence of control peptide (left) or TRAF1 Blocking Peptide #1066 (right).



TRADD Antibody #3694: Flow cytometric analysis of HT-29 cells using #3694 (blue) compared to a nonspecific negative control antibody (red).



DR5 (D4E9) XP® Rabbit mAb #8074: Confocal IF analysis of HT-1080 cells using #8074 (green). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

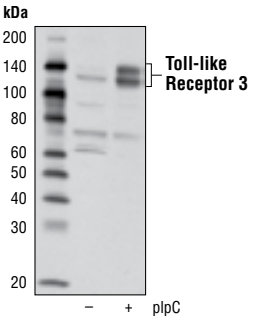
Selected Product References:

#3736 TNF-R1 (C25C1) Rabbit mAb: Álvarez-Errico, D. et al. (2011) *J. Immunol.* 187, 5577-5586. (W)

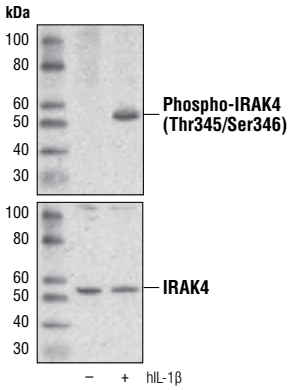
#4403 TWEAK Receptor/Fn14 Antibody: Ikner, A. and Ashkenazi, A. (2011) *J. Biol. Chem.* 286, 21546-54. (W, IP)

#4842 Cox2 Antibody: Forrester, M.T. et al. (2011) *Biotechniques* 50, 41-45. (W)

Innate Immunity



Toll-like Receptor 3 (D10F10) Rabbit mAb #6961: Western blot analysis of extracts from HT-29 cells, untreated or following transfection with pIpC (100 µg/ml; overnight), using #6961.



Phospho-IRAK4 (Thr345/Ser346) Antibody #7652: Western blot analysis of serum-starved KARPAS-299 cells, untreated or treated with hIL-1β #8900 (50 ng/ml, 15 min), using #7652 (upper) or IRAK4 Antibody #4363 (lower).

Selected Product References:

#4283 MyD88 (D80F5) Rabbit mAb: Geraghty, P. et al. (2011) *J. Biol. Chem.* 286, 30211-30218. (W)

#2219 Toll-like Receptor 4 Antibody (Rodent Specific): Kim, J.K. et al. (2011) *J. Biol. Chem.* 286, 41296-41311. (W)

#4596 TRIF Antibody: Mukherjee, A. et al. (2011) *PLoS Pathog.* 7, e1001311. (W)

#4504 IRAK1 (D51G7) XP® Rabbit mAb: Geraghty, P. et al. (2011) *J. Biol. Chem.* 286, 30211-30218. (W) / Pallotta, M.T. et al. (2011) *Nat. Immunol.* 12, 870-878. (W)

Toll-like Receptor Signaling

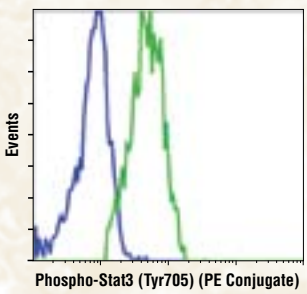
		Applications	Reactivity
	#4283 MyD88 (D80F5) Rabbit mAb	W, IP	H, M, R, Mk
	#3699 MyD88 Antibody	W	H, Mk
	#2209 Toll-like Receptor 1 Antibody	W, IP	H, (Mk)
	#2229 Toll-like Receptor 2 Antibody	W	H, Mk
New	#6961 Toll-like Receptor 3 (D10F10) Rabbit mAb	W	H, (Mk)
	#6236 SignalSilence® Toll-like Receptor 3 siRNA I		H
	#2219 Toll-like Receptor 4 Antibody (Rodent Specific)*	W	M, (R)
	#5632 Toll-like Receptor 7 (D7) Rabbit mAb	W, IP	H
	#2633 Toll-like Receptor 7 Antibody	W	H, M, R, (Mk, Dg)
	#5845 Toll-like Receptor 9 (D2C9) Rabbit mAb	W, IP	H
	#2254 Toll-like Receptor 9 Antibody	W, IP	H
	#4748 Tollip Antibody	W	H, Mk
	#4596 TRIF Antibody	W, IP	H

IRAK

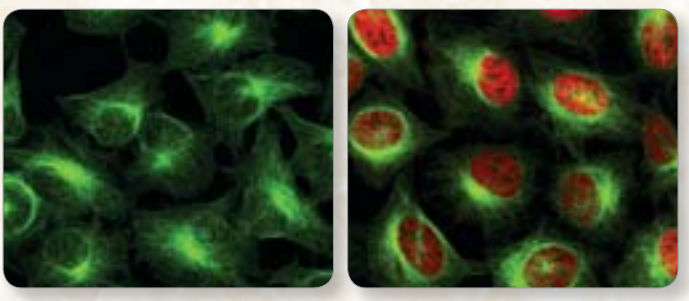
		Applications	Reactivity
XP®	#4504 IRAK1 (D51G7) XP® Rabbit mAb	W, IP, IF-IC	H, M, Mk
New XP®	#11123 IRAK1 (D51G7) XP® Rabbit mAb (Biotinylated)	W	H, M, Mk
	#4359 IRAK1 Antibody (Human Specific)	W, IF-IC	H, Mk
	#6253 SignalSilence® IRAK1 siRNA I		H
	#6228 SignalSilence® IRAK1 siRNA II		H
	#4367 IRAK2 Antibody	W, IF-IC	H, M, R, Mk
New	#7652 Phospho-IRAK4 (Thr345/Ser346) Antibody	W	H, (M, R, Mk, B, Dg)
	#4363 IRAK4 Antibody	W, IP	H, M, R, Mk
	#4369 IRAK-M Antibody	W, IF-IC	H, Mk

Conjugated Antibodies

Cell Signaling Technology (CST) offers Alexa Fluor® conjugated antibodies that are optimized for flow cytometry. The combination of Alexa Fluor®, which exhibit superior brightness and photostability, with the highest quality CST™ antibodies results in conjugates with bright signal and low background. PE-conjugates are also available for a number of targets. All conjugated antibodies are validated in-house. Price-competitive and high-quality custom antibody conjugation of CST antibodies is offered from our Conjugation Group. Contact your sales representative for more information.



Phospho-Stat3 (Tyr705) (D3A7) XP® Rabbit mAb (PE Conjugate) #8119: Flow cytometric analysis of Jurkat cells, untreated (blue) or treated with hIFN-α1 #8927 (green), using #8119.



Phospho-Stat1 (Tyr701) (58D6) Rabbit mAb (Alexa Fluor® 555 Conjugate) #8183: Confocal IF analysis of HeLa cells, untreated (left) or treated with IFN-α (right), using #8183 (red) and β-Tubulin (9F3) Rabbit mAb (Alexa Fluor® 488 Conjugate) #3623 (green).

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing
* detects transfected levels only / ** detects recombinant protein only

Cytoplasmic Innate Immune Response

			Applications	Reactivity
New	#8055	AIM2 Antibody	W	H, (Mk)
	#4199	Cleaved Caspase-1 (Asp297) (D57A2) Rabbit mAb	W, IP	H, (Mk)
	#3866	Caspase-1 (D7F10) Rabbit mAb	W, IP	H, (Mk)
	#2225	Caspase-1 Antibody	W, IP, IHC-P	H
	#3993	MAVS Antibody	W, IF-IC	H
	#4983	MAVS Antibody (Rodent Specific)	W, IP, IF-IC	M, R
	#4990	NALP1 Antibody	W	H, M, R, (Mk)
	#9036	NDP52 Antibody	W, IP	H
	#3545	Nod1 Antibody	W	H, M, R, Mk
	#3743	Rig-I (D14G6) Rabbit mAb	W, IP	H, M, R, Mk
	#4200	Rig-I (D33H10) Rabbit mAb	W, IP	H, M, (Mk, B)
	#4520	Rig-I Antibody	W	H, M, (Mk)

Interferon Regulatory Factors (IRFs)

New XP®	#8478	IRF-1 (D5E4) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R, (Mk)
	#4943	IRF-2 Antibody	W, IP	H, M, R, (Mk)
	#4947	Phospho-IRF-3 (Ser396) (4D4G) Rabbit mAb	W	H, M, (Mk, Pg)
	#4302	IRF-3 (D83B9) Rabbit mAb	W, IP	H, M, R, Mk
	#6274	SignalSilence® IRF-3 siRNA I		H
	#4299	IRF-4 (D43H10) Rabbit mAb	W, IP, ChIP	H, R
	#4964	IRF-4 Antibody	W, IP, IF-IC, F, ChIP	H
	#4948	IRF-4 (P173) Antibody	W	H, M, R, (Mk)
	#3257	IRF-5 Antibody	W, IP, IF-IC	H
	#4950	IRF-5 Antibody (Rodent Specific)	W, IP	M, R
	#6948	IRF-6 Antibody	W, IP	H, (Mk, B, Dg)
	#5184	Phospho-IRF-7 (Ser471/472) Antibody*	W	H, (M, R, Hm, Mk, B, Dg, Pg)
	#4920	IRF-7 Antibody	W, IP	H, (Mk)
	#5628	IRF-8 (D20D8) Rabbit mAb	W, IP, ChIP	H, M, (R, Mk, X, B)

Selected Product References:

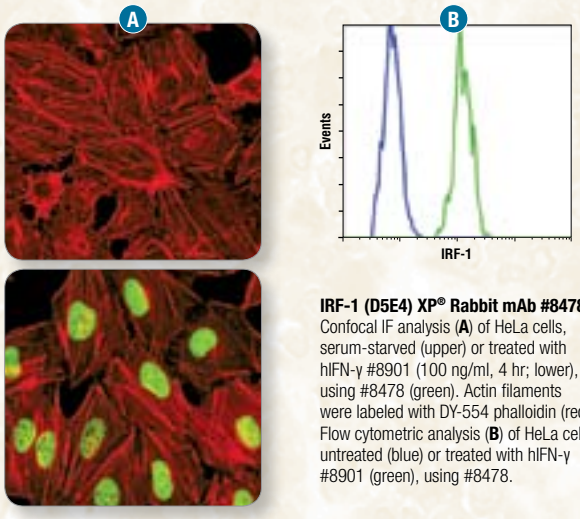
#4947 Phospho-IRF-3 (Ser396) (4D4G) Rabbit mAb: Yang, P. et al. (2010) *Nat. Immunol.* 11, 487-494. (W)

#4964 IRF-4 Antibody: Staudt, V. et al. (2010) *Immunity* 33, 192-202. (ChIP, F, IF-IC)

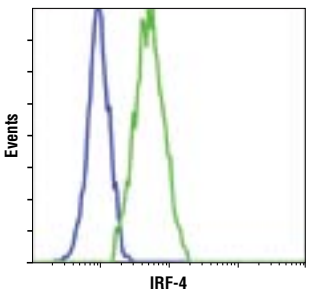
IRF-1

Interferon regulatory factors (IRFs) comprise a family of transcription factors that function within the Jak/Stat pathway to regulate interferon (IFN) and IFN-inducible gene expression in response to viral infection. IRFs play an important role in pathogen defense, autoimmunity, lymphocyte development, cell growth, and susceptibility to transformation.

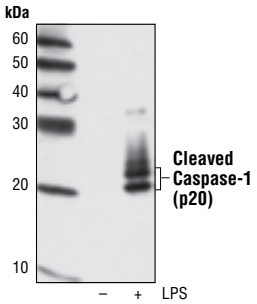
The IRF-1 transcription factor was originally identified as a regulator of virus-inducible enhancer-like elements of the IFN-β gene. IRF-1 is widely expressed and upregulated by viral infection or stimulation with IFN or other cytokines. IRF-1 is serine phosphorylated by CKII at two clustered sites, one in the DNA-binding domain (amino acids 138-150) and another in the transactivation domain (amino acids 219-231). Mutation analysis of the latter site suggests that these phosphorylation sites help regulate IRF-1 activity. Tyrosine phosphorylation has also been shown to be important in IFN-γ-mediated differentiation of myeloid cell lines.



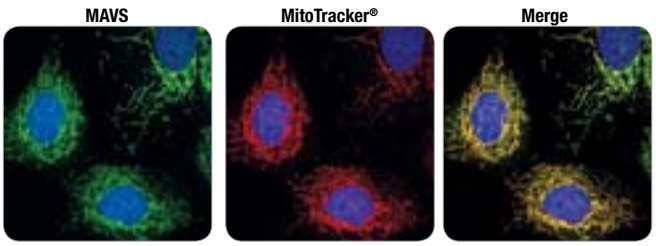
IRF-1 (D5E4) XP® Rabbit mAb #8478: Confocal IF analysis (**A**) of HeLa cells, serum-starved (upper) or treated with hIFN-γ #8901 (100 ng/ml, 4 hr; lower), using #8478 (green). Actin filaments were labeled with DY-554 phalloidin (red). Flow cytometric analysis (**B**) of HeLa cells, untreated (blue) or treated with hIFN-γ #8901 (green), using #8478.



IRF-4 Antibody #4964: Flow cytometric analysis of THP-1 (blue) and RPMI 8226 (green) cells using #4964.

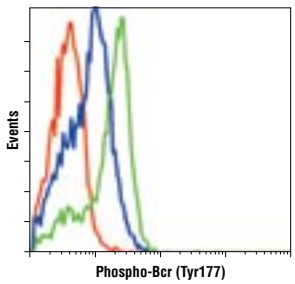


Cleaved Caspase-1 (Asp297) (D57A2) Rabbit mAb #4199: Western blot analysis of extracts from the media of THP-1 cells, differentiated with TPA #4174 (80 nM, overnight) followed by treatment with LPS (1 µg/ml, 8 hr), using #4199.

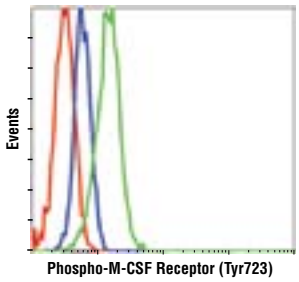


MAVS Antibody #3993: Confocal IF analysis of MCF7 cells using #3993 (green) showing colocalization with mitochondria that have been labeled with MitoTracker® Red CMXRos (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

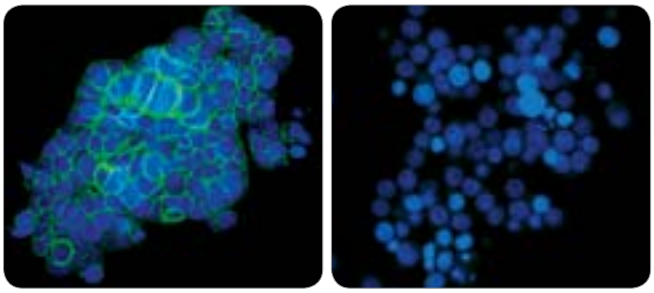
Lymphocyte Signaling



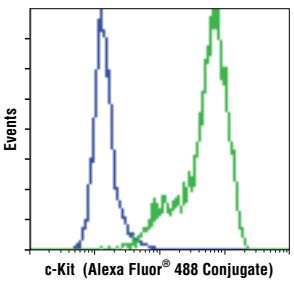
Phospho-Bcr (Tyr177) Antibody #3901: Flow cytometric analysis of K-562 cells, untreated (green) or imatinib-treated (blue), using #3901 compared to a nonspecific negative control antibody (red).



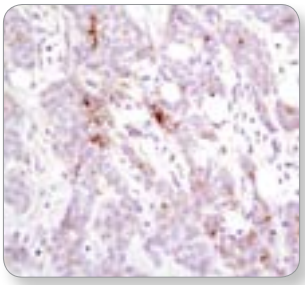
Phospho-M-CSF Receptor (Tyr723) (49C10) Rabbit mAb #3155: Flow cytometric analysis of BaF3/CSF-1R cells, untreated (blue) or M-CSF-treated (green), using #3155 compared to a nonspecific negative control antibody (red).



c-Kit (D13A2) XP® Rabbit mAb #3074: Confocal IF analysis of NCI-H526 (left) and Jurkat (right) cells using #3074 (green). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).



c-Kit (Ab81) Mouse mAb (Alexa Fluor® 488 Conjugate) #3310: Flow cytometric analysis of Jurkat (blue) and NCI-H526 (green) cells using #3310.



SCF (C19H6) Rabbit mAb #2093: IHC analysis of paraffin-embedded human breast carcinoma using #2093.

Bcr and Abl

		Applications	Reactivity
#3098	Phospho-c-Abl (Tyr89) (61A6) Rabbit mAb	W	H
#3009	Phospho-c-Abl (Tyr204) (C42B5) Rabbit mAb	W, IP	H, (M)
#2868	Phospho-c-Abl (Tyr245) (73E5) Rabbit mAb	W	H, (M)
#2861	Phospho-c-Abl (Tyr245) Antibody	W	H, (M)
#2865	Phospho-c-Abl (Tyr412) (247C7) Rabbit mAb	W	H, (M)
#2864	Phospho-c-Abl (Thr735) Antibody	W	H
#2862	c-Abl Antibody	W, IP, IF-IC	H, M, R
#3908	Bcr-Abl (b2a2 Junction Specific) (L99H4) Mouse mAb	W	H
#3901	Phospho-Bcr (Tyr177) Antibody	W, IHC-P, F	H, M
#3902	Bcr Antibody	W, IF-IC, F	H, M, R, Pg

FLT3

#3464	Phospho-FLT3 (Tyr589/591) (30D4) Rabbit mAb	W	H, M
#3474	Phospho-FLT3 (Tyr591) (33G6) Rabbit mAb	W	H, M
#3461	Phospho-FLT3 (Tyr591) Antibody	W	H, M
#3466	Phospho-FLT3 (Tyr591) (54H1) Mouse mAb	W	H, M
#4577	Phospho-FLT3 (Tyr842) (10A8) Rabbit mAb	W, IP	H, M
#3463	Phospho-FLT3 (Tyr969) (C24D9) Rabbit mAb	W	H, M
#3462	FLT3 (8F2) Rabbit mAb	W, IP, IHC-P	H, M

M-CSF Receptor

#3083	Phospho-M-CSF Receptor (Tyr546) Antibody	W	H, M
#3399	Phospho-M-CSF Receptor (Tyr699) Antibody	W	H, M
#3080	Phospho-M-CSF Receptor (Tyr708) Antibody	W	H, M
#3155	Phospho-M-CSF Receptor (Tyr723) (49C10) Rabbit mAb	W, IP, IHC-P, F	H, M
#3151	Phospho-M-CSF Receptor (Tyr723) Antibody	W	H, M
#3154	Phospho-M-CSF Receptor (Tyr809) Antibody	W	H, M
#3406	Phospho-M-CSF Receptor (Tyr923) Antibody	W	H, (M)
#3152	M-CSF Receptor Antibody	W	H, M

c-Kit

#3073	Phospho-c-Kit (Tyr703) (D12E12) Rabbit mAb	W, IP	H
#3391	Phospho-c-Kit (Tyr719) Antibody	W	H, M
XP®	#3074	c-Kit (D13A2) XP® Rabbit mAb	W, IP, IF-IC	H, M
#3392	c-Kit Antibody	W	H
#3308	c-Kit (Ab81) Mouse mAb	W, IP, IF-IC, F	H
#3310	c-Kit (Ab81) Mouse mAb (Alexa Fluor® 488 Conjugate)	IF-IC, F	H
#2093	SCF (C19H6) Rabbit mAb	W, IHC-P, F	H

XP® Monoclonal Antibodies

one antibody, multiple applications™

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing

***** detects transfected levels only / ****** detects recombinant protein only

Src Family and Csk

		Applications	Reactivity
	#3262 Blk Antibody	W	H
	#4980 Csk (C74C1) Rabbit mAb	W	H, M, R, Mk, Pg
	#2755 Fgr Antibody	W, IP, F	H
	#4023 Fyn Antibody	W	H, M
	#4352 Hck Antibody	W	H, M, Mk
	#2751 Phospho-Lck (Tyr505) Antibody	W, IP	H, M
XP®	#2984 Lck (D88) XP® Rabbit mAb	W, IHC-P	H
	#2787 Lck (73A5) Rabbit mAb	W, IF-IC, F	H
	#2752 Lck Antibody	W	H, M
	#2714 Lck (V49) Antibody	W, IP	H
	#2657 Lck (L22B1) Mouse mAb	W, IP	H
	#2731 Phospho-Lyn (Tyr507) Antibody	W	H, M, (R)
	#2796 Lyn (C13F9) Rabbit mAb	W, IP, IHC-P	H, M, R, Mk
	#2732 Lyn Antibody	W, IP	H, M, R
	#4576 Lyn (5G2) Mouse mAb	W	H
	#5473 Phospho-Src (Ser17) Antibody	W	H, R, Mk
	#6943 Phospho-Src (Tyr416) (D49G4) Rabbit mAb	W, IP	H, M, (R)
	#2113 Phospho-Src Family (Tyr416) (100F9) Rabbit mAb	W	H, M, R, (C)
	#2101 Phospho-Src Family (Tyr416) Antibody	W	H, M, R, (C, X)
	#2102 Non-phospho-Src (Tyr416) (7G9) Mouse mAb	W, IP	H, M, R, (C, X)
	#2105 Phospho-Src (Tyr527) Antibody	W, IHC-P	H, M, R, (C)
	#2107 Non-phospho-Src (Tyr527) Antibody	W	H, M, R, (C)
	#2109 Src (36D10) Rabbit mAb	W, IP, IHC-P, IHC-F, IF-F, IF-IC, F	H, M, R, Hm, Mk, B, Pg, (C)
	#2123 Src (32G6) Rabbit mAb	W, IP	H, M, R, (C)
	#2108 Src Antibody	W, IP, IF-IC, F	H, M, R, Mk, (C)
	#2110 Src (L4A1) Mouse mAb	W, IP	H, M, R, Mk, (C)
	#2734 Yes Antibody	W, IHC-P	H, M

Tec, Itk and Btk

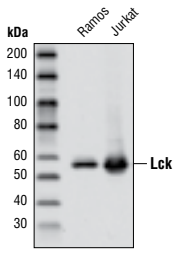
	#3138 Phospho-Ack1 (Tyr284) Antibody	W	H, (M, R)
	#3097 Phospho-Ack1 (Tyr857/858) (C57E10) Rabbit mAb	W	H, (M)
	#3137 Phospho-Ack1 (Tyr857/858) Antibody	W	H, M
	#3537 Phospho-Btk (Ser180) (3D3) Mouse mAb*	W	H, (M)
	#5082 Phospho-Btk (Tyr223) Antibody	W	H, (M, R)
New	#8547 Btk (D3H5) Rabbit mAb	W, IP, IHC-P	H, M, (R, Hm, Mk, B, Dg, Pg)
	#3533 Btk (C82B8) Rabbit mAb	W	H, M
	#3211 Phospho-Etk (Tyr40) Antibody	W, IP	H
	#4268 Fer (5D2) Mouse mAb	W, IP	H, M
	#2736 Fes Antibody	W, IP, F	H
	#2380 Itk (2F12) Mouse mAb	W, IP	H, (M, R, Mk)
	#4987 Tec Antibody	W	H, M
	#5638 Phospho-TNK1 (Tyr277) (D46E7) Rabbit mAb	W	H, (M, R)
	#4553 Phospho-TNK1 (Tyr277) Antibody	W	H
	#4570 TNK1 (C44F9) Rabbit mAb	W	H

Selected Product References:

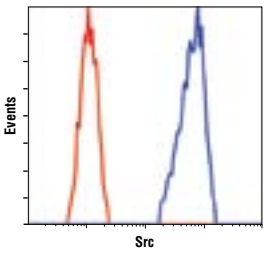
#4023 Fyn Antibody: Pallotta, M.T. et al. (2011) *Nat. Immunol.* 12, 870-878. (W)

#2731 Phospho-Lyn (Tyr507) Antibody: De Franceschi, L. et al. (2011) *Blood* 118, 5652-5663. (W)

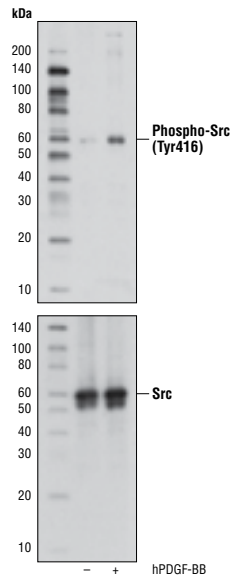
#2732 Lyn Antibody: Kubo, T. et al. (2009) *J. Exp. Med.* 206, 1971-1982. (IP) / De Franceschi, L. et al. (2011) *Blood* 118, 5652-5663. (W)



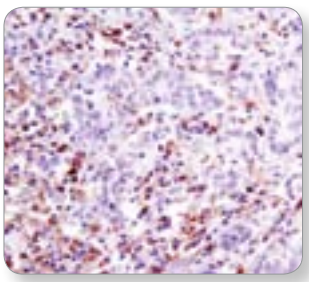
Lck (D88) XP® Rabbit mAb #2984: Western blot analysis of extracts from Ramos and Jurkat cells using #2984.



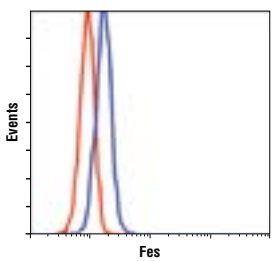
Src (36D10) Rabbit mAb #2109: Flow cytometric analysis of A-431 cells using #2109 (blue) compared to a nonspecific negative control antibody (red).



Phospho-Src Family (Tyr416) (D49G4) Rabbit mAb #6943: Western blot analysis of extracts from NIH/3T3 cells, serum-starved or treated with hPDGF-BB #8912 (100 ng/ml, 15 min), using #6943 (upper) or Src (36D10) Rabbit mAb #2109 (lower).

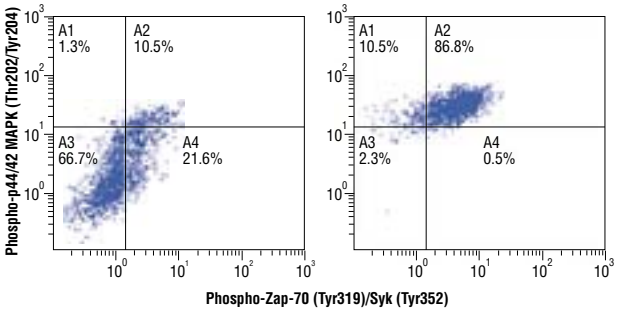


Btk (D3H5) Rabbit mAb #8547: IHC analysis of paraffin-embedded human colon carcinoma using #8547. Note staining of inflammatory cells.

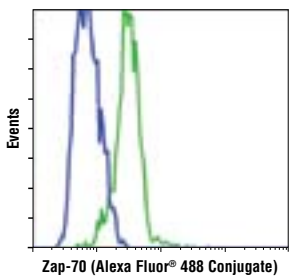


Fes Antibody #2736: Flow cytometric analysis of Jurkat cells using #2736 (blue) compared to a nonspecific negative control antibody (red).

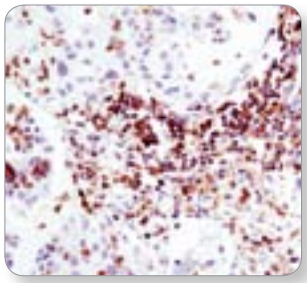
Lymphocyte Signaling



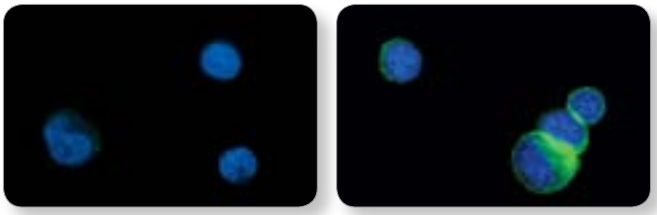
Phospho-Zap-70 (Tyr319)/Syk (Tyr352) Antibody #2701: Two-color flow cytometric analysis of Jurkat cells, untreated (left) or anti-CD3 activated (right), using #2701 and Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (E10) Mouse mAb #9106. Anti-CD3 activation increases the intensity of label with both antibodies.



Zap-70 (D1C10E) XP® Rabbit mAb (Alexa Fluor® 488 Conjugate) #9473: Flow cytometric analysis of Ramos (blue) and Jurkat (green) cells using #9473.



HS1 (D83A8) XP® Rabbit mAb (Human Specific) #3890: IHC analysis of paraffin-embedded human lung carcinoma using #3890.



Phospho-HS1 (Tyr397) (D12C1) XP® Rabbit mAb #8714: Confocal IF analysis of Ramos cells, untreated (left) or treated with IgM (12 µg/ml, 10 min; right) using #8714 (green). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

Zap-70 and Syk

		Applications	Reactivity
	#2715 Phospho-Syk (Tyr323) Antibody	W, IP	H, (M)
	#2710 Phospho-Syk (Tyr525/526) (C87C1) Rabbit mAb	W, IP	H, (M, R)
	#2711 Phospho-Syk (Tyr525/526) Antibody	W	H, (M, R)
	#2712 Syk Antibody	W	H, M, (R)
	#2717 Phospho-Zap-70 (Tyr319)/Syk (Tyr352) (65E4) Rabbit mAb	W	H, M
	#2701 Phospho-Zap-70 (Tyr319)/Syk (Tyr352) Antibody	W, IP, IF-IC, F	H, M
	#2704 Phospho-Zap-70 (Tyr493) Antibody	W, IP, F	H, (M, R)
XP®	#3165 Zap-70 (D1C10E) XP® Rabbit mAb	W, IP, IF-F, F	H, M
New XP®	#9473 Zap-70 (D1C10E) XP® Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M
	#2705 Zap-70 (99F2) Rabbit mAb	W, IP, IHC-P, F	H, M
	#2707 Zap-70 (136F12) Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H
	#2709 Zap-70 (L1E5) Mouse mAb	W, IP	H

Lymphocyte Adaptor Proteins

	#3601 Phospho-BLNK (Tyr96) Antibody	W, IP	H
	#3587 BLNK Antibody	W, IP	H, M, R
	#3793 CIITA Antibody*	W, IP	H
	#4472 HPK1 Antibody	W, IP	H, M
New XP®	#8714 Phospho-HS1 (Tyr397) (D12C1) XP® Rabbit mAb	W, IF-IC, F	H, (M, R)
	#4507 Phospho-HS1 (Tyr397) Antibody	W, IP	H
XP®	#3890 HS1 (D83A8) XP® Rabbit mAb (Human Specific)	W, IP, IHC-P, IF-IC, F	H
XP®	#3892 HS1 (D5A9) XP® Rabbit mAb (Rodent Specific)	W, IP, IHC-P, F	M, R
	#4503 HS1 Antibody (Human Specific)	W, IP, F	H
	#4557 HS1 Antibody (Rodent Specific)	W, IP	M, R
	#3581 Phospho-LAT (Tyr171) Antibody	W	H
	#3584 Phospho-LAT (Tyr191) Antibody	W, IP	H
	#9166 LAT Antibody	W, IP, IHC-P, F	H, M, (R)
	#5277 Phospho-LCP1 (Tyr28) Antibody	W	H
New	#3588 LCP1 (D1C3) Rabbit mAb	W, IHC-P	H, M, (Mk)
	#5350 LCP1 Antibody	W	H, M, (R)
	#3812 LSP1 Antibody	W	H, M, R
	#4162 Myeloperoxidase (L607) Antibody	W, IP	H, M, R, (Mk)
	#4163 Myeloperoxidase (P733) Antibody	W	H, R, (Mk)
	#9533 NTAL/LAB Antibody	W, IP	H
	#4301 p47phox (D21F6) Rabbit mAb	W	H, (Mk)
	#3923 p67phox Antibody	W	H, M, R
	#5543 Phospho-PZR (Tyr263) Antibody	W, IP	H, M, R, B
	#5272 SH2D1A (D10G8) Rabbit mAb	W	H, M, (R)
	#2778 SH2D1A Antibody	W, IP	H
	#2805 SH2D1A (XLP 1D12) Rat mAb	W, F	H
	#4958 SLP-76 Antibody	W, IP, IHC-P	H, M
	#5251 Phospho-TCTP (Ser46) Antibody	W, IHC-P, IF-IC, F	H, M, R, Mk

Selected Product References:

#2711 Phospho-Syk (Tyr525/526) Antibody: Cheng, S. et al. (2011) *Blood* 118, 6342-6352. (W, IHC-P) / De Franceschi, L. et al. (2011) *Blood* 118, 5652-5663. (W)

#2712 Syk Antibody: Cheng, S. et al. (2011) *Blood* 118, 6342-6352. (W) / Kazerounian, S. et al. (2011) *Blood* 117, 4658-4666. (W) / De Franceschi, L. et al. (2011) *Blood* 118, 5652-5663. (W)

#3584 Phospho-LAT (Tyr191) Antibody: Alvarez-Errico, D. et al. (2011) *J. Immunol.* 187, 5577-5586. (W) / Verhagen, A.M. et al. (2012) *J. Immunol.* 188, 122-134. (W)

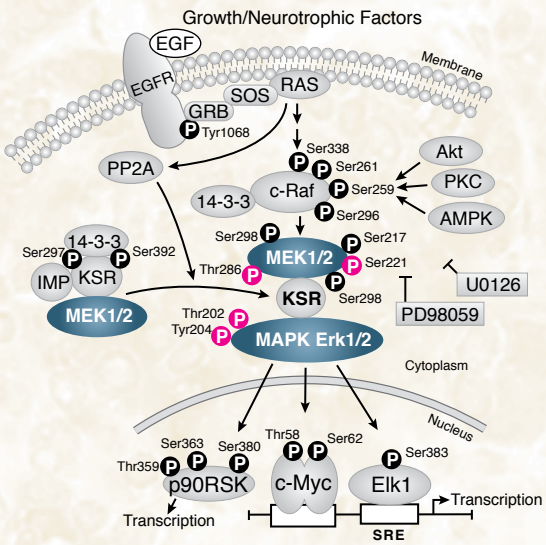
#9166 LAT Antibody: Verhagen, A.M. et al. (2012) *J. Immunol.* 188, 122-134. (W)

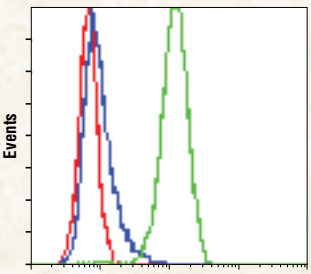
APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing

* detects transfected levels only / ** detects recombinant protein only

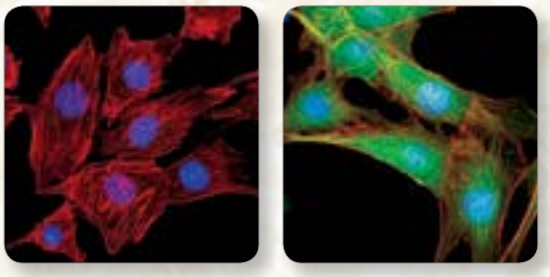
MAPK Signaling

		Applications	Reactivity
XP®	#4511 Phospho-p38 MAPK (Thr180/Tyr182) (D3F9) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R, Mk, Sc, (Hm, C, Z, B, Pg)
XP®	#9836 Phospho-p38 MAPK (Thr180/Tyr182) (D3F9) XP® Rabbit mAb (Alexa Fluor® 555 Conjugate)	IF-IC	H, M, R, Sc (Hm, C, B, Pg)
	#9216 Phospho-p38 MAPK (Thr180/Tyr182) (28B10) Mouse mAb	W, IP, IF-IC, F	H, M, R, Mk, Sc, (Z)
	#4551 Phospho-p38 MAPK (Thr180/Tyr182) (28B10) Mouse mAb (Alexa Fluor® 488 Conjugate)	F	H, M, R, Mk, Sc, (Z)
	#4552 Phospho-p38 MAPK (Thr180/Tyr182) (28B10) Mouse mAb (Alexa Fluor® 647 Conjugate)	F	H, M, R, Mk, Sc, (Z)
	#9219 Phospho-p38 MAPK (Thr180/Tyr182) Mouse mAb (Sepharose Bead Conjugate)	IP	H, M, R
XP®	#8690 p38 MAPK (D13E1) XP® Rabbit mAb	W, IHC-P, IF-IC, F	H, M, R, Hm, Mk, Pg
	#9218 p38α MAPK Antibody	W, IP, IHC-P	H, M, R, Mk
	#9217 p38α MAPK (5F11) Mouse mAb	W	H, M, R
	#9228 p38α MAPK (L53F8) Mouse mAb	W, IF-IC, F	H, M, R, Mk, Sc
	#2339 p38β MAPK (C28C2) Rabbit mAb	W, IP	H, Mk
	#2308 p38δ MAPK (10A8) Rabbit mAb	W, IP	H, R
	#9214 p38δ MAPK Antibody	W	H, R, Mk
	#2307 p38γ MAPK Antibody	W, IP	H, M, R, Mk
XP®	#4370 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Dg, Pg, Sc, (Ce)
XP®	#4344 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg
XP®	#4284 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg
XP®	#5682 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (PE Conjugate)	F	H, M, R, Mk, Mi, Dm, Z, B, Dg, Pg, Sc, (Ce)
XP®	#4094 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (Biotinylated)	W, F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg, Sc
XP®	#8544 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (HRP Conjugate)	W	H, M, R, Hm, Mk, Mi, Dm, Z, B, Dg, Pg, Sc, (Ce)
XP®	#9488 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (Magnetic Bead Conjugate)	IP	H, M, R, Hm, Mk, Mi, Dm, Z, B, Dg, Pg, Sc, (Ce)
XP®	#3510 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb (Sepharose Bead Conjugate)	IP	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg, Sc, (Dg)
	#9106 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (E10) Mouse mAb	W, IP, F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg
	#4374 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (E10) Mouse mAb (Alexa Fluor® 488 Conjugate)	F	H, M
	#4375 Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (E10) Mouse mAb (Alexa Fluor® 647 Conjugate)	F	H M
	#4695 p44/42 MAPK (Erk1/2) (137F5) Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Dg, Pg, Ce, (C)
	#4780 p44/42 MAPK (Erk1/2) (137F5) Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg, Ce
	#5376 p44/42 MAPK (Erk1/2) (137F5) Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg, Ce
	#5013 p44/42 MAPK (Erk1/2) (137F5) Rabbit mAb (Biotinylated)	W, IP, F	H, M, R, Mk, Mi, Dm, Z, B, Pg
	#4348 p44/42 MAPK (Erk1/2) (137F5) Rabbit mAb (HRP Conjugate)	W	H, M, R, Hm, Mk, Mi, Dm, Z, B, Pg, Ce, (C, Dg)
	#5736 p44/42 MAPK (Erk1/2) (137F5) Rabbit mAb (Sepharose Bead Conjugate)	IP	H, M, R, Hm, Mk, Mi, Z, B, Dg, Pg, Ce
	#9102 p44/42 MAPK (Erk1/2) Antibody	W, IP, IHC-P, IF-IC, F	H, M, R, Hm, Mk, Mi, Z, B, Pg, Sc
	#4696 p44/42 MAPK (Erk1/2) (L34F12) Mouse mAb	W, IHC-P, IF-IC, F	H, M, R, Mk, Mi, Z, Pg





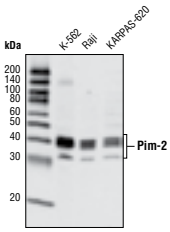
Phospho-p38 MAPK (Thr180/Tyr182) (D3F9) XP® Rabbit mAb #4511: Flow cytometric analysis of Jurkat cells, untreated (blue) or anisomycin-treated (green), using #4511 compared to a nonspecific negative control antibody (red).



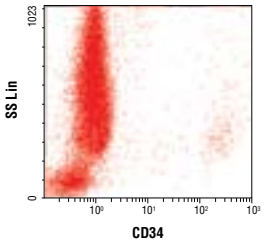
Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) (D13.14.4E) XP® Rabbit mAb #4370: Confocal IF analysis of C2C12 cells, treated with U0126 #9903 (10 µM, 1 hr; left) or TPA #4174 (200 nM, 15 min; right), using #4370 (green). Actin filaments were labeled with Alexa Fluor® 555 phalloidin (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

For a full list of MAP Kinase Signaling products please visit our website.

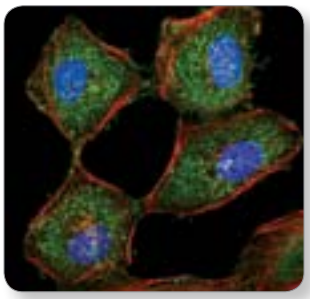
Lymphocyte Signaling



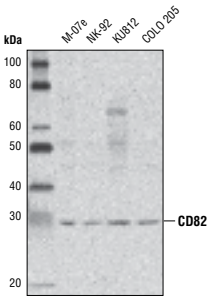
Pim-2 (D1D2) XP® Rabbit mAb #4730: Western blot analysis of extracts from K-562, Raji, and KARPAS-620 cells using #4730.



CD34 (ICO115) Mouse mAb #3569: Flow cytometric analysis of peripheral blood spiked with CD34-positive Stem-Trol™ Control Cells (Beckman Coulter) using #3569.



CD44 (156-3C11) Mouse mAb (Alexa Fluor® 488 Conjugate) #3516: Confocal IF analysis of HeLa cells using #3516 (green). Actin filaments were labeled with DY-554 phalloidin (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).



CD82 Antibody #8854: Western blot analysis of extracts from various cell lines using #8854.

Selected Product References:

#4975 AID (L7E7) Mouse mAb: Klemm, L. et al. (2009) *Cancer Cell* 16, 232-245. (W)

#4959 AID (EK2 5G9) Rat mAb: Klemm, L. et al. (2009) *Cancer Cell* 16, 232-245. (F)

#4730 Pim-2 (D1D2) XP® Rabbit mAb: Gómez-Abad, C. et al. (2011) *Blood* 118, 5517-5527. (W, IHC-P)

#3574 CD19 Antibody: Hentges, K.E. et al. (2005) *Oncogene* 24, 1220–1230. (W)

#3528 CD31 (PECAM-1) (89C2) Mouse mAb: Whyte, J.L. et al. (2011) *Stem Cell Res.* 6, 238-250. (W, IF-IC)

#3570 CD44 (156-3C11) Mouse mAb: Gilbert, C.M. and Parwani, A. (2010) *J. Pathol. Inform.* 1, 23. (IHC-P) / Golubkov, V.S. et al. (2010) *J. Biol. Chem.* 285, 35740-35749. (W)

AID and RAG

		Applications	Reactivity
#4949	AID (30F12) Rabbit mAb	W, IP	H
#4975	AID (L7E7) Mouse mAb	W, IP	H, M, (R)
#4959	AID (EK2 5G9) Rat mAb	W, IHC-P	H
#3968	RAG1 (D36B3) Rabbit mAb	W, IP	H

Pim

#3247	Pim-1 (C93F2) Rabbit mAb	W	H, M, (R, Mk, B)
#2907	Pim-1 Antibody	W	H, (Mk)
XP® #4730	Pim-2 (D1D2) XP® Rabbit mAb	W, IP, IHC-P, IF-IC	H
#4165	Pim-3 (D17C9) Rabbit mAb	W, IP	H, M, R, (Mk)

CD Markers

#4443	CD3ε (CD3-12) Rat mAb	W, IP, F	H, M, (Pg)
#3563	CD4 (Edu-2) Mouse mAb	F	H
#3572	CD8 (RIV11) Mouse mAb	F	H
#3565	CD10 (CB-CALLA) Mouse mAb	F	H
#3571	Phospho-CD19 (Tyr531) Antibody	W, IP	H
#3574	CD19 Antibody	W, IP, IF-IC, F	H, M
#3569	CD34 (ICO115) Mouse mAb	IHC-P, F	H
#3578	CD44 Antibody	W	H
#5640	CD44 (8E2) Mouse mAb	W, IP, IF-IC, F	H, M, R
#3570	CD44 (156-3C11) Mouse mAb	W, IP, IHC-P, IF-IC, F	H
#3516	CD44 (156-3C11) Mouse mAb (Alexa Fluor® 488 Conjugate)	IF-IC, F	H
#8724	CD44 (156-3C11) Mouse mAb (PE Conjugate)	F	H
#4041	CD44 (156-3C11) Mouse mAb (Biotinylated)	W, F	H
#3575	CD45 (136-4B5) Mouse mAb	IHC-P	H
#4915	CD54 (ICAM-1) Antibody	W, IHC-P	H
#3576	CD56 (NCAM) (123C3) Mouse mAb	W, IHC-P, IF-IC, F	H
#5173	Phospho-CD79A (Tyr182) Antibody	W, IP, IF-IC, F	H, (M, R)
#3351	CD79A Antibody	W, IF-IC	H
New #8854	CD82 Antibody	W	H

Effector Proteins

#4928	Granzyme A Antibody	W, E-P	H
#4275	Granzyme B Antibody	W, E-P	H, M, R
#3693	Perforin Antibody (Mouse Specific)	W, IF-IC, F	M

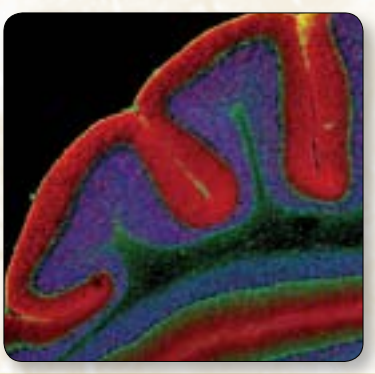
Conjugated Secondary Antibodies

Alexa Fluor® Conjugate	488	555	647
Anti-mouse IgG (H+L), F(ab')$_2$ Fragment	#4408	#4409	#4410
Anti-rabbit IgG (H+L), F(ab')$_2$ Fragment	#4412	#4413	#4414
Anti-rat IgG (H+L)	#4416	#4417	#4418

Excitation/Emission Table

Detection Dye	Ex $_{(max)}$ (nm)	Em $_{(max)}$ (nm)
Alexa Fluor® 488	495	519
Alexa Fluor® 555	555	565
Alexa Fluor® 647	650	668

Confocal IF analysis of mouse cerebellum using α-Synuclein Antibody (IF Preferred) #2628 detected with **Anti-rabbit IgG (H+L), F(ab')$_2$ Fragment (Alexa Fluor® 555 Conjugate) #4413** (red) and Neurofilament-L (DA2) Mouse mAb #2835 detected with **Anti-mouse IgG (H+L), F(ab')$_2$ Fragment (Alexa Fluor® 488 Conjugate) #4408** (green). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).



APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing

* detects transfected levels only / ** detects recombinant protein only

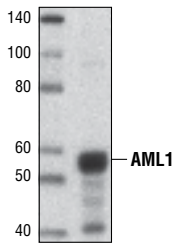
Transcription Factors and Nuclear Receptors

			Applications	Reactivity
	#4327	Phospho-AML1 (Ser249) Antibody	W, IP, IF-IC, F	H
XP®	#4336	AML1 (D33G6) XP® Rabbit mAb	W, IHC-P, IF-IC, F	H, Mk
New	#8529	AML1 (D4A6) Rabbit mAb (Mouse Preferred)	W, IP	H, M, (R, Mk)
	#4334	AML1 Antibody	W, IF-IC, F	H, Mk
	#4242	BCL6 Antibody	W	H, M, (R)
New	#8638	BATF (D7C5) Rabbit mAb	W, IP, IF-IC, F	H, M
New	#5650	BCL6 (D65C10) Rabbit mAb	W, IP	H, M
	#9115	Blimp-1/PRDI-BF1 (C14A4) Rabbit mAb	W, IP, IF-IC	H, M, (Mk)
	#4498	ETO Antibody	W	H, M, R, Mk
	#2593	Evi-1 (C50E12) Rabbit mAb	W, IP, IF-IC, F	H
	#2265	Evi-1 Antibody	W	H, (Dg)
XP®	#5348	Phospho-c-Fos (Ser32) (D82C12) XP® Rabbit mAb	W, IP, IF-IC, F	H, M, R, (Hm, Mk, B, Pg)
	#2250	c-Fos (9F6) Rabbit mAb	W, IF-IC, F	H, M, R, (Hm, B, Pg)
	#4384	c-Fos Antibody	W	H, M, R
	#2251	FosB (5G4) Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R
	#2023	FosB (5G4) Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M, Mk
	#2263	FosB Antibody	W, IP, IF-IC	H, M, R
	#5298	FoxP3 (D25D4) Rabbit mAb	W	H
XP®	#4589	GATA-1 (D24E4) XP® Rabbit mAb	W, IP, IF-IC, F	H
XP®	#3535	GATA-1 (D52H6) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R
	#4591	GATA-1 Antibody	W, IP	H
XP®	#5852	GATA-3 (D13C9) XP® Rabbit mAb	W, IF-IC, F	H, (Mk)
	#5849	GFI1b (D3G2) Rabbit mAb	W	H, M, R, Mk
	#2361	Phospho-c-Jun (Ser63) (54B3) Rabbit mAb	W, IHC-P	H, M, R
	#5464	Phospho-c-Jun (Ser63) (54B3) Rabbit mAb (Biotinylated)	W	H, M, R
	#9261	Phospho-c-Jun (Ser63) II Antibody	W, IP, IF-IC, F	H, M, R, Mk, Pg
New XP®	#3270	Phospho-c-Jun (Ser73) (D47G9) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M, R, Mk
	#9164	Phospho-c-Jun (Ser73) Antibody	W, IF-IC	H, M, R, Mk
	#2303	Phospho-c-Jun (Thr91) Antibody	W	H, M, R
	#2993	Phospho-c-Jun (Thr93) Antibody	W	H, M, R
	#2994	Phospho-c-Jun (Ser243) Antibody	W	H, M, R, Mk
	#9165	c-Jun (60A8) Rabbit mAb	W, IP, IHC-P, IHC-F, IF-IC	H, M, R, Mk
	#2315	c-Jun (L70B11) Mouse mAb	W	H, M, R, Mk
New	#8053	Phospho-JunB (Thr102/Thr104) (D3C6) Rabbit mAb	W, IP	H, (M, R)
	#3753	JunB (C37F9) Rabbit mAb	W, IP, IHC-P, IF-IC	H, M, R, Mk
	#3746	JunB (G53) Antibody	W, IP, IF-IC	H
	#3755	JunB (P169) Antibody	W, IP, IF-IC	H, M, (R)
	#2088	LEDGF (C57G11) Rabbit mAb	W, IHC-P, IF-IC, F	H, M, R, (Mk)
	#2879	LITAF Antibody	W	H
New	#3329	MNDA (3C1) Rat mAb	W, IF-IC, F	H
New	#9283	MNDA (3C1) Rat mAb (Alexa Fluor® 488 Conjugate)	IF-IC, F	H
New XP®	#5861	NFAT1 (D43B1) XP® Rabbit mAb	W, IP, IHC-P, IF-IC, F	H, M
New	#5862	NFAT1 (D9C2) Rabbit mAb	W, IP	H, M
	#4389	NFAT1 Antibody	W, IP, IF-IC	H, M, (R)
New	#8032	NFAT2 (D15F1) Rabbit mAb	W, IP	H, M
	#2183	NFAT3 (23E6) Rabbit mAb	W	H, M, R
	#2188	NFAT3 (31G6) Rabbit mAb	W, IP	H
	#4998	NFAT4 Antibody	W, IP	H, (M)
	#4342	Pbx1 Antibody	W, IP, IF-IC	H, M, (R)
	#2258	PU.1 (9G7) Rabbit mAb	W, IP, IHC-P, IF-IC, F, ChIP	H, M, (Mk, Pg)
	#2216	PU.1 (9G7) Rabbit mAb (Alexa Fluor® 488 Conjugate)	F	H, M
	#2240	PU.1 (9G7) Rabbit mAb (Alexa Fluor® 647 Conjugate)	F	H, M
	#2266	PU.1 Antibody	W, IP, IHC-P, IF-IC, F, ChIP	H, M, (Mk, Pg)
New XP®	#8965	RARγ1 (D3A4) XP® Rabbit mAb	W, IP, IHC-P, IF-IC	H, M, (R, Hm, B, Dg)
	#2191	SRC-1 (128E7) Rabbit mAb	W, IP, IHC-P	H, M, R, Mk
	#2979	Phospho-SRC-3 (Thr24) Antibody	W, IF-IC	H
	#2126	SRC-3 (5E11) Rabbit mAb	W, IP	H, M, R, Mk
	#2115	SRC-3 (11B1) Mouse mAb	W, IF-IC, F	H
	#5214	TBX21 (V365) Antibody	W, IP	H

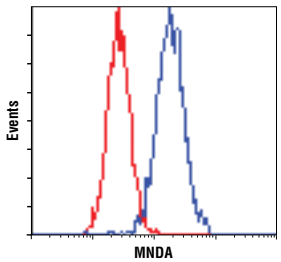
Selected Product References:

#9115 Blimp-1/PRDI-BF1 (C14A4) Rabbit mAb: Smith, M.A. et al. (2010) *J. Immunol.* 185, 6058-6067. (ChIP, W) / Desai, S. et al. (2010) *Mol. Cancer Res.* 8, 907-918. (W) / Cubedo, E. et al. (2011) *FEBS J.* 278, 3065-3075. (ChIP)

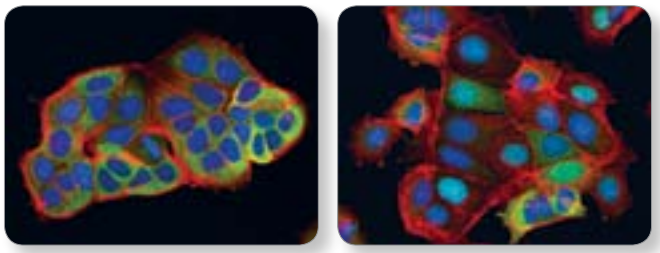
#3329 MNDA (3C1) Rat mAb: McClintock-Treep, S.A. et al. (2011) *Am. J. Clin. Pathol.* 135, 380-385. (F)



AML1 (D4A6) Rabbit mAb (Mouse Preferred) #8529: Western blot analysis of extracts from EL4 cells using #8529.



MNDA (3C1) Rat mAb #3329: Flow cytometric analysis of Jurkat (red) and THP-1 (blue) cells using #3329.



NFAT1 (D43B1) XP® Rabbit mAb #5861: Confocal IF analysis of MCF7 cells, untreated (left) or treated with Ionomycin #9995 (1 µM, 1 hr; right), using #5861 (green). Actin filaments were labeled with DY-554 phalloidin (red). Blue pseudocolor = DRAQ5® #4084 (fluorescent DNA dye).

Antibody Sampler Kits

Cell Signaling Technology (CST) offers numerous Antibody Sampler Kits that provide researchers with an economical means to investigate various aspects of cellular signaling. CST™ Antibody Sampler Kits contain sample sizes of several antibodies directed against a protein, pathway, or cellular process of interest, as well as secondary antibodies needed for detection and analysis. Each kit contains enough primary antibody to perform four western blots per target.

- Kits contain sample sizes of our catalog antibodies.
- HRP-conjugated secondary antibodies are also included.

	#9768	B Cell Signaling Antibody Sampler Kit
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	#9958	Phospho-IKKα/β (Ser176/180) Antibody Sampler Kit
	#9966	IKK Isoform Antibody Sampler Kit
	#4769	IRAK Isoform Antibody Sampler Kit
	#9945	Jak Isoform Sampler Kit
New	#8343	Jak/Stat Pathway Inhibitors Antibody Sampler Kit
	#9370	c-Kit Antibody Sampler Kit
	#9936	NF-κB Pathway Sampler Kit
	#4888	NF-κB Non-Canonical Pathway Antibody Sampler Kit
	#4766	NF-κB Family Member Antibody Sampler Kit
	#4767	NF-κB p65 Antibody Sampler Kit
	#9779	Pim Kinase Antibody Sampler Kit
New	#8348	Rig-I Pathway Antibody Sampler Kit
	#9935	Src Antibody Sampler Kit
	#9914	Phospho-Stat Antibody Sampler Kit
	#9939	Stat Antibody Sampler Kit
	#9925	Phospho-Syk Antibody Sampler Kit
New	#9382	T Cell Signaling Antibody Sampler Kit
New	#9971	Toll-like Receptor Antibody Sampler Kit
New	#8347	TRAF Antibody Sampler Kit

T Cell Signaling Antibody Sampler Kit #9382

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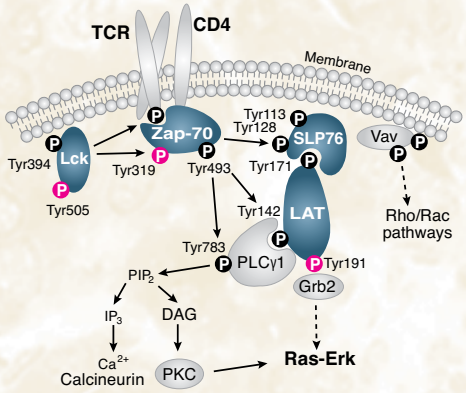
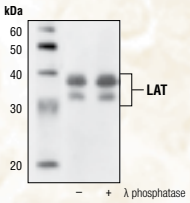
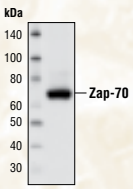
- LAT Antibody #9166
- Phospho-Lck (Tyr505) Antibody #2751
- Lck (73A5) Rabbit mAb #2787
- SLP-76 Antibody #4958
- Phospho-Zap-70 (Tyr319)/Syk (Tyr352) (65E4) Rabbit mAb #2717
- Zap-70 (D1C10E) XP® Rabbit mAb #3165

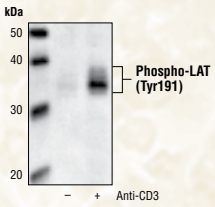




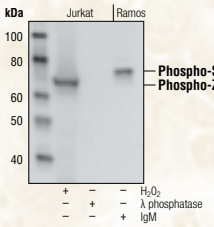
LAT Antibody #9166: Western blot analysis of extracts from Jurkat cells, untreated or treated with λ phosphatase, using #9166.



Zap-70 (D1C10E) XP® Rabbit mAb #3165: Western blot analysis of extracts from Jurkat cells using #3165.



Phospho-LAT (Tyr191) Antibody #3584: Western blot analysis of extracts from Jurkat cells, untreated or anti-CD3-treated (10 µg/ml, 2 min) after overnight serum starvation, using #3584.



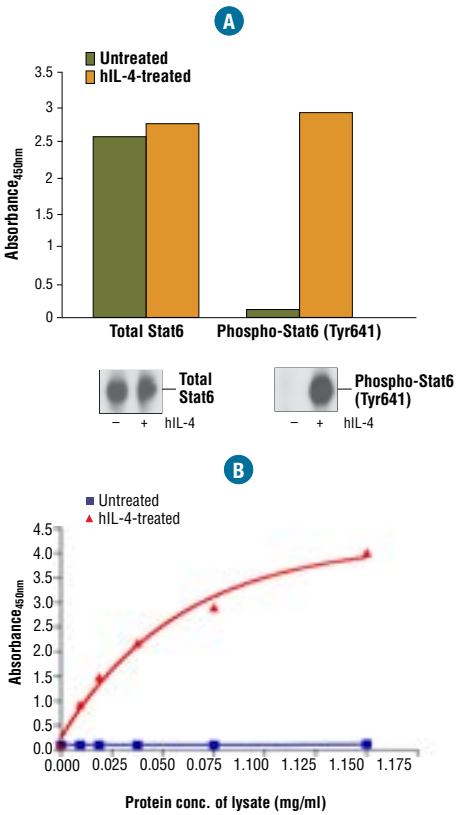
Phospho-Zap-70 (Tyr319)/Syk (Tyr352) (65E4) Rabbit mAb #2717: Western blot analysis of extracts from Jurkat cells, treated with H_2O_2 (2 mM, 2 min) or with λ phosphatase, and extracts from Ramos cells, treated with anti-human IgM (12 µg/ml, 2 min), using #2717.

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing
* detects transfected levels only / ** detects recombinant protein only

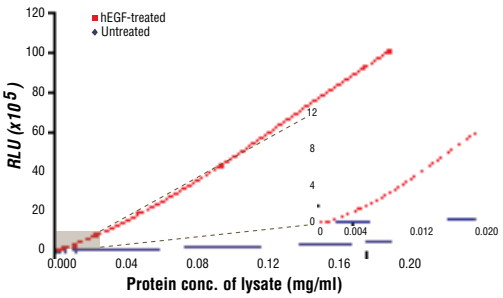
PathScan® Sandwich ELISA Kits and Pairs

Antibody Pairs

		Reactivity
#7343	PathScan® Phospho-IκBα (Ser32) Sandwich ELISA Antibody Pair	H, M
#7831	PathScan® Total IκBα Sandwich ELISA Antibody Pair	H, M
#7294	PathScan® Phospho-c-Kit (panTyr) Sandwich ELISA Antibody Pair	H
#7299	PathScan® Phospho-c-Kit (Tyr719) Sandwich ELISA Antibody Pair	H
#7937	PathScan® Phospho-LAT (Tyr191) Sandwich ELISA Antibody Pair	H
#7993	PathScan® Phospho-Lck (Tyr505) Sandwich ELISA Antibody Pair	H
#7834	PathScan® Phospho-NF-κB p65 (Ser536) Sandwich ELISA Antibody Pair	H, M
#7836	PathScan® Total NF-κB p65 Sandwich ELISA Antibody Pair	H, M
#7992	PathScan® Total Src Sandwich ELISA Antibody Pair	H, M
#7146	PathScan® Phospho-Stat3 (Tyr705) Sandwich ELISA Antibody Pair	H, M
#7281	PathScan® Phospho-Stat5 (Tyr694) Sandwich ELISA Antibody Pair	H
#7852	PathScan® Phospho-Zap-70 (Tyr319) Sandwich ELISA Antibody Pair	H
#7850	PathScan® Total Zap-70 Sandwich ELISA Antibody Pair	H



PathScan® Phospho-Stat6 (Tyr641) Sandwich ELISA Kit #7275: Treatment of ACHN cells (**A**) with hIL-4 #8919 stimulates phosphorylation of Stat6 at Tyr641, as detected by #7275, but does not affect levels of total Stat6 protein detected by PathScan® Total Stat6 Sandwich ELISA Kit #7267. The absorbance readings at 450 nm are shown in the top figure, while the corresponding western blots using Stat6 Antibody #9362 (left panel) or Phospho-Stat6 (Tyr641) (C11A12) Rabbit mAb #9364 (right panel) are shown in the bottom figure. Relationship between protein concentration of lysates from ACHN cells (**B**), untreated or treated with hIL-4 #8919, and the absorbance at 450 nm is shown. Cells (80% confluence) were treated with hIL-4 (100 ng/ml) and lysed after incubation at 37ºC for 15-20 min.



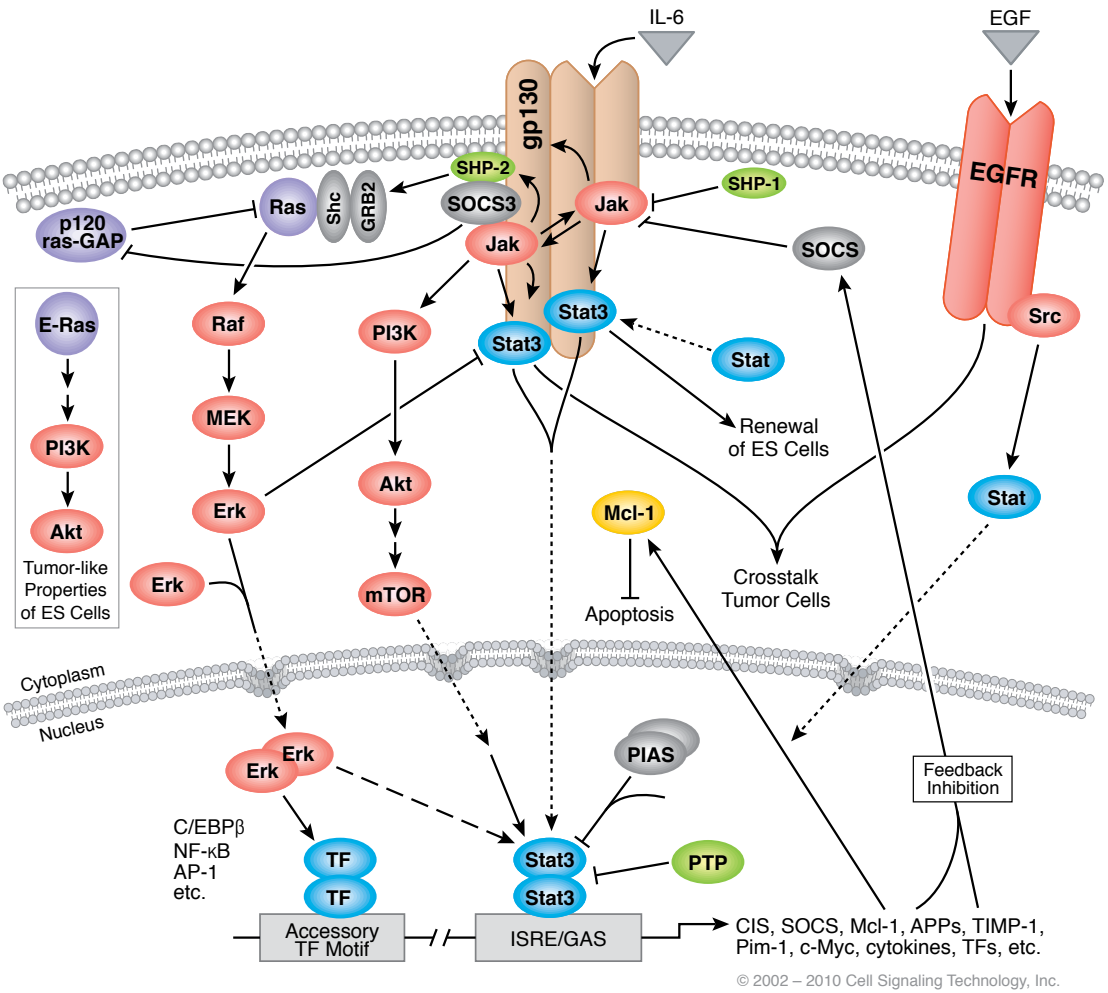
PathScan® Phospho-Stat3 (Ser727) Chemiluminescent Sandwich ELISA Kit #8026: Relationship between protein concentration of lysates from A-431 cells untreated or hEGF-treated and immediate light generation with chemiluminescent substrate is shown. Cells (85% confluence) were treated with hEGF #8916 (100 ng/ml) and lysed after incubation at 37ºC for 5 min. Graph inset corresponding to the shaded area shows high sensitivity and a linear response at the low protein concentration range.

Kits

			Reactivity
	#7967	PathScan® EGF Receptor Activation Multiplex IF Kit	H, Mk, (M)
	#7276	PathScan® Inflammation Multi-Target Sandwich ELISA Kit	H, M
	#7272	PathScan® Signaling Nodes Multi-Target Sandwich ELISA Kit	H, M
New	#7291	PathScan® Total Cox2 Sandwich ELISA Kit	H
	#7206	PathScan® Phospho-FLT3 (Tyr591) Sandwich ELISA Kit	H
	#7021	PathScan® Phospho-FLT3 (Tyr591) Chemiluminescent Sandwich ELISA Kit	H
	#7202	PathScan® Total FLT3 Sandwich ELISA Kit	H
	#7355	PathScan® Phospho-IκBα (Ser32) Sandwich ELISA Kit	H, M
	#7360	PathScan® Total IκBα Sandwich ELISA Kit	H, M
	#7073	PathScan® Phospho-IKKα (Ser176/180) Sandwich ELISA Kit	H
	#7078	PathScan® Total IKKα Sandwich ELISA Kit	H
	#7231	PathScan® Phospho-c-Kit (panTyr) Sandwich ELISA Kit	H
	#7298	PathScan® Phospho-c-Kit (Tyr719) Sandwich ELISA Kit	H
	#7936	PathScan® Phospho-LAT (Tyr191) Sandwich ELISA Kit	H
	#7197	PathScan® Total c-Kit Sandwich ELISA Kit	H
	#7941	PathScan® Phospho-Lck (Tyr505) Sandwich ELISA Kit	H
	#7173	PathScan® Phospho-NF-κB p65 (Ser536) Sandwich ELISA Kit	H, M
	#7174	PathScan® Total NF-κB p65 Sandwich ELISA Kit	H, M
	#7038	PathScan® Total p70 S6 Kinase Sandwich ELISA Kit	H, M
	#7091	PathScan® Total Ros Sandwich ELISA Kit	H
	#7984	PathScan® Total Src Sandwich ELISA Kit	H, M
	#7234	PathScan® Phospho-Stat1 (Tyr701) Sandwich ELISA Kit	H
	#7300	PathScan® Phospho-Stat3 (Tyr705) Sandwich ELISA Kit	H, M
	#7149	PathScan® Phospho-Stat3 (Tyr705) Chemiluminescent Sandwich ELISA Kit	H, M
	#7995	PathScan® Phospho-Stat3 (Ser727) Sandwich ELISA Kit	H
New	#8026	PathScan® Phospho-Stat3 (Ser727) Chemiluminescent Sandwich ELISA Kit	H
	#7305	PathScan® Total Stat3 Sandwich ELISA Kit	H
	#7113	PathScan® Phospho-Stat5 (Tyr694) Sandwich ELISA Kit	H
New	#7275	PathScan® Phospho-Stat6 (Tyr641) Sandwich ELISA Kit	H
New	#7267	PathScan® Total Stat6 Sandwich ELISA Kit	H
	#7171	PathScan® Phospho-Zap-70 (Tyr319) Sandwich ELISA Kit	H
	#7172	PathScan® Total Zap-70 Sandwich ELISA Kit	H

Signaling Pathways

Jak/Stat Signaling: IL-6 Receptor Family



Pathway Description: Jaks and Stats are critical components of many cytokine receptor systems, regulating growth, survival, differentiation, and pathogen resistance. An example of these pathways is shown for the IL-6 (or gp130) family of receptors, which co-regulate B cell differentiation, plasmacytogenesis and the acute phase reaction. Cytokine binding induces receptor dimerization, activating the associated Jaks, which phosphorylate themselves and the receptor. The phosphorylated sites on the receptor and Jaks serve as docking sites for the SH2-containing Stats, such as Stat3, and for SH2-containing proteins and adaptors that link the receptor to MAP kinase, PI3K/Akt, and other cellular pathways.

Receptor-bound Stats phosphorylated by Jaks dimerize and translocate into the nucleus to regulate target gene transcription. Members of the suppressor of cytokine signaling (SOCS) protein family dampen receptor signaling via homologous or heterologous feedback regulation. Jaks or Stats can also participate in signaling through other receptor classes, as outlined in the Jak/Stat Utilization Table (found on page 6).

Deregulated signaling of IL-6 is seen in the pathogenesis of autoimmune diseases, inflammation, and cancers such as multiple myeloma and prostate cancer. Stat3 can act as an oncogene and is constitutively active in many cancers. In prostate cancer and multiple myeloma, signaling from the IL-6R involves cross talk with Epidermal Growth Factor Receptor (EGFR) family members. IL-6 also induces anti-apoptotic signals, which may contribute to oncogenesis. One target gene is a Bcl-2 family member, Mcl-1.

Janus kinase mutations are major molecular events in human hematological malignancies. A unique somatic mutation in the Jak2 pseudokinase domain (V617F) occurs in >90% of polycythemia vera patients, and in a large proportion of essential thrombocythemia and idiopathic myelofibrosis patients. This mutation results in the pathologic activation Jak2 kinase, which leads to malignant transformation of hematopoietic progenitors. Several Jak3 pseudokinase domain mutations, present in some patients with acute megakaryoblastic leukemia, also render Jak3 constitutively active. Somatic acquired gain-of-function mutations in Jak1 have been discovered in approximately 20% of adult T-cell acute lymphoblastic leukemia.

Somatic activating mutations in Jak1, Jak2, and Jak3 have been identified in pediatric acute lymphoblastic leukemia (ALL) patients. Jak2 mutations have been detected around pseudokinase domain R683 (R683G or ΔIREED) in Down syndrome and pediatric B-ALL patients, where they are also associated with translocations or mutations (F232C) in the CRLF2 gene, which codes for the thymic stromal lymphopoietin receptor (TLSP) receptor. Although TLSP was thought to signal via other Jaks, it appears that mutant Jak2 and TLSPR cooperate to promote oncogenesis in a fraction of pediatric ALL.

For Selected Reviews see www.cellsignal.com

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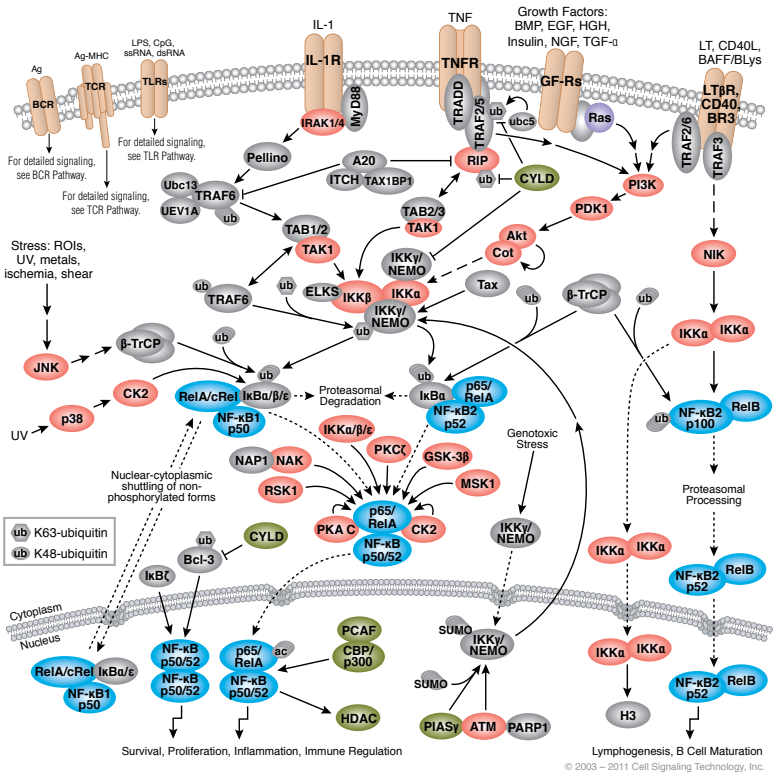
Direct Inhibitory Modification
Multistep Stimulatory Modification
Multistep Inhibitory Modification
Tentative Stimulatory Modification
Tentative Inhibitory Modification
Transcriptional Stimulatory Modification
Transcriptional Inhibitory Modification

NF-κB Signaling

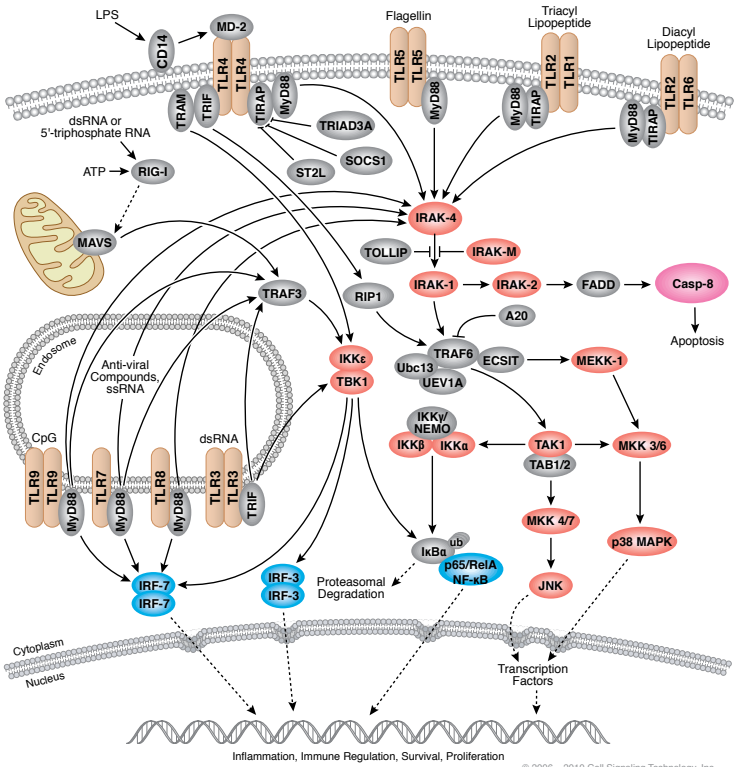


Pathway Description: Nuclear factor-κB (NF-κB)/Rel proteins include NF-κB2 p52/p100, NF-κB1 p50/p105, c-Rel, RelA/p65, and RelB. These proteins function as dimeric transcription factors that control genes regulating a broad range of biological processes including innate and adaptive immunity, inflammation, stress responses, B cell development, and lymphoid organogenesis. In the classical (or canonical) pathway, NF-κB/Rel proteins are bound and inhibited by IκB proteins. Proinflammatory cytokines, LPS, growth factors, and antigen receptors activate an IKK complex (IKKβ, IKKα, and NEMO), which phosphorylates IκB proteins. Phosphorylation of IκB leads to its ubiquitination and proteasomal degradation, freeing NF-κB/Rel complexes. Active NF-κB/Rel complexes are further activated by phosphorylation and translocate to the nucleus where, either alone or in combination with other transcription factor families including AP-1, Ets, and Stat, they induce target gene expression. In the alternative (or noncanonical) NF-κB pathway, NF-κB2 p100/RelB complexes are inactive in the cytoplasm. Signaling through a subset of receptors including LTβR, CD40, and BR3 activates the kinase NIK, which in turn activates IKKα complexes that phosphorylate C-terminal residues in NF-κB2 p100. Phosphorylation of NF-κB2 p100 leads to its ubiquitination and proteasomal processing to NF-κB2 p52, creating transcriptionally competent NF-κB p52/RelB complexes that translocate to the nucleus and induce target gene expression. Only a subset of NF-κB agonists and target genes are shown here.

Selected Reviews:

Gilmore, T.D. (2008) Rel/NF-κB Transcription Factors: www.nf-kb.org
Hayden, M.S. and Ghosh, S. (2008) Shared principles in NF-κB signaling. *Cell* 132, 344–362.
Perkins, N.D. (2006) Post-translational modifications regulating the activity and function of the nuclear factor κB pathway. *Oncogene* 25, 6717–6736.

Toll-like Receptor Signaling

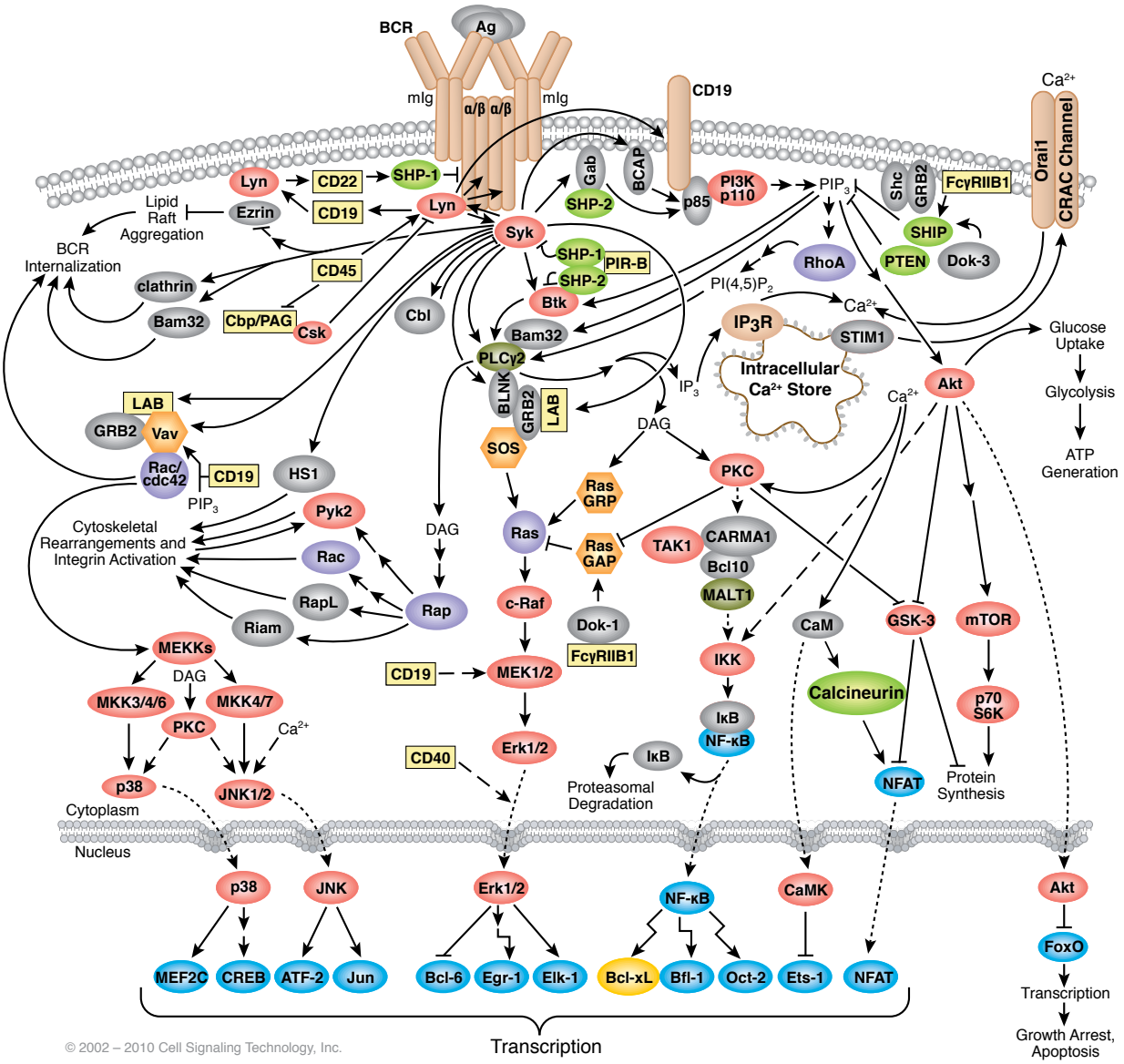


Pathway Description: Toll-like receptors (TLRs) recognize distinct pathogen-associated molecular patterns and play a critical role in innate immune responses. They participate in the first line of defense against invading pathogens and play a significant role in inflammation, immune cell regulation, survival, and proliferation. To date 11 members of the TLR family have been identified, of which TLR1, TLR2, TLR4, TLR5, and TLR6 are located on the cell surface and TLR3, TLR7, TLR8, and TLR9 are localized to the endosomal/lysosomal compartment. The activation of the TLR signaling pathway originates from the cytoplasmic Toll/IL-1 receptor (TIR) domain that associates with a TIR domain-containing adaptor, MyD88. Upon stimulation with ligands, MyD88 recruits IL-1 receptor-associated kinase-4 (IRAK-4) to TLRs through interaction of the death domains of both molecules. IRAK-1 activated by phosphorylation then associates with TRAF6, finally leading to activation of MAP kinases (JNK, p38 MAPK) and NF-κB. Tollip and IRAK-M interact with IRAK-1 and negatively regulate the TLR-mediated signaling pathways. Additional modes of regulation for these pathways include TRIF-dependent induction of TRAF6 signaling by RIP1 and negative regulation of TIRAP mediated downstream signaling by ST2L, TRIAD3A, and SOCS1. MyD88-independent pathways induce activation of IRF3 and expression of interferon-β. TIR-domain containing adaptors such as TIRAP, TRIF, and TRAM regulate TLR-mediated signaling pathways by providing specificity for individual TLR signaling cascades.

Selected Reviews:

Barton, G.M. and Kagan, J.C. (2009) A cell biological view of Toll-like receptor function: regulation through compartmentalization. *Nat. Rev. Immunol.* 9, 535–542. / Blasius, A.L. and Beutler, B. (2010) Intracellular Toll-like Receptors. *Immunity* 32, 305–315. / Li, X. et al. (2010) Toll-like receptor signaling in cell proliferation and survival. *Cytokine* 49, 1–9. / McGettrick, A.F. and O'Neill, L.A. (2010) Localisation and trafficking of Toll-like receptors: an important mode of regulation. *Curr. Opin. Immunol.* 22, 20–27. / Miggin, S.M. et al. (2006) New insights into the regulation of TLR signaling. *J. Leuk. Biol.* 80, 220–226. / Pasare, C. and Medzhitov, R. (2005) Toll-like receptors: linking innate and adaptive immunity. *Adv. Exp. Med. Biol.* 560, 11–18.

B Cell Receptor Signaling



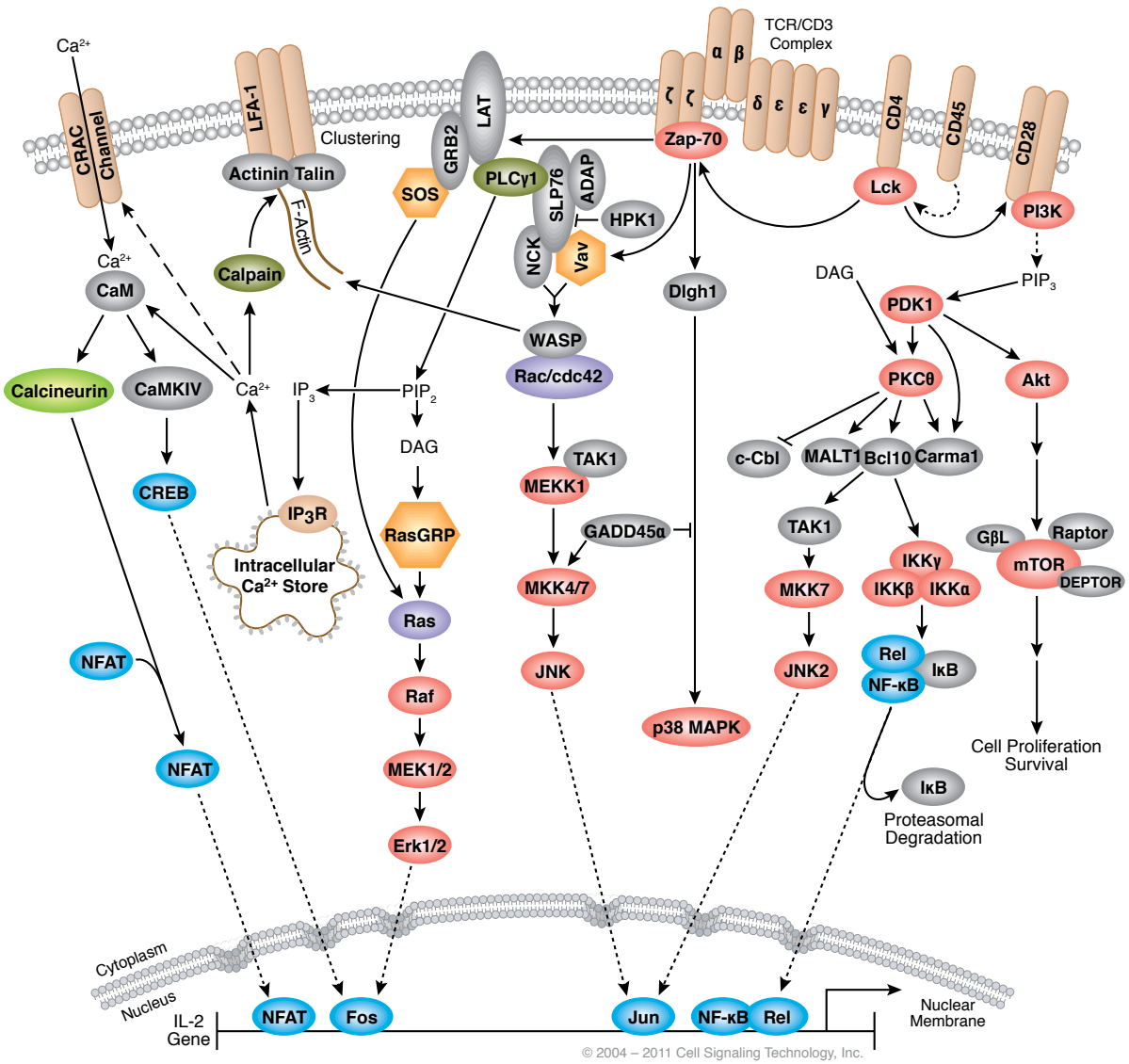
Pathway Description: The B-cell antigen receptor (BCR) is composed of membrane immunoglobulin (mIg) molecules and associated Igα/Igβ (CD79a/CD79b) heterodimers (α/β). The mIg subunits bind antigen, resulting in receptor aggregation, while the α/β subunits transduce signals to the cell interior. BCR aggregation rapidly activates the Src family kinases Lyn, Blk, and Fyn as well as the Syk and Btk tyrosine kinases. This initiates the formation of a 'signalosome' composed of the BCR, the aforementioned tyrosine kinases, adaptor proteins such as CD19 and BLNK, and signaling enzymes such as PLCγ2, PI3K, and Vav. Signals emanating from the signalosome activate multiple signaling cascades that involve kinases, GTPases, and transcription factors. This results in changes in cell metabolism, gene expression, and cytoskeletal organization. The complexity of BCR signaling permits many distinct outcomes, including survival, tolerance (anergy) or apoptosis, proliferation, and differentiation into antibody-producing cells or memory B cells. The outcome of the response is determined by the maturation state of the cell, the nature of the antigen, the magnitude and duration of BCR signaling, and signals from other receptors such as CD40 and BAFF-R. Many other transmembrane proteins, some of which are receptors, modulate specific elements of BCR signaling. A few of these, including CD45, CD19, CD22, PIR-B, and FcγRIIB1 (CD32), are indicated above in yellow. The magnitude and duration of BCR signaling are limited by negative feedback loops including those involving the Lyn/CD22/SHP-1 pathway, the Cbp/Csk pathway, SHIP, Cbl, Dok-1, Dok-3, FcγRIIB1, PIR-B, and internalization of the BCR. Please refer to the diagrams for the PI3K/Akt signaling pathway, the NF-κB signaling pathway, and the regulation of actin dynamics for more details about these pathways.

Selected Reviews:

Dal Porto, J.M. et al. (2004) B cell antigen receptor signaling 101. *Molec. Immunol.* 41, 599–613. / Harwood, N.E. and Batista, F.D. (2008) New insights into the early molecular events underlying B cell activation. *Immunity* 28, 609–619. / Harwood, N.E. and Batista, F.D. (2010) Early events in B cell activation. *Annu. Rev. Immunol.* 28, 185–210. / Kurosaki, T. et al. (2010) B cell signaling and fate decision. *Annu. Rev. Immunol.* 28, 21–55.

APPLICATIONS KEY:
W Western / **IP** Immunoprecipitation / **IHC** Immunohistochemistry / **IF** Immunofluorescence / **F** Flow Cytometry / **ChIP** Chromatin Immunoprecipitation / (**-IC** Immunocytochemistry, **-P** Paraffin, **-F** Frozen) / **E-P** Peptide ELISA / **N** Neutralizing
* detects transfected levels only / ** detects recombinant protein only

T Cell Receptor Signaling



Pathway Description: T Cell Receptor (TCR) activation promotes a number of signaling cascades that ultimately determine cell fate through regulating cytokine production, cell survival, proliferation, and differentiation. An early event in TCR activation is phosphorylation of immunoreceptor tyrosine-base activation motifs (ITAMs) on the cytosolic side of the TCR/CD3 complex by lymphocyte protein-tyrosine kinase (Lck). The CD45 receptor tyrosine phosphatase modulates the phosphorylation and activation of Lck and other Src family tyrosine kinases. ζ-chain associated protein kinase (Zap-70) is recruited to the TCR/CD3 complex where it becomes activated, promoting recruitment and phosphorylation of downstream adaptor or scaffold proteins. Phosphorylation of SLP-76 by Zap-70 promotes recruitment of Vav (a guanine nucleotide exchange factor), the adaptor proteins NCK and GADS, and an inducible T cell kinase (ITK). Phosphorylation of phospholipase C γ1 (PLCγ1) by Itk results in the hydrolysis of phosphatidylinositol 4,5-bisphosphate (PIP_2) to produce the second messengers diacylglycerol (DAG) and inositol trisphosphate (IP_3). DAG activates PKCθ and the MAPK/Erk pathways, both promoting transcription factor NF-κB activation. IP_3 triggers the release of Ca^{2+} from the ER, which promotes the entry of extracellular Ca^{2+} into cells through calcium release-activated Ca^{2+} (CRAC) channels. Calcium-bound calmodulin (Ca^{2+}/CaM) activates the phosphatase calcineurin, which promotes IL-2 gene transcription through the transcription factor NFAT. Feedback regulation at several points within these pathways allows for different outcomes, depending on the cell type and environment. The incorporation of signals from additional cell surface receptors (such as CD28 or LFA-1) further regulates cellular response.

Selected Reviews:

Burbach, B.J. et al. (2007) T-cell receptor signaling to integrins. *Immunol. Rev.* 218, 65–81. / Cronin, S.J. and Penninger, J.M. (2007) From T-cell activation signals to signaling control of anti-cancer immunity. *Immunol. Rev.* 220,151–168. / Marsland, B.J. and Kopf, M. (2008) T-cell fate and function: PKC-theta and beyond. *Trends Immunol.* 29, 179–185. / Qi, Q. and August, A. (2007) Keeping the (kinase) party going: SLP-76 and ITK dance to the beat. *Sci STKE.* 2007, pe39. / Thome, M. (2008) Multifunctional roles for MALT1 in T-cell activation. *Nat. Rev. Immunol.* 8, 495–500.

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