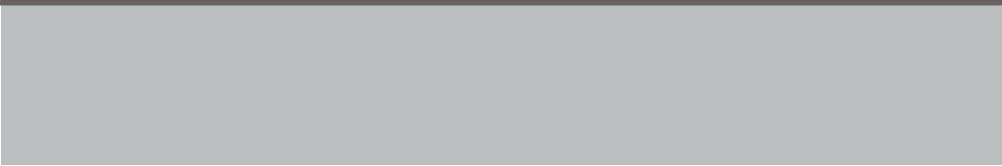




ACTIVE KINASE MANUAL



OUR GOAL

SignalChem is a biotechnology company focused on the research, development and production of innovative cell signaling products for the advancement of basic life sciences research and drug discovery efforts. Specific emphasis is placed on the production of highly purified biologically-active human recombinant proteins.

SignalChem is a leader in the recombinant protein market. We produce products to fulfill the needs of scientists in both academia and the biotech industry. All of SignalChem's products are subjected to rigorous testing and quality control analyses to ensure the highest quality proteins are produced.

PRICES

Prices listed on the SignalChem website are in US dollars*. For orders placed outside of North America, our representatives can redirect you to the appropriate distributor for your territory.

**Prices are listed on the SignalChem website and are subject to change without notice.*

BULK ORDERS

All products supplied by SignalChem are available for purchase in bulk quantities or as custom preparations. Should you require our products to be supplied in different pack sizes to meet your specific research requirements, please contact us at info@signalchem.com.

PAYMENT TERMS

Terms of payment are net thirty (30) days, unless otherwise specified. Pre-payment may be required prior to shipping in certain territories. All sales are F.O.B. from point of shipment, pre-paid and added to the invoice.

SHIPPING

All orders to be shipped within North America, which are received by 10:00 AM PST (1:00 PM EST) Monday to Wednesday will usually be shipped out on the same day. North American customers will typically receive their orders within 1-2 business days. International orders are shipped on Fridays only. Freight charges may include, but are not limited to priority service and packaging materials. SignalChem is not responsible for any fees that may be incurred by your order such as brokerage costs, duties and taxes.

CONFIDENTIALITY

We keep all customer information strictly confidential. All information and/or materials provided by the customer will be used only as directed.

CONTACT INFORMATION

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ORDER INFORMATION

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Orders can be placed by phone, fax or email.

TECHNICAL SUPPORT

Should you require technical support, our team of protein experts will be available to assist you from:

- 7:00 AM to 5:00 PM PST
- 10:00 AM to 8:00 PM EST

SignalChem's Active Kinases

Kinases are one of the largest classes of enzymes, with 516 family members, they constitute ~2% of all human genes. Kinases catalyze the transfer of the γ -phosphate from ATP to acceptor hydroxyl groups on amino acids (such as serine, threonine and tyrosine) in proteins or glycosyl moieties in lipids. This process, termed phosphorylation, is the most efficient way to regulate protein and lipid function in cells and is considered a key step in posttranslational modification of proteins and lipids kinases. Phosphorylation usually results in a functional change of the substrate or target protein such as a change in its enzyme activity, cellular localization, or association with other proteins.

Protein and lipid kinases are not only present in humans, but also are readily found in bacteria and plants. Protein kinase activity is highly regulated, allowing it to participate in diverse signaling pathways in within the cell. Growth factors, cytokines and hormones can turn on or off the activity of various protein kinases, thereby regulating the function of downstream substrate proteins. Due to the key regulatory function of protein kinases on cellular pathways, they are often highly associated with diseases. Defective signaling by protein kinases accounts for more than 400 human diseases. Today, these targets are still being actively pursued for therapeutic intervention. Research geared toward targeting protein kinases by small molecule inhibitors or neutralizing antibodies has been extremely beneficial in the treatment of various human diseases such as cancer. Over 160 protein kinases have been shown to be associated with human diseases, and numerous kinases have been found as the drug targets which are being developed and under approval by the FDA.



SignalChem offers a diverse and comprehensive range of serine/threonine kinases, receptor tyrosine kinases, cytoplasmic tyrosine kinases and lipid kinases for drug discovery efforts and functional studies.

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AGC Kinases

Members of the AGC kinases are categorized based upon the homology of their catalytic kinase domain. PDK1 is an AGC kinase, which is required for phosphorylating many of its fellow AGC members. One of its targets is is AKT1/PKB α , another AGC family member which acts as a central node in cell signaling for growth factors, cytokines, and other stimuli, turning on programs for cell survival and proliferation. Hyperactive AKT1 signaling promotes tumor cell survival and resistance to apoptosis. Despite the relevance of AKT1 towards tumorigenesis, efforts to selectively target this kinase face the challenge of compensation by other AGC family members in the face of AKT inhibition.

AKT1	Alias	Product Substrate	Genbank ID
	PKB; RAC; PRKBA; MGC99656; RAC-ALPHA	AKT (PKB) Substrate (A05-58)	NM_005163

AKT1 is a serine/threonine kinase that belongs to the AKT family. It is frequently overexpressed and active in many types of human cancers due to its involvement in a variety of cellular activities including, glucose metabolism, transcriptions, survival, cell proliferation, angiogenesis and cell motility.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AKT1, Active	A16-10G	Human	Insect	N-terminal GST tag	Full Length	85 kDa
AKT1 Mutant (E17K), Active	A16-12G	Human	Insect	N-terminal GST tag	Full Length	85 kDa

AKT2	Alias	Product Substrate	Genbank ID
	PRKBB; PKBBETA; RAC-BETA	AKT (SGK) Substrate (A08-58)	NM_001626

AKT2 is a serine/threonine kinase that belongs to the AKT family. AKT2 like the other AKT members regulates many cellular processes such as glucose metabolism, transcription, survival, cell proliferation, angiogenesis, and cell motility. Translocation of AKT2 and other AKT isoforms to the plasma membrane by lipid secondary messengers is critical for their activity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AKT2, Active	A17-10G	Human	Insect	N-terminal GST tag	Full Length	85 kDa
AKT2, Active	A17-10H	Human	Insect	N-terminal His tag	Full Length	58 kDa
AKT2 Mutant (E17K), Active	A17-12G	Human	Insect	N-terminal GST tag	Full Length	85 kDa
AKT2 Mutant (R274H), Active	A16-12G	Human	Insect	N-terminal GST tag	Full Length	85 kDa

AKT3	Alias	Product Substrate	Genbank ID
	PKBG; PRKBG; STK-2; RAC-gamma; RAC-PK-gamma	AKT (SGK) Substrate (A08-58)	NM_005465

AKT3 is a serine/threonine kinase that belongs to the AKT family. It regulates many cellular proteins and functions such as metabolism, survival/apoptosis, and proliferation. Recent evidence indicates that AKT3 is frequently overexpressed in many types of human cancers including those of the breast and prostate.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AKT3, Active	A18-10G	Human	Insect	N-terminal GST tag	Full Length	85 kDa
AKT3 Mutant (E17K), Active	A18-12G	Human	Insect	N-terminal GST tag	Full Length	85 kDa
AKT3 Mutant (G171R), Active	A18-12BG	Human	Insect	N-terminal GST tag	Full Length	85 kDa

DMPK	Alias	Product Substrate	Genbank ID
	DM, DM1, DMK, MDPK, DM1PK, MT-PK	Axltide (A16-58)	NM_004409

DMPK (Myotonic Dystrophy Protein Kinase) is a serine/threonine kinase that belongs to the Myotonic dystrophy kinase-related Cdc42-binding family of kinases (MRCKs) and closely resembles other protein kinase members of the Rho family of small GTPases. Mainly expressed in muscle tissue. DMPK is known to play an important role in skeletal muscle structure and function DMPK is an autosomal dominant disease caused by a cytosine-thymine-guanine expansion in the 3' untranslated region of DMPK.

AGC KINASES

DMPK (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DMPK, Active	D07-10G	Human	Insect	N-terminal GST tag	Full Length	105 kDa

DMPK2	Alias	Product Substrate	Genbank ID
	DMPK2; HSMDPKIN; KAPPA-200; MRCKG; MRCKgamma	S6K Substrate (S05-58)	NM_017525

DMPK2 (Myotonic Dystrophy Protein Kinase 2) is a serine/threonine protein kinase that belongs to the Myotonic dystrophy kinase-related Cdc42-binding family of kinases (MRCKs). DMPK2 is known to act as a downstream effector of CDC42 in cytoskeletal reorganization and contributes to the actomyosin contractility required for cell invasion, through the regulation of MYPT1 and MLC2 phosphorylation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDC42BPG (DMPK2), Active	D17-11G	Human	Insect	N-terminal GST tag	1-475	78 kDa

GPRK7	Alias	Product Substrate	Genbank ID
	GRK7	PLKtide (P41-58)	NM_139209

GRK7 (G Protein-Coupled Receptor Kinase 7) is a member of the G protein-coupled receptor kinase subfamily and is a serine/threonine protein kinase. GRK7 is specifically expressed in the retina and has been shown to phosphorylate cone opsins in a light-dependent manner and initiate their deactivation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GRK7, Active	G05-10G	Human	Insect	N-terminal GST tag	Full Length	89 kDa

GRK1	Alias	Product Substrate	Genbank ID
	GPRK1; RHOK; RK	Modified PLKtide (P41-58B)	NM_002929

GRK1 (G Protein-Coupled Receptor Kinase 1) is a member of the guanine nucleotide-binding protein (G protein)-coupled receptor kinase subfamily of the serine/threonine protein kinases. GRK1 mediates rapid desensitization of rod photoreceptors to light by catalyzing phosphorylation of the visual pigment rhodopsin which leads to its deactivation. Defects in GRK1 are known to cause Oguchi disease 2 (Stationary Night Blindness Oguchi Type-2).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GRK1, Active	R03-10G	Human	Insect	N-terminal GST tag	Full Length	95 kDa

GRK2	Alias	Product Substrate	Genbank ID
	ADRBK1; BARK1; BETA-ARK1, FLJ16718	PLKtide (P41-58)	NM_001619

GRK2 (G Protein-Coupled Receptor Kinase 2) is a ubiquitously expressed cytosolic enzyme that specifically phosphorylates the activated form of the beta-adrenergic and related G protein-coupled receptors. Abnormal coupling of beta-adrenergic receptor to G protein is involved in the pathogenesis of the failing heart. GRK2 is also known to play an important role in cell migration and cell cycle progression as evidenced by the different levels of expression and activity of this kinase in a number of inflammatory disorders.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GRK2, Active	A14-10G	Human	Insect	N-terminal GST tag	Full Length	102 kDa

GRK3	Alias	Product Substrate	Genbank ID
	ADRBK2; BARK2	GRKtide (G46-58)	NM_005160

GRK3 (G Protein-Coupled Receptor Kinase 3) specifically phosphorylates the agonist-occupied form of the beta-adrenergic and related G protein-coupled receptors. GRK3 is highly expressed in lung, heart, and adipose tissue. Single nucleotide polymorphisms (SNPs) in the promoter region of GRK3 have been associated with bipolar disorder.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GRK3, Active	A15-11G	Human	Insect	N-terminal GST tag	1-554	84 kDa

AGC KINASES

GRK5	Alias	Product Substrate	Genbank ID
	GPRK5	Casein Protein (C03-54N)	NM_005308

GRK5 (G Protein-Coupled Receptor Kinase 5) is a member of the guanine nucleotide-binding protein (G protein)-coupled receptor kinase subfamily of the serine/threonine protein kinases. It phosphorylates the activated forms of G protein-coupled receptors thus initiating their deactivation. It has been implicated in several human pathologies including heart failure, hypertension, cancer, diabetes, and Alzheimer's disease.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GRK5, Active	G03-10G	Human	Insect	N-terminal GST tag	Full Length	95 kDa

GRK6	Alias	Product Substrate	Genbank ID
	GPRK6; FLJ32135	PLKtide (P41-58)	BC017272

GRK6 (G Protein-Coupled Receptor Kinase 6) is a serine/threonine protein kinase and a member of the G protein-coupled receptor kinase subfamily. GRK6 is present in all tissues with strongest expression in placenta and skeletal muscle. GRK6 phosphorylates G protein-coupled dopamine receptors, thereby regulating their activity and mediating desensitization of the receptors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GRK6, Active	G04-10G	Human	Insect	N-terminal GST tag	Full Length	93 kDa

LATS1	Alias	Product Substrate	Genbank ID
	WARTS; wts	SGKtide (S08-58)	NM_004690

LATS1 (Large Tumor Suppressor Kinase 1) is a putative serine/threonine kinase that localizes to the mitotic apparatus and complexes with cell cycle controller CDK1 in early mitosis. LATS1 acts as a tumor suppressor and plays an important role in the development of soft-tissue sarcomas, ovarian stromal cell tumors while displaying high sensitivity to carcinogenic treatments.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LATS1, Active	L01-11G	Human	Insect	N-terminal GST tag	589-end	95 kDa

LATS2	Alias	Product Substrate	Genbank ID
	N/A	SGKtide (S08-58)	NM_014572

LATS2 (Large Tumor Suppressor Kinase 2) is a serine/threonine protein kinase belonging to the LATS tumor suppressor family. LATS2 plays an essential role in the maintenance of mitotic fidelity and genomic integrity by interacting with a negative regulator of p53 in a positive feedback loop. LATS2 is key tumor suppressor in human cancer and may be an important target for anticancer therapy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LATS2, Active	L02-11G	Human	Insect	N-terminal GST tag	480-1088	110 kDa

MRCK alpha	Alias	Product Substrate	Genbank ID
	CDC42BPA, MRCK, PK428, FLJ23347, KIAA0451, DKFZ-p686L1738, DKFZp686P1738	SGKtide (S08-58)	NM_003607

MRCK alpha (Myotonic Dystrophy Kinase-Related Cdc42-Binding Kinase alpha) is a serine/threonine kinase with multiple functional domains. MRCK alpha is a critical regulator of signal transduction pathways in eukaryotic cells. It is known to play a role in cytoskeleton reorganization by acting as a downstream effector of CDC42 and RhoA. As a result, elevated expression levels of MRCK alpha have been revealed in several human cancers including those of the head and neck.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MRCK alpha, Active	C27-11G	Human	Insect	N-terminal GST tag	1-473	73 kDa

AGC KINASES

MRCK beta	Alias	Product Substrate	Genbank ID
	CDC42BPB, KIAA1124	SGKtide (S08-58)	NM_006035

MRCK beta (Myotonic Dystrophy Kinase-Related Cdc42-binding kinase beta) belongs to the DMPK subfamily. The myotonic dystrophy kinase-related kinases and myotonic dystrophy kinase-related Cdc42 binding kinase (MRCK) are effectors of RhoA and CDC42, respectively, where they are involved in actin cytoskeletal reorganization and neurite outgrowth. Effects of the repeat expansion on the DMPK gene may be responsible for muscle and heart features of myotonic dystrophy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MRCK beta, Active	C28-11G	Human	Insect	N-terminal GST tag	1-473	73 kDa

MSK1	Alias	Product Substrate	Genbank ID
	RPS6KA5, RLPK, MSPK1, MGC1911	RSK Substrate (S06-58)	NM_004755

MSK1 (Mitogen-and Stress-Activated Protein Kinase-1) is a serine/threonine kinase which contains two protein kinase domains. MSK1 is required for the mitogen or stress-induced phosphorylation of the transcription factors, CREB (cAMP response element-binding protein) and ATF1 (activating transcription factor-1). MSK1 is widely expressed in the heart, brain and placenta, it is activated in-vitro and in-vivo by either ERK or SAPK2 proteins.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MSK1, Active	R19-10G	Human	Insect	N-terminal GST tag	Full Length	120 kDa

MSK2	Alias	Product Substrate	Genbank ID
	RPS6KA4; RSK-B; RSKB	RSK Substrate (S06-58)	BC012964

MSK2 (Mitogen-and Stress-Activated Protein Kinase-2) is a serine/threonine kinase that contains two non-identical kinase catalytic domains and phosphorylates various substrates, including CREB1 and c-FOS. MSK2 is also known as ribosomal protein S6 kinase 4 (RPS6KA4) and is activated by the mitogen-activated protein kinases ERK1, ERK2, and p38. Along with MSK1, MSK2 is a key component of the negative feedback mechanism needed to limit Toll-like receptor (TLR)-driven inflammation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MSK2, Active	R18-10G	Mouse	Insect	N-terminal GST tag	Full Length	114 kDa

NDR	Alias	Product Substrate	Genbank ID
	NDR1, STK38	Modified PKA Substrate (C01-58B)	NM_007271

NDR (Nuclear Dbf2-Related) protein is a serine/threonine kinase in the AGC kinase family. NDR is regulated by Mob proteins. Fas and TNF alpha receptor stimulation activates human NDR by promoting phosphorylation at the hydrophobic motif. NDR acts as a novel pro-apoptotic kinase and is a key member of the RASSF1A/MST1 signaling cascade. NDR is crucial for the fidelity of mitotic chromosome alignment in mammalian cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NDR, Active	S49-10G	Human	Insect	N-terminal GST tag	Full Length	81 kDa

NDR2	Alias	Product Substrate	Genbank ID
	KIAA0965; STK38L	Modified SGKtide (S08-58B)	NM_015000

NDR2 (Nuclear Dbf2-Related Protein 2) is a serine/threonine kinase in the AGC kinase family. NDR2 is regulated by Mob proteins. NDR2 act as novel pro-apoptotic kinase that is activated by RASSF1A/MST1 in response to Fas receptor stimulation, promoting apoptosis. NDR2 is mainly involved in the regulation of structural processes in differentiating and mature neuronal cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NDR2, Active	S50-10G	Human	Insect	N-terminal GST tag	Full Length	82 kDa

AGC KINASES

p70S6K	Alias	Product Substrate	Genbank ID
	S6K ¹ ; PS6K ¹ ; S6K1 ¹ ; STK14A ¹ ; RPS6KB1 ¹ ; p70-alpha ¹ ; p70(S6K)-alpha ¹ ; RPS6KB2 ² ; STK14B ² , KLS ² , P70-beta ² , P70-beta-1 ² , P70-beta-2 ² , S6K2 ² , p70(S6K)-beta ² , S6K-beta2 ² , SRK ²	S6K Substrate (S05-58) ¹ , RSK Substrate (S06-58) ²	NM_003161 ¹ , BC000094 ²

p70S6K (Ribosomal Protein S6 Kinase beta-1) is serine/threonine kinase responsible for the phosphorylation of 40s ribosomal protein S6. It is ubiquitously expressed in human adult tissues and acts downstream of PIP3 and Phosphoinositide-dependent Kinase 1 in the PI3 kinase pathway. The kinase activity of this protein leads to an increase in protein synthesis and cell proliferation and is often overexpressed in certain breast cancer cell lines.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
p70S6K, Active ¹	R21-10H	Human	Insect	N-terminal HIS tag	Full Length	76 kDa
p70S6Kb, Active ²	R22-10G	Human	Insect	N-terminal GST tag	Full Length	85 kDa

PDK1	Alias	Product Substrate	Genbank ID
	PRO0461; PDPK1; MGC20087; MGC35290; PkB-like; Pkβ-like 1	PDKtide (P10-58)	NM_002613

Human PDK1 (3-Phosphoinositide-Dependent Protein Kinase) is a 556-residue monomeric enzyme containing a catalytic domain related to the PKA, PKB and PKC subfamily of protein kinases. PDK1 is activated by the presence of PtdIns(3,4,5)P3 or PtdIns(3,4)P2. PDK1 then activates AKT which, in turn, inactivates glycogen synthase kinase-3 (GSK3). The phosphorylation of other proteins by AKT and GSK3 are likely to mediate many of the intracellular actions of insulin.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDK1, Active	P14-10H	Human	Insect	N-terminal His tag	Full Length	67 kDa

PKAc	Alias	Product Substrate	Genbank ID
	PKAa ¹ ; cAPKa ¹ ; MGC48865 ¹ ; MGC102831 ¹ ; PKAb ² , cAPKb ² , MGC9320 ² , MGC41879 ² , DKFZp781I2452 ² , KAPG ³ , PKAr ³ , cAPKr ³	CREBtide (C50-58)	NM_002730 ¹ , NM_002731 ² ; NM_002732 ³

PKAc (Protein Kinase A Catalytic) is a member of the serine/threonine protein kinase family. A null mutation in PKAc alpha was demonstrated to cause early post-natal lethality in most mice. Mice which survived until adulthood were runted. In the brains of animals, PKAc beta levels were increased, likely to compensate for the loss of PKAcα. However, other tissues, including skeletal muscle, heart, and sperm, contained less than 10% of the normal PKA activity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKAc alpha, Active ¹	P51-10G	Human	Insect	N-terminal GST tag	Full Length	69 kDa
PKAc beta, Active ²	P52-10G	Human	Insect	N-terminal GST tag	Full Length	65 kDa
PKAc gamma, Active ³	P53-10G	Human	Insect	N-terminal GST tag	Full Length	65 kDa

PKC alpha	Alias	Product Substrate	Genbank ID
	AAG6 ¹ ; PKCA ¹ ; PRKCA ¹ ; PRKACA ¹ ; MGC129900 ¹ ; MGC129901 ¹ ; MGC82897 ² , PRKCA ²	CREBtide (C50-58)	NM_002737 ¹ , BC078065 ²

PKC alpha (Protein Kinase C alpha) is a member of the protein kinase C (PKC) family of serine/threonine protein kinases which are often activated by calcium and the second messenger diacylglycerol (DAG). PKC alpha has been reported to play roles in many different cellular processes, such as cell adhesion, cell transformation, cell cycle checkpoint, and cell volume control. It has also been identified as a fundamental regulator of cardiac contractility and Ca²⁺ handling in myocytes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC alpha, Active ¹	P61-18G	Human	Insect	N-terminal GST tag	Full Length	103 kDa
PKC alpha, Active ²	P61-10G	Xenopus	Insect	N-terminal GST tag	Full Length	103 kDa

AGC KINASES

PKC beta	Alias	Product Substrate	Genbank ID
	PKCB ¹ ; PRKCB ¹ ; PRKCB ² ; MGC41878 ¹ ; PKC-beta ¹ ; PRKCB ¹ ; PRKCB ¹ ² , PRKCB (X07109) ²	PKCtide (P15-58) ¹ ; CREBtide (C50-58) ²	X06318 ¹ , NM_002738 ²

PKC beta (Protein Kinase C beta) is a member of the protein kinase C (PKC) family of serine/threonine kinases which are activated by calcium and second messenger diacylglycerol (DAG). PKC beta has been reported to be involved in many different cellular functions such as B cell activation, apoptosis induction and endothelial cell proliferation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC beta I, Active ¹	P62-10G	Human	Insect	N-terminal GST tag	Full Length	102 kDa
PKC beta II, Active ²	P63-10G	Human	Insect	N-terminal GST tag	Full Length	105 kDa

PKC delta	Alias	Product Substrate	Genbank ID
	PRKCD; MAY1; MGC49908; nPKC-delta	CREBtide (C50-58)	NM_006254

PKC delta (Protein Kinase C delta) is a member of the protein kinase C (PKC) family of serine/threonine kinases. PKC delta is involved in fundamental cellular functions regulated by diacylglycerols and mimicked by phorbol esters Northern blot analysis indicated that PKC delta is widely distributed in almost all the tissues and is a major isoform of PKC expressed in hemopoietic cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC delta, Active	P64-10G	Human	Insect	N-terminal GST tag	Full Length	104 kDa

PKC epsilon	Alias	Product Substrate	Genbank ID
	PRKCE; MGC125656; MGC125657; nPKC-epsilon	PKCtide (P15-58)	NM_005400

PKC epsilon (Protein Kinase C epsilon) is a member of the protein kinase C (PKC) family of serine/threonine kinases. PKC epsilon is involved in many different cellular functions, such as neuron channel activation, cardioprotection from ischemia, heat shock response, as well as insulin exocytosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC epsilon, Active	P65-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

PKC eta	Alias	Product Substrate	Genbank ID
	PKCL; PKC-L; PRKCL; MGC5363; MGC26269; nPKC-eta, PRKCH	PKCtide (P15-58)	NM_006255

PKC eta (Protein Kinase C eta) is a member of the protein kinase C (PKC) family of serine/threonine kinases. PKC eta is predominantly expressed in squamous cell epithelia and induces terminal differentiation of keratinocytes. PKC eta that is endogenously expressed or overexpressed is found to associate with the CDK2/cyclin E/p21CIP1 complex in keratinocytes of mice and humans.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC eta, Active	P67-10G	Human	Insect	N-terminal GST tag	Full Length	103 kDa

PKC gamma	Alias	Product Substrate	Genbank ID
	PKCC; PKCG; SCA14; MGC57564; PKC-gamma; PRKCG	PKCtide (P15-58)	NM_002739

PKC gamma (Protein Kinase C gamma) is a member of the protein kinase C (PKC) family of serine/threonine kinases. PKC gamma is expressed solely in neurons within the brain and spinal cord. Studies have demonstrated that several neuronal functions specifically required PKC gamma.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC gamma, Active	P66-10G	Human	Insect	N-terminal GST tag	Full Length	105 kDa

AGC KINASES

PKC iota	Alias	Product Substrate	Genbank ID
	PRKCI; DXS1179E; MGC26534; nPKC-iota	CREBtide (C50-58)	NM_002740

PKC iota (Protein Kinase C iota) is a member of the protein kinase C family of serine/threonine kinases. PKC iota is homologous to PKC zeta, with 72% identity overall rising to 84% in the catalytic domain. PKC iota has been implicated in Ras signaling and is a critical downstream effector of oncogenic Ras in the colonic epithelium.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC iota, Active	P68-10G	Human	Insect	N-terminal GST tag	Full Length	105 kDa

PKC theta	Alias	Product Substrate	Genbank ID
	PRKCQ, PRKCT, MGC126514, MGC141919, nPKC-theta	PKCtide (P15-58)	NM_006257

PKC theta (Protein Kinase C theta) is an important component in the intracellular signaling cascade related to insulin signaling. Insulin resistance plays a primary role in the development of type 2 diabetes (T2D) and may be related to alterations in fat metabolism. PKC-theta is a crucial component mediating fat-induced insulin resistance in skeletal muscle and is a potential therapeutic target for the treatment of T2D.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC theta, Active	P74-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

PKC zeta	Alias	Product Substrate	Genbank ID
	PRKCZ; PRKCZ; PKC2	CREBtide (C50-58)	NM_002744

PKC zeta (Protein Kinase C zeta) is an atypical isoform of the PKC family. Overexpression of PKC zeta potentiates phorbol ester-induced mitogen-activated protein (MAP) kinase activation in a PKC-dependent manner. PKC zeta is an upstream modulator of p70S6K an important regulator of cell proliferation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC zeta, Active	P75-10G	Human	Insect	N-terminal GST tag	Full Length	93 kDa

PKN1	Alias	Product Substrate	Genbank ID
	PRK1, DBK, PKN1, PKN, MGC46204, PAK1, PRKCL1, PKC-L1	CREBtide (C50-58)	BC040061

PKN1/PRK1 (Protein Kinase N1/Protein Kinase C-related Protein Kinase 1) belongs to the protein kinase C superfamily which is activated by the Rho family of small G proteins. PKN mediates the Rho-dependent signaling pathway and it can be activated by phospholipids and by limited proteolysis. PDPK1/PDK may also mediate insulin signals to the actin cytoskeleton and the proteolytic activation of this kinase by caspase-3 or related proteases during apoptosis suggest its role in signal transduction related to apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKN1/PRK1, Active	P70-11G	Human	Insect	N-terminal GST tag	289-end	115 kDa

PKN2	Alias	Product Substrate	Genbank ID
	PRKCL2, PKN2, PRK2, PAK2, Pak-2, PRO2042, MGC71074, MGC150606	CREBtide (C50-58)	NM_006256

PKN2/PRK2 (Protein Kinase N2/Protein Kinase C-related Protein Kinase 2) is a Rho effector and a member of the protein kinase C superfamily of serine/threonine kinases. PKN2 is required for phosphorylation and activation of Cdc25B, the phosphatase required for activation of mitotic CDK1/cyclin complexes at the G2/M transition. The C-terminus of PKN2 could be a potential drug target for effector-specific pharmacological intervention of Rho-mediated biological processes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKN2/PRK2, Active	P71-10G	Human	Insect	N-terminal GST tag	289-end	145 kDa

AGC KINASES

PKN3	Alias	Product Substrate	Genbank ID
	RP11-545E17.1	RSK Substrate (S06-58)	NM_013355

PKN3/PRK3 (Protein Kinase N3/Protein Kinase C-related Protein Kinase 3) is a serine/threonine kinase which associates with RhoA in a GTP-dependent manner. PKN3 can also interact with GRAF and GRAF2 via the SH3 domains and phosphorylate these proteins. PKN3 is a mediator of malignant growth of human prostate cancer cells and functions downstream of activated PI3K. PKN3 is upregulated in human tumor cells but not in surrounding non-tumorigenic tissues.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKN3/PRK3, Active	P69-10G	Human	Insect	N-terminal GST tag	289-end	130 kDa

PRKG1	Alias	Product Substrate	Genbank ID
	PGK, CGKI, PRKG1B, PRKGR1B, FLJ36117, MGC71944, cGKI-BETA, cGKI-alpha, DKFZp686K042	RSK Substrate (S06-58)	NM_006258 ¹ , NP_001091982 ²

PRKG1 (Protein Kinase, CGMP-Dependent, Type 1) functions as a homodimer with each monomer containing a regulatory cGMP-binding domain and a catalytic domain. PRKG1 plays an important stimulatory role in platelet activation. PRKG1 knockout mice showed impaired platelet responses to VWF or low doses of thrombin and prolonged bleeding time. Human platelet aggregation induced by VWF or low-dose thrombin was inhibited by PRKG1 inhibitors but enhanced by cGMP.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PRKG1, Active ¹	P78-10BG	Human	Insect	N-terminal GST tag	Full Length	100 kDa
PRKG1, Active ²	P78-11G	Xenopus	Insect	N-terminal GST tag	324-end	67 kDa

PRKG2	Alias	Product Substrate	Genbank ID
	cGKII, PRKGR2	RSK Substrate (S06-58)	NM_006259

PRKG2 (Protein Kinase, CGMP-Dependent, Type 2) is a member of the cGMP-dependent protein kinase family. This protein is highly expressed in brain, lung, and intestinal mucosa. PRKG2 is a molecular switch that couples the cessation of proliferation and the start of hypertrophic chondrocyte differentiation through attenuating SOX9 function.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PRKG2, Active	P79-10G	Human	Insect	N-terminal GST tag	Full Length	112 kDa

PRKX	Alias	Product Substrate	Genbank ID
	PKX1	PAKTide (P08-58)	NM_005044

PRKX (Protein Kinase, X-Linked) is a serine/threonine kinase that is closely related to the catalytic subunit of the cAMP-dependent protein kinase. Aberrant adult kidney expression of PRKX is found in autosomal dominant polycystic kidney disease. PRKX is also involved in macrophage and granulocyte maturation. Abnormal recombination between PRKX and a related pseudogene on chromosome Y is a frequent cause of sex reversal disorder in XX males and XY females.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PRKX, Active	P81-10G	Human	Insect	N-terminal GST tag	Full Length	73 kDa

ROCK1	Alias	Product Substrate	Genbank ID
	P160ROCK; ROCK-I; ROKbeta	S6K Substrate (S05-58)	NM_005406

ROCK1 (Rho-associated Protein Kinase) is a ubiquitously expressed serine/threonine kinase that acts downstream of the small GTPase RhoA. ROCK1 is involved in diverse cellular functions, including smooth muscle contraction, actin cytoskeleton organization, cell adhesion and motility, and gene expression. ROCK1 contributes to the development of cardiac fibrosis and induction of fibrogenic cytokines in cardiomyocytes in response to pathological stimuli.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ROCK1, Active	R10-11G	Human	Insect	N-terminal GST tag	17-535	85 kDa

AGC KINASES

ROCK2	Alias	Product Substrate	Genbank ID
	KIAA0619; ROCK-II; ROKalpha	S6K Substrate (S05-58)	NM_006258 ¹ , NP_001091982 ²

ROCK2 (Rho-associated Protein Kinase) is a ubiquitously expressed serine/threonine kinase localized in the nucleus. ROCK2 regulates cytokinesis, smooth muscle contraction, the formation of actin stress fibers and focal adhesions, and the activation of the c-fos serum response element. ROCK2 is an immediate downstream target of the small GTPase RhoA. ROCK2 may play a pivotal role in cardiovascular diseases such as vasospastic angina, ischemic stroke, and heart failure.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ROCK2, Active	R11-11G	Human	Insect	N-terminal GST tag	5-554	88 kDa
ROCK2, Active	R11-11H	Xenopus	Insect	N-terminal HIS tag	5-554	66 kDa

RSK1	Alias	Product Substrate	Genbank ID
	RPS6KA1; HU-1; MAPKAPK1A; S6K-alpha 1	RSK Substrate (S06-58)	NM_002953

RSK1 (Ribosomal s6 Kinase 1) is a member of the RSK family of growth factor-regulated serine/threonine kinases. RSK1 contains two non-identical kinase catalytic domains and phosphorylates various substrates, including members of the mitogen-activated kinase (MAPK) signalling pathway. RSKs are implicated in the activation of the mitogen-activated kinase (MAPK) cascade and the stimulation of cell proliferation and differentiation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RSK1, Active	R15-10G	Human	Insect	N-terminal GST tag	Full Length	108 kDa

RSK2	Alias	Product Substrate	Genbank ID
	RPS6KA3; HU-3; MAPKAPK1B; CLS; MRX19; ISPK-1; p90-RSK2; pp90RSK2; S6K-alpha3	RSK Substrate (S06-58)	NM_004586

RSK2 (Ribosomal s6 Kinase 2) is a member of the RSK family of growth factor-regulated serine/threonine kinases. RSK2 has been shown to mediate growth factor signaling via RAS and MAPK. Mutations in RSK2 have been shown to be responsible for Coffin-Lowry syndrome (CLS) which is an X-linked disorder characterized by severe psychomotor retardation, facial and digital dysmorphisms, and progressive skeletal deformations.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RSK2, Active	R17-10G	Human	Insect	N-terminal GST tag	Full Length	112 kDa
RSK2 Mutant (I416V), Active	R17-12BG	Human	Insect	N-terminal GST tag	Full Length	112 kDa
RSK2 Mutant (L608F), Active	R17-12CG	Human	Insect	N-terminal GST tag	Full Length	112 kDa
RSK2 Mutant (Y483C), Active	R17-12DG	Human	Insect	N-terminal GST tag	Full Length	112 kDa

RSK3	Alias	Product Substrate	Genbank ID
	RSK; HU-2; RPS6KA2; p90-RSK3; pp90RSK3; MAPKAPK1C; S6K-alpha; S6K-alpha2	S6K Substrate (S05-58)	NM_021135

RSK3 (Ribosomal s6 Kinase 3) is a member of the RSK family that encodes a 733-amino-acid protein with a unique N-terminal region containing a putative nuclear localization signal. Upon stimulation, RSK3 translocates to the cell nucleus and phosphorylates nuclear proteins. RSK3 can bind to ERK1/2 and this association increases the duration of RSK3 activation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RSK3, Active	R16-10G	Human	Insect	N-terminal GST tag	Full Length	112 kDa

AGC KINASES

RSK4	Alias	Product Substrate	Genbank ID
	RPS6KA6	RSK Substrate (S06-58)	NM_014496

RSK4 (Ribosomal s6 Kinase 4) is a member of the 90-kDa ribosomal S6 kinase family which are important components of growth factor-mediated stimulation of cellular proliferation, survival and differentiation. RSK4 is activated via coordinated phosphorylation by ERK and 3-phosphoinositide-dependent protein kinase-1 (PDK1). It is often associated with contiguous gene syndromes consisting of X-linked deafness type 3 (DFN3), mental retardation (MRX) and choroideremia.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RSK4, Active	R20-10G	Human	Insect	N-terminal GST tag	Full Length	112 kDa

SGK1	Alias	Product Substrate	Genbank ID
	SGK	AKT (SGK) Substrate (A08-58)	NM_005627

SGK1 (Serum/Glucocorticoid Regulated Kinase 1) is a member of the serum- and glucocorticoid-induced protein kinases. SGK1 is activated in vitro by 3-phosphoinositide-dependent protein kinase-1 (PDK1) and in vivo in response to signals that activate phosphatidylinositol (PI) 3-kinase. SGK1 promotes cell survival by phosphorylating and inactivating FKHL1.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SGK1, Active	S06-10G	Human	Insect	N-terminal GST tag	Full Length	75~82 kDa
SGK1, Active	S06-11G	Human	Insect	N-terminal GST tag	60-end	73 kDa

SGK2	Alias	Product Substrate	Genbank ID
	H-SGK2; dJ138B7.2	AKT (SGK) Substrate (A08-58)	NM_170693

SGK2 (Serum/Glucocorticoid Regulated Kinase 2) is a member of the serum- and glucocorticoid-induced kinases (SGK) which belong to the AGC kinase subfamily. SGK2, like the other two isoforms SGK1 and SGK3, is stimulated by insulin and insulin-like growth factor-1 (IGF-1), and has been shown to enhance Na⁺/K⁺-ATPase activity in a variety of cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SGK2, Active	S07-10G	Human	Insect	N-terminal GST tag	Full Length	71 kDa

SGK3	Alias	Product Substrate	Genbank ID
	CISK, SGKL	AKT (SGK) Substrate (A08-58)	NM_013257

SGK3 (Serum/Glucocorticoid Regulated Kinase 3) is a member of the SGK family and encodes a phosphoprotein with a PX (phox homology) domain. PKD1 can phosphorylate and activate SGK3 in vitro. A 10-fold increase in PKD1 increases the phosphorylation status of SGK3. SGK3 phosphorylates several target proteins and has a role in neutral amino acid transport and activation of potassium and chloride channels.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SGK3, Active	S08-10G	Human	Insect	N-terminal GST tag	Full Length	82 kDa

STK21	Alias	Product Substrate	Genbank ID
	CIT; CRIK	MBP Protein (M42-51N)	NM_007174

STK21 (Serine-Threonine Kinase 21) is a serine/threonine kinase that functions in cell division and also to promote efficient cytokinesis. STK21 is a novel molecular mechanism for a subset of human malformation syndromes of the central nervous system. STK21 is also associated with bipolar disorder and risk for schizophrenia. STK21 is a novel partner for the GTP-bound forms of Rho and Rac.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK21 (CIT), Active	C52-11G	Human	Insect	N-terminal GST tag	1-449	74 kDa

AGC KINASES

STK32B	Alias	Product Substrate	Genbank ID
	YANK2; STK32B; STK32; STKG6; HSA250839	MBP Protein (M42-51N)	BC038238

STK32B (Serine-Threonine Kinase 32B) is a serine/threonine kinase that contains a motif for binding metal ions and nucleotides. STK32B has been associated with isolated cleft lip with or without cleft palate and cleft palate which are among the most common human birth defects of oral cleft cases. Long interspersed nuclear element-1 (LINE-1 or L1) mediated deletion of the STK32B gene is observed in patients with Ellis-van Creveld syndrome with borderline intelligence.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK32B (YANK2), Active	Y04-10G	Human	Insect	N-terminal GST tag	1-449	72 kDa

STK32C	Alias	Product Substrate	Genbank ID
	STK32C, YANK3, PKE, RP11-140A10.1	MBP Protein (M42-51N)	NM_173575

STK32C (Serine-Threonine Kinase 32C) is a member of the YANK family of serine/threonine kinases. STK36C requires magnesium for catalytic activity. There are two isoforms of the protein generated by alternative splicing and the protein undergoes serine phosphorylation by upstream protein kinases. The STK32C gene product is conserved in many species including chimpanzee, dog, cow, mouse, rat, and chicken.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK32C (YANK3), Active	Y05-11G	Human	Insect	N-terminal GST tag	66-end	72 kDa

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Active Methyltransferases	Active Histone Deacetylases

ATYPICAL KINASES

Atypical Kinases

Eukaryotic Protein Kinases (ePKs) include most of the kinase enzymes in humans. Atypical kinases differ from stereotypical ePKs in the sequence of their catalytic domains. Atypical kinases include several medically relevant enzymes, such as BCR and the PDHK subgroups. The constitutively active kinase BCR-ABL is a hallmark of Chronic Myeloid Leukemia (CML). Numerous TKIs have been developed to specifically target this BCR-ABL and its TKI resistant secondary mutant variants. PDHKs regulate mitochondrial metabolism by inhibiting the Krebs cycle, making PDHK an attractive target for therapies to manage metabolic disorders such as diabetes.

EEF2K	Alias	Product Substrate	Genbank ID
	eEF-2K, HSU93850, MGC45041	EF2tide (E01-58)	NM_013302

EEF2K (Eukaryotic Elongation Factor-2 Kinase) is a highly conserved calmodulin-dependent protein kinase III that links activation of cell surface receptors to cell division. It phosphorylates and inhibits eukaryotic elongation factor 2 (EEF2), a cytoplasmic protein that catalyzes the movement of the ribosome along mRNA during translation. EEF2K is highly expressed in heart and skeletal muscle. In addition, EEF2K is highly expressed in patients with systemic lupus erythematosus as well as in cancers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EEF2K, Active	E01-10G	Human	Insect	N-terminal GST tag	Full Length	125 kDa

FASTK	Alias	Product Substrate	Genbank ID
	FAST; FLJ13079	PKA Substrate (C01-58)	NM_006712

FASTK (Fas-Activated Serine/Threonine Kinase) is a member of the serine/threonine protein kinase family that becomes rapidly activated during Fas-mediated apoptosis in Jurkat cells and in response to Fas receptor ligation. Activated FASTK phosphorylates TIA1, an apoptosis-promoting nuclear RNA-binding protein to initiate the Jurkat cell Fas-mediated apoptosis. FASTK is a strong inducer of lymphocyte apoptosis as FASTK is the component of the molecular cascade that involved in FAS-mediated apoptosis. FASTK is highly expressed in heart, brain, placenta, lung, liver, skeletal muscle, kidney, and pancreas.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FASTK, Active	F01-10G	Human	Insect	N-terminal GST tag	Full Length	84 kDa

PDHK1	Alias	Product Substrate	Genbank ID
	PDK1	PDHA1 Protein (P57-55H)	NM_002610

PDHK1 (Pyruvate Dehydrogenase Kinase 1) is a member of the PDHK family that phosphorylates and inactivates the Pyruvate Dehydrogenase (PDH) enzyme. PDH is a mitochondrial multi-enzyme complex that catalyzes the oxidative decarboxylation of pyruvate and is one of the major enzymes responsible for the regulation of homeostasis of carbohydrate fuels in mammals. PDHK1 is an important regulator of PDH in clonal β -cells and the activity of PDHK1 and PDH are important for efficient metabolic coupling. Maintaining low PDHK1 expression/ activity and conserving PDH in a dephosphorylated and active state is important for β -cells to achieve optimized glucose-stimulated insulin secretion.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDHK1, Active	P57-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa

ATYPICAL KINASES

PDHK2	Alias	Product Substrate	Genbank ID
	PDK2	PDHA1 Protein (P57-55H)	NM_002611

PDHK2 (Pyruvate Dehydrogenase Kinase 2) is a member of the PDHK family. PDH is a mitochondrial multienzyme complex that catalyzes the oxidative decarboxylation of pyruvate and is one of the major enzymes responsible for the regulation of homeostasis of carbohydrate fuels in mammals. PDHK2 is a target of peroxisome proliferator-activated receptor (PPARs), reinforcing the importance of PPAR in metabolic regulation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDHK2, Active	P58-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa

PDHK3	Alias	Product Substrate	Genbank ID
	PDK3	PDHA1 Protein (P57-55H)	NM_005391

PDHK3 (Pyruvate Dehydrogenase Kinase 3) is a member of the PDHK family. HIF-1 (hypoxia-inducible factor 1) induces PDHK3 expression leading to inhibition of mitochondrial respiration. Inappropriately expressed PDHK3 results in increased lactic acid accumulation and drug resistance in cancer cells, whereas knocking down PDHK3 prevents hypoxia-induced cytoplasmic glycolysis and cell survival.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDHK3, Active	P59-10G	Human	Insect	N-terminal GST tag	Full Length	69 kDa

PDHK4	Alias	Product Substrate	Genbank ID
	PDK4; FLJ40832	PDHA1 Protein (P57-55H)	NM_002612

PDHK4 (Pyruvate Dehydrogenase Kinase 4) is a member of the PDHK family. Upregulation of PDHK4 in adipocytes results in the hypolipidemic effect of thiazolidinediones through modulation of glyceroneogenesis. PDHK4 expression is strongly and selectively induced by Rosiglitazone in a direct and transcriptional manner.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDHK4, Active	P60-10G	Human	Insect	N-terminal GST tag	Full Length	71 kDa

STK19	Alias	Product Substrate	Genbank ID
	D6S60; D6S60E; G11; HLA-RP1; RP1	CREBtide (C50-58)	NM_004197

STK19 (Serine/Threonine Protein Kinase 19) is a serine/threonine protein kinase which localizes within the nucleus at the major histocompatibility complex class III region of chromosome 6. STK19 is involved in transcriptional regulation by phosphorylating alpha-casein at the serine/threonine residues and histone at serine residues only.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK19, Active	S35-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa

CAMK KINASES

CAMK Kinases

Ca²⁺/Calmodulin-dependent kinases (CaMKs) are serine/threonine kinases that mediate many of the second messenger effects of Ca²⁺ via their conserved C-terminal Ca²⁺/Calmodulin-binding domains. CAMKs are indispensable metabolic sensors, which can respond to ion flux or concentration gradients to elicit programs that regulate cell migration, cell cycle and cell polarity.

Well-known CAMKs include AMP-activated protein kinase (AMPK) and CAMK2 (CAMKII). AMPK is activated in response to low cellular ATP levels. As a metabolic regulator, AMPK is an important facet of how cancer cells use energy. CAMK2 is widely expressed and it is required for a wide range of processes, from learning to heart function. Due to its role in translating information from short-term to long-term memory, CAMK2 is often referred to as the “memory molecule”. In the synapses of neurons, long-term potentiation (LTP) elicits Ca²⁺ influx, activating CAMK2. In turn, the kinase phosphorylates proteins to reinforce LTP and strengthen the synapse. In the heart, CAMK2 activity is promotes contractile strength of the cardiac muscle. Thus, hyperactivation of CAMK2 can lead to high blood pressure and cardiac hypertrophy. Due to their wide range physiological roles, members of the CAMK protein kinase family are excellent targets for pharmaceutical intervention. Currently, small molecule AMPK activators are under evaluation for cancer prevention and therapy and CAMK2 inhibitors are showing promise as agents for treating hypertension and other heart-related conditions.

AMPK	Alias	Product Substrate	Genbank ID
	<u>A1</u> : PRKAA1, MGC33776, MGC57364 <u>A2</u> : PRKAA2, AMPK, AMPK2, PRKAA <u>B1</u> : PRKAB1, AMPK, HAMPKb, MGC17785, <u>B2</u> : PRKAB2, MGC61468, <u>G1</u> : PRKAG1, AMPKG, MGC8666, <u>G2</u> : PRKAG2, AAKG, CMH6, WPWS, AAKG2, H91620p, <u>G3</u> : PRKAG3	SAMStide (S07-58)	<u>A1</u> : NM_006251 <u>A2</u> : NM_006252 <u>B1</u> : NM_006253 <u>B2</u> : NM_005399 <u>G1</u> : NM_002733 <u>G2</u> : NM_001040633 <u>G3</u> : NM_017431

AMPK (AMP-Activated Protein Kinase) is an important enzyme in monitoring cellular energy status. AMPK consists of 3 subunits; an alpha catalytic subunit and 2 non-catalytic beta and gamma subunits. Due to its role as a central regulator of both lipid and glucose metabolism, AMPK is considered to be a potential therapeutic target for the treatment of type II diabetes mellitus, obesity, and cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AMPK (A1/B1/G1), Active	P47-10H	Human	Insect	C-terminal His tags	Full Length	<u>A1</u> : 68 kDa <u>B1</u> : 38 kDa <u>G1</u> : 40 kDa
AMPK (A1/B1/G2), Active	P55-10G	Human	Insect	N/C-terminal GST/His	Full Length	<u>A1</u> : 92 kDa <u>B1</u> : 65kDa <u>G2</u> : 105 kDa
AMPK (A1/B1/G2), Active	P55-10H	Human	Insect	C-terminal His tags	Full Length	<u>A1</u> : 68 kDa <u>B1</u> : 38 kDa <u>G2</u> : 65 kDa

CAMK KINASES

AMPK (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AMPK (A1/B1/G3), Active	P56-10G	Human	Insect	N/C-terminal GST/His	Full Length	<u>A1</u> : 92 kDa <u>B1</u> : 65 kDa <u>G3</u> : 108 kDa
AMPK (A1/B1/G3), Active	P56-10H	Human	Insect	C-terminal His tags	Full Length	<u>A1</u> : 68 kDa <u>B1</u> : 38 kDa <u>G3</u> : 51 kDa
AMPK (A1/B2/G1), Active	P50-10G	Human	Insect	N/C-terminal GST/ His	Full Length	<u>A1</u> : 92 kDa <u>B2</u> : 62 kDa <u>G1</u> : 68 kDa
AMPK (A1/B2/G1), Active	P50-10H	Human	Insect	C-terminal His tag	Full Length	<u>A1</u> : 68 kDa <u>B2</u> : 36 kDa <u>G1</u> : 40 kDa
AMPK (A1/B2/G2), Active	P45-10G	Human	Insect	N/C-terminal GST/His	Full Length	<u>A1</u> : 92 kDa <u>B2</u> : 62 kDa <u>G2</u> : 105 kDa
AMPK (A1/B2/G3), Active	P83-10G	Human	Insect	N/C-terminal GST/His	Full Length	<u>A1</u> : 92 kDa <u>B2</u> : 62 kDa <u>G3</u> : 108 kDa
AMPK (A2/B1/G1), Active	P48-10H	Human	Insect	C-terminal His tags	Full Length	<u>A2</u> : 69 kDa <u>B1</u> : 38 kDa <u>G1</u> : 40 kDa
AMPK (A2/B1/G2), Active	P84-10GH	Human	Insect	N/C-terminal GST/His	Full Length	<u>A2</u> : 92 kDa <u>B1</u> : 65 kDa <u>G2</u> : 105 kDa
AMPK (A2/B1/G3), Active	P85-10GH	Human	Insect	N/C-terminal GST/His	Full Length	<u>A2</u> : 92 kDa <u>B1</u> : 65 kDa <u>G3</u> : 108 kDa
AMPK (A2/B2/G1), Active	P49-10GH	Human	Insect	N/C-terminal GST/His	Full Length	<u>A2</u> : 92 kDa <u>B2</u> : 62 kDa <u>G1</u> : 68 kDa
AMPK (A2/B2/G1), Active	P49-10H	Human	Insect	C-terminal His tags	Full Length	<u>A2</u> : 69 kDa <u>B2</u> : 36 kDa <u>G1</u> : 41 kDa
AMPK (A2/B2/G2), Active	P54-10GH	Human	Insect	N/C-terminal GST/His	Full Length	<u>A2</u> : 92 kDa <u>B2</u> : 62 kDa <u>G2</u> : 105 kDa
AMPK (A2/B2/G2), Active	P54-10H	Human	Insect	C-terminal His tags	Full Length	<u>A2</u> : 69 kDa <u>B2</u> : 36 kDa <u>G2</u> : 65 kDa
AMPK (A2/B2/G3), Active	P46-10GH	Human	Insect	N/C-terminal His tags	Full Length	<u>A2</u> : 92 kDa <u>B2</u> : 62 kDa <u>G3</u> : 108 kDa

CAMK KINASES

BRSK	Alias	Product Substrate	Genbank ID
	Gm1100 ¹ ; MGC99905 ¹ ; SAD-B ¹ ; SADB ¹ , HUSSY-12 ² , C11orf7 ² ; PEN11B ² ; SAD1 ² ; STK29 ²	Chktide (C10-58)	NM_001003920 ¹ NM_003957 ²

BRSK1 (BR Serine/Threonine Kinase 1) is a serine/threonine kinase which is required for presynaptic differentiation in *C. elegans*. BRSK1 is highly expressed in all specific adult brain regions followed by fetal brain and adult spinal cord. BRSK2 is a serine/threonine kinase, which is enriched in the brain, with weaker expression in testis and pancreas. Endogenous BRSK2 kinase activity is induced by DNA damage caused by ultraviolet (UV) irradiation or methyl methane sulfonate, but not by ionizing radiation. Overexpression of BRSK2 induces G2/M arrest in HeLa cells while small interfering RNA against BRSK2 partly abrogated UV-induced G2/M arrest.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BRSK1, Active ¹	B13-10G	Mouse	Insect	N-terminal GST tag	Full Length	118 kDa
BRSK2, Active ²	B14-10G	Human	Insect	N-terminal GST tag	Full Length	108 kDa

CAMK1	Alias	Product Substrate	Genbank ID
	AI505105 ¹ ; D6Ertd263e ¹ , Punc ² ; Bstk3 ² ; CaMKIb2 ² ; caMKIb1 ² ; Pnc ² ; RP11-462F15.1 ³ ; CKLiK ³ ; CaM-K1 ³ ; CaMKID ³ ; VWS1 ^{4,5} ; CLICKIII ^{4,5} ; dJ272L16.1 ^{4,5}	Autocamide 2 (A15-58)	NM_133926 ¹ NM_012040 ² NM_153498 ³ NM_020439 ^{4,5}

CAMK1 (Calcium/Calmodulin-Dependent Protein Kinase 1) is a serine/threonine protein kinase that phosphorylates a number of proteins including SYN1, SYN2, CREB and CFTR. CAMK1 phosphorylates HDAC7 on multiple sites that lead to alteration in localization of HDAC7 between the cytoplasm and nucleus.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CAMK1, Active ¹	C07-10G	Mouse	E. coli	N-terminal GST Tag	Full Length	70 kDa
CAMK1 beta, Active ²	C08-10G	Mouse	Insect	N-terminal GST Tag	Full Length	64 kDa
CAMK1 delta, Active ³	C09-10G	Human	Insect	N-terminal GST tag	Full Length	68 kDa
CAMK1 gamma, Active ⁴	C10-10BG	Human	Insect	N-terminal GST Tag	Full Length	80 kDa
CAMK1 gamma, Active ⁵	C10-11G	Human	Insect	N-terminal GST Tag	1-330	69 kDa

CAMK2	Alias	Product Substrate	Genbank ID
	CAMKA ¹ ; KIAA0968 ¹ ; CAMKB ^{2,3} , CAM2 ^{2,3} , CAMK2 ^{2,3} , MGC29528 ^{2,3} , CAMKD ⁴ , MGC44911 ⁴ ; CAMKG ^{5,6} , CAMK ^{5,6} , CAMK-II ^{5,6} , MGC26678 ^{5,6}	Autocamide 2 (A15-58)	NM_171825 ¹ NM_172081 ^{2,3} NM_172115 ⁴ NM_172169 ^{5,6}

CAMK2 (Calcium/Calmodulin-Dependent Protein Kinase 2) is a serine/threonine kinase that is regulated by the Calcium/Calmodulin complex. CAMK2 is necessary for Ca²⁺ homeostasis and reuptake in cardiomyocytes, chloride transport in epithelia, positive T-cell selection, and CD8 T-cell activation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CAMK2 alpha, Active ¹	C11-10G	Human	Insect	N-terminal GST Tag	Full Length	74 kDa
CAMK2 beta, Active ²	C12-10H	Human	Insect	N-terminal His tag	Full Length	58 kDa
CAMK2beta, Active ³	C12-10G	Human	Insect	N-terminal GST Tag	Full Length	81 kDa
CAMK2 delta, Active ⁴	C13-10G	Human	Insect	N-terminal GST Tag	Full Length	77 kDa
CAMK2 gamma, Active ⁵	C14-10G	Human	Insect	N-terminal GST Tag	c-terminal truncation	60 kDa
CAMK2gamma, Active ⁶	C14-10BG	Human	Insect	N-terminal GST Tag	Full Length	86 kDa

CAMK KINASES

CAMK4	Alias	Product Substrate	Genbank ID
	CaMK-GR; MGC36771	Autocamtide 2 (A15-58)	NM_001744

CAMK4 (Calcium/Calmodulin-Dependent Protein Kinase 4) is a multifunctional serine/threonine protein kinase involved in neural activity-dependent signaling in the neuronal nucleus and thought to play an important role in the consolidation/retention of hippocampus-dependent long-term memory.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CAMK4, Active	C15-10G	Human	Insect	N-terminal GST tag	Full Length	79 kDa

CASK	Alias	Product Substrate	Genbank ID
	CAGH39; CAMGUK; CMG; FGS4; LIN2; MICPCH; TNRC8	PKA Substrate (C01-58)	NM_003688

CASK (Calcium/Calmodulin Dependent Serine Protein Kinase) is a Calcium/Calmodulin-dependent serine protein kinase located at synapses in the brain. CASK functions as a cytoskeletal membrane scaffold that coordinates signal transduction pathways within the cortical cytoskeleton.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CASK, Active	C19-11G	Human	Insect	N-terminal GST tag	1-570	95 kDa

CHK1	Alias	Product Substrate	Genbank ID
	CHEK1	Chktide (C10-58)	NM_001274

CHK1 (Checkpoint Kinase 1) is a serine/threonine protein kinase that was originally identified in fission yeast. It was found to play a role in activation of the DNA damage checkpoint in the G2-phase of the cell cycle. CHK1 prevents damaged cells from progressing through the cell cycle through the initiation of cell cycle checkpoints, cell cycle arrest and DNA repair.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CHK1, Active	C47-10G	Human	Insect	N-terminal GST tag	Full Length	82 kDa
CHK1, Active	C47-10H	Human	Insect	N-terminal HIS tag	Full Length	59 kDa

CHK2	Alias	Product Substrate	Genbank ID
	RP11-436C9.1, CDS1, CHEK2, HuCds1, LFS2, PP1425, RAD53	Chktide (C10-58)	NM_007194

CHK2 (Checkpoint Kinase 2) is a multifunctional enzyme whose functions are central to the induction of cell cycle arrest and apoptosis by DNA damage. CHK2 is rapidly phosphorylated and activated in response to replication blocks and DNA damage.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CHK2, Active	C48-10G	Human	Insect	N-terminal GST tag	Full Length	88 kDa

DAPK1	Alias	Product Substrate	Genbank ID
	DAPK, DKFZp781I035	MBP Protein (M42-51N)	NM_004938

DAPK1 (Death-Associated Protein Kinase 1) is a mediator of gamma-interferon induced programmed cell death. DAPK1 is a pro-apoptotic regulator, which is controlled both by its phosphorylation status and protein stability. Activation of DAPK occurs via dephosphorylation of Ser-308 and subsequent association of calcium/calmodulin.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DAPK1, Active	D01-11G	Human	Insect	N-terminal GST tag	1-363	71 kDa

CAMK KINASES

DAPK2	Alias	Product Substrate	Genbank ID
	DRP-1; MGC119312	LC20 Protein (M89-54G)	NM_014326

DAPK2 (Death-Associated Protein Kinase 2) is a mediator of gamma-interferon induced programmed cell death. DAPK2 contains N-terminal kinase domain followed by a conserved calmodulin-binding domain that is homologous to DAPK1. In bone marrow, DAPK2 plays a role in the hematopoiesis of granulocytes (granulopoiesis).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DAPK2, Active	D02-10G	Human	Insect	N-terminal GST tag	Full Length	67 kDa

DAPK3	Alias	Product Substrate	Genbank ID
	ZIP, ZIPK, FLJ36473	MBP Protein (M42-51N)	NM_001348

DAPK3 (Death-Associated Protein Kinase 3) is a nuclear serine/threonine protein kinase that phosphorylates core histones H3 and H4 and myosin light chains. The C-terminal leucine zipper structure of DAPK3 is necessary for homo-dimerization and activation of the kinase.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DAPK3, Active	D03-10G	Human	Insect	N-terminal GST tag	Full Length	79 kDa

DCAMKL1	Alias	Product Substrate	Genbank ID
	DCLK1; DCDC3A; DCLK; KIAA0369	Autocamtide 2 (A15-58)	NM_004734

DCAMKL (Double Cortin-Like Kinase) is a microtubule-associated kinase that is involved in several different cellular processes, including neuronal migration, retrograde transport, neuronal apoptosis and neurogenesis. DCAMKL contains two N-terminal double cortin domains, which bind microtubules and regulate microtubule polymerization, a C-terminal serine/threonine protein kinase domain and a serine/proline-rich domain between the doublecortin and the protein kinase domains, which mediate protein-protein interactions.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DCAMKL1, Active	D14-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa
DCAMKL1, Active	D14-11G	Human	Insect	N-terminal GST tag	266-end	80 kDa

DCAMK2	Alias	Product Substrate	Genbank ID
	DCLK2; DCK2; DCDC3; DCDC3B; DKFZp761I032; MGC45428	MBP Protein (M42-51N)	NM_001040261

DCAMKL2 (Double Cortin-Like Kinase 2) is a homolog of DCX (doublecortin). DCX is linked to intractable epilepsy in humans, a disease caused by severe disorganization of the neocortex and hippocampus. DCAMKL2-null mice display frequent spontaneous seizures that originate in the hippocampus, with most animals dying within the first few months.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DCAMKL2, Active	D15-11G	Human	Insect	N-terminal GST tag	1-690	105 kDa

DRAK1	Alias	Product Substrate	Genbank ID
	DRAK1; STK17A	MRCL3 Peptide (M56-58)	NM_004760

DRAK1 (DAP Kinase-Related Apoptosis-Inducing Protein Kinase 1) is a member of the DAP kinase-related apoptosis-inducing protein kinase family. DRAK1 contains a kinase domain responsible for inducing apoptosis. The non-catalytic C-terminus of DRAK1 is crucial for full kinase activity. DRAK1 is a direct target of p53 and a modulator of cisplatin toxicity and reactive oxygen species in testicular cancer cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DRAK1 (STK17A), Active	S33-10G	Human	Insect	N-terminal GST tag	Full Length	83 kDa

CAMK KINASES

DRAK2	Alias	Product Substrate	Genbank ID
	DRAK2; STK17B	MRCL3 Peptide (M56-58)	NM_004226

DRAK2 (DAP Kinase-Related Apoptosis-Inducing Protein Kinase 2) is a serine/threonine kinase and a member of the DAP kinase-related apoptosis-inducing protein kinase family. DRAK2 is related to death-associated protein kinase that triggers apoptosis. DRAK2 is selectively important for T-cell survival and inhibition of DRAK2 has therapeutic potential for autoimmune disease.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DRAK2 (STK17B), Active	S34-10G	Human	Insect	N-terminal GST tag	Full Length	69 kDa

HUNK	Alias	Product Substrate	Genbank ID
	MAKV, MAK-V	MBP Protein (M42-51N)	NM_014586

HUNK (Hormonally Up-Regulated Neu-Associated Kinase) is a member of the mitogen-activated protein kinase. HUNK is essential for mammary tumor metastasis. Given that abrogation of HUNK in mice does not alter viability, fertility, longevity, or propensity to develop tumors and it is also dispensable for murine development.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HUNK, Active	H08-10G	Human	Insect	N-terminal GST tag	Full Length	108 kDa

MAPKAPK2	Alias	Product Substrate	Genbank ID
	DCLK1; DCDC3A; DCLK; KIAA0369	HSP27tide (H31-58)	NM_032960

MAPKAPK2 (MAPKAP Kinase 2) is a serine/threonine protein kinase which is regulated via direct phosphorylation by p38 MAP kinase. MAPKAPK2 is involved in many cellular processes, including stress and inflammatory responses, nuclear export, gene expression and cell proliferation. Heat shock protein, HSP27, is a common known substrate of MAPKAPK2.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MAPKAPK2, Active	M40-11G	Human	Insect	N-terminal GST tag	46-end	68 kDa (2 isoforms)
MAPKAPK2, Active	M40-11H	Human	Insect	N-terminal HIS tag	46-end	41 kDa (2 isoforms)

MAPKAPK3	Alias	Product Substrate	Genbank ID
	3PK; MAPKAP3; 3pK	HSP27tide (H31-58)	NM_004635

MAPKAP3 (MAPKAP Kinase 3) is a serine/threonine protein kinase and is activated by growth inducers and stress stimulation of cells. ERK, p38, MAP kinase and JNK phosphorylate and activate MAPKAP3 kinase. The main role of MAPKAPK3 is to be integrative element of signaling in both mitogen and stress responses.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MAPKAPK3, Active	M41-10G	Human	Insect	N-terminal GST tag	Full Length	69 kDa

MAPKAPK5	Alias	Product Substrate	Genbank ID
	PRAK	HSP27tide (H31-58)	NM_003668

MAPKAPK5 (MAPKAP Kinase 5) is a member of the serine/threonine kinase family that responds to cellular stress and proinflammatory cytokines. MAPKAPK5 is activated through its phosphorylation by MAP kinases including ERK, p38-alpha, and p38-beta. In vitro, MAPKAPK5 kinase phosphorylates heat shock protein, HSP27, at physiologically relevant sites.

CAMK KINASES

MAPKAPK5 (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MAPKAPK5, Active	M42-10G	Human	Insect	N-terminal GST tag	Full Length	69 kDa

MARK1	Alias	Product Substrate	Genbank ID
	MARK, KIAA1477	Chktide (C10-58)	BC114478

MARK1 (Microtubule Affinity Regulating Kinase 1) is a member of the MARK family and is a serine/threonine-protein kinase that plays a key role in signal transduction. Due to its protein serine/threonine kinase activity, MARK1 is known to mediate phosphorylation of key proteins involved in signal transduction and cell communication. MARK1 phosphorylates microtubule-associated proteins and trigger microtubule disruption. Mice lacking functional MARK1 displayed hind leg motor dysfunction and inability to drink.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MARK1, Active	M43-10G	Human	Insect	N-terminal GST tag	Full Length	125 kDa

MARK2	Alias	Product Substrate	Genbank ID
	EMK1, PAR-1, MGC99619	Chktide (C10-58)	NM_001039469

MARK2 (Microtubule Affinity Regulating Kinase 2) is an important regulator of cell polarity in epithelial and neuronal cells through the control of microtubule stability. Key targets of MARK2 include several microtubule-associated proteins, including Tau. MARK2 phosphorylates kinesin-like motor protein GAKIN/KIF13B to regulate axon formation. MARK2 function in the establishment of T cell polarity following engagement to an APC.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MARK2, Active	M44-10G	Human	Insect	N-terminal GST tag	Full Length	114 kDa

MARK3	Alias	Product Substrate	Genbank ID
	KP78, CTAK1, PAR1A	Chktide (C10-58)	NM_002376

MARK3 (Microtubule Affinity Regulating Kinase 3) is a member of the PAR-1/MARK kinase family which play critical roles in polarity and cell cycle control and are regulated by 14-3-3 scaffolding proteins, as well as the LKB1 tumour suppressor kinase and atypical protein kinase C (PKC). MARK3 is a dual-specificity protein kinase that controls entry into mitosis by dephosphorylating CDC2. MARK3 appears to be a positive regulator of the beta-catenin pathway and an inhibitor of the JNK pathway.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MARK3, Active	M45-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

MARK4	Alias	Product Substrate	Genbank ID
	MARKL1; KIAA1860	Chktide (C10-58)	NM_031417

MARK4 (Microtubule Affinity Regulating Kinase 4) is a member of the Par-1 family of serine/threonine protein kinases. MARK4 is predominantly expressed in the brain and readily phosphorylates Tau, MAP2 and MAP4. Overexpression of MARK4 causes thinning out of the microtubule network, concomitant with the reorganization of microtubules into bundles. MARK4 provides a growth advantage to cells and the up-regulation of this kinase may represent an interesting new target for pharmacological intervention.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MARK4, Active	M46-10G	Human	Insect	N-terminal GST tag	Full Length	104 kDa

CAMK KINASES

MELK	Alias	Product Substrate	Genbank ID
	HPK38, KIAA0175	ZIPTide (Z16-58)	NM_014791

MELK (Maternal Embryonic Leucine Zipper Kinase) is a member of the CAMKL kinase family. MELK is a key regulator of the proliferation of malignant brain tumors and various other types of cancers. MELK transcript abundance correlates with malignancy grade in human astrocytomas and represents a therapeutic target for the management of the most frequent brain tumors in adult and children. MELK also plays a role in mammary carcinogenesis through inhibition of the pro-apoptotic function of Bcl-GL.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MELK, Active	M50-11G	Human	Insect	N-terminal GST tag	1-340	61 kDa
MELK, Active	M50-18G	Human	Insect	N-terminal HIS tag	1-550	88 kDa
MELK Mutant (T460M), Active	M50-12G	Human	Insect	N-terminal GST tag	1-550	88 kDa

MLCK	Alias	Product Substrate	Genbank ID
	MYLK, KRP, MLCK108, MLCK210, MSTP083, FLJ12216, DKFZ-p686I10125	LC20 Protein (M89-54G)	NM_053025

MLCK (Myosin Light Chain Kinase) is a muscle member of the immunoglobulin gene superfamily and is a calcium/calmodulin dependent protein kinase. MLCK is a regulatory protein for smooth muscle contraction which acts to phosphorylate 20-kDa myosin light chain (MLC20) and activate myosin ATPase activity. Phosphorylation of the regulatory light chain of myosin plays an important role in the control of morphological changes in cell division.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MLCK, Active	M62-11G	Human	Insect	N-terminal GST tag	1425-1776	70 kDa

MNK1	Alias	Product Substrate	Genbank ID
	MKNK1	MBP Protein (M42-51N)	NM_003684

MNK1 (MAP Kinase-Interacting Kinase 1) is a serine/threonine kinase which was isolated by a novel expression screening method for identifying the protein kinase substrates. MNK1 is expressed in all tissues with the highest level of expression in skeletal muscle.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MNK1, Active	M54-10G	Human	Insect	N-terminal GST tag	Full Length	92 kDa

MNK2	Alias	Product Substrate	Genbank ID
	MKNK2; GPRK7	MBP Protein (M42-51N)	NM_017572

MNK2 (MAP Kinase-Interacting Kinase 2) is a serine/threonine kinase which binds to the growth factor-regulated MAP kinases, ERK1 and ERK2. ERK and p38 phosphorylate MNK2, and stimulates kinase activity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MNK2, Active	M55-10G	Human	Insect	N-terminal GST tag	Full Length	74 kDa

MYLK2	Alias	Product Substrate	Genbank ID
	skMLCK, KMLC, MLCK, MLCK2	LC20 Protein (M89-54G)	NM_033118

MYLK2 (Myosin Light Chain Kinase 2) is a member of the myosin light chain kinase family and it is exclusively expressed in adult skeletal muscle. MYLK2 is involved in multiple molecular functions as a result of various subdomains that participate in ATP binding, calmodulin binding, nucleotide binding, protein serine/threonine kinase activity and transferase activity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MYLK2, Active	M63-10H	Human	Insect	N-terminal His tag	Full Length	74 kDa

CAMK KINASES

MYLK3	Alias	Product Substrate	Genbank ID
	caMLCK; MLCK, MLCK2, MGC126319, MGC126320	LC20 Protein (M89-54G)	BC109097

MYLK3 (Myosin Light Chain Kinase 3) plays a key role in rate of cross-bridge recruitment in cardiac myocytes. MYLK3 is upregulated in failing human myocardia and expression of MYLK3 correlates with the pulmonary arterial pressure of patients with heart failure. Knockdown of MYLK3 with small interfering RNAs in cultured rat cardiomyocytes decreases Myl2 phosphorylation and impairs epinephrine-induced activation of sarcomere reassembly.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MYLK3, Active	M64-10G	Human	Insect	N-terminal GST tag	Full Length	135 kDa

MYLK4	Alias	Product Substrate	Genbank ID
	SGK085	LC20 Protein (M89-54G)	BC132833

MYLK4 (Myosin Light Chain Kinase 4) is serine/threonine protein kinases in which MYLK4 is one of four myosin light chain kinases in a comprehensive analysis of protein kinases encoded by the human genome.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MYLK4, Active	M74-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa

NIM1	Alias	Product Substrate	Genbank ID
	MGC42105	Chktide (C10-58)	NM_153361

NIM1 is a calcium/calmodulin-dependent protein kinase belonging to CAMK serine/threonine protein kinase family. NIM1 may play a role in cell-cycle regulation by acting at the G0-1/S-phase transition. Unlike to other AMPK-related kinases, NIM1 cannot be phosphorylated and activated by LKB1.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NIM1, Active	N14-10G	Human	Insect	N-terminal GST tag	Full Length	74 kDa

NUAK1	Alias	Product Substrate	Genbank ID
	ARK5; KIAA0537	Chktide (C10-58)	NM_014840

NUAK1 (AMPK-related kinase 1) is a member of the NUAKE family of SNF1-like kinase 1 that is also known as AMPK-related protein kinase 5 (ARK5). NUAKE1 is a tumor cell survival factor that is activated by AKT and acts as an ATM kinase under conditions of nutrient starvation. NUAKE1 is highly expressed in heart and brain, and at lower levels in skeletal muscle, kidney, ovary, placenta, lung, and liver. NUAKE1 is involved in tolerance to glucose starvation and suppresses Fas-induced apoptosis by phosphorylation of CASP6, thus suppressing the activation of the caspase and the subsequent cleavage of CFLAR.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NUAK1, Active	N19-10G	Human	Insect	N-terminal GST tag	Full Length	122 kDa

NUAK2	Alias	Product Substrate	Genbank ID
	SNARK, FLJ90349, DKFZP434J037, DKFZp686F01113	Chktide (C10-58)	NM_030952

NUAK2 (AMPK-related kinase 2) is a member of the NUAKE family of SNF1-like kinase 2 and is activated by muscle contraction and is a unique mediator of contraction-stimulated glucose transport in skeletal muscle. NUAKE2 is involved in cellular stress responses linked to obesity and type 2 diabetes. Glucose deprivation increases NAUK2 activity in baby hamster kidney fibroblasts.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NUAK2, Active	N20-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

CAMK KINASES

PASK	Alias	Product Substrate	Genbank ID
	STK37; PASKIN; KIAA0135; DKFZ-p434O051; DKFZp686P2031	ZIPTide (Z16-58)	NM_015148

PASK (PAS Domain Containing Serine/Threonine kinase) regulates the function of many intracellular signaling pathways involved in stress. PASK is involved in sensing environmental changes in light intensity, oxygen concentration and redox potential. Through interaction with IRS-1, PASK has been proposed as a counter-regulatory mechanism in insulin and cytokine signaling.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PASK, Active	P08-11G	Human	Insect	N-terminal GST tag	981-end	66 kDa

PHKG1	Alias	Product Substrate	Genbank ID
	PHKG	ZIPTide (Z16-58)	NM_006213

PHKG1 (Phosphorylase Kinase Gamma 1) is a member of the serine/threonine protein kinase family that encodes a protein with one protein kinase domain and two calmodulin-binding domains. PHKG1 functions as a glycogenolytic regulatory enzyme. PHKG1 is the catalytic member of a 16-subunit protein kinase complex that contains equimolar ratios of 4 subunit types known as alpha, beta, gamma and delta. Skeletal muscle contains the highest amount of PHKG1 enzymatic activity, although activity is also observed in liver, cardiac muscle, brain, and several other tissues.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PHKG1, Active	P19-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa

PHKG2	Alias	Product Substrate	Genbank ID
	GSD9C	ZIPTide (Z16-58)	NM_000294

PHKG2 (Phosphorylase Kinase Gamma 2) is the hepatic and testis isoform of the gamma subunit of phosphorylase kinase. PHKG2 is a regulator of glycogen metabolism; and deficient function of this enzyme is responsible for 25% of all cases of glycogen storage disease. Mutations in the PHKG2 gene lead to autosomal liver-specific PHK deficiency (glycogen storage disease IXc) and an increased risk of cirrhosis. There are more than 11 known PHKG2 mutations to date.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PHKG2, Active	P20-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa

PIM1	Alias	Product Substrate	Genbank ID
	PIM	S6K Substrate (S05-58)	NM_002648

PIM1 is a highly conserved serine/threonine kinase proto-oncogene which was originally identified from Moloney murine leukemia virus induced T-cell lymphomas in mice. PIM1 is involved in the control of cytokine-mediated cell proliferation, differentiation and survival of lymphoid and myeloid cells. Expression of PIM1 is mediated through JAK/STAT pathway and is regulated at four different levels: transcriptional, post-transcriptional, translational and post-translational.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIM1, Active	P35-10G	Human	Insect	N-terminal GST tag	Full Length	62 kDa

PIM2	Alias	Product Substrate	Genbank ID
	N/A	S6K Substrate (S05-58)	NM_006875

PIM2 is a serine/threonine kinase that is present in all tissues. It is most abundant in hematopoietic tissues, spleen, thymus, peripheral blood leukocytes, testis, small intestine, and colon. It is highly expressed in human leukemic, lymphoma and colorectal adenocarcinoma cell lines. Similar to PIM1, PIM2 also acts as a pro-survival kinase. A notable phospho-target of PIM2 is the BAD protein.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIM2, Active	P36-10G	Human	Insect	N-terminal GST tag	Full Length	61 kDa

CAMK KINASES

PIM3	Alias	Product Substrate	Genbank ID
	PIM-3 ¹ ; Kid1 ² ; MGC27707 ² ; MGC37517 ²	RSK Substrate (S06-58)	NM_001001852 ¹ NM_145478 ²

PIM3 belongs to a family of proto-oncogenes that encode serine/threonine protein kinases. PIM3 expressed in hepatocellular carcinoma development and plays a main role in the proliferation of human hepatoma cell lines by phosphorylating BAD to block Bad-mediated apoptosis in human pancreatic cancer cell lines.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIM3, Active ¹	P37-10BG	Human	Insect	N-terminal GST tag	Full Length	65 kDa
PIM3, Active ²	P37-10G	Mouse	Insect	N-terminal GST tag	Full Length	63 kDa

PKC mu	Alias	Product Substrate	Genbank ID
	PKD; PKCM; PRKCM	CREBtide (C50-58)	X75756

PKC mu (Protein Kinase C mu) is a member of the protein kinase C family which forms a complex with the lipid kinases PI4K and PIP5K1C. These interactions are facilitated by a lipid kinase interaction domain between the N-terminal transmembrane domain and the PH domain of PKC mu. A region of PKC mu between the amino-terminal transmembrane domain and the pleckstrin homology domain is shown to be involved in the association with the lipid kinases.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC mu, Active	P72-10G	Human	Insect	N-terminal GST tag	Full Length	131 kDa

PKC nu	Alias	Product Substrate	Genbank ID
	EPK2; PRKCN; PKD3; nPKC-NU	CREBtide (C50-58)	NM_005813

PKC nu (Protein Kinase C nu) is a member of the protein kinase C family of serine/threonine kinases that play critical roles in the regulation of cellular differentiation and proliferation in many cell types. PKC nu is 77.3% similar to human PKC mu and 77.4% similarity to mouse PKD. The PKCv mRNA is ubiquitously expressed in various tissues and the gene is located between markers WI-9798 and D2S177 on chromosome 2p21 region.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKC nu, Active	P73-10G	Human	Insect	N-terminal GST tag	Full Length	142 kDa

PKD2	Alias	Product Substrate	Genbank ID
	HSPC187; nPKC-D2; PRKD2	RSK Substrate (S06-58)	NM_016457

PKD2 (Protein Kinase D2) is a serine/threonine kinase that contains two cysteine-rich motifs at the N terminus, a PH domain, and a catalytic domain. The PKD family of enzymes are implicated in very diverse cellular functions including Golgi organization, plasma membrane directed transport, metastasis, immune responses, apoptosis and cell proliferation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PKD2, Active	P76-10G	Mouse	Insect	N-terminal GST tag	Full Length	130 kDa
PKD2 Mutant (G848E), Active	P76-12BG	Human	Insect	N-terminal GST tag	Full Length	130 kDa
PKD2 Mutant (G870E), Active	P76-12CG	Human	Insect	N-terminal GST tag	Full Length	130 kDa

QIK	Alias	Product Substrate	Genbank ID
	SNF1LK2, SIK2, KIAA0781, LOH11CR1I, DKFZp434K1115	AMARA Peptide (A11-58)	NM_015191

QIK (Qin-Induced Kinase) is a serine/threonine protein kinase that contains an N-terminal kinase domain, a central domain with ubiquitin-associate motif, and a C-terminal PKA phosphorylation site. The QIK-mediated phosphorylation of IRS1 may modulate the efficiency of insulin signal transduction and could be responsible for insulin resistance associated with diabetes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
QIK, Active	S15-10G	Human	Insect	N-terminal GST tag	Full Length	150 kDa

CAMK KINASES

SIK	Alias	Product Substrate	Genbank ID
	SNF1LK, MSK, SIK1	AMARA Peptide (A11-58)	NM_173354

SIK (Salt-Inducible Kinase) is a protein kinase involved in regulating AMPK-related kinases. SIK is also involved in signaling by various proteins including: STRAD, NUA1, NUA2, BRSK1, BRSK2, QIK, QSK, MARK1, MARK2, MARK3, MARK4 and MELK that are related to AMPK. Activation of SIK1 by phosphorylation on Thr322 lead to an increase in the catalytic activity of sodium/potassium ATPase alpha subunit at the plasma membrane, resulting in an increase in intracellular sodium levels.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SIK, Active	S14-11G	Human	Insect	N-terminal GST tag	1-303	61 kDa

SIK3	Alias	Product Substrate	Genbank ID
	QSK; SIK-3; L19; FLJ12240; KIAA0999	AMARA Peptide (A11-58)	BC128510

SIK3 (Salt-Inducible Kinase 3) is a serine/threonine kinase that belongs to QIK subfamily. The phosphorylation of SIK3 by LKB1 through 14-3-3 binding enhances the catalytic activity of SIK3 and leads its localization to punctate structures within the cytoplasm. Overexpression of SIK3 promotes G1/S-phase cell cycle progression with ovarian cancer. Two mutants of SIK3 (H331L and A1103V) are found at significant frequencies in breast cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SIK3, Active	S12-11G	Human	Insect	N-terminal GST tag	1-307	62 kDa

SNRK	Alias	Product Substrate	Genbank ID
	HSNFRK, SNFRK, KIAA0096	MBP Protein (M42-51N)	NM_017719

SNRK (Sucrose Non-Fermenting Related Kinase) is a member of the sucrose nonfermenting (SNF)-related kinase family of serine/threonine kinases. The tumor suppressor LKB1 activates SNRK through phosphorylation of Thr173. SNRK is involved in multiple steps of angioblast development and acts via notch signaling pathway in artery-vein-specification in vertebrates.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SNRK, Active	S16-10G	Human	Insect	N-terminal GST tag	Full Length	110 - 120 kDa

STK33	Alias	Product Substrate	Genbank ID
	N/A	MBP Protein (M42-51N)	BC031231

STK33 (Serine-Threonine Kinase 33) is a distant member of the CAMK group of serine/threonine kinases. STK33 highly expressed in testis, lung epithelia, alveolar macrophages, horizontal cells in the retina and in embryonic organs such as heart, brain and spinal cord. STK33 contributes to abnormal cell growth in human cell lines expressing oncogenic mutations in KRAS, but not in human cancer cell lines expressing wildtype KRAS.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK33, Active	S46-10G	Human	Insect	N-terminal GST tag	Full Length	94 kDa

TRIO	Alias	Product Substrate	Genbank ID
	N/A	Autocamtide 2 (A15-58)	O75962-1

TRIO (Triple Functional Domain Protein) is a member of the CAMK protein kinase family. There are five isoforms of TRIO, which are produced by alternative splicing; and these encodes two Dbl-homology-Pleckstrin-homology (DH-PH) Rho-GEF units with different specificities and a C-terminal serine/threonine kinase domain. TRIO was originally identified as a binding partner of the transmembrane tyrosine phosphatase LAR, and they together play a role in coordinating cell-matrix and cytoskeletal rearrangements required for cell migration and cell growth.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TRIO, Active	T16-11G	Human	Insect	N-terminal GST tag	471 aa (2627-3097 end)	82 kDa

CAMK KINASES

TSSK1B	Alias	Product Substrate	Genbank ID
	TSSK1, STK22D, FKSG81, SPOGA4	Chktide (C10-58)	NM_032028

TSSK1B (Testis-Specific Serine Kinase 1B) is a serine/threonine kinase that is related to AMPK. TSSK1B is highly expressed in testis and lower expressed in pancreas and other tissues. TSSK members are present in the equatorial segment of human sperm. TSSK1B shares 72% amino acid identity and 83% identity in the kinase domain with other family TSSK members.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TSSK1B, Active	S40-10BG	Human	Insect	N-terminal GST tag	Full Length	71 kDa

TSSK2	Alias	Product Substrate	Genbank ID
	DGS-G, SPOGA2, STK22B, FLJ38613	Chktide (C10-58)	NM_053006

TSSK2 (Testis-Specific Serine Kinase 2) is an intronless serine/threonine kinase that was originally identified in mice. TSSK2 and TSSK1 share 72% overall amino acid identity and 83% identity in the kinase domain respectively. Co-immunoprecipitation and yeast 2-hybrid analysis show that TSSK2 can interact with a protein TSKS, a commonly known substrate for TSSK2.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TSSK2, Active	S38-10G	Human	Insect	N-terminal GST tag	Full Length	66 kDa

Using Myelin Basic Protein (MBP) for Effective Cell Signaling Research

Broad Kinase Specificity

- >125 Ser/Thr Kinases with Defined Assays
- Tyrosine Kinases
- Tested With SignalChem's Over 700 Kinases

Dependable Performance

- >90% Average Purity
- Lot-to-Lot Consistency

SignalChem's purified Myelin Basic Protein (MBP) (M42-51N) from swine tissue is an effective substrate for many human kinases, making it a versatile tool for exploring mechanisms in signal transduction.

MBP is a phosphoprotein targeted by Ser/Thr and Tyr kinases at several conserved amino acid residues (1-4). Hundreds of publications have cited the use of MBP as an appropriate kinase substrate, pointing to its use as a universal standard for testing kinase activity in basic life science research and drug discovery programs.

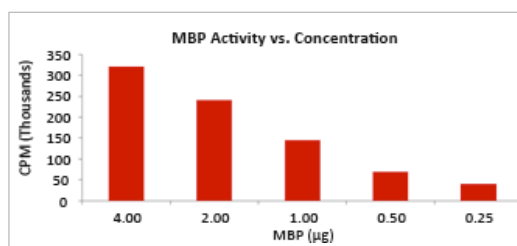


Figure: Sample of concentration dependent activity of purified swine MBP in kinase activity assays.

References:

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2. Turner RS et al., Substrate specificity of phospholipid/Ca²⁺-dependent protein kinase as probed with synthetic peptide fragments of the bovine myelin basic protein. *J Biol Chem.* 1985 Sep 25;260(21):11503-7.
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CMGC KINASES

CMGC Kinases

CMGC kinases are a family of enzymes that preferentially phosphorylate proline-rich target sequences. CDKs are amongst the most studied members of the CGMC family because of their essential roles in regulating the cell cycle. CDK dysregulation is linked to many types of cancers through promoting abnormal cell growth. Efforts to selectively inhibit individual CDKs in cancer have revealed that these enzymes can compensate for one another, leading to little or no therapeutic effect in tumors. Current strategies involve designing inhibitors that are effective against more than one CDK to circumvent this problem.

CDK1	Alias	Product Substrate	Genbank ID
	<u>CDK1</u> : CDC2 ^{1,2,3} ; CyclinA1: CCNA1 ¹ <u>CyclinA2</u> : CCN1; CCNA ² <u>CyclinB1</u> : CCNB1, CCNB ³	Histone H1 Protein (H10-54N)	NM_001786 ^{1,2,3} , BC036346 ¹ , NM_031966 ³

CDK1 (Cyclin-Dependent Kinase 1) is essential for the completion of START, the controlling event to initiate mitosis. CDK1 is a catalytic subunit of M-Phase Promoting Factor to induce mitosis and is universal among eukaryotes. Phosphorylation of Bcl-2 in G2/M phase-arrested cells following photodynamic therapy with hypericin involves a CDK1-mediated signal and delays the onset of apoptosis. The therapeutic potential of a CDK inhibitor, NU2058, in androgen-independent prostate cancer has also been demonstrated.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK1/CyclinA1, Active ¹	C22-18BG	Human	Insect	N-terminal GST tag	Full Length	<u>CDK1</u> : 58 kDa <u>CyclinA1</u> : 81 kDa
CDK1/CyclinA2, Active ²	C22-18G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK1</u> : 59 kDa <u>CyclinA2</u> : 78 kDa
CDK1/CyclinB1, Active ³	C22-10G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK1</u> : 58 kDa <u>CyclinB1</u> : 75 kDa

CDK2	Alias	Product Substrate	Genbank ID
	<u>CDK2</u> : p33(CDK2) ^{1,2,3,4} ; <u>CyclinA1</u> : CCNA1 ¹ <u>CyclinA2</u> : CCN1; CCNA ² <u>CyclinE</u> ³ : CCNE1, CCNE ³ ; <u>CyclinO</u> : CCNO; CCNU; UDG2 ⁴	Histone H1 Protein (H10-54N)	NM_001798 ^{1,2,3} NM_001238 ³ NM_021147 ⁴

CDK2 (Cyclin-Dependent Kinase 2) is a catalytic subunit of the cyclin-dependent protein kinase complex, whose activity is restricted and essential for cell cycle G1/S phase transition. CDK2 associates with and is regulated by the regulatory subunits of the complex including Cyclin A or E, CDK inhibitor p21Cip1 (CDKN1A) and p27Kip1 (CDKN1B). CDK2 phosphorylates cellular substrates including SMAD3 and FOXO1.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK2/CyclinA1, Active ¹	C29-10BG	Human	Insect	N-terminal GST tag	Full Length	<u>CDK1</u> : 58 kDa ; <u>CyclinA1</u> : 81 kDa
CDK2/CyclinA2, Active ²	C29-10G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK2</u> : 58 kDa ; <u>CyclinA2</u> : 78 kDa
CDK2/CyclinE1, Active ³	C29-18G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK2</u> : 58 kDa ; <u>CyclinE1</u> : 73 kDa
CDK2/CyclinO, Active ⁴	C29-19G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK2</u> : 58 kDa ; <u>CyclinO</u> : 68 kDa

CMGC KINASES

CDK3	Alias	Product Substrate	Genbank ID
	<u>CDK3</u> : N/A ; <u>CyclinE1</u> : CCNE1, CCNE	Histone H1 Protein (H10-54N)	NM_001258/NM_001238

CDK3 (Cyclin-Dependent Kinase 3) is a member of the cyclin-dependent protein kinase family. Through interactions with regulatory cyclin proteins, CDK3 promotes entry into S-phase by activating transcription factors in the E2F family. CDK3 associates with cyclin C to target the retinoblastoma 1 protein (Rb), resulting in exit from G0-phase.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK3/CyclinE1, Active	C30-10G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK3</u> : 60 kDa <u>CyclinE1</u> : 73 kDa

CDK4	Alias	Product Substrate	Genbank ID
	<u>CDK4</u> : CMM3; PSK-J3; MGC14458 ^{1,2} ; <u>CyclinD1</u> : BCL1, PRAD1, U21B31, D11S287E ¹ ; <u>Cyclin D3</u> : CCND3 ²	Rb Protein (R05-55G)	NM_000075 ^{1,2} ; NM_001760 ²

CDK4 (Cyclin-Dependent Kinase 4) is a member of the cyclin-dependent protein kinase family and is involved in cell proliferation in the G1-phase of cell cycle. CDK4 forms a complex with the D-type cyclins and is inhibited by p16 (cyclin-dependent kinase inhibitor-2). CDK4 can mediate phosphorylation of RB protein to repress the active transcriptional repression of E2F complex. CDK4 can also phosphorylate the transcription factor SMAD3.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK4/CyclinD1, Active ¹	C31-10G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK4</u> : 57 kDa <u>CyclinD1</u> : 61 kDa
CDK4/CyclinD3, Active ²	C31-18G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK4</u> : 58 kDa <u>CyclinD3</u> : 58 kDa

CDK5	Alias	Product Substrate	Genbank ID
	<u>CDK5</u> : PSSALRE ^{1,2} ; <u>p25</u> : CDK5R1; CDK5P35, CDK5R, NCK5A, p23, p35, p35nck5a ¹ ; <u>p35</u> : CDK5R1; CDK5P35, CDK5R, NCK5A, p35, p35nck5a ²	Histone H1 Protein (H10-54N)	NM_004935 ^{1,2} ; NM_003885 ²

CDK5 (Cyclin-Dependent Kinase 5) is a member of the cyclin-dependent kinase family and is a crucial component for neuronal migration in the developing central nervous system. CDK5 heterodimerizes with a 25 kDa protein, which is proteolytically derived from a 35 kDa brain and neuron-specific protein. CDK5 also has a role in regulating cellular processes, such as adhesion and motility, to synaptic plasticity and drug addiction.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK5/p25, Active ¹	C33-10G	Human	Insect	N-terminal GST tag	Full Length	<u>CDK5</u> : 59 kDa <u>p25</u> : 49 kDa
CDK5/p35, Active ²	C33-10BG	Human	Insect	N-terminal GST tag	Full Length	<u>CDK5</u> : 59 kDa <u>p35</u> : 60 kDa

CDK6	Alias	Product Substrate	Genbank ID
	<u>CDK6</u> : PLSTIRE, MGC59692 ^{1,2} ; <u>Cyclin D1</u> : BCL1, PRAD1, U21B31, D11S287E1 ; <u>Cyclin D3</u> : CCND3 ²	Rb Protein (R05-55G)	NM_001259 ^{1,2} ; NM_053056 ¹ ; NM_001760 ²

CDK6 (Cyclin-Dependent Kinase 6) is a member of the cyclin-dependent family of protein kinases that are essential regulators for cell cycle progression. CDK6 activity is regulated by the D-type cyclins and members of the INK4 family of CDK inhibitors. The CDK6 kinase activity is detected in mid-G1 phase of the cell cycle. CDK6 phosphorylates Thr821 and regulation of the activity of tumor suppressor protein Rb.

CMGC KINASES

CDK6 (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK6/CyclinD1, Active ¹	C35-18H	Human	Insect	N-terminal GST/His	Full Length	CDK6 : 40 kDa CyclinD1 : 61 kDa
CDK6/CyclinD3, Active ²	C35-10H	Human	Insect	N-terminal His tags	Full Length	CDK6 : 40 kDa CyclinD3 : 35 kDa

CDK7	Alias	Product Substrate	Genbank ID
	CDK7 : CAK1, STK1, CDKN7, p39MO15 ; Cyclin H1 : CCNH, CAK, p34, p37 ; MNAT1: MAT1, RNF66	MBP Protein (M42-51N)	NM_001799

CDK7 (Cyclin-Dependent Kinase 7) is a member of the cyclin-dependent protein kinase family that are important regulators of cell cycle progression. CDK7 forms a trimeric complex with Cyclin H and MAT1. CDK7 is an essential component of the transcription factor TFIIF that is involved in transcription initiation and DNA repair. CDK7 is thought to serve as a direct link between the regulation of transcription and the cell cycle.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK7/CyclinH1/MNAT1, Active	C36-10H	Human	Insect	N-terminal His tags	Full Length	CDK7 : 40 kDa ; Cyclin H1 : 39 kDa MNAT1 : 37 kDa

CDK9	Alias	Product Substrate	Genbank ID
	CDK9 : CDC2L4, C-2k, TAK, PITALRE ^{1,2} ; Cyclin K : CCNK, CPR4, MGC91131 ; CyclinT2 : CCNT2; CYCT22	PDKtide (P10-58)	NM_001261 ^{1,2} ; NM_001241 ²

CDK9 (Cyclin-Dependent Kinase 9) is a member of the cyclin-dependent protein kinase family which is closely related to Cdc28 and Cdc2 . CDK9 is a component of the multiprotein complex TAK/P-TEFbeta and it can phosphorylate the C-terminal domain of the largest subunit of RNA polymerase II. CDK9 forms a complex with and is regulated by its regulatory subunit cyclin T or cyclin K.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDK9/CyclinK, Active ¹	C40-10G	Human	Insect	N-terminal GST tags	Full Length	CDK9 : 68 kDa CyclinK : 67 kDa
CDK9/CyclinT2, Active ²	C40-18BG	Human	Insect	N-terminal GST tags	Full Length	CDK9 : 68 kDa Cyclin D3 : 105 kDa

CLK1	Alias	Product Substrate	Genbank ID
	CLK, STY, CLK/STY	MBP Protein (M42-51N)	NM_004071

CLK1 (CDC-Like Kinase 1) is a member of the CDC2-like (or LAMMER) family of dual specificity protein kinases. CLK/STY, which could phosphorylates the specific serine/arginine-rich (SR) family proteins like as ASF/SF2, may directly regulates the activity and compartmentalization of SR splicing factors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CLK1, Active	C57-11G	Human	Insect	N-terminal His tags	129-end	66 kDa

CLK2	Alias	Product Substrate	Genbank ID
	hCLK2, MGC61500	MBP Protein (M42-51N)	NM_003993

CLK2 (CDC-Like Kinase 2) belongs to the CLK family of autophosphorylating kinases. CLK1 phosphorylates SR proteins and influences alternative splicing in overexpression systems. Mutations in CLK2 affect organismal features such as development, behavior, reproduction and aging as well as cellular features such as the cell cycle, apoptosis, the DNA replication checkpoint and telomere length.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CLK2, Active	C58-11G	Human	Insect	N-terminal His tags	137-end	68 kDa

CMGC KINASES

CLK3	Alias	Product Substrate	Genbank ID
	PHCLK3, FLJ22858, PHCLK3/152	MBP Protein (M42-51N)	NM_003992

CLK3 (CDC-like kinase 3) is a serine/threonine kinase complete with a non-conserved N-terminal domain. The CLK3 protein has functions such as ATP binding, nucleotide binding, protein serine/threonine kinase activity, protein-tyrosine kinase activity and transferase activity. CLK3 is thought to regulate the intranuclear distribution of the serine/arginine-rich (SR) family of splicing factors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CLK3, Active	C60-10G	Human	Insect	N-terminal GST tag	Full Length	86 kDa

CLK4	Alias	Product Substrate	Genbank ID
	DKFZp686A20267	MBP Protein (M42-51N)	NM_020666

CLK4 (CDC-Like Kinase 4) belongs to the CLK family of serine/threonine kinases and interact with and phosphorylate the serine- and arginine-rich (SR) proteins. The SR proteins are known to play an important role in the formation of spliceosomes and thus may be involved in regulating alternative splicing.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CLK4, Active	C61-11G	Human	Insect	N-terminal GST tag	70-end	73 kDa

DYRK1	Alias	Product Substrate	Genbank ID
	DYRK; PSK47 ¹ , MIRK ²	DYRKtide (D96-58)	NM_012791 ¹ ; BC018751 ²

DYRK1 (Dual-Specificity Tyrosine-(Y)-Phosphorylation Regulated Kinase 1) plays a significant role in regulating cell proliferation with possible links to brain development. Its homolog DYRK1B is also involved in cell proliferation and differentiation. DYRK1B acts in G0/G1-phase to maintain cells in growth arrest and quiescence by targeting Cyclin D1 for proteasomal degradation. Paradoxically, DYRK1B can also stabilize p27Kip1 proteins by phosphorylation on Ser10 during the G0-phase of the cell cycle. Deregulation of DYRK1B such as gene amplification, overexpression and/or constitutive activation has been observed in multiple types of cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DYRK1A, Active ¹	D09-10G	Rat	Insect	N-terminal GST tag	Full Length	100 kDa
DYRK1B, Active ²	D09-10BG	Human	Insect	N-terminal GST tag	Full Length	106 kDa

DYRK2	Alias	Product Substrate	Genbank ID
	FLJ21217; FLJ21365	DYRKtide (D96-58)	NM_006482

DYRK2 (Dual-Specificity Tyrosine-(Y)-Phosphorylation Regulated Kinase 2) belongs to a family of protein kinases whose members are involved in cellular growth and/or have the ability to autophosphorylate on its tyrosine residues. DYRK2 can also regulates p53 to induce apoptosis in response to DNA damage.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DYRK2, Active	D10-10G	Human	E. coli	N-terminal GST tag	Full Length	95 kDa

DYRK3	Alias	Product Substrate	Genbank ID
	RED, REDK, DYRK5	DYRKtide (D96-58)	NM_001004023

DYRK3 (Dual-Specificity Tyrosine-(Y)-Phosphorylation Regulated Kinase 3) is a dual-specificity protein kinase that catalyzes the transfer of phosphate group onto serine/threonine and tyrosine residues. DYRK3 catalyzes phosphorylation of histones H3 and H2B. In addition, the enzymes regulate different steps of the caveolar cycle and phosphorylate SIRT1 at Thr522 to deacetylate p53.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DYRK3, Active	D11-11G	Human	E. coli	N-terminal GST tag	63-end	95 kDa

CMGC KINASES

DYRK4	Alias	Product Substrate	Genbank ID
	N/A	DYRKtide (D96-58)	NM_003845

DYRK4 (Dual-Specificity Tyrosine-(Y)-Phosphorylation Regulated Kinase 4) plays an important role in cell proliferation, survival, and development. Like other DYRK family members, DYRK4 is highly expressed in the testis with a very restricted expression to stage VIII postmeiotic spermatids, suggesting that there might be functional redundancy between DYRK isoforms during spermiogenesis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DYRK4, Active	D12-10G	Human	Insect	N-terminal GST tag	Full Length	90 kDa

ERK1	Alias	Product Substrate	Genbank ID
	MAPK3; PRKM3; P44ERK1; P44MAPK; HS44KDAP; HUMKER1A; MGC20180	MBP Protein (M42-51N)	NM_002746

ERK1 (Extracellular Signal-Regulated Kinase 1) is a serine/threonine kinase in the ERK family and activation of ERK1 requires both tyrosine and threonine phosphorylation by MEK. ERK1 is ubiquitously distributed in tissues with the highest expression in the heart, brain and spinal cord. Activated ERK1 translocates into the nucleus where it phosphorylates various transcription factors (e.g., Elk-1, c-Myc, c-JUN, c-FOS, and C/EBP beta).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERK1, Active	M29-10G	Human	E. coli	N-terminal GST tag	Full Length	72 kDa
ERK1, Active	M29-10U	Human	E. coli	N-terminal GST tag	Full Length	44 kDa

ERK2	Alias	Product Substrate	Genbank ID
	MAPK1, P42MAPK, MAPK2, PRKM2, PRKM1, p41mapk, ERT1, p40, p41, ERK	MBP Protein (M42-51N)	NM_002745

ERK2 (Extracellular Signal-Regulated Kinase 2) is a serine/threonine kinase in the ERK family and its activation requires both tyrosine and threonine phosphorylation by MEK. ERK2 is ubiquitously distributed in tissues with the highest expression in heart, brain and spinal cord. Activated ERK2 translocates into the nucleus where it phosphorylates various transcription factors (e.g., Elk-1, c-Myc, c-Jun, c-Fos, and C/EBP beta).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERK2, Active	M28-10G	Human	E.coli	N-terminal GST tag	Full Length	68 kDa

ERK3	Alias	Product Substrate	Genbank ID
	ERK3; MAPK6; HsT17250; p97MAPK; PRKM6	MBP Protein (M42-51N)	NM_002748

ERK3 (Extracellular Signal-Regulated Kinase 3) is a member of ERK family and is activated through protein phosphorylation cascades. ERK3 acts as an integration point for multiple biochemical signals. ERK3 is highly expressed in various human tissues and most abundantly in skeletal muscle.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERK3 (MAPK6), Active	M31-10G	Human	E.coli	N-terminal GST tag	721 aa (FL)	135 kDa

ERK5	Alias	Product Substrate	Genbank ID
	MAPK7, BMK1, ERK4, PRKM7	MBP Protein (M42-51N)	NM_139033

ERK5 (Extracellular Signal-Regulated Kinase 5) is involved in many cellular processes such as proliferation, differentiation, transcription regulation and development. ERK5 is activated by mitogen-activated protein kinase kinase 5 (MAP2K5/MEK5) in response to extracellular signals. Upon activation, ERK5 translocates to cell nucleus where it regulates gene expression by phosphorylating and activating different transcription factors. ERK5 has been shown to be critical for endothelial function and maintenance of blood vessel integrity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERK5, Active	M32-10G	Human	Insect	N-terminal GST tag	Full Length	132 kDa

CMGC KINASES

ERK7	Alias	Product Substrate	Genbank ID
	MAPK15, ERK7, ERK8	MBP Protein (M42-51N)	BC048082

ERK7 (Extracellular Signal-Regulated Kinase 7) is a distinct member of the MAPK family that is activated by a Src-dependent signaling pathway involved in control of its cellular localization by nuclear exclusion, and suggest a key role for this MAP kinase in the regulation of the biological activities of this nuclear receptor. ERK7 also plays an important role in the response to repair of DNA single strand breaks.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERK7 (MAPK15), Active	M47-10BG	Mouse	Insect	N-terminal GST tag	Full Length	86 kDa

GSK3 alpha	Alias	Product Substrate	Genbank ID
	N/A	GSK3 Substrate (G50-58)	NM_019884

GSK3 alpha (Glycogen Synthase Kinase 3 alpha) is a multifunctional protein serine kinase which is homologous to the Drosophila protein shaggy (zeste-white3). It controls several regulatory proteins including glycogen synthase and transcription factors, including c-JUN). GSK3 alpha also plays a role in the WNT and PI3K signaling pathways. GSK3 alpha is required for production of the beta-amyloid-40 and -42 peptides by presenilin-dependent gamma-secretase cleavage. Inhibiting the function GSK3 alpha using lithium blocks the production of the beta-amyloid peptides by interfering with the gamma-secretase step.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GSK3 alpha, Active	G08-10G	Mouse	Insect	N-terminal GST tag	Full Length	81 kDa

GSK3 beta	Alias	Product Substrate	Genbank ID
	N/A	GSK3 Substrate (G50-58)	NM_002093

GSK3 beta (Glycogen Synthase Kinase 3 beta) is a serine/threonine protein kinase that phosphorylates and inhibits the glycogen synthase enzyme. GSK3 beta is found in most human tissues and controls glycogen and protein synthesis by insulin. GSK3 beta also modulates the transcription factors AP-1 and CREB. GSK3 beta is implicated taopathic neurodegenerative diseases though contributing to the hyperphosphorylation of Tau (MAPT) at all of its phospho-sites.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GSK3 beta, Active	G09-10G	Human	Insect	N-terminal GST tag	Full Length	73 kDa
GSK3 beta, Active	G09-10H	Mouse	Insect	N-terminal His tag	Full Length	48 kDa

HIPK1	Alias	Product Substrate	Genbank ID
	Myak, Nbak2, KIAA0630, MGC26642, MGC33446, MGC33548	MBP Protein (M42-51N)	NM_152696

HIPK1 (Homeodomain-Interacting Protein Kinase 1) is a serine/threonine protein kinase in the HIPK family. HIPK1 phosphorylates DAXX to decrease transcriptional repression activity. HIPK1 also interacts with p53 and phosphorylates it on serine residues. HIPK1 expression is elevated in breast cancer cell lines and embryonic fibroblasts from HIPK1-null mice are more susceptible to apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HIPK1, Active	H03-11G	Mouse	Insect	N-terminal GST tag	156-555	71 kDa

CMGC KINASES

HIPK2	Alias	Product Substrate	Genbank ID
	DKFZp686K021111 ¹ ; FLJ23711 ¹ ; PRO0593 ¹ , Stank ² ; 1110014O20Rik ² ; B230339E18Rik ²	MBP Protein (M42-51N)	NM_022740 ¹ ; BC031904 ²

HIPK2 (Homeodomain Interacting Protein Kinase 2) is a conserved serine/threonine nuclear kinase that interacts with homeodomain transcription factors. It enhances expression of p53 targeted genes. HIPK2 is a target for MDM2 mediated ubiquitin-dependent degradation. Knockdown of HIPK2 using siRNA reduced p53 binding and activation of p53R2 resulting in impaired UV-induced DNA repair.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HIPK2, Active ¹	H04-11BG	Human	Insect	N-terminal GST tag	1-640	98 kDa
HIPK2, Active ²	H04-11G	Mouse	Insect	N-terminal His tag	153-564	72 kDa

HIPK3	Alias	Product Substrate	Genbank ID
	PKY, YAK1, DYRK6, FIST3	MBP Protein (M42-51N)	NM_005734

HIPK3 (Homeodomain Interacting Protein Kinase 3) is a member of the HIPK family. JNK regulates the expression of HIPK3 in prostate cancer cells and contributes to increased resistance to Fas receptor-mediated apoptosis. HIPK3 phosphorylates FADD and is implicated in multidrug resistance in a number of tumors. HIPK3 also increases the activity of the SF1 transcription factor resulting in increased steroidogenic gene expression in response to cAMP signaling.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HIPK3, Active	H05-13H	Mouse	Insect	N-terminal His tag	163-562	49 kDa

HIPK4	Alias	Product Substrate	Genbank ID
	FLJ32818	MBP Protein (M42-51N)	NM_144685

HIPK4 (Homeodomain Interacting Protein Kinase 4) is a serine/threonine kinase that can act as a co-repressor of transcription factors. HIPK4 phosphorylates the human p53 protein at serine 9. This action is important for p53 mediated transcriptional repression. HIPK4 is expressed in lung and white adipose tissue. HIPK4 expression has also been observed in various cancer cell lines.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HIPK4, Active	H06-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa
HIPK4, Active	H06-10H	Human	Insect	N-terminal His tag	Full Length	85 kDa

ICK	Alias	Product Substrate	Genbank ID
	ECO; MRK; KIAA0936; LCK2; MGC46090	MBP Protein (M42-51N)	NM_014920

ICK (Intestinal Cell Kinase) belongs to a family of proteins that share a conserved catalytic core common with both serine/threonine and tyrosine kinases. ICK localizes to the intestinal crypts and the enzyme is suspected to play an important role in intestinal epithelial cell proliferation and differentiation. ICK is also involved in the development of central nervous, skeletal, and endocrine systems.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ICK, Active	I01-10G	Mouse	Insect	N-terminal GST tag	Full Length	98 kDa

JNK1	Alias	Product Substrate	Genbank ID
	JNK; PRKM8; SAPK1; A1849689; JNK1A2; JNK21B1/2	ATF2 Protein (A10-55G)	NM_016700

JNK1 (c-Jun N-Terminal Kinase 1) is a member of the MAP kinase group that is activated by dual phosphorylation at threonine and tyrosine residue in response to stresses such as UV irradiation. Activation of JNK1 results in defects in myotube viability and integrity while removal of JNK1 results in decreased adiposity and significantly improved insulin sensitivity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
JNK1, Active	M33-10G	Mouse	Insect	N-terminal GST tag	Full Length	71 kDa

CMGC KINASES

JNK2	Alias	Product Substrate	Genbank ID
	MAPK9, SAPK, p54a, JNK2A, JNK2B, PRKM9, JNK-55, JNK2BETA, p54aS-APK, JNK2ALPHA	ATF2 Protein (A10-55G), p38 Substrate (P03-58)	NM_139069

JNK2 (c-Jun N-Terminal Kinase 2) is a member of the MAP kinase group that is activated by dual phosphorylation at threonine and tyrosine residues during exposure to stress such as UV irradiation and treatment of cells with TNF. JNK2 binds to c-Jun at its transactivation domain and phosphorylates the proto-oncogene at serines 63 and 73. JNK2 has been shown to play an important role in disease processes. JNK2 plays a role in ventricular hypertrophy and is thought to be involved in hypertensive cardiac disease.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
JNK2, Active	M34-10BG	Human	Insect	N-terminal GST tag	Full Length	70 kDa

JNK3	Alias	Product Substrate	Genbank ID
	MAPK10; JNK3A, MGC50974, PRKM10, p493F12, p54bSAPK; FLJ12099, FLJ33785	ATF2 Protein (A10-55G), p38 Substrate (P03-58)	NM_002753

JNK3 (c-Jun N-Terminal Kinase 2) phosphorylates various transcription factors such as ATF2, ELK and members of the JUN family. Activation and nuclear localization of JNK3 is associated with hypoxic and ischemic damage of CA1 neurons in the hippocampus. Mice which lack functional JNK3 display reduced apoptosis of hippocampal neurons and reduced seizures induced by kainic acid, a glutamate-receptor agonist.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
JNK3, Active	M35-10BG	Human	Insect	N-terminal GST tag	Full Length	71 kDa

MAK	Alias	Product Substrate	Genbank ID
	dJ417M14.2	MBP Protein (M42-51N)	BC039825

MAK (Male Germ Cell-Associated Kinase) is a serine/threonine protein kinase related to kinases involved in cell cycle regulation in the testis of germ cells. MAK plays an important role in spermatogenesis and it is also required for retinal photoreceptor survival as a regulator of ciliary length.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MAK, Active	M01-10G	Human	Insect	N-terminal GST tag	Full Length	78 kDa

MSSK1	Alias	Product Substrate	Genbank ID
	STK23, SRPK3, MGC102944	PKCtide (P15-58)	BC117124

MSSK1 (Muscle-Specific Protein Kinase) is a muscle-specific protein kinase belonging to the serine arginine protein kinase family which phosphorylates serine/arginine repeat-containing proteins. MSSK1 is enriched in heart and skeletal muscle. MSSK1 levels appear to be tightly regulated. MSSK1-null mice display a new entity of type 2 fiber-specific myopathy with a marked increase in centrally placed nuclei. Transgenic mice overexpressing MSSK1 in skeletal muscle show severe myofiber degeneration and early lethality.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MSSK1, Active	S41-10G	Human	Insect	N-terminal GST tag	Full Length	98 kDa

NLK	Alias	Product Substrate	Genbank ID
	FLJ21033, DKFZp761G1211	MBP Protein (M42-51N)	NM_016231

NLK (Nemo-Like Kinase) is a serine/threonine kinase which is required for the differentiation of bone marrow stromal cells. NLK also suppresses transcription factors such as CREB by phosphorylation of the co-activator CREBBP and Notch signaling by interfering with formation of the active Notch transcriptional complex. NLK expression increases the number of apoptotic cells but does not induce obvious cell cycle arrest.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NLK, Active	N15-10G	Human	Insect	N-terminal GST tag	Full Length	84 kDa

CMGC KINASES

p38	Alias	Product Substrate	Genbank ID
	CSBP1 ¹ ; CSBP2 ¹ ; CSPB1 ¹ ; PRKM14 ¹ ; PRKM15 ¹ ; SAPK2A ¹ ; MAPK14 ¹ ; MAPK11 ² ; SAPK2 ² ; p38-2 ² ; PRKM11 ² ; SAPK2B ² ; p38b ² ; P38b2 ² , SAPK4 ³ ; PRKM13 ³ ; MAPK13 ³ , ERK3 ⁴ ; ERK6 ⁴ ; SAPK3 ⁴ ; PRKM12 ⁴ ; MAPK12 ⁴	p38 Substrate (P03-58)	NM_139012 ¹ , NM_002751 ² , NM_002754 ³ , NM_002969 ⁴

p38 MAP kinases are activated by various environmental stresses and proinflammatory cytokines. Activation of p38 requires its phosphorylation by MAP kinase kinases (MKKs), or its autophosphorylation triggered by the interaction of MAP3K7IP1/TAB1 protein with this kinase. p38 MAPK substrates include transcription regulators ATF2, MEF2C, MAX; cell cycle regulator CDC25B; and tumor suppressor p53. Taken together, these targets indicate that p38 MAPKs are essential players in stress related transcription and cell cycle regulation as well as in genotoxic stress.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
p38 alpha, Active ¹	M39-10BG	Human	Insect	N-terminal GST tag	Full Length	67 kDa
p38 beta, Active ²	M36-10BG	Human	Insect	N-terminal GST tag	Full Length	71 kDa
p38 delta, Active ³	M38-10BG	Human	Insect	N-terminal GST tag	Full Length	71 kDa
p38 gamma, Active ⁴	M37-10BG	Human	Insect	N-terminal GST tag	Full Length	71 kDa

PFTK1	Alias	Product Substrate	Genbank ID
	<u>PFTK1</u> : CDK14; PFTAIRE1 ; <u>CyclinY</u> : CCNY; C10orf9; CBCP1; CCNX; CFP1	MBP Protein (M42-51N); Histone H1 Protein (H10-54N); Rb (C-Term) Protein (R05-55G)	NM_012395/NM_145012

PFTK1 (Serine/Threonine-Protein Kinase PFTAIRE-1) is a member of the CDC2 -related protein kinase family. PFTK1 physically interacts with all four isoforms of the adaptor protein 14-3-3. PFTK1 acts as a cyclin-dependent kinase which regulates cell cycle progression and cell proliferation. Overexpression of PFTK1 predicts resistance to chemotherapy in patients with oesophageal squamous cell carcinoma.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PFTK1 (CDK14)/CyclinY, Active	P15-10G	Human	Insect	N-terminal GST tags	Full Length	<u>PFTK1 (CDK14)</u> : 72 kDa <u>CyclinY</u> : 64 kDa

PTCK1	Alias	Product Substrate	Genbank ID
	<u>PCTK1 (CDK16)</u> : FLJ16665; PCTAIRE; PCTAIRE1; PCTGAIRE, <u>CyclinY</u> : CCNY; C10orf9; CBCP1; CCNX; CFP1	MBP Protein (M42-51N); Histone H1 Protein (H10-54N); Rb (C-Term) Protein (R05-55G)	NM_006201/NM_145012

PCTK1 (PCTAIRE Protein Kinase 1) belongs to the Cdc2/Cdkx subfamily of the serine/threonine protein kinases. PCTK1 plays a role in signal transduction cascades in terminally differentiated cells in exocytosis and in transporting secretory cargo from the endoplasmic reticulum. PCTK1 is ubiquitously expressed with the highest levels detected in the brain and testis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PCTK1 (CDK16)/CyclinY, Active	P09-11G	Human	Insect	N-terminal GST tags	<u>PCTK1 (CDK16)</u> : 107-end and <u>CyclinY</u> : 2-end	<u>PCTK1 (CDK16)</u> : 66 kDa, <u>CyclinY</u> : 64 kDa

CMGC KINASES

PTCK2	Alias	Product Substrate	Genbank ID
	<u>PCTK2 (CDK17)</u> : PCTAIRE2; PCTK2, <u>CyclinY</u> : CCNY; C10orf9; CBCP1; CCNX; CFP1	MBP Protein (M42-51N)	NM_002595/NM_145012

PCTK2 (PCTAIRE Protein Kinase 2) belongs to the Cdc2/Cdkx subfamily of the serine/threonine protein kinases. PCTK2 is thought to play a role in terminally differentiated neurons. Cdc2-related kinases can regulate the cell cycle together with the emerging large family of cyclins.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PCTK2 (CDK17)/CyclinY, Active	P10-10G	Human	Insect	N-terminal GST tags	Full Length	<u>PCTK2 (CDK17)</u> : 88 kDa, <u>CyclinY</u> : 64 kDa

PTCK3	Alias	Product Substrate	Genbank ID
	<u>PCTK3</u> : PCTAIRE, PCTAIRE3 <u>CyclinY</u> : CCNY; C10orf9; CBCP1; CCNX; CFP1	MBP Protein (M42-51N)	BC011526/NM_145012

PCTK3 (PCTAIRE Protein Kinase 3) is a member of the Cdc2/Cdkx subfamily of the serine/threonine protein kinases. PCTK3 is thought to play a role in terminally differentiated neurons. Elevated PCTAIRE 3 in the temporal cortex of Alzheimer's disease patients. It is proposed that PCTAIRE 3 is a paired helical filaments-associated kinase that modulates Tau phosphorylation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PCTK3 (CDK18)/CyclinY, Active	P11-10G	Human	Insect	N-terminal GST tags	Full Length	<u>PCTK3</u> : 76 kDa <u>CyclinY</u> : 64 kDa

SRPK1	Alias	Product Substrate	Genbank ID
	SFRSK1	MBP Protein (M42-51N)	BC038292

SRPK1 (SRSF Protein Kinase 1) is a serine/threonine protein kinase. Inactivation of SRPK1 induces cellular resistance to anticancer drugs such as cisplatin and bleomycin. SRPK1 phosphorylates serine/arginine-rich (SR) proteins, such as splicing factors ASF/SF2, SC35, and SRp55, in their arginine/serine-rich (RS) domains in vitro. It is believed that SRPK1 plays a key role in regulation of both constitutive and alternative splicing by regulating intracellular localization of splicing factors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SRPK1, Active	S21-10G	Human	Insect	N-terminal GST tag	Full Length	130 kDa

SRPK2	Alias	Product Substrate	Genbank ID
	SFRSK2, FLJ36101	MBP Protein (M42-51N)	NM_182691

SRPK2 (SRSF Protein Kinase 1) is a member of the serine/arginine (SR) protein-specific kinase family which phosphorylate SR domain-containing proteins in nuclear speckles and mediate the pre-mRNA splicing events. SRPK2 is required for phosphorylation of human PRP28 protein thereby destabilizing PRP28 association with the tri-snRNP. SRPK2 is also essential for cell viability and is required for spliceosomal B complex formation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SRPK2, Active	S22-10G	Human	Insect	N-terminal GST tag	Full Length	135 kDa

CK1 KINASES

CK1 Kinases

CK1 is a group of serine/threonine kinases that regulate cell differentiation, proliferation, cytoskeleton dynamics, chromosomal segregation, DNA repair and circadian rhythms. There are seven isoforms of CK1. CK1 α , δ , and ϵ activate the tumor suppressor p53 to ensure centrosome integrity and genomic stability. CK1 isoforms are localized to various regions within the cell, including the nucleus, where the directly interacts with the mitotic spindle to regulate the cell cycle. Dysregulation or deletion of CK1 isoforms have been linked to neurodegenerative diseases and many types of cancers.

CK1	Alias	Product Substrate	Genbank ID
	CSNK1A1 ¹ , CK1, HLCDGP1 ¹ , PRO2975 ¹ , CK1A1 ¹ ; CSNK1A1L ² , CK1A1L ² , CK1alpha1L ² , CK1 ² , MGC33182 ² ; CSNK1D ³ , HCKID ³ , CK1D ³ ; CSNK1E ^{4,5} , HCKIE ^{4,5} , MGC10398 ^{4,5} ; CK1E ⁵ ; CK1G1 ⁶ ; CSNK1G1 ⁶ ; CKI-gamma 1 ⁶ ; CSNK1G2 ⁷ , CK1G2 ⁷ ; CSNK1G3 ⁸	Casein, Dephosphorylated (C03-54BN) ^{1,3,4,5} ; Casein Protein (C03-54N) ^{2,6}	NM_001892 ¹ , BC028723 ² , NM_001893 ³ , NM_001894 ^{4,5} , NM_022048 ⁶ , NM_001319 ⁷ , NM_001031812 ⁸

CK1 (Casein Kinase 1) belong to a family of serine/threonine protein kinases which function as signal transduction pathway regulators. Six CK1 isoforms have been identified in humans (alpha, delta, epsilon and gamma 1-3). CK1 family members are involved in a variety of cellular processes, including membrane trafficking, cell differentiation and proliferation, circadian rhythms and nucleocytoplasmic shuttling of transcription factors. Deregulation in the coding sequence of CK1 isoforms are linked with neurodegenerative diseases and cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CK1 alpha 1, Active ¹	C64-10G	Human	Insect	N-terminal GST tag	Full Length	62 kDa
CK1 alpha 1L, Active ²	C75-10G	Human	Insect	N-terminal GST tag	Full Length	64 kDa
CK1 delta, Active ³	C65-10G	Human	Insect	N-terminal GST tag	Full Length	72 kDa
CK1 epsilon Mutant (R178C), Active ⁴	C66-12BG	Human	Insect	N-terminal GST tag	Full Length	72 kDa
CK1 epsilon, Active ⁵	C66-10G	Human	Insect	N-terminal GST tag	Full Length	72 kDa
CK1 gamma 1, Active ⁶	C68-11G	Human	Insect	N-terminal GST tag	21-end	70-76 kDa
CK1 gamma 2, Active ⁷	C68-10BG	Human	Insect	N-terminal GST tag	Full Length	73 kDa
CK1 gamma 3, Active ⁸	C68-10CG	Human	Insect	N-terminal GST tag	Full Length	73 kDa

TTBK1	Alias	Product Substrate	Genbank ID
	BDTK; RP3-330M21.4	MBP Protein (M42-51N)	NM_032538

TTBK1 (Tau-Tubulin Kinase 1) belongs to the serine/threonine CK1 superfamily. TTBK1 functions as regulator in the phosphorylation and oligomerization of Tau proteins. Upregulation of TTBK1 has been implicated in Alzheimer's disease. In transgenic mice, its overexpression leads to increased phosphorylation-related neurofilament aggregation resulting in significant age-dependent memory impairment.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TTBK1, Active	T17-11G	Human	Insect	N-terminal GST tag	1-479	96 kDa

CK1 KINASES

TTBK2	Alias	Product Substrate	Genbank ID
	mKIAA0847; TTBK; TTBK1; TTK	MBP Protein (M42-51N)	NM_080788

TTBK2 (Tau-Tubulin Kinase 2) is a multifunctional kinase which belongs to the CK1 family of eukaryotic protein kinases. TTBK2 is a serine/threonine kinase that phosphorylates Tau and tubulin proteins. Mutations in TTBK2 are associated with spinocerebellar ataxia type 11 (SCA11). TTBK2 also play a role in the development of resistant cancer target therapies and in regulating glucose and GABA transport.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TTBK2, Active	T18-11G	Mouse	Insect	N-terminal GST tag	70-538	88 kDa

VRK1	Alias	Product Substrate	Genbank ID
	MGC117401; MGC138280; MGC142070	Casein, Dephosphorylated (C03-54BN)	NM_003384

VRK1 (Vaccinia-Related Kinase 1) is one of the most abundant nuclear serine/threonine kinases. It is widely expressed in normal and tumor tissues. VRK1 regulates cell proliferation and phosphorylates histone, casein, and the transcription factors ATF2 (Activating Transcription Factor 2) and c-JUN. Mutations in the VRK1 gene causes spinal muscular atrophy with pontocerebellar hypoplasia.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
VRK1, Active	V01-10G	Human	Insect	N-terminal GST tag	Full Length	71 kDa

VRK2	Alias	Product Substrate	Genbank ID
	N/A	Casein Protein (C03-54N)	NM_006296

VRK2 (Vaccinia-Related Kinase 2) is a serine/threonine protein kinase. VRK2 functions as an effector of signalling pathways involved in the regulation of apoptosis and tumor cell growth. VRK2 is widely expressed in human tissues and in actively dividing cells. VRK2 interacts specifically with Epstein-Barr virus BHRF1, a homologue of Bcl-2; protecting cells from apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
VRK2, Active	V02-11G	Human	Insect	N-terminal GST tag	1-375	66 kDa

LIPID KINASES

Lipid Kinases

Eukaryotic Protein Kinases (ePKs) include most of the kinase enzymes in humans. Atypical kinases differ from stereotypical ePKs in the sequence of their catalytic domains. Atypical kinases include several medically relevant enzymes, such as BCR and the PDHK subgroups. The constitutively active kinase BCR-ABL is a hallmark of Chronic Myeloid Leukemia (CML). Numerous TKIs have been developed to specifically target this BCR-ABL and its TKI resistant secondary mutant variants. PDHKs regulate mitochondrial metabolism by inhibiting the Krebs cycle, making PDHK an attractive target for therapies to manage metabolic disorders such as diabetes.

DGKA	Alias	Product Substrate	Genbank ID
	DAGK; DAGK1; DGK-alpha	Lipid Dilution Buffer (L21-09)	NM_001345

DGKA (Diacylglycerol Kinase Alpha) is a member of the eukaryotic diacylglycerol kinase family and acts as a modulator that competes with Protein Kinase C (PKC) for diacylglycerol (DAG) in intracellular signaling pathways. Upon stimulation DGKA converts secondary messenger DAG into phosphatidylinositols and attenuating PKC activity. The DGK α /atypical PKC/ β 1 integrin signaling pathway is required for matrix invasion of breast carcinoma cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DGKA, Active	D21-10G	Human	Insect	GST tag	Full Length	79 kDa

PI3K	Alias	Product Substrate	Genbank ID
	<u>p110 alpha</u> : PIK3CA, MGC142161, MGC142163 ; PI3K beta, p110-BETA, MGC133043, DKFZ-p779K1237 <u>p110 delta</u> : p110 delta; <u>p110 gamma</u> : PI3K, PIK3, PI3CG, PI3Kgamma <u>p85 alpha</u> : PIK3R1, GRB1, p85-ALPHA <u>p85beta</u> : PIK3R2, P85B, p85-BETA <u>p55 gamma</u> : PIK3R3, p55, p55-GAMMA, FLJ41892	PI(4,5)P2:PS (lipid substrate) (P429-59)	NM_006218 ^{1,2,3,4,5,6} , NM_008839 ⁷ , NM_006219 ^{8,9} , NM_005026 ¹⁰ , NM_181523 ¹⁰ , NM_002649 ¹¹

PI3K (Phosphoinositide 3-Kinase) is a member of the PI3K family which phosphorylates phosphoinositides on the 3-hydroxyl group of the inositol ring. PI3K is activated by G protein coupled receptors and tyrosine kinase receptors. PI3K plays a role in oncogenic transformation and is consistently expressed at a high level in blast cells from AMP. The PI3K signaling pathway is involved in immune responses relevant to the pathogenesis of rheumatoid arthritis and other inflammatory diseases.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PI3K (p110 alpha/p85 alpha), Active ¹	P27-102G	Human	Insect	GST tag	Full Length	<u>p110 alpha</u> : 140 kDa <u>p85 alpha</u> : 110 kDa
PI3K (p110 alpha (E545K)/p85 alpha), Active ²	P27-152H	Human	Insect	HIS tags	Full Length	<u>p110 alpha (E545K)</u> : 111 kDa <u>p85 alpha</u> : 86 kDa
PI3K (p110 alpha (N345K)/p85 alpha), Active ³	P27-122CH	Human	Insect	HIS tags	Full Length	<u>p110 alpha (N345K)</u> : 111 kDa <u>p85 alpha</u> : 86 kDa

LIPID KINASES

PI3K (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PI3K (p110 alpha(E542K)/p85 alpha, Active ⁴)	P27-122DH	Human	Insect	HIS tags	Full Length	p110 alpha (E542K) : 111 kDa p85 alpha : 86 kDa
PI3K (p110 alpha/p55 gamma), Active ⁵	P27-102CH	Human	Insect	HIS tag	Full Length	p110 alpha : 111 kDa p55 gamma : 61 kDa
PI3K (p110 alpha/p85 alpha), Active ⁶	P27-102H	Human	Insect	HIS tags	Full Length	p110 alpha : 111 kDa p85 alpha : 86 kDa
PI3K (p110 alpha/p85 alpha), Active ⁷	P27-182H	Mouse	Insect	HIS tags	Full Length	p110 alpha : 111 kDa p85 alpha : 86 kDa
PI3K (p110 beta/p85 alpha), Active ⁸	P28-102H	Human	Insect	His tags	Full Length	p110 beta : 111 kDa p85 alpha : 86 kDa
PI3K (p110 beta/p85 beta), Active ⁹	P28-102BH	Human	Insect	His tags	Full Length	p110 beta : 111 kDa p85 beta : 88 kDa
PI3K (p110 delta/p85 alpha), Active ¹⁰	P30-102H	Human	Insect	His tags	Full Length	p110 delta : 111 kDa p85 alpha : 86 kDa
PI3K (p120 gamma), Active ¹¹	P29-102H	Human	Insect	HIS tag	Full Length	121 kDa

PI4K2A

Alias	Product Substrate	Genbank ID
DKFZp761G1923; PI4KII; PIK42A; RP11-548K23.6	PI:PS (P425-59)	NM_018425

PI4K2A (Phosphatidylinositol 4-Kinase Type 2 Alpha) is a member of the phosphatidylinositol 4-kinase family (PI4K) which phosphorylate phosphatidylinositol to produce phosphatidylinositol-polyphosphates (PtdInsPs). PtdInsPs are centrally involved in many biological processes ranging from cell growth and organization of the actin cytoskeleton to endo- and exocytosis. PI4K2A is a novel regulator of tumor growth by its action on angiogenesis and HIG-1alpha regulation. PI4K2A also generate PtdIns4P-rich domains within the Golgi which regulate targeting of clathrin adaptor AP-1 complexes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PI4K2A, Active	P21-102G	Human	Insect	GST tag	Full Length	79 kDa

PI4K2B

Alias	Product Substrate	Genbank ID
FLJ11105; PI4KIIB; PIK42B	PI:PS (P425-59)	NM_018323

PI4K2B (Phosphatidylinositol 4-Kinase Type 2 Beta) is a member of the phosphatidylinositol 4-kinase family (PI4K) which phosphorylate phosphatidylinositol to generate phosphatidylinositol 4-phosphate; immediate precursors of several important signaling and scaffolding molecules. PI4K2B is primarily cytosolic and often recruited to membranes where it stimulates phosphatidylinositol 4, 5-bisphosphate syntheses.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PI4K2B, Active	P22-102G	Human	Insect	GST tag	Full Length	84 kDa

LIPID KINASES

PI4KA	Alias	Product Substrate	Genbank ID
	FLJ16556; PI4K-ALPHA; pi4K230; PIK4CA	PI:PS (P425-59)	NM_002650

PI4KA (Phosphatidylinositol 4-Kinase Alpha) is a member of the phosphatidylinositol 4-kinase family (PI4K) that encodes a phosphatidylinositol (PI) 4, the kinase responsible for catalyzing the first committed step in the biosynthesis of phosphatidylinositol 4, 5-bisphosphate. Two classes of mammalian PI4-kinases are classified based on their molecular mass and modulation by detergent and adenosine. PI4KA is highly expressed in the placenta and brain and is associated with the membranes of the Golgi vesicles and vacuoles.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PI4KA, Active	P31-102G	Human	Insect	GST tag	Full Length	120 kDa

PI4KB	Alias	Product Substrate	Genbank ID
	PI4K-BETA, pi4K92, PI4Kbeta, PI4KIIbeta	PI:PS (P425-59)	BC000029

PI4KB (Phosphatidylinositol 4-Kinase Beta) is a member of the phosphatidylinositol 4-kinase family (PI4K) and is the first committed step in the production of the second messenger inositol-1, 4, 5-trisphosphate (PIP3). PI4KB regulates the Golgi disintegration/reorganization during mitosis possibly via phosphorylation of phosphatidylinositol. PI4KB inhibits insulin-stimulated translocation of glucose transporter-4 in mouse adipocytes through its interaction with neuronal calcium sensor-1. PI4KB is also critical for glucose-induced insulin secretion granules.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PI4KB, Active	P32-102G	Human	Insect	GST tag	Full Length	120 kDa

PIK3C2A	Alias	Product Substrate	Genbank ID
	PI3K-C2 (ALPHA), PI3-K-C2A, DKFZ-p686L193, CPK, MGC142218	PI:PS (P425-59)	NM_002645

PIK3C2A (Phosphatidylinositol-4-Phosphate 3-Kinase Catalytic Subunit Type 2 Alpha) is a member of the Phosphoinositide 3-Kinase (PI3K) family which play roles in signaling pathways involved in cell proliferation, oncogenic transformation, cell survival, cell migration and intracellular protein trafficking. PIK3C2A contains a lipid kinase catalytic domain as well as a C-terminal C2 domain; which enables PIK3C2A to act as calcium-dependent phospholipid binding motifs that mediate translocation of protein to membranes and protein-protein interactions.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIK3C2A, Active	P23-112G	Human	Insect	GST tag	299-end	155 kDa

PIK3C2B	Alias	Product Substrate	Genbank ID
	C2-PI3K	PI:PS (P425-59)	BC144342

PIK3C2B (Phosphatidylinositol-4-Phosphate 3-Kinase Catalytic Subunit Type 2 Beta) is a member of the Phosphoinositide 3-Kinase (PI3K) family which play a role in signaling pathways involved in cell proliferation, oncogenic transformation, cell survival, cell migration, and intracellular protein trafficking. PIK3C2B contains a lipid kinase catalytic domain as well as a C-terminal C2 domain which act as calcium-dependent phospholipid binding motifs that mediate translocation of the proteins to membrane and protein-protein interactions. In cell signaling, PIK3C2B stabilizes nucleotide-free Ras and the interaction of Ras and PI3K2B mutually inhibited one another activity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIK3C2B, Active	P24-112BG	Human	Insect	GST tag	850-end	98 kDa

PIK3C2G	Alias	Product Substrate	Genbank ID
	PI3K-C2GAMMA	PI:PS (P425-59)	BC130277

PIK3C2G (Phosphatidylinositol 4-Phosphate 3-Kinase C2 Domain-Containing Subunit Gamma) is a member of the Phosphoinositide 3-Kinase (PI3K) family which play main roles in signaling pathways and involved in cell proliferation, oncogenic transformation, cell survival, cell migration, and intracellular protein trafficking. PIK3C2G contains a lipid kinase catalytic domain as well as a C-terminal C2 domain which act as calcium dependent phospholipid binding motifs which mediate translocation to membranes and also mediate protein-protein interactions. The N-terminal and C-terminal C2 domain are essential for enzymatic activity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIK3C2G, Active	P25-112G	Human	Insect	GST tag	468-1203	110 kDa

LIPID KINASES

PIK3C3	Alias	Product Substrate	Genbank ID
	VPS34, hVps34, MGC61518	PI:PS (P425-59)	NM_002647

PIK3C3 (Phosphatidylinositol 3-Kinase Catalytic Subunit Type 3) is a member of the Phosphoinositide 3-Kinase (PI3K) family that mediates the active diversion of proteins from the secretory pathway to vacuoles. Different complex forms play a role in multiple membrane pathways; PI3KC3-C1 is involved in initiation of autophagosomes and PI3KC3-C2 in maturation of autophagosomes and endocytosis. PIK3C3 are involved in both receptor-mediated signal transduction and intracellular trafficking and is mainly involved in mediating the catalysis on membrane and surpassing futile adenosine triphosphatase cycles.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIK3C3 (Vps34), Active	P26-102G	Human	Insect	GST tag	Full Length	128 kDa

PIP4K2A	Alias	Product Substrate	Genbank ID
	FLJ13267; PI5P4KA; PIP5K2A; PIP-5KII-alpha; PIP5KIIA; PIPK	PI(5)P:PS (P428-59)	NM_005028

PIP4K2A (Phosphatidylinositol-5-Phosphate 4-Kinase Type 2 Alpha) is a member of the phosphatidylinositol 4-kinase (PI4K) family that catalyzes the phosphorylation of phosphatidylinositol-5-phosphate on the fourth hydroxyl of the myo-inositol ring to form phosphatidylinositol-4,5-bisphosphate. PIP4K2A plays an essential role in phosphoinositide signal transduction cascades as the precursor to second messengers and is involved in the regulation of secretion, cell proliferation, differentiation, and motility. PIP4K2A may be one of the factors related to the regulation of beta-globin gene expression and various levels of Hb H in alpha-thalassemic patients.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP4K2A, Active	P76-102AG	Human	Insect	GST tag	Full Length	76 kDa

PIP4K2B	Alias	Product Substrate	Genbank ID
	PI5P4KB; PIP5K2B; PIP5KIIB; PIP-5KIIBeta	PI(5)P:PS (P428-59)	NM_003559

PIP4K2B is a member of the phosphatidylinositol 4-kinase family (PI4K) that catalyzes the phosphorylation of phosphatidylinositol-5-phosphate on the fourth hydroxyl of the myo-inositol ring to form phosphatidylinositol-4,5-bisphosphate. PIP4K2B closely interacts with the juxta membrane region of the p55 TNF receptor and that PIP5K2B activity is increased with mammalian cells by treatment with TNF-alpha. PIP4K2B plays a role in determining insulin sensitivity and adiposity.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP4K2B, Active	P76-102BG	Human	Insect	GST tag	Full Length	73 kDa

PIP4K2C	Alias	Product Substrate	Genbank ID
	PIP5K2C; FLJ22055	PI(5)P:PS (P428-59)	BC028596

PIP4K2C (Phosphatidylinositol-5-Phosphate 4-Kinase Type 2 Gamma) is a member of the phosphatidylinositol 4-kinase(PI4K) family which plays an important role in a wide variety of cell functions. PIP4K2C is found in the cytosol and surrounding plasma membrane and its presences in the endoplasmic reticulum plays an important role in the production of phosphatidylinositol bisphosphate (PIP2).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP4K2C, Active	P76-102CG	Human	Insect	GST tag	Full Length	75 kDa

LIPID KINASES

PIP5K1A	Alias	Product Substrate	Genbank ID
	RP11-68I18.9	PI(4)P:PS (P427-59)	BC007833

PIP5K1A (Phosphatidylinositol-4-Phosphate 5-Kinase Type 1 Alpha) is a member of phosphatidylinositol 4-phosphate 5-kinase (PI5K) family that synthesize phosphatidylinositol 4,5-bisphosphate by phosphorylating phosphatidylinositol 4-phosphate. PIP5K1A-mediated PIP(2) production is crucial for HIV-1 entry and the early steps of infection in permissive lymphocytes. When the wild type PIP5K1A is overexpressed, HIV-1 Env-mediated PIP(2) production occurs and enhances viral replication in primary lymphocytes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP5K1A, Active	P16-102AG	Human	Insect	GST tag	Full Length	86 kDa

PIP5K1B	Alias	Product Substrate	Genbank ID
	MSS4; STM7	PI(4)P:PS (P427-59)	NM_003558

PIP5K1B (Phosphatidylinositol-4-Phosphate 5-Kinase Type 1 Beta) is a member of phosphatidylinositol 4-phosphate 5-kinase (PI5K) family which plays a role in the biosynthesis of phosphatidylinositol 4,5-bisphosphate while also mediating the reorganization of actin filaments. PIP5K1B gene contains 17 exons and spans more than 300kb. The overexpression of PIP5K1B in COS-7 cells induces an increase in short actin fibers and a decrease in actin stress fibers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP5K1B, Active	P16-102BG	Human	Insect	GST tag	Full Length	96 kDa

PIP5K1C	Alias	Product Substrate	Genbank ID
	KIAA0589; LCCS3; PIP5K-GAMMA; PIP5Kgamma; PIPKIg_v4	PI(4)P:PS (P427-59)	NM_012398

PIP5K1C (Phosphatidylinositol-4-Phosphate 5-Kinase Type 1 Gamma) is a member of phosphatidylinositol 4-phosphate 5-kinase (PI5K) family which is found at synapse and plays roles in endocytosis and cell migration. PIP5K1C directly associates with β -catenin activity and increases β -catenin activity downstream of growth factor stimulation. PIP5K1C directly associates with β -catenin phosphorylation on residues that promote nuclear importation and transcriptional activity. PIP5K1C deficiency impairs neutrophil recruitment as a result of defect in adhesion.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP5K1C, Active	P16-102CG	Human	Insect	GST tag	Full Length	120 kDa

PIP5K3	Alias	Product Substrate	Genbank ID
	PIKFYVE; CFD; FAB1; PIP5K; FLJ37746; KIAA0981; MGC40423	PI(3)P:PS (P426-59)	NM_015040

PIP5K3 (Phosphatidylinositol-3-Phosphate 5-Kinase 3) encodes an enzyme that phosphorylates the D-5 position in PtdIns and make phosphatidylinositol-3-phosphate (PtdIns3P) to make PtdIns5P and PtdIns (3,5) bisphosphate. PIP5K3 regulates cytoskeletal function, membrane trafficking, and receptors signaling by recruiting protein complexes to cell- and endosomal-membranes. The inhibition of PIP5K3 renders the late endosome/lysosome compartment refractory to fuse with autophagosomes and multi-vesicular bodies.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PIP5K3 (PIKFYVE), Active	P17-112BG	Human	Insect	GST tag	1400-end	110 kDa

LIPID KINASES

SPHK1	Alias	Product Substrate	Genbank ID
	SPHK	Kinase Dilution Buffer IX (K29-09)	BC008040

SPHK1 (Sphingosine Kinase 1) is a member of the SPHK family and catalyzes the phosphorylation of sphingosine to for sphingosine-1-phosphate (SPP); a novel lipid messenger with both intracellular and extracellular functions. Various stimuli increase cellular levels by SPP by activation of SPHK1. Competitive inhibition of SPHK1 block formation of SPP and selectively inhibit cellular proliferation induced by a variety of factors. SPHK1 is also involved in immune cell motility.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SPHK1, Active	S17-102G	Human	Insect	GST tag	Full Length	71 kDa

SPHK2	Alias	Product Substrate	Genbank ID
	N/A	Kinase Dilution Buffer IX (K29-09)	NM_020126

SPHK2 (Sphingosine Kinase 2) is member of the SPHK family and catalyzes the phosphorylation of lipid sphingosine to the bioactive lipid sphingosine-1-phosphate (STP). SPHK2 is involved in the regulation of chemosensitivity by controlling ceramide formation and the downstream AKT pathways in human colon cancer cells. The N-terminal extended form of SPHK2 has a role in serum-dependent regulation of cell proliferation and apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SPHK2, Active	S18-102G	Human	Insect	GST tag	Full Length	110 kDa

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OTHER KINASES

Other Kinases

There are many kinases that cannot be classified within the framework of conventional subfamilies. These “other” kinases include notable groups, such as the Aurora kinases. There are three Aurora kinases in humans. These serine/threonine kinases are essential for regulating various aspects of mitosis, including: checkpoint monitoring, spindle assembly, centrosome alignment and cytokinesis. Thus, defects in Aurora kinases are connected to the production of aneuploid, polyploid and multinucleate cells. Aurora kinases are emerging as important targets for the treatment of many types of solid and hematological cancers.

AURORA A	Alias	Product Substrate	Genbank ID
	AURKA, AIK, ARK1, AURA, BTAK, STK6, STK7, STK15, AURORA2	MBP Protein (M42-51N)	NM_003600 ¹ , NM_011497 ²

AURORA A is a mitotic serine/threonine kinase involved in the regulation of cell cycle progression and control of chromosome segregation. AURORA A is expressed at its highest level during G2-M phase of the cell cycle and is readily involved in centrosome separation, duplication and maturation as well as in bipolar spindle assembly and stability. Overexpression of AURORA A has been found to be correlated with the grade of various human solid tumours.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AURORA A, Active ¹	A28-18G	Human	Insect	N-terminal GST tag	Full Length	72 kDa
AURORA A, Active ²	A28-10G	Mouse	Insect	N-terminal GST tag	Full Length	71 kDa

AURORA B	Alias	Product Substrate	Genbank ID
	AURKB, AIK2; AIM1; ARK2; AurB; IPL1; AIM-1; STK12	MBP Protein (M42-51N)	NM_004217

AURORA B regulates various mitotic events including mitotic spindle assembly and stability and plays a critical role during centrosome separation, duplication and maturation. AURORA B localizes to the microtubules near kinetochores, specifically to the specialized microtubules called K-fibers. AURORA B inhibits the microtubule depolymerizing activity of mitotic centromere-associated kinesin (MCAK) by phosphorylating MCAK on Ser92. Overexpression of AURORA B has shown to be correlated with tumor development and progression.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AURORA B, Active	A31-10G	Human	Insect	N-terminal GST tag	Full Length	68 kDa

AURORA C	Alias	Product Substrate	Genbank ID
	AURKC, AIE2, AIK3, AurC, STK13, aurora-C	MBP Protein (M42-51N)	NM_003160

AURORA C is a member of the mitotic serine/threonine AURORA kinase family which regulates centrosome maturation, chromosome segregation, and cytokinesis. AURORA C is often overexpressed in early embryonic development and in several cancer cell lines, suggesting its involvement in oncogenic signal transduction. Its overexpression has been correlated with centrosome amplification which causes genomic instability in tumor cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AURORA C, Active	A33-10G	Human	Insect	N-terminal GST tag	Full Length	61 kDa

BUB1B	Alias	Product Substrate	Genbank ID
	SSK1, BUBR1, Bub1A, MAD3L, hBUBR1, BUB1beta	MBP Protein (M42-51N)	NM_001211

BUB1B (Budding Uninhibited by Benzimidazoles 1 Homolog beta) is involved in spindle checkpoint functions and is localized in the kinetochore. BUB1B plays a role in the inhibition of the anaphase-promoting complex/cyclosome (APC/C), delaying the onset of anaphase and ensuring proper chromosome segregation. BUB1B is essential for early embryonic development and normal hematopoiesis where it plays roles in mitosis progression and tumor suppression. BUB1B expression during the spindle checkpoint is dependent on residual BUB1B expression and impaired spindle checkpoint function has been found in many forms of cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BUB1B, Active	B12-11G	Human	Insect	N-terminal GST tag	613-end	73 kDa

OTHER KINASES

CAMKK1	Alias	Product Substrate	Genbank ID
	CAMKKA ¹ , MGC34095 ¹ , DKFZ-p761M0423 ¹ ; CaMKK12; CaMKK alpha ² ; CaM-kinase IV kinase ²	MBP Protein (M42-51N)	NM_032294 ¹ , L42810 ²

CAMKK1 (Calcium/Calmodulin Dependent Protein Kinase Kinase 1) belongs to the Calcium/Calmodulin-dependent protein kinase subfamily of serine/threonine protein kinases that activates CaM-kinases I and IV via phosphorylation of their Thr177 and Thr196 residues, respectively. Recent studies have shown that the activity of CAMKK1 is decreased upon phosphorylation by cAMP-dependent protein kinase (PKA). CAMKK1 has been identified in intact cells as AMPKKs, predicting a significant role for this kinase in regulating AMPK activity in vivo.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CAMKK1, Active ¹	C17-10G	Human	Insect	N-terminal GST tag	Full Length	94 kDa
CAMKK1, Active ²	C17-18G	Rat	Insect	N-terminal GST tag	Full Length	88 kDa

CAMKK2	Alias	Product Substrate	Genbank ID
	CAMKK; CAMKKB; KIAA0787; MGC15254	MBP Protein (M42-51N)	NM_172226

CAMKK2 (Calcium/Calmodulin Dependent Protein Kinase Kinase 2) belongs to the Calcium/Calmodulin-dependent protein kinase subfamily of serine/threonine protein kinases. CAMKK2 is broadly distributed in tissues with high expression in the brain, thymus, spleen, and testis. CAMKK2 activates CaMI and CaMKIV when it is co-expressed in Jurkat T cells on Thr(177) and Thr(200) residues, respectively. CAMKK2 also phosphorylates and regulates AMPK activity which has been found to be an important regulator of cellular metabolism in response to metabolic stress.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CAMKK2, Active	C18-10G	Human	Insect	N-terminal GST tag	Full Length	88 kDa

CDC7	Alias	Product Substrate	Genbank ID
	<u>CDC7</u> : CDC7L1; HsCDC7; Hsk1; huC-D7; MGC117361; MGC126237; MGC126238; <u>DBF4</u> : ASK; CHIF; DBF4A; ZDBF1	PDKtide (P10-58)	NM_003503/NM_006716

CDC7 (Cell Division Cycle 7 Homolog Protein) is a cell division cycle protein critical for G1/S transition and initiation of DNA replication during the cell division cycle. Inhibition of CDC7 in cancer cells impairs progression through S phase thereby inducing a p53-independent apoptotic cell death where in normal cells cell viability is not affected. Overexpression of CDC7 is linked to neoplastic transformation for some tumors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CDC7/DBF4, Active	C26-10G	Human	Insect	N-terminal GST tag	Full Length	<u>CDC7</u> : 94 kDa <u>DBF4</u> : 125 kDa

CK2	Alias	Product Substrate	Genbank ID
	CKII ¹ ; CK2A1 ¹ ; CKII&alpha ¹ ; CSNK2A2 ² ; CKII-alpha 2 ² ; CK2A2 ²	CK2 Substrate (C08-58)	NM_001895 ¹ , NM_001896 ²

CK2 (Casein Kinase 2) are serine/threonine protein kinases who function as regulators of cellular growth. CK2 participates in the phosphorylation and regulation of a large number of cellular targets. CK2 exerts its anti-apoptotic role by protecting protein from caspase-mediated degradation. Overexpression of the CK2 catalytic subunit in lymphocytes of transgenic mice leads to T cell lymphoma and the development of many cancers in humans.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CK2 alpha 1, Active ¹	C70-10G	Human	Insect	N-terminal GST tag	Full Length	70 kDa
CK2 alpha 2, Active ²	C71-10G	Human	Insect	N-terminal GST tag	Full Length	64 kDa

OTHER KINASES

EIF2AK1	Alias	Product Substrate	Genbank ID
	HCR; HRI; KIAA1369	RS Repeat Peptide (R55-58)	NM_014413

EIF2AK1 (Eukaryotic Translation Initiation Factor 2-alpha Kinase 1) is a heme-sensing capacity kinase that is inactivated by hemin and activated by heme deficiency. EIF2AK1 (HRI) functions in iron homeostasis and may play a role in hemolytic and inflammatory anemia. It also responds to various stress conditions, such as oxidative stress or osmotic shock. EIF2AK1 (HRI) is downregulated in the majority of ovarian cancers compared with normal ovarian tissues.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EIF2AK1 (HRI), Active	H07-10G	Human	Insect	N-terminal GST tag	Full Length	120 kDa

EIF2AK2	Alias	Product Substrate	Genbank ID
	PKR, PRKR, EIF2AK1	MBP Protein (M42-51N)	NM_002759

EIF2AK2 (dsRNA-Activated Protein Kinase) is a serine/threonine protein kinase shown to be involved in HIV/gp120-associated neurodegeneration. EIF2AK2 is a critical mediator of gp120 neurotoxicity and is a substrate for a family of protein kinases that respond to environmental stressors. EIF2AK2 plays a critical role in mRNA translation, cell proliferation and apoptosis. Cross-talk between the EIF2AK2 and p53 is implicated in cell proliferation and tumorigenesis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EIF2AK2, Active	P80-11G	Human	Insect	N-terminal GST tag	252-end	64 kDa

EIF2AK3	Alias	Product Substrate	Genbank ID
	PERK, PEK, WRS, HRI, DKFZp781H1925	SMAD3 Protein (S12-30G)	NM_004836

EIF2AK3 (Eukaryotic Translation Initiation Factor 2-alpha Kinase 3) may modulate mitochondrial function through phosphorylating the alpha subunit of eukaryotic translation-initiation factor 2 (EIF2). This leads to the inactivation of EIF2, resulting in a rapid reduction of translational initiation and repression of global protein synthesis. EIF2AK3 plays a major role in the ability of cells to adapt to ER stress and is also involved in an integrated adaptive response to hypoxic stress. Mutations in a similar gene in human are associated with Wolcott-Rallison syndrome.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EIF2AK3, Active	E11-11G	Human	E.coli	N-terminal GST tag	563-1115	115 kDa

EIF2AK4	Alias	Product Substrate	Genbank ID
	GCN2; KIAA1338	RS Repeat Peptide (R55-58)	NM_001013703

EIF2AK4 (Eukaryotic Translation Initiation Factor 2 alpha Kinase 4) belongs to a family of kinases that phosphorylate the alpha subunit of eukaryotic translation initiation factor-2. This leads to downregulation of protein synthesis in response to varied cellular stresses. Mutations in this gene have been found in individuals suffering from autosomal recessive pulmonary venoocclusive-disease-2.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EIF2AK4 (GCN2), Active	E12-11G	Human	Insect	N-terminal GST tag	192-1024	132 kDa

ERN1	Alias	Product Substrate	Genbank ID
	hIRE1p; IRE1; IRE1A; IRE1P	MBP Protein (M42-51N)	NM_001433

ERN1 (Endoplasmic Reticulum to Nucleus Signaling 1) is a human homolog of yeast IRE1. ERN1 possesses intrinsic kinase activity and an endoribonuclease activity and it is important in endoplasmic reticulum-based stress signals. ERN1 controls IRE1 proteolysis in mammalian cells. ERN1 function is also essential for fetal viability.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERN1 (IRE1), Active	E31-11G	Human	Insect	N-terminal GST tag	468-end	87 kDa

OTHER KINASES

ERN2	Alias	Product Substrate	Genbank ID
	IRE1B; IRE2; IRE1-BETA; IRE2p	MBP Protein (M42-51N)	NM_033266

ERN2 (Endoplasmic Reticulum to Nucleus Signaling 2) is a human homolog of yeast IRE1 and is required for activation of the endoribonuclease domain. ERN2 is a serine/threonine protein kinase which also plays multiple roles in the ER stress response.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ERN2 (IRE2), Active	E32-11G	Human	Insect	N-terminal GST tag	499-end	80 kDa

GSG2	Alias	Product Substrate	Genbank ID
	GSG2, HASPIN	Histone H3 Protein (H12-54N)	NM_031965

GSG2 (Haspin) is a serine/threonine protein kinase that regulates chromosome and spindle function during mitosis and meiosis. GSG2 activates AURKB and other components of the chromosomal passenger complex (CPC) at centromeres to ensure proper chromatid cohesion, metaphase alignment and normal progression through the cell cycle. Phosphorylation of H3T3ph by GSG2 is necessary for chromosomal passenger complex (CPC) accumulation at centromeres.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
Haspin (GSG2), Active	G10-11G	Human	Insect	N-terminal GST tag	470-end	64 kDa

IKK alpha	Alias	Product Substrate	Genbank ID
	CHUK, IKK1, IKBKA, TCF16, NFKBIKA, IKK-alpha	IKKtide (I33-58)	BC092514

IKK alpha (IkappaB alpha Kinase) is a serine/threonine protein kinase that phosphorylates the I-kappa-B protein, an inhibitor of the transcription factor NF-kappa-B complex. Phosphorylation of I-kappa-B protein triggers the degradation of the inhibitor via the ubiquitination pathway, activating NF-kappa-B complex. IKK alpha is an essential regulator of NF-kappa-B-dependent gene expression through control of promoter-associated histone phosphorylation after cytokine exposure. IKK α is a critical component of the cytoplasmic transductional-transcriptional processor leading to induction of IFN alpha production. IKK alpha is also involved in the epidermis where it antagonizes mitogenic and angiogenic signals and represses tumor progression and metastases.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IKK alpha, Active	C51-10G	Human	Insect	N-terminal GST tag	Full Length	114 kDa

IKK beta	Alias	Product Substrate	Genbank ID
	IKK2, IKKB, NFKBIKB, FLJ40509, IKK-beta, MGC131801	IKKtide (I33-58)	NM_001556

IKK beta (IkappaB beta Kinase) is a serine/threonine protein kinase that phosphorylates I-kappa-B protein, an inhibitor of the transcription factor NF-kappa-B complex. Phosphorylation of I-kappa-B protein triggers the degradation of the inhibitor via the ubiquitination pathway, activating NF-kappa-B complex. Overexpression of catalytically inactive IKK beta blocks cytokine-induced NF-kappa-B activation. Aspirin and sodium salicylate can inhibit IKK beta activity in vitro and in vivo by binding to IKK beta to reduce ATP binding.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IKK beta, Active	I03-10BG	Human	Insect	N-terminal GST tag	Full Length	105 kDa
IKK beta, Active	I03-18G	Human	Insect	N-terminal GST tag	674 aa (FL)	115 kDa

IKK epsilon	Alias	Product Substrate	Genbank ID
	IKBKE, IKKE, IKKI, IKK-i, KIAA0151, MGC125294, MGC125295	IKKtide (I33-58)	NM_014002

IKK epsilon (IkappaB epsilon Kinase) is a non-canonical I-kappa-B kinase (IKK) essential for regulating antiviral signaling pathways. IKK epsilon is an oncogene that is amplified and overexpressed in over 30% of breast carcinomas and breast cancer cell lines. IKK epsilon is a part of a novel PMA-inducible I-kappa-B kinase complex which plays an essential role for an in triggering the host antiviral response to viral infection.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IKK epsilon, Active	I04-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

OTHER KINASES

NEK1	Alias	Product Substrate	Genbank ID
	D8Ertd790e; kat; MGC189817	MBP Protein (M42-51N)	NM_175089

NEK1 (Never in Mitosis Gene A-Related Kinase 1) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis gene A). NEK1 is a serine/threonine kinase involved in cell cycle regulation and is found in a centrosomal complex with FEZ1, a neuronal protein that plays a role in axonal development. NEK1 is involved early in the DNA damage response pathway where NEK1 cycles through the nucleus via nuclear localization and export signals. NEK1 plays an important role in the kidney where it has opened a new avenue for studying cystogenesis and identifying possible modes of therapy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK1, Active	N02-11G	Mouse	Insect	N-terminal GST tag	1-495	85 kDa

NEK2	Alias	Product Substrate	Genbank ID
	NLK1; HsPK21; NEK2A	MBP Protein (M42-51N)	NM_002497

NEK2 (Never in Mitosis Gene A-Related Kinase 2) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK2 is closely related in its catalytic domain to the serine/threonine protein kinase NIMA of *A. nidulans* that is required for entry into mitosis and may function in parallel to the universal mitotic inducer p34cdc2. Like NIMA, the NEK2 protein is almost undetectable during G1 but accumulated progressively throughout S, reaching maximal levels in late G2. NEK2 is shown to be expressed most abundantly in the testis of the adult tissues while being localized to the nucleus.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK2, Active	N03-10G	Human	Insect	N-terminal GST tag	Full Length	76 kDa

NEK3	Alias	Product Substrate	Genbank ID
	HSPK36, MGC29949	MBP Protein (M42-51N)	NM_002498

NEK3 (Never in Mitosis Gene A-Related Kinase 3) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK3 mRNA is detected in all the proliferating cell lines and is preferentially expressed in mitotically active tissue. Analysis of breast tissue microarray shows a significant up-regulation of NEK3 expression in malignant versus normal specimens. During Prolactin receptor signaling, VAV2 is phosphorylated and activated by NEK3. Overexpression of NEK3 in Chinese hamster ovary cells increases cytoskeletal re-organization in response to Prolactin while downregulation of NEK3 expression by siRNA block these effects.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK3, Active	N05-10G	Human	Insect	N-terminal GST tag	Full Length	86 kDa

NEK4	Alias	Product Substrate	Genbank ID
	NRK2, STK2	MBP Protein (M42-51N)	BC063044

NEK4 (Never in Mitosis Gene A-Related Kinase 4) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK4 has been identified in a genetic screen as a mediator of response to Taxol. After Taxol treatment, NEK4 promoted microtubule outgrowth, whereas NEK4 deficiency impaired G(2)-M arrest and decreased formation of mitotic-like asters. In contrast, NEK4 deficiency sensitized cells to vincristine, which destabilizes microtubules.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK4, Active	N06-10G	Human	Insect	N-terminal GST tag	Full Length	160 kDa

NEK5	Alias	Product Substrate	Genbank ID
	MGC75495	MBP Protein (M42-51N)	NM_199289

NEK5 (Never in Mitosis Gene A-Related Kinase 5) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK5 is a serine/threonine kinase that is essential for cell cycle progression. NEK5 is intracellularly localized to the proximal portions of centrosomes. Dysregulation of NEK5 leads to unscheduled separation of centrosomes during interphase. NEK5 is required for the loss of centrosome linker proteins and enhanced microtubule nucleation that leads to centrosome separation and bipolar spindle formation in mitosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK5, Active	N07-11G	Human	Insect	N-terminal GST tag	1-508	84 kDa

OTHER KINASES

NEK6	Alias	Product Substrate	Genbank ID
	SID6-1512	MBP Protein (M42-51N)	NM_014397

NEK6 (Never in Mitosis Gene A-Related Kinase 6) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK6 is a serine/threonine kinase that shares an amino-terminal catalytic domain related to NIMA family. NEK6 is required for mitotic progression of human cells. This kinase is phosphorylated and activated during M phase of the cell cycle. Inhibition of NEK6 leads to M-phase arrest and triggers apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK6, Active	N08-10G	Human	Insect	N-terminal GST tag	Full Length	63 kDa

NEK7	Alias	Product Substrate	Genbank ID
	N/A	Casein Protein (C03-54N)	NM_133494

NEK7 (Never in Mitosis Gene A-Related Kinase 7) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK7 is a serine/threonine kinase which is rapidly and efficiently increased by serum deprivation, and may be regulated in a cell cycle-dependent manner. In contrast to the other documented NIMA-related kinases, NEK7 harbor its catalytic domain in the C-terminus of the protein.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK7, Active	N09-10G	Human	Insect	N-terminal GST tag	Full Length	63 kDa

NEK8	Alias	Product Substrate	Genbank ID
	JCK; NEK12A; NPHP9; RHPD2	MBP Protein (M42-51N)	NM_178170

NEK8 (Never in Mitosis Gene A-Related Kinase 8) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK8 (never in mitosis gene a-related kinase 8) is a serine/threonine kinase that plays an important role in cell cycle progression from G2 to M phase. NEK8 is part of a complex of ciliary proteins required for renal tubular integrity and cardiovascular development. Diseases associated with NEK8 include Nephronophthisis 9 and Renal-Hepatic-Pancreatic Dysplasia 2.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK8, Active	N10-11G	Human	Insect	N-terminal GST tag	1-322	66 kDa

NEK9	Alias	Product Substrate	Genbank ID
	NEK8, NERCC, NERCC1, MGC16714, MGC138306, DKFZp434D0935	MBP Protein (M42-51N)	NM_033116

NEK9 (Never in Mitosis Gene A-Related Kinase 9) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK9 has high homology to NEK1, NEK3 and NEK4. NEK9 plays an important role in the control of mitotic progression and it has found to be regulated by CDC2 and RAN GTPase. NEK9 can catalyze the phosphorylation of recombinant NEK6 and NEK7 in vitro, suggesting that NEK9 may be responsible for activation of NEK6 and NEK7 during mitosis. Overexpression of both active and inactive variants of NEK9 are toxic to cells and inhibits cell division causing abnormal nuclear morphologies.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK9, Active	N11-11G	Human	Insect	N-terminal GST tag	1-979; deleted fragment of 346-731	115 kDa

NEK11	Alias	Product Substrate	Genbank ID
	FLJ23495	MBP Protein (M42-51N)	NM_024800

NEK11 (Never in Mitosis Gene A-Related Kinase 11) is a member of the NEK family of protein kinases that share high amino acid homology with NIMA (Never in Mitosis Gene A). NEK11 localizes to the nucleoli where it may function with NEK2A in the S-phase checkpoint. NEK2 phosphorylates and elevates NEK11 kinase activity by dissociating the autoinhibitory domain from the N-terminal catalytic domain. NEK11 protein appears to play a role in DNA replication and response to genotoxic stress.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NEK11, Active	N13-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

OTHER KINASES

PEAK1	Alias	Product Substrate	Genbank ID
	SGK269	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_024776

PEAK1 (Pseudopodium-Enriched Atypical Kinase 1) is a member of the NKF3 kinase family and regulates the cytoskeleton and has been shown to be involved in cancer progression. PEAK1 is highly expressed in spleen, heart, ovary, brain, lung, kidney, and fetal brain. PEAK1 may direct or indirectly affect phosphorylation levels of cytoskeleton-associated proteins.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PEAK1, Active	P18-11G	Human	Insect	N-terminal GST tag	1127-end	100 kDa

PLK1	Alias	Product Substrate	Genbank ID
	STPK13	Casein, Dephosphorylated (C03-54BN)	NM_005030

PLK1 (Polo-Like Kinase 1) is a serine/threonine kinase which is highly expressed during mitosis. PLK1 play key roles throughout M-phase of the cell cycle including; regulating centrosome maturation and spindle assembly; removing cohesion from chromosome arms and regulating of mitotic exit and cytokinesis. PLK1 depletion has shown to dramatically inhibit of cell proliferation and to promote cell apoptosis, hence it is an important target for cancer therapy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PLK1, Active	P41-10H	Human	Insect	N-terminal His tag	Full Length	70 kDa

PLK2	Alias	Product Substrate	Genbank ID
	SNK	Casein, Dephosphorylated (C03-54BN)	NM_006622

PLK2 (Polo-like Kinase 2) is a tumor suppressor serine/threonine protein kinase that is essential for normal cell division. PLK2 binds to and phosphorylates proteins that are already phosphorylated. Other PLK2 targets include the Rap activator and the Ras inhibitor. PLK2 kinase may play an important role in wound healing, embryogenesis and neoplasia.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PLK2, Active	P42-10G	Human	Insect	N-terminal GST tag	Full Length	106 kDa

PLK3	Alias	Product Substrate	Genbank ID
	CNK, FNK, PRK	Casein, Dephosphorylated (C03-54BN)	NM_004073

PLK3 (Polo-like Kinase 3) is a cytokine-inducible kinase which is associated with centrosomes in a microtubule-dependent manner. During mitosis, PLK3 becomes localized to the mitotic apparatus. PLK3 is known to be an important regulator of cell cycle progression and tumorigenesis. PLK3-defective mutants display mitotic arrest followed by apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PLK3, Active	P43-13G	Human	Insect	N-terminal GST tag	57-340	60 kDa

PLK4	Alias	Product Substrate	Genbank ID
	SAK, STK18	MBP Protein (M42-51N)	NM_014264

PLK4 (Polo-like Kinase 4) plays an important role in centriole duplication. PLK4 localizes to centrioles where it regulates their duplication during cell cycle. Overexpression of PLK4 triggers the simultaneous formation of multiple procentrioles around each pre-existing centriole, resulting in aberrant centriole amplification. Reduced PLK gene dosage increases the probability of have mitotic errors and consequently cancer development.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PLK4, Active	P44-11G	Human	Insect	N-terminal GST tag	1-836	140 kDa

OTHER KINASES

SBK1	Alias	Product Substrate	Genbank ID
	SBK	PKA Substrate (C01-58)	NM_001024401

SBK1 (SH3 Domain Binding Kinase 1) is a serine/threonine kinase which is structurally related to *Xenopus* gastrula-specific protein kinase. SBK1 possess a consensus sequence for an SH3-binding domain from developing rat brain, suggesting that it is involved in signaling pathways related to brain development. SBK1 is dysregulated in certain cancers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SBK1, Active	S56-10G	Human	Insect	N-terminal GST tag	Full Length	69 kDa

STK36	Alias	Product Substrate	Genbank ID
	FU, DKFZp434N0223	MBP Protein (M42-51N)	BC026158

STK36 (Serine-Threonine Kinase 36) is a serine/threonine kinase which regulates GLI zinc-finger transcription factors. STK36 is responsible for controlling the activity of GLI1 and GLI2 by opposing the effect of SUFU, a negative regulator of hedgehog signaling. Since the Hedgehog signaling pathway is frequently activated in certain kinds of gastrointestinal cancers, STK36 is an attractive target for targeted inhibition.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK36, Active	S48-11G	Human	Insect	N-terminal GST tag	1-457	87 kDa

TBK1	Alias	Product Substrate	Genbank ID
	NAK, T2K, FLJ11330	MBP Protein (M42-51N)	BC034950

TBK1 (TANK-binding Kinase) plays an essential role in regulating inflammatory responses to foreign agent through activatin I κ B kinases. Activation of I κ B kinases allows the phosphorylation of I κ B protein which is then degraded via the ubiquitination pathway. This mechanism allows the activation of the NF κ B transcriptional complex. TTBK1 is a component of the virus-activated kinase that phosphorylate IRF3 and IRF7 allowing their dimerization and translocation to the nucleus where they induce transcription of interferon.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TBK1, Active	T02-10G	Human	Insect	N-terminal GST tag	Full Length	105 kDa

TLK1	Alias	Product Substrate	Genbank ID
	KIAA0137; PKU-beta	Histone H3 Protein (H12-54N)	NM_012290

TLK1 (Tousled-like Kinase 1) is a nuclear serine/threonine kinase that regulates chromatin assembly. TLK1 is a novel target of the DNA damage checkpoint that is rapidly inactivated upon exposure to ionizing radiation (IR) and the inactivation is directly mediated by the S-phase DNA damage checkpoint. The suppression of TLK1 activity after double-strand breaks in the DNA, replication blockade or low doses of ultraviolet irradiation requires ATM, NBS and CHK1.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TLK1, Active	T10-10G	Human	Insect	N-terminal GST tag	Full Length	135 kDa

TLK2	Alias	Product Substrate	Genbank ID
	MGC44450; PKU-ALPHA	Casein Protein (C03-54N)	NM_006852

TLK2 (Tousled-like Kinase 2) is a nuclear serine/threonine kinase which regulates chromatin assembly. TLK2 is also involved in other cellular processes such as intracellular signaling cascade, protein amino acid phosphorylation, cell cycle, chromatin modification and response to DNA damage stimulus. TLK2 displays maximal activity during S-phase of the cell cycle where it appears to be regulated by cell-cycle-dependent phosphorylation. Inhibition of DNA replication causes a rapid loss of TLK2 activity suggesting TLK2 functions are tightly linked to ongoing DNA replication.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TLK2, Active	T11-11G	Human	Insect	N-terminal GST tag	1-367	67 kDa

OTHER KINASES

TOPK	Alias	Product Substrate	Genbank ID
	PBK, SPK, Nori-3, FLJ14385	MBP Protein (M42-51N)	NM_018492

TOPK (T-Cell-Originated Protein Kinase) is a MAP2 kinase that phosphorylates p38 MAPK. TOPK expression is detected in male germ line progenitor cells, activated T-cells, and a variety of lymphomas and leukemia. TOPK is activated by CDK1 and is required for mitotic cell division however it's functional relevance to cell division is not yet fully understood. TOPK may play an important role in linking extracellular signals to an intracellular state, possibly allowing extracellular influence on the cell-cycle-related processes of proliferation or differentiation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TOPK, Active	T14-10G	Human	Insect	N-terminal GST tag	Full Length	68 kDa

TTK	Alias	Product Substrate	Genbank ID
	ESK, PYT, MPS1, MPS1L1, FLJ38280	MBP Protein (M42-51N)	NM_003318

TTK is a serine/threonine kinase that regulates centrosome duplication and mitotic checkpoint response. TTK is required for stabilization and activation of p53 during spindle disruption. Disruption of TTK leads to a combination of severe mitotic abnormalities and failure in centrosome duplication.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TTK, Active	T20-10G	Human	Insect	N-terminal GST tag	Full Length	130 kDa

ULK1	Alias	Product Substrate	Genbank ID
	ATG1, UNC51, Unc51.1, FLJ38455	MBP Protein (M42-51N)	BC111603

ULK1 (Unc-51-like Kinase 1) is a serine/threonine kinase which is involved in the initial stages of autophagy ultimately affecting the cell's response to nutrient starvation. ULK1 acts upstream of phosphatidylinositol 3-kinase (PIK3C3) to regulate the formation of autophagophores. ULK1 forms a complex with ATG1 which is essential for starvation-induced autophagy. Many tumours depend on autophagy for their survival, making ULK1/ATG1 excellent targets for pharmaceutical intervention.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ULK1, Active	U01-11G	Human	Insect	N-terminal GST tag	1-649	125 kDa

ULK2	Alias	Product Substrate	Genbank ID
	Unc51.2, KIAA0623	MBP Protein (M42-51N)	NM_014683

ULK2 (Unc-51-like Kinase 2) is a serine/threonine kinase that plays a critical role during initial stages of autophagy. ULK2 forms a heterotrimeric complex with ATG13 and FIP200 and this complex is direct targeted by mTOR as a part of the autophagy response. ULK2 activity is implicated in neuronal differentiation and is required for granule cell axon formation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ULK2, Active	U02-11G	Human	Insect	N-terminal GST tag	1-478	98 kDa

ULK3	Alias	Product Substrate	Genbank ID
	DKFZP434C131	Casein, Dephosphorylated (C03-54BN)	BC157884

ULK3 (Unc-51-like Kinase 3) is a member of the serine/threonine kinase family that is involved in the SHH signaling pathway as a positive regulator of GLI proteins. ULK3 is widely expressed in tissues where SHH signaling is known to be active. Suggesting that ULK3 is involved in the SHH pathway as a positive regulator of GLI proteins. ULK3 also acts as a regulator of autophagy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ULK3, Active	U03-10H	Human	Insect	N-terminal His tag	Full Length	51 kDa

OTHER KINASES

WNK1	Alias	Product Substrate	Genbank ID
	HSAN2; HSN2; KDP; KIAA0344; MGC163339; MGC163341; p65; PRKWNK1; PSKDKFZP434C131	MBP Protein (M42-51N)	NM_018979

WNK1 (WNK Lysine Deficient Protein Kinase 1) is serine/threonine kinase which is involved in electrolyte homeostasis, cell signalling, cell survival and cell proliferation. WNK1 regulates blood pressure by controlling the transport of sodium and chloride ions through the inhibition of WNK4. Mutations in WNK1 have been associated with pseudohypoaldosteronism type II and hereditary sensory neuropathy type II.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
WNK1, Active	W02-11G	Human	Insect	N-terminal GST tag	181-507	67 kDa

WNK2	Alias	Product Substrate	Genbank ID
	KIAA1760; NY-CO-43; P/OKcl.13; PRKWNK2; SDCCAG43	PKA Substrate (C01-58)	NM_006648

WNK2 (WNK Lysine Deficient Protein Kinase 2) is a serine/threonine kinase which is predominantly expressed in brain, heart muscle, small intestine, and colon. WNK2 is involved in the modulation of growth factor-induced cancer cell proliferation by negatively regulating the EGF-induced activation of the ERK/MPK-pathway and the downstream cell cycle progression. As a tumor suppressor, WNK2 expression was found down-regulated epigenetically by promoter methylation in human gliomas.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
WNK2, Active	W03-11G	Human	Insect	N-terminal GST tag	1-489	100 kDa

WNK4	Alias	Product Substrate	Genbank ID
	PHA2B; PRKWNK4	PKA Substrate (C01-58)	NM_175638

WNK4 (WNK Lysine Deficient Protein Kinase 4) is a serine/threonine kinase which controls ion homeostasis through by acting as a molecular switch that can vary the balance that exists between NaCl reabsorption and K⁺ secretion. WNK4 negatively regulates the surface expression of SLC12A3 and the loss of this regulation may cause an inherited form of hypertension, suggesting that WNK4 and is a potential target for anti-hypertensive drugs.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
WNK4, Active	W05-11G	Mouse	Insect	N-terminal GST tag	1-441	86 kDa

STE Kinases

STE kinases are named after its founding member, the yeast sterile20 (Ste20) serine/threonine kinase. The STE subfamily includes many enzymes involved in MAP kinase signaling, including the mammalian Ste-20 like kinases (MSTs). There are five MSTs in humans: MST1 (STK4), MST2 (STK3), MST3 (STK24), MST4 (STK26), and YSK1 (STK25). MST1 and 2 are potent activators of cell proliferation and MST3/4 regulates cytoskeletal control and cell migration. Not surprisingly, mutations and fusions of MSTs have been found in cancers. Aberrant MST1/2 activity is connected to the rare cancer, mesothelioma and MST3/4 promotes metastasis in aggressive subtypes of breast cancer.

ASK1	Alias	Product Substrate	Genbank ID
	MAP3K5; MEKK5; MAPKKK5	MBP Protein (M42-51N)	NM_005923

ASK1 (Apoptosis Signal Regulating Kinase 1) is a member of MAPKKK family and induces apoptotic cell death when overexpressed. Upon activation by TRF2, ASK1 phosphorylates MKK4 which in turn activates JNK. Thus, ASK1 is a mediator of TRAF2-induced JNK activation. ASK1 also activates MKK3 and MKK6.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ASK1, Active	M13-11G	Human	Insect	N-terminal GST tag	649-946	60 kDa

COT	Alias	Product Substrate	Genbank ID
	MAP3K8, EST, ESTF, TPL2, Tpl-2, c-COT, FLJ10486	MEK1, Unactive (M02-14G); RK1, Unactive (M29-14U); MBP Protein (M42-54G)	NM_005204

COT (Cancer Osaka Thyroid) is an oncogene that can activate both the MAP kinase and JNK kinase pathways. COT activates I κ B kinases and induces the nuclear production of NF- κ B. The C-terminal catalytic domain of KSR2 is associated with and negatively regulates COT activity in vitro. COT regulates the ERK1/ERK2 pathway in response to IL-1 and blockage of COT expression results in failure of IL-1 to induce an increase in IL-8 and MIP-1 mRNA levels.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
COT, Active	M16-11G	Human	Insect	N-terminal GST tag	30-397	70 kDa

GCK	Alias	Product Substrate	Genbank ID
	MAP4K2, BL44, RAB8IP	MBP Protein (M42-51N)	NM_004579

GCK (Germinal Center Kinase) is a serine/threonine kinase that is activated by TNF alpha and interacts with the TNF receptor-associated factor 2 (TRAF2). GCK functions upstream of MAP kinases and activates the SAPK pathway. While it is present in different tissues, GCK expression in lymphoid follicles is restricted to the cells of germinal centre where it is suspected to participate in B-cell differentiation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GCK, Active	M24-10G	Human	Insect	N-terminal GST tag	Full Length	125 kDa

GLK	Alias	Product Substrate	Genbank ID
	MAP4K3; MAPKKK3; MEKKK3; RAB8IPL1	Abltide (A02-58)	NM_003618

GLK (Germinal Center Kinase-like Kinase) is a STE20 family serine/threonine protein kinase that contains N-terminal catalytic domain and C-terminal regulatory domain. GLK acts upstream from MEKK1 to activate the JNK signaling pathway. GLK can directly activate PKC theta during TCR signaling, as well as act like a pro-apoptotic kinase which orchestrates activation of BAX via the concerted posttranscriptional modulation of PUMA, BAD, and BIM.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
GLK, Active	M25-11G	Human	Insect	N-terminal GST tag	1-380	70 kDa

STE KINASES

HGK	Alias	Product Substrate	Genbank ID
	MAP4K4, NIK, FLH21957, FLJ10410, FLJ20373, FLJ90111, KIAA0687	Abtide (A02-58)	NP_004825

HGK (Hepatocyte Progenitor Kinase-like/Germinal Center Kinase-like Kinase) has serine/threonine protein kinase activity which specifically activates MAPK8/JNK. Inhibition of the MAP3K7-MAP2K4-MAP2K7 kinase cascade prevents MAPK8 activation by HGK, suggesting HGK involvement in the pathway. HGK-dependent signaling inhibits PPAR gamma-responsive gene expression, adipogenesis and insulin-stimulated glucose transport.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HGK, Active	M26-11G	Human	Insect	N-terminal GST tag	1-328	64 kDa

HPK1	Alias	Product Substrate	Genbank ID
	MAP4K1	Abtide (A02-58)	NM_007181

HPK1 (Hematopoietic Progenitor Kinase 1) is a STE20 serine/threonine kinase family member that is hematopoietic cell-restricted. HPK1 is a tissue-specific upstream activator of the MEKK/JNK/SAPK signaling pathway. HPK1 diminishes T cell receptor (TCR) signaling activity and T cell proliferation by phosphorylating the adaptor protein SLP-76. HPK1 is most commonly referred to as mitogen-activated protein kinase kinase kinase kinase 1 (MAP4K1).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HPK1, Active	M23-11G	Human	Insect	N-terminal GST tag	1-346	65 kDa

KHS1	Alias	Product Substrate	Genbank ID
	MAP4K5, KHS, GCKR, MAPKKK5	Abtide (A02-58)	NM_006575

KHS1 (Kinase Homologous to SPS1/STE20) is a serine/threonine kinase that stimulates the stress-activated protein kinase (SAPK, or Jun kinase). KHS1 is a mitogen-activated protein kinase kinase kinase kinase 5 (MAPK5), termed germinal center kinase (GCKR).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
KHS1, Active	M27-10G	Human	Insect	N-terminal GST tag	Full Length	135 kDa

LOK	Alias	Product Substrate	Genbank ID
	STK10, PRO2729	Axltide (A16-58)	NM_005990

LOK (Lymphocyte-Oriented Kinase) is similar to several known polo-like kinase kinases (Plks). LOK can associate with and phosphorylate Polo-like Kinase 1. Overexpressing of kinase-dead LOK interferes with normal cell cycle progression. LOK can also negatively regulate interleukin 2 expression in T-cells via the mitogen activated protein kinase kinase 1 pathway. MEKK1 and LOK have opposing roles in regulating the enhancer element of the IL-2 gene; MEKK1 is responsible for the CD28 signalling pathway that activates the CD28 response element, while co-expression with LOK attenuates these effects.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LOK, Active	S29-11G	Human	Insect	N-terminal GST tag	1-348	65 kDa

MEK1	Alias	Product Substrate	Genbank ID
	MAP2K1, MKK1, MAPKK1, PRKMK1	ERK1, Unactive (M29-14G) ^{1,2} ; MEK1 (M02-10G) ¹ ; MBP Protein (M42-41N) ^{1,2}	NM_002755 ¹ , NM_008927 ²

MEK1 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 1, MAP2K1) is a member of the dual specificity protein kinase family that acts as a mitogen-activated protein kinase (MAPK) kinase. MEK1 lies upstream of MAPK/ERK and stimulates the enzymatic activity of MAPK/ERK upon a wide variety of extra- and intracellular signals. MEK1 is also involved in cell proliferation, differentiation, transcription regulation and development. Constitutive activation of MEK1 results in cellular transformation. Thus, MEK1 represents a likely target for pharmacologic intervention in proliferative diseases such as cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK1, Active ¹	M02-10G	Human	Insect	N-terminal GST tag	Full Length	72 kDa
MEK1 (EE), Active ²	M02-12G	Mouse	E. coli	N-terminal GST tag	1-348	69 kDa

STE KINASES

MEK2	Alias	Product Substrate	Genbank ID
	MAP2K2, MKK2, PRKMK2, MAPKK2	ERK2, Unactive (M28-14G); MEK2, Active (M03-10G); MBP Protein (M42-54G)	NM_030662

MEK2 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 2, MAP2K2) is a member of MAPK kinase family, dual-specificity kinases which activates extracellular signal-regulated kinase (ERK) and mitogen-activated protein kinase. Therefore, MEK2 plays a pivotal role in the Ras/Raf/MEK/ERK mitogen-activated protein kinase (MAPK) signaling. Approximately 30% of all human cancers have a constitutively activated MAPK pathway. Constitutive activation of MEK2 results in cellular transformation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK2, Active	M03-10G	Human	Insect	N-terminal GST tag	Full Length	71 kDa

MEK3	Alias	Product Substrate	Genbank ID
	MAP2K3, MKK3, MAPKK3, PRKMK3, SKK2	p38 gamma, Unactive (M37-14G); MEK3, Active (M04-10G); p38 Substrate (P03-58)	NM_002756

MEK3 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 3, MAP2K3) is dual-specificity serine/threonine kinase that is involved in the activation of the MAP kinases that phosphorylate p38 MAP kinase. This stimulates the ability of p38 MAPK to phosphorylate protein substrates such as ATF2 and ELK1. MEK3 is activated by cellular stress and inflammatory cytokines. MEK3-null mice are viable and fertile, but their macrophages and dendritic cells are defective in IL-12 production. A virulence factor from *Yersinia pseudotuberculosis*, YopJ, was found to bind directly to MEK3 in vitro and this leads to blockage of its phosphorylation and activation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK3 (MAP2K3), Active	M04-10G	Human	Insect	N-terminal GST tag	Full Length	62 kDa

MEK4	Alias	Product Substrate	Genbank ID
	MAP2K4, JNKK1, MAPKK4, MKK4, PRKMK4, SKK-1, SEK1	JNK1, Unactive (M33-14G)	NM_003010

MEK4 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 4, MAP2K4) is member of the STE7 dual specificity kinases. Key targets of MEK4 include p38, JNK1 and JNK2. MEK4 plays contrasting roles in tumorigenesis. A loss-of-function mutation in MEK4 was found in lung and pancreatic tumors. Conversely, MEK4 has also displayed pro-oncogenic roles.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK4 (MAP2K4), Active	M05-10G	Human	Insect	N-terminal GST tag	Full Length	71 kDa

MEK5	Alias	Product Substrate	Genbank ID
	MAP2K5, MAPKK5, MKK5, PRKMK5, SAPKK5; SKK5; HsT17454	ERK2, Unactive (M32-14G); MEK5, Active (M06-10G); MBP (M42-51N)	BC_008838

MEK5 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 5, MAP2K5) is a dual specificity protein kinase that specifically interacts with and activates MAPK7/ERK5. MEK5 is phosphorylated by MAP3K3/MEKK3 and by atypical protein kinase C isoforms (aPKCs). The signal cascade mediated by MEK5 is involved in growth factor stimulated cell proliferation and muscle cell differentiation. Polymorphisms in the MEK5 promoter are linked with colorectal cancer development.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK5, Active	M06-10G	Human	Insect	N-terminal GST tag	Full Length	77 kDa

MEK6	Alias	Product Substrate	Genbank ID
	MAP2K6, MAPKK6, MKK6, PRKMK6, SAPKK3, SKK3, SEK3	p38alpha, Unactive (M39-14G); MEK6, Active (M07-10G); p38 Substrate (P03-58)	BC012009

MEK6 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 6, MAP2K6) a member of the dual specificity protein kinase family. MEK6 is an essential component of the p38 MAP kinase mediated signal transduction pathway where it phosphorylates and activates p38 MAP kinase in response to inflammatory cytokines or environmental stress. MEK6 is involved in many cellular processes such as stress induced cell cycle arrest, transcription activation and apoptosis.

STE KINASES

MEK6 (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK6, Active	M07-10G	Human	Insect	N-terminal GST tag	Full Length	64 kDa

MEK7	Alias	Product Substrate	Genbank ID
	MAP2K7; MKK7; JNKK2; MAPKK7; PRKMK7; SKK4	JNK2, Unactive (M34-14G)	BC038295

MEK7 (Mitogen-Activated Extracellular Signal-Related Kinase Kinase 7, MAP2K7) is a member of the STE7 dual-specificity protein kinases. MEK7 phosphorylates and activates JNK1/2 in response to environmental stress, pro-inflammatory cytokines, or developmental cues. The activation of MKK7 is mediated by various MAPKKs, including mixed lineage protein kinases (MLKs) and MAPK/ERK kinase (MEK) kinase (MEKK1).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEK7, Active	M08-10G	Human	Insect	N-terminal GST tag	Full Length	78 kDa

MEKK1	Alias	Product Substrate	Genbank ID
	MAP3K1; MEKK; MAPKKK1	MEK1, Unactive (M02-14BG); ERK1, Unactive (M29-14G); MBP Protein (M42-51N)	XM_042066

MEKK1 (Mitogen-Activated Protein Kinase Kinase Kinase 1) is a serine/threonine kinase that acts downstream of mitogenic and metabolic stimuli, including insulin and many growth factors. MEKK1 functions not only as an upstream activator of ERK and JNK through its kinase domain, but also as an E3 ubiquitin ligase through its PHD domain. This provides a negative regulatory mechanism for decreasing ERK1/ERK2 activity via ubiquitin mediated degradation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEKK1, Active	M09-11G	Human	Insect	N-terminal GST tag	900-1748	155 kDa

MEKK2	Alias	Product Substrate	Genbank ID
	MAP3K2, MEKK2B	MEK1, Unactive (M02-14G); ERK1, Unactive (M29-14U); MBP Protein (M42-51N)	NM_006609

MEKK2 (Mitogen-Activated Protein Kinase Kinase Kinase 2) is a member of the MEKK family of protein kinases which acts as a major upstream activator of the JNK/MAPK cascade. MEKK2 phosphorylates MKK4 and MKK7, which are key activators of JNK. Rheumatoid arthritis and osteoarthritis synovial tissues contain high levels of MEKK2 indicating that this kinase may be an important activator of the JNK pathway in inflammatory diseases.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEKK2, Active	M10-10G	Human	Insect	N-terminal GST tag	Full Length	115 kDa

MEKK3	Alias	Product Substrate	Genbank ID
	MAP3K3, MAPKKK3	MBP Protein (M42-51N)	NM_002401

MEKK3 (Mitogen-Activated Protein Kinase Kinase Kinase 3) is a member of the MEKK family of protein kinases. KSR2 phosphorylates MEKK3 enabling MEKK3 to activate SEK and MEK1/2. MEKK3 gene knockout experiments in mice led disruption of blood vessel development and affected the structural integrity of the yolk sac. These results suggest that MEKK3 may be a possible target for drugs that control angiogenesis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEKK3, Active	M11-10G	Human	Insect	N-terminal GST tag	Full Length	105 kDa

MEKK6	Alias	Product Substrate	Genbank ID
	MAP3K6, MAPKKK6, ASK2	MBP Protein (M42-51N)	NM_004672

MEKK6 (Mitogen-Activated Protein Kinase Kinase Kinase 6) is a serine/threonine protein kinase. MEKK6 was identified by its interaction with MAP3K5/ASK, a protein kinase and an activator of c-Jun kinase (MAPK7/JNK) and MAPK14/p38 kinase. MEKK6 activates the JNK and p38 pathway and induces apoptosis when overexpressed in stably transfected cells. MEKK6 transcript is expressed in several tissues with the highest expression in heart and skeletal muscle.

STE KINASES

MEKK6 (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MEKK6, Active	M14-11G	Human	Insect	N-terminal GST tag	620-950	67 kDa

MINK1	Alias	Product Substrate	Genbank ID
	B55; ZC3; MINK; YSK2; hMINK; MAP4K6; MGC21111; hMINK β	MBP Protein (M42-51N)	NM_015716

MINK1 (Misshapen-like Kinase 1) is a member of the STE20 family kinases which are required for regulating a wide variety of cellular processes including cell morphology, cytoskeletal rearrangement, and survival. Overexpression of kinase-dead mutants of MINK1 leads to enhanced cell spreading, actin stress fiber formation, adhesion to extracellular matrix and decreased cell motility and invasion. MINK acts downstream of activated Ras and the kinase is involved in stimulating the p38 MAPK and RAF/ERK pathways.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MINK1, Active	M53-11G	Human	Insect	N-terminal GST tag	1-320	61 kDa

MST1	Alias	Product Substrate	Genbank ID
	KRS2; YSK3; DKFZp686A2068; STK4	Axltide (A16-58)	NM_006282

MST1 (Mammalian Sterile 20-like Kinase 1) belongs to the STE20 family of serine/threonine kinases that share similarity with a budding yeast protein. Endogenous full-length MST1 is activated by a variety of stress stimuli. Interfering its ability to associate with Nore1/RASSF can inhibit Ras-induced apoptosis. MST1 can initiate apoptosis when transiently overexpressed in mammalian cells. Recombinant MST1 undergo a robust autoactivation in vitro, mediated by an intramolecular autophosphorylation on the activation loop of an MST dimer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MST1, Active	S25-10G	Human	Insect	N-terminal GST tag	Full Length	83 kDa

MST3	Alias	Product Substrate	Genbank ID
	STK24, MST-3, STK3, MST3B, RP11-111L24.5	PKCtide (P15-58)	NM_001032296

MST3 (Mammalian Sterile 20-like Kinase 3) is a member of the germinal center kinase-III family. Caspase-mediated cleavage of the regulatory domain of MST3 activates its intrinsic kinase activity and leads to nuclear translocation. Expression of C-terminal truncated MST3 in cells results in DNA fragmentation and induction of apoptosis. MST3 can inhibit cell migration in a fashion dependent on autophosphorylation and can regulate paxillin phosphorylation through tyrosine phosphatase PTPN12.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MST3, Active	S42-11G	Human	Insect	N-terminal GST tag	1-311	63 kDa

MST4	Alias	Product Substrate	Genbank ID
	MASK; RP6-213H19.1	MBP Protein (M42-54G)	NM_016542

MST4 (Mammalian Sterile 20-like Kinase 4) belongs to the STE20 family of serine/threonine kinases that share similarity with a budding yeast protein. MST4/MAPK signaling is involved in a diverse range of cellular processes, including cytoskeletal rearrangement, morphogenesis and apoptosis. In prostate cancer cell lines, MST4 expression levels positively correlate with tumorigenicity and inversely correlate with androgen receptor status. Induced overexpression of MST4 leads to anchorage-independent growth and increase proliferation of prostate cancer cell in vitro.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MST4, Active	M59-10G	Human	Insect	N-terminal GST tag	Full Length	72 kDa

MYO3 alpha	Alias	Product Substrate	Genbank ID
	myosin IIIA; DFNB30	MBP Protein (M42-51N)	NM_017433

MYO3 alpha (Myosin-3 alpha) is a class III myosin that is highly expressed in retina and cochlea and plays an important role in hearing in humans. Mutations in the MYO3 alpha have been shown to cause nonsyndromic progressive hearing loss.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MYO3 alpha, Active	M65-11G	Human	Insect	N-terminal GST tag	1-434	76 kDa

STE KINASES

MYO3 beta	Alias	Product Substrate	Genbank ID
	myosin IIIB	MBP Protein (M42-51N)	NM_138995

MYO3 beta (Myosin-3 beta) is a class III myosin actin-dependent motor protein. MYO3 beta contains a N-terminal kinase domain followed by motor, neck, and tail domains. The MYO3 beta gene generates a variety of splice variants that contain 1 or 2 calmodulin-binding (IQ) motifs in the neck domain and 1 of 3 domains in the tail domain. Northern blot analysis shows expression of a 7-kb MYO3 beta transcript in the human retina but not in a retinal pigment epithelial cell line. The MYO3 beta mRNA is also detected in the kidney, intestine and testis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MYO3 beta, Active	M66-11G	Human	E. coli	N-terminal GST tag	1-326	63 kDa

NIK	Alias	Product Substrate	Genbank ID
	MAP3K14, HS, HSNIK, FTDCR1B	MBP Protein (M42-54G)	NM_003954

NIK (NF-kappa-B-Inducing Kinase) is a mitogen-activated protein kinase kinase kinase 14 (MAP3K14), which binds to TRAF2 and stimulates NF-kappaB activity. NIK is expressed in primary human cells and in rheumatoid arthritis tissue where it plays a selective role in signaling by the lymphotoxin-beta receptor. Thus, NIK is a therapeutic target in the immune and bone-destructive components of inflammatory arthritis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
NIK, Active	M22-11G	Human	Insect	N-terminal GST tag	325-end	108 kDa

PAK1	Alias	Product Substrate	Genbank ID
	PAKalpha, MGC130000, MGC130001	PAKtide (P08-58)	NM_002576

PAK1 (P21 Activated Kinase 1) is a p21-activated kinase which is activated by and is an effector of small GTPases, CDC42 and RAC. PAK1 is a key regulator of the actin cytoskeleton, adhesion and cell motility. Inactive dimeric PAK1 is mainly cytosolic. Interaction with the activators Cdc42-GTP and RAC1-GTP localizes PAK1 to the cellular protrusion sites leading to the formation of adhesions to the extracellular matrix.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PAK1/CDC42, Active	P02-10G	Human	Insect	N-terminal GST tag	Full Length	96 kDa
PAK1, Active	P02-10BG	Human	E. coli	N-terminal GST tag	Full Length	95 kDa

PAK3	Alias	Product Substrate	Genbank ID
	Stk4, mPAK-3, Pak65beta, Pak65alpha	MBP Protein (M42-54G)	NM_008778

PAK3 (P21 Activated Kinase 3) is a p21-activating kinase which serves as targets for the small GTP binding proteins like Cdc42 and RAC. PAK3 appears to be necessary for dendritic development and for the rapid cytoskeletal reorganization in dendritic spines associated with synaptic plasticity. A point mutation in PAK3 gene has been linked to nonsyndromic X-linked mental retardation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PAK3, Active	P04-10G	Mouse	Insect	N-terminal GST tag	Full Length	89 kDa

PAK4	Alias	Product Substrate	Genbank ID
	N/A	Modified AKT Substrate II (A05-58C)	NM_005884

PAK4 (P21 Activated Kinase 4) is a p21-activated kinases implicated in the regulation of a number of cellular processes including cytoskeleton rearrangement, apoptosis and the MAP kinase signaling pathway. PAK4 has been shown to regulate cell morphology and cytoskeletal organization in mammalian cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PAK4, Active	P05-10BG	Human	Insect	N-terminal GST tag	Full Length	90 kDa

STE KINASES

PAK6	Alias	Product Substrate	Genbank ID
	PAK5	PAKTide (P08-58)	NM_020168

PAK6 (P21 Activated Kinase 6) is a serine/threonine protein kinase that is highly expressed in the testis and prostate tissues and interacts with the androgen receptor (AR). In response to androgen, PAK6 and AR co-translocate into the nucleus. PAK6 is weakly expressed in normal prostate epithelium, but the expression is increased in primary and metastatic prostate cancer cells. PAK6 expression is further elevated in the tumors of patients that have suffered relapse after androgen deprivation therapy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PAK6, Active	P06-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa

PAK7	Alias	Product Substrate	Genbank ID
	PAK5; KIAA1264; MGC26232	AKT (PKB) Substrate (A05-58)	NM_177990

PAK7 (P21 Activated Kinase 7) is a novel human PAK family kinase that contains a CDC42/Rac1 interactive binding (CRIB) motif at the N-terminus and a STE20-like kinase domain at the C-terminus. Like other PAK members, PAK7 has been implicated in the regulation of cell morphology, motility and transformation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PAK7, Active	P07-10G	Human	Insect	N-terminal GST tag	Full Length	130 kDa

SLK	Alias	Product Substrate	Genbank ID
	LOSK, STK2, se20-9, KIAA0204, MGC133067, bA16H23.1	Histone H3 Protein (H12-54N)	AB002804

SLK (STE20-like Protein Kinase) is a serine/threonine protein kinase which is associated with microtubule and centrosome. Inhibition of SLK activity by dominant-negative mutant or RNAi leads to unfocused microtubule arrangement, suggesting that SLK is required for microtubule organization and for the proper localization of Golgi complex. Expression of v-Src can down-regulate SLK activity through CK2, a kinases which directly phosphorylates and inhibit SLK activity. Inhibition of CK2 in v-Src-transformed cells results in normal SLK activity. CK2 and SLK display subcellular co-localization in fibroblast cell lines.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SLK, Active	S11-10G	Human	Insect	N-terminal GST tag	Full Length	180 kDa

SOK1	Alias	Product Substrate	Genbank ID
	STK25, YSK1, DKFZp686J1430	MBP Protein (M42-51N)	NM_006374

SOK1 (Oxidant Stress-Response Kinase-1) is a serine/threonine kinase that regulates cell death after chemical anoxia. SOK1 is activated by reactive oxygen intermediates but not by growth factors, alkylating agents, cytokines or environmental stresses. SOK1 is expressed ubiquitously with the highest expression observed in the brain and testis. SOK1 entry into the nucleus is important for the cell death response. SOK1 mutants that are unable to enter the nucleus lack the ability to induce cell death. In addition, down-regulation of SOK1 by RNAi leads to enhanced cell survival.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SOK1, Active	S43-10G	Human	Insect	N-terminal GST tag	Full Length	76 kDa

STK3	Alias	Product Substrate	Genbank ID
	KRS1; MST2; FLJ90748	MBP Protein (M42-51N)	BC010640

STK3 (Serine-Threonine Protein Kinase 3) is a 491-amino-acid protein which contains an N-terminal catalytic domain characteristic of STKs. STK3 can be activated by the proapoptotic agents staurosporine and FAS. STK3 activation presumably allows cells to resist unfavorable environmental conditions. RAF1 has been shown to counteract apoptosis through suppressing the activation STK3.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK3, Active	S24-10G	Human	Insect	N-terminal GST tag	Full Length	87 kDa

STK39	Alias	Product Substrate	Genbank ID
	STK39; STK3; DCHT; DKFZp686K05124; PASK; SPAK	MBP Protein (M42-51N)	NM_013233

STK39 (Serine-Threonine Kinase 39) is involved in the cellular stress response pathway. STK39 is activated in response to hypotonic stress, resulting in the phosphorylation of several cation-chloride-coupled co-transporters. STK39 activates the p38 MAP kinase pathway and its interaction with p38 decreases during cellular stress.

STE KINASES

STK39 (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
STK39 (STLK3), Active	S51-10H	Human	Insect	N-terminal His tag	Full Length	63 kDa

TAOK1

Alias	Product Substrate	Genbank ID
PSK2, MARKK, MAP3K16, FLJ14314, KIAA1361	MBP Protein (M42-51N)	NM_020791

TAOK1 (Thousand and One-Amino Acid Protein Kinase 1) is a serine/threonine kinase involved in the regulation of the p38-containing stress-responsive MAP kinase pathway and extracellular signal-regulated protein kinase (ERK) kinases (or MEKS). The activation of and binding to MEK3 by TAOK1 implicates TAOK1 in the regulation of the p38-containing stress-responsive MAP kinase pathway. TAOK1 is an important regulator of mitotic progression, required for both chromosome congression and checkpoint-induced anaphase delay.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TAOK1, Active	T24-11G	Human	Insect	N-terminal GST tag	1-314	63 kDa

TAOK2

Alias	Product Substrate	Genbank ID
PSK, PSK1, TAO1, TAO2, MAP3K17, KIAA0881	MBP Protein (M42-51N)	NM_004783

TAOK2 (Thousand and One-Amino Acid Protein Kinase 2) activates p38 mitogen-activated protein kinase cascade in vitro and in cells by phosphorylating the MAP/ERK kinases MKK3 and MKK6. TAOK2 may play an important role in the activation of specific intracellular signaling pathways that are unique to osmotic stress.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TAOK2, Active	T25-11G	Human	Insect	N-terminal GST tag	1-314	63 kDa

TAOK3

Alias	Product Substrate	Genbank ID
DPK, JIK, MAP3K18, FLJ31808, DKFZp666H245	MBP Protein (M42-51N)	NM_016281

TAOK3 (Thousand and One-Amino Acid Protein Kinase 3) is a serine/threonine kinase that inhibits the basal activity of Jun kinase. TAOK3 is negatively regulated by epidermal growth factor (EGF). Overexpression of TAOK3 may activate the ERK1/ERK2 and JNK/SAPK targets. TAOK3 is highly expressed in peripheral blood leukocytes (PBLs), thymus, spleen, kidney, skeletal muscle, heart and liver.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TAOK3, Active	T26-11G	Human	Insect	N-terminal GST tag	1-463	89 kDa

TNIK

Alias	Product Substrate	Genbank ID
N/A	MBP Protein (M42-51N)	NM_015028

TNIK (TRAF2 and NCK Interacting Kinase) has an N-terminal kinase domain and a C-terminal GCK domain that serves in a regulatory role. TNIK is mainly expressed in the brain, heart, and spleen and it is a specific effector of RAP2 which regulates actin cytoskeleton.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TNIK, Active	T27-11G	Human	Insect	N-terminal GST tag	1-510	67 kDa

YSK4

Alias	Product Substrate	Genbank ID
RCK; MAP3K19	MBP Protein (M42-51N)	NM_025052

YSK4 (Yeast Sps1/Ste20-related Kinase 1) is member of the STE20 serine/threonine kinases. YSK4 is expressed predominantly by alveolar and interstitial macrophages and bronchial epithelial cells in the lung. Moreover, YSK4 mRNA levels are elevated in patients with Chronic Obstructive Pulmonary Disease (COPD).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
YSK4 (MAP3K19), Active	Y06-11G	Human	Insect	N-terminal GST tag	941-end	83 kDa

Tyrosine Kinases

Tyrosine kinases represent the largest class of protein kinases. These enzymes can be further sub-categorized into receptor tyrosine kinases (RTKs) and cytoplasmic tyrosine kinases (non-receptor tyrosine kinases; NRTKs).

RTKs often act as cell surface receptors that are essential for regulating many fundamental cellular processes, including cell growth, differentiation, migration and survival. Dysregulated RTK signaling plays a prominent role in the development and progression of many types of cancers. Therefore, RTKs are amongst the most popular targets for therapeutic intervention in oncology. They are localized to within the plasma membrane, RTKs can be targeted by monoclonal antibodies (mAbs) and small molecule kinase inhibitors (SMKIs). In the span of twenty years, RTK-targeted therapies have led to a paradigm shift in the way many types of cancers are treated; benefiting patients with decreased side-effects and increased survival rates.

Several of the larger subfamilies within the NRTKs include the SRC, JAK, TEC and ABL kinases. Aberrant activation of NTRKS can lead to the development of disease. The Philadelphia chromosome refers to a of reciprocal translocation between chromosomes 9 and 22, that yields the oncogenic BCR-ABL fusion gene. This chromosomal rearrangement is found in most patients with chronic myelogenous leukemia (CML), and in some patients with acute lymphoblastic leukemia (ALL) or acute myelogenous leukemia (AML). Since the FDA approval of Gleevec and other related drugs, the survival rates of CML has doubled.

ABL1	Alias	Product Substrate	Genbank ID
	ABL; JTK7; p150; c-ABL; v-abl, bcr/abl	Abtide (A02-58)	NM_005157 ^{1,3,5,7,8,10,11,13} , NM_009594 ² , NM_005159 ⁴ , NM_005160 ⁶ , NM_005162 ⁹ , NM_005164 ¹² , NM_005158 ¹⁴

ABL1 (Abelson Tyrosine Protein Kinase 1) is a proto-oncogene encodes a cytoplasmic and nuclear protein tyrosine kinase that is been implicated in cell differentiation, division, adhesion and stress response. ABL1 is ubiquitously expressed. Its ability to bind DNA is regulated by CDK1-mediated phosphorylation, suggesting that it is activated during the cell cycle. ABL is negatively regulated by its SH3 domain. Removal of the SH3 domain transforms ABL1 into its oncogenic form. The Philadelphia chromosome refers to a common chromosomal translocation found in 95% of chronic myelogenous leukemia patients. The result of this rearrangement is the constitutively active BCR-ABL fusion gene. The tyrosine kinase inhibitor imatinib (Gleevec) inhibits proliferation of BCR-ABL-expressing hematopoietic cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ABL1, Active ¹	A03-18H	Human	Insect	N-terminal His tag	27-end	135 kDa
ABL1, Active ²	A03-11H	Mouse	Insect	N-terminal His tag	27-end	135 kDa
ABL1 Mutant (E255K), Active ³	A03-12BG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (E255V), Active ⁴	A03-12HH	Human	Insect	N-terminal His tag	27-end	135 kDa
ABL1 Mutant (F317I), Active ⁵	A03-12JG	Human	Insect	N-terminal GST tag	27-end	135 kDa
ABL1 Mutant (F317L), Active ⁶	A03-12IG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (G250E), Active ⁷	A03-12CG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (H396P), Active ⁸	A03-12LG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (M351T), Active ⁹	A03-12KG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (Q252H), Active ¹⁰	A03-12FG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (T315I), Active ¹¹	A03-12DG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (V299L), Active ¹²	A03-12MG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (Y253F), Active ¹³	A03-12EG	Human	Insect	N-terminal GST tag	27-end	160 kDa
ABL1 Mutant (Y253H), Active ¹⁴	A03-12GH	Human	Insect	N-terminal HIS tag	27-end	135 kDa

TK KINASES

ABL2	Alias	Product Substrate	Genbank ID
	ARG; ABLL	Modified Axltide Substrate (A16-58B)	NM_005158

ABL2 (Abelson Tyrosine Protein Kinase 2) is a non-receptor cytoplasmic tyrosine kinase which is closely related to ABL1. The similarity of ABL2 is involved in translocation with the ETV6 gene in human leukemia and has an altered expression in several human carcinomas. The C-terminal domain of ABL2 contains two F-actin-binding sequences, which perform a number of actions related to cell morphology and motility by interacting with actin filaments.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ABL2, Active	A04-11H	Human	Insect	N-terminal HIS tag	38-end	132 kDa

ACK	Alias	Product Substrate	Genbank ID
	TNK2, ACK1, FLJ44758, FLJ45547, p21cdc42Hs	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005781

ACK (Activated Cdc42-Associated Kinase) is a tyrosine kinase that binds to CDC42-GTP and inhibits both the intrinsic and GTPase-activating protein (GAP)-stimulated GTPase activity of CDC42. Overexpressing ACK in epithelial cancer cell lines increases cellular motility and invasiveness. In mice, ACK overexpression enhances the ability of a human breast cancer cell line to metastasize to the lung, leading to increased mortality.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ACK, Active	A05-11G	Human	Insect	N-terminal GST tag	110-476	132 kDa

ALK	Alias	Product Substrate	Genbank ID
	ALK (Ki-1), CD246, NBLST3, TFG/ALK; EML4: C2orf2, EMAPL4 ; NPM1: B23; NPM ; TFG:HMSNP; SPG57; TFG	IGF1Rtide (I15-58)	NM_004304 ¹⁻¹³ , AB274722 ¹⁴ , U04946 ¹⁵ , HSU04946 ¹⁶ , NM_001195478/NM_004304 ¹⁷

ALK (Anaplastic Lymphoma Kinase) is a receptor tyrosine kinase that was originally identified as a member of the insulin receptor subfamily. Many chromosomal rearrangements leading to enhanced ALK activity have been described and are implicated in a many types of cancer in the nervous system. ALK in the presence of ligand appears essential for axonal guidance. Whereas in the absence of ligand, ALK expression can lead to developmental neuronal apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ALK, Active ¹	A19-11G	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (C1156Y), Active ²	A19-12DG	Mouse	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (F1174L), Active ³	A19-12EG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (F1174S), Active ⁴	A19-12FG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (G1202R), Active ⁵	A19-12HG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (G1269A), Active ⁶	A19-12JG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (G1269S), Active ⁷	A19-12KG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (L1152R), Active ⁸	A19-12CG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (L1196M), Active ⁹	A19-12GG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (R1275Q), Active ¹⁰	A19-12LG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (S1206R), Active ¹¹	A19-12IG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (T1151_L1152insT), Active ¹²	A19-12G	Human	Insect	N-terminal GST tag	1060-end	90 kDa
ALK Mutant (T1151M), Active ¹³	A19-12BG	Human	Insect	N-terminal GST tag	1060-end	90 kDa
EML4-ALK Mutant, Active ¹⁴	A19-19G	Human	Insect	N-terminal GST tag	N-terminal GST tag^EML4 (1-496)-ALK (1058-end)	150 kDa
NPM1-ALK Mutant (F1174L), Active ¹⁵	A19-19EG	Human	Insect	N-terminal GST tag	NPM1 (1-117)-ALK (F1174L) (1058-end)	108 kDa
NPM1-ALK Mutant, Active ¹⁶	A19-19BG	Human	Insect	N-terminal GST tag	NPM1 (1-117)-ALK (1058-end)	110 kDa
TFG-ALK Mutant, Active ¹⁷	A19-19CG	Human	Insect	N-terminal GST tag	1058-end protein	115 kDa

TK KINASES

AXL	Alias	Product Substrate	Genbank ID
	UFO, JTK11	Abtide (A02-58)	NM_021913

AXL (AXL Receptor Tyrosine Kinase) is receptor tyrosine kinase family kinase which has oncogenic potential and is implicated in human myeloid leukemia. AXL is a member of a complex signaling network that is involved in the control of cell proliferation and differentiation. Overexpression of AXL in cell lines induces neoplastic transformation with the concomitant appearance of a 140 kDa phosphorylated form of the protein.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
AXL, Active	A34-11G	Human	Insect	N-terminal GST tag	473-end	78 kDa
AXL, Active	A34-11H	Human	Insect	N-terminal His tag	473-end	55 kDa
AXL Mutant (R499C), Active	A34-12BG	Human	Insect	N-terminal GST tag	473-end	76 kDa

BLK	Alias	Product Substrate	Genbank ID
	MGC10442	Poly (4:1 Glu, Tyr) Peptide (P61-58)	BC007371

BLK (B Lymphoid Kinase) is a 55 kDa tyrosine kinase. It shares similarities with the Src protein tyrosine kinase via its SH3, SH2 and catalytic domains. BLK is expressed specifically in the B cell lineage and plays a role in signal transduction pathway that is restricted to B lymphoid cells. Stimulation of resting B-lymphocytes with antibodies to surface immunoglobulin (sIgD or sIgM) induces activation of BLK.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BLK, Active	B02-10G	Human	Insect	N-terminal GST tag	Full Length	84 kDa

BMX	Alias	Product Substrate	Genbank ID
	ETK; PSCTK2; PSCTK3	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_001721 ¹ , NM_001109016 ²

BMX (Bone Marrow Kinase on Chromosome X) is a non-receptor tyrosine kinase that is found to induce activation of the STAT signaling pathway and may play a role in the growth and differentiation of hematopoietic cells. Interestingly, chromosome X also contains the closest relative of BMX, the BTK gene, implicated in X-linked agammaglobulinemia.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BMX, Active	B07-10G	Human	Insect	N-terminal GST tag	Full Length	110 kDa
BMX, Active	B07-10CG	Rat	Insect	N-terminal GST tag	Full Length	110 kDa

BRK	Alias	Product Substrate	Genbank ID
	PTK6; FLJ42088	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005975

BRK (Breast Tumor-Related Kinase) is a member of the non-receptor tyrosine kinase. The protein contains an amino terminal SH3 and SH2 domain as well as a catalytic domain. BRK expression is low or undetectable in normal mammary tissue and benign lesions however, approximately two-thirds of breast tumors express appreciable levels of the protein, and over one in four tumors overexpress BRK by five-fold or more over normal levels.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BRK, Active	P94-10G	Human	Insect	N-terminal GST tag	Full Length	80 kDa

BTK	Alias	Product Substrate	Genbank ID
	AT; ATK; BPK; XLA; IMD1; AGMX1; PSCTK	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_000061 ^{1,3,4} , NM_001007798 ²

BTK (Bruton Tyrosine Kinase) plays a crucial role in B-lymphocyte differentiation and activation. Upon stimulation of B- and T-cell receptors, BTK interacts with SRC homology 3 domains of activated FYN, LYN and HCK. Defects in the BTK gene cause agammaglobulinemia, an X-linked immunodeficiency characterized by failure to produce mature B lymphocyte cells and associated with a failure of Ig heavy chain rearrangement. The unique role of BTK makes it a desirable target for potential anti-cancer, anti-inflammatory and anti-viral agents as well as other treatments.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BTK, Active ¹	B10-10H	Human	Insect	N-terminal His tag	Full Length	78 kDa
BTK, Active ²	B10-10CG	Rat	Insect	N-terminal His tag	Full Length	105 kDa
BTK Mutant (C481S), Active ³	B10-12CH	Human	Insect	N-terminal His tag	Full Length	75 kDa
BTK Mutant (P190K), Active ⁴	B10-12BH	Human	Insect	N-terminal His tag	Full Length	75 kDa

TK KINASES

c-KIT	Alias	Product Substrate	Genbank ID
	PBT, SCFR, CD117	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_000222

c-KIT is a proto-oncogene and a type 3 transmembrane receptor for MGF (Mast Cell Growth Factor or Stem Cell Factor). c-KIT together with its ligand regulates growth and activation of a variety of hemopoietic and non-hemopoietic cells. Mutations in c-KIT are associated with gastrointestinal stromal tumors, mast cell disease, acute myelogenous leukemia, and piebaldism. Deregulation of the KIT receptor TK by the prevalent activation loop mutation D816V has served as a focal point in therapeutic strategies aimed curbing neoplastic mast cell growth.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
c-KIT, Active	K06-11BG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (A829P), Active	C06-12HG	Mouse	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D557-558), Active	K06-12WG	Human	Insect	N-terminal GST tag	544-end	75 kDa
c-KIT Mutant (D816E), Active	C06-12IG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D816F), Active	C06-12JG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D816H), Active	C06-12KG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D816I), Active	K06-12XG	Human	Insect	N-terminal GST tag	544-end (D816I)	75 kDa
c-KIT Mutant (D816V), Active	C06-12LG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D816Y), Active	C06-12MG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D820E), Active	K06-12BG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (D820Y), Active	K06-12CG	Human	Insect	N-terminal GST tag	544-end	75 kDa
c-KIT Mutant (K642E), Active	C06-12NG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (L576P), Active	K06-12UG	Human	Insect	N-terminal GST tag	544-end	75 kDa
c-KIT Mutant (N822K), Active	K06-12DG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (T670E), Active	K06-12EG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (T670I), Active	C06-12FG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V559A), Active	C06-12OG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V559D T670I), Active	K06-12QG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V559D V654A), Active	K06-12RG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V559D), Active	C06-12PG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V560G D816V), Active	C06-12TG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V560G N822K), Active	K06-12VG	Human	Insect	N-terminal GST tag	544-end	75 kDa
c-KIT Mutant (V560G), Active	C06-12SG	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (V654A), Active	K06-13G	Human	Insect	N-terminal GST tag	544-end	73 kDa
c-KIT Mutant (Y823D), Active	K06-12GG	Human	Insect	N-terminal GST tag	544-end	73 kDa

CSK	Alias	Product Substrate	Genbank ID
	MGC117393	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004383

CSK (C-terminal Src Kinase) is a cytoplasmic tyrosine kinase that downregulates the tyrosine kinase activity of the c-Src through tyrosine phosphorylation of the c-Src carboxy terminus. The Src homology-3 (SH3) domain of CSK associates with a proline-rich region of PEP, a protein-tyrosine phosphatase expressed in haematopoietic cells. This association is highly specific and it is speculated that PEP may be an effector and/or regulator of CSK in T cells and other hemopoietic cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
CSK, Active	C63-10G	Human	Insect	N-terminal GST tag	Full Length	78 kDa
CSK, Active	C63-10U	Human	Insect	Tag-free	Full Length	52 kDa

TK KINASES

DDR1	Alias	Product Substrate	Genbank ID
	CAK; CD167; DDR; EDDR1 (S496A); MCK10; NEP; NTRK4; PTK3; PTK3A; RTK6; TRKE	Modified Axltide Substrate (A16-58B)	NM_001954

DDR1 (Discoidin Domain Receptor Family 1) is a member of the subfamily of tyrosine kinase receptors with a homology region to the D. discoideum protein, discoidin I, in its extracellular domain. DDR1 is widely expressed in normal and transformed epithelial cells and is activated by various types of collagen. Expression of DDR1 is restricted to epithelial cells, particularly in the kidney, lung, gastrointestinal tract, and brain. DDR1 is over-expressed in fast-growing invasive tumors of the breast, ovary, esophagus, brain and lung.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DDR1, Active	D05-11G	Human	Insect	N-terminal GST tag	444-end	77 kDa
DDR1 Mutant (S496A), Active	D05-12G	Human	Insect	N-terminal GST tag	444-end	77 kDa

DDR2	Alias	Product Substrate	Genbank ID
	TKT; NTRKR3; TYRO10	Modified Axltide Substrate (A16-58B)	NM_006182

DDR2 (Discoidin Domain Receptor Family 2) is a member of a novel subclass of RTKs containing a distinct extracellular region encompassing a factor VIII-like domain and is thought to be involved in the regulation of cell growth, differentiation, and metabolism. DDR2 plays a role in the regulation of collagen turnover mediated by smooth muscle cells in obstructive diseases of blood vessels and the lung.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
DDR2, Active	D06-11BG	Human	Insect	N-terminal GST tag	467-end	70 kDa
DDR2 Mutant (T654M), Active	D06-12G	Human	Insect	N-terminal GST tag	467-end	70 kDa

EGFR	Alias	Product Substrate	Genbank ID
	ERBB, mENA, ERBB1, HER1	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005228

EGFR (Epidermal Growth Factor Receptor) is a receptor tyrosine kinase that when activated leads to cell proliferation, differentiation, motility and cell survival. Improper activation of EGFR signaling in the gastrointestinal mucosa is linked to colon cancer through upregulation of mitogenic signaling. Approximately 15% of patients with non-small cell lung cancer (NSCLC) have mutations to the EGFR. The effectiveness of EGFR inhibitors such as gefitinib, erlotinib, and afatinib are limited to patients with tumors which have known activating EGFR-activating mutations.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EGFR, Active	E10-11G	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR, Active	E10-112G	Human	Insect	N-terminal GST tag	668-end	89~100 kDa
EGFR (A767_S768insTLA) Protein	E10-13CG	Human	Insect	N-terminal GST tag	695-end	89~98 kDa
EGFR (V769_D770insGE) Protein	E10-13EG	Human	Insect	N-terminal GST tag	695-end	89~98 kDa
EGFR Mutant (A763_Y764insFHEA), Active	E10-12VG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (A763_Y764insFHEA), Active	E10-13BG	Human	Insect	N-terminal GST tag	695-end	88-98 kDa
EGFR Mutant (A763_Y764insFHEA), Active	E10-132BG	Human	Insect	N-terminal GST tag	695-end	92~100 kDa
EGFR Mutant (C797A), Active	E10-12RG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (C797S), Active	E10-12SG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (d746), Active	E10-12IG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (d746-750 C797S), Active	E10-12TG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (d746-750 T790M C797S L858R), Active	E10-122YG	Human	Insect	N-terminal GST tag	668-end	95~105 kDa
EGFR Mutant (d746-750 T790M L858R), Active	E10-122XG	Human	Insect	N-terminal GST tag	668-end	100~105 kDa
EGFR Mutant (d746-750 T790M L978I), Active	E10-122WG	Human	Insect	N-terminal GST tag	668-end	95~105 kDa

TK KINASES

EGFR (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EGFR Mutant (d746-750 T790M) Protein	E10-12KG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (d746-750 T790M), Active	E10-122KG	Human	Insect	N-terminal GST tag	668-end	95~105 kDa
EGFR Mutant (d746-750), Active	E10-122JG	Human	Insect	N-terminal GST tag	668-end	95~105 kDa
EGFR Mutant (d746-750), Active	E10-12JG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (d747-749 A750P), Active	E10-12MG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (d747-749), Active	E10-12LG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (d747-752 P753S), Active	E10-12NG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (d752-759), Active	E10-12OG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (D761Y), Active	E10-12QG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (D770_N771insGF) Protein	E10-13IG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (D770_N771insNPG), Active	E10-13GG	Human	Insect	N-terminal GST tag	695-end	88-98 kDa
EGFR Mutant (D770_N771insNPG), Active	E10-132GG	Human	Insect	N-terminal GST tag	668-end	92~100 kDa
EGFR Mutant (D770GY), Active	E10-13KG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (G719C), Active	E10-12FG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (G719D), Active	E10-12GG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (G719S), Active	E10-12HG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (H773_V774insAH) Protein	E10-13PG	Human	Insect	N-terminal GST tag	695-end (H773_V774insAH)	89 kDa
EGFR Mutant (H773_V774insH) Protein	E10-13RG	Human	Insect	N-terminal GST tag	695-end (H773_V774insH)	89 kDa
EGFR Mutant (H773_V774insNPH) Protein	E10-13OG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (H773_V774insPH) Protein	E10-13QG	Human	Insect	N-terminal GST tag	695-end (H773_V774insPH)	89 kDa
EGFR Mutant (L747S), Active	E10-12PG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (L858R), Active	E10-12BG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (L861Q), Active	E10-12CG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (P772_H773insNPH), Active	E10-13MG	Human	Insect	N-terminal GST tag	695-end	90 kDa
EGFR Mutant (T790M C797S L858R), Active	E10-122VG	Human	Insect	N-terminal GST tag	668-end	89~100 kDa
EGFR Mutant (T790M C797S L858R), Active	E10-12UG	Human	Insect	N-terminal GST tag	695-end	87 kDa
EGFR Mutant (T790M L858R), Active	E10-12DG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (T790M), Active	E10-12EG	Human	Insect	N-terminal GST tag	695-end	89 kDa
EGFR Mutant (V769_D770insASV) Protein	E10-13DG	Human	Insect	N-terminal GST tag	695-end	90 kDa

EPHA1

Alias	Product Substrate	Genbank ID
EPH; EPHT; EPHT1; MGC163163	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005232

EPHA1 (Ephrin Type-A Receptor 1) is a member of the ephrin receptor subfamily of protein-tyrosine kinases which participate in mediating developmental events, particularly in the nervous system. Receptors in the Eph subfamily typically have a single kinase domain, an extracellular region containing a Cys-rich domain and 2 fibronectin type III repeats. EPHA1 is a marker for differentiated normal epidermis and downregulation of this enzyme in non-melanoma skin cancer may contribute to carcinogenesis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA1, Active	E13-18BG	Human	Insect	N-terminal GST tag	613-892	55 kDa

TK KINASES

EPHA1 (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA1, Active	E13-11G	Mouse	Insect	N-terminal GST tag	569-end	71 kDa
EPHA1, Active	E13-18G	Human	Insect	N-terminal GST tag	569-end	72 kDa

EPHA2	Alias	Product Substrate	Genbank ID
	ECK	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004431

EPHA2 (Ephrin Type-A Receptor 2) is a member of the ephrin receptor subfamily of protein-tyrosine kinases that bind the Ephrin-A ligand and have diverse cellular function. EPHA2 is an oncoprotein that is overexpressed in several human cancer types and promotes malignancy through a mechanism involving RhoA-dependent destabilization of adherens junctions.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA2, Active	E14-11G	Human	Insect	N-terminal GST tag	561-end	72 kDa

EPHA3	Alias	Product Substrate	Genbank ID
	ETK, HEK, ETK1, HEK4, TYRO4	Poly (4:1 Glu, Tyr) Peptide (P61-58)	BC063282

EPHA3 (Ephrin Type-A Receptor 3) is a member of the ephrin receptor subfamily of protein-tyrosine kinases that bind the Ephrin-A ligand. Expression of EPHA3 is associated with adherence and motility of malignant T cells and somatic mutations in EPHA3 have been identified in colorectal, breast, lung and pancreatic cancers. EPHA3 gene expression can be regulated by CD28 and IGF-1 in Jurkat cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA3, Active	E15-11G	Human	Insect	N-terminal GST tag	561-end	72 kDa

EPHA4	Alias	Product Substrate	Genbank ID
	SEK, HEK8, TYRO1	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004438

EPHA4 (Ephrin Type-A Receptor 4) belongs to the ephrin receptor subfamily of protein-tyrosine kinases which have been implicated in mediating developmental events, particularly in the nervous system. The EPHA4 ligand Ephrin-A3 is localized to the astrocytic processes that envelop the spine. Activation of EPHA4 by Ephrin-A3 induces spinal retraction and reduces spine density and inhibits the interaction distorted spine shape and organization.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA4, Active	E16-11G	Human	Insect	N-terminal GST tag	670-887	73 kDa
EPHA4, Active	E16-11BG	Human	Insect	N-terminal GST tag	570-end	58 kDa

EPHA6	Alias	Product Substrate	Genbank ID
	EPA6, FLJ35246, PRO57066, DKFZp434C1418	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_001080448

EPHA6 (Ephrin Type-A Receptor 6) is a member of the ephrin receptor subfamily of protein-tyrosine kinases, which have been implicated in axon guidance, neuron-target interactions, regional compartmentalization, and synaptic functions in nervous systems. EPHA6 is highly expressed in the brain and testis. Reduction in EPHA6 has been detected in hypospadias, a common defect affecting the growth and closure of the external genitalia. Inhibition of EPHA6 in mice produces behavioral deficits specifically in tests of learning and memory.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA6, Active	E18-11G	Human	Insect	N-terminal GST tag	683-end	73 kDa

EPHA7	Alias	Product Substrate	Genbank ID
	CEK11, EHK3, HEK11, MDK1	Poly (4:1 Glu, Tyr) Peptide (P61-58)	BC026153

EPHA7 (Ephrin Type-A Receptor 7) is a member of the ephrin receptor subfamily of protein-tyrosine kinases family that are implicated in mediating developmental events, particularly in the nervous system. Receptors in the EPH subfamily typically have a single kinase domain and an extracellular region containing a Cys-rich domain and 2-fibronectin types III repeats. EPHA7 mediated signaling act as a physiologic trigger for apoptosis that can alter brain size and shape by regulating the number of neural progenitors. Overexpression of EPHA7 contributes towards malignant transformation, invasion progression and metastasis of primary hepatocellular carcinoma.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHA7, Active	E18-11G	Mouse	Insect	N-terminal GST tag	580-end	73 kDa

TK KINASES

EPHB1	Alias	Product Substrate	Genbank ID
	Elk, Net, Cek6, Elkh, Hek6, EPHT2, AW488255, 9330129L11	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_173447

EPHB1 (Ephrin Type-B Receptor 1) is a member of the ephrin receptor family of receptor tyrosine kinases. Ligand-activated EPHB1 forms a signaling complex with Nck, paxillin, and focal adhesion kinase and induces tyrosine phosphorylation of paxillin in a c-Src-dependent manner to promote cell migration. In addition, activated EPHB1 recruits the adaptor proteins Grb2 and p52Shc and promotes p52Shc and c-Src tyrosine phosphorylation as well as MAPK/extracellular signal-regulated kinase (ERK) activation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHB1, Active	E21-11G	Mouse	Insect	N-terminal GST tag	591-end	62 kDa

EPHB2	Alias	Product Substrate	Genbank ID
	DRT; ERK; CAPB; Hek5; PCBC; EPHT3; Tyro5; MGC87492	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004442

EPHB2 (Ephrin Type-B Receptor 2) is a member of the ephrin receptor family of receptor tyrosine kinases that phosphorylates and physically interacts with the non-receptor tyrosine kinase ABL. Through this and other interactions, EPHB2 mediates neurodevelopmental processes such as boundary formation, axon guidance, vasculogenesis, and cell migration. EPHB2 is overexpressed in a number of tumors particularly glioblastoma and this increases glioma cell migration and invasion.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHB2, Active	E22-11G	Human	Insect	N-terminal GST tag	570-end	66 kDa
EPHB2, Active	E22-11BG	Human	Insect	N-terminal GST tag	611-893	56 kDa

EPHB3	Alias	Product Substrate	Genbank ID
	ETK2; HEK2; Cek10; Mdk5; TYRO6	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004443

EPHB3 (Ephrin Type-B receptor 3) is a member of the ephrin receptor family and is expressed during embryonic development in multiple regions of the central nervous system. In the brain, EPHB3 is expressed in the cerebellum, raphe pallidus, hippocampus, entorhinal cortex, and both motor and sensory cortices. EPHB3 is involved in the maintenance of mature neuronal connections and/or re-arrangement of synaptic connections during late stages of development. The catalytic activity of EPHB3 is required for inhibition of integrin-mediated cell adhesion.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHB3	E23-11G	Mouse	Insect	N-terminal GST tag	585-end	68 kDa

EPHB4	Alias	Product Substrate	Genbank ID
	HTK, MYK1, TYRO11, Mdk2	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004444

EPHB4 (Ephrin Type-B Receptor 4) is a member of the ephrine receptor family of receptor tyrosine kinases. EPHB4 interacts with EPHB2, and together they play a crucial role in regulating cell adhesion and cell movement during embryonic development. EPHB4 is expressed in the vascular endothelial and endocardial cells and animal knockout studies with EPHB4 reveal a phenotype that is similar to EPHB2 gene knockdown.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
EPHB4, Active	E24-11G	Human	Insect	N-terminal GST tag	561-end	72 kDa
EPHB4, Active	E24-11H	Human	Insect	N-terminal HIS tag	561-end	50 kDa

FAK	Alias	Product Substrate	Genbank ID
	PTK2 ^{1,2} ; FADK ^{1,2} ; FAK1 ^{1,2} ; FRNK ¹ ; pp125FAK ^{1,2}	Poly (4:1 Glu, Tyr) Peptide (P61-58)	BC035404 ¹ ; NM_153831 ²

FAK (Focal Adhesion Kinase) is a non-receptor protein tyrosine kinase involved in signal transduction from integrin-enriched focal adhesion sites. FAK-enhanced signals have been shown to mediate the survival of anchorage-dependent cells and these signals contribute towards efficient cell migration in response to growth factor receptor and integrin stimulation. Elevated FAK expression correlates with increased tumor malignancy and invasiveness; a condition often found in anaplastic astrocytoma and glioblastoma tumor biopsy samples.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FAK, Active ¹	P91-10G	Human	Insect	N-terminal GST tag	Full Length	140 kDa
FAK, Active ²	P91-11H	Human	Insect	N-terminal HIS tag	393-698	35 kDa

TK KINASES

FER	Alias	Product Substrate	Genbank ID
	Fert, Fert2, AV082135, C330004K01Rik	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_001037997

FER (Fps/Fes Related Kinase) is a member of the FPS/FES family of non-transmembrane receptor tyrosine kinases. FER is implicated in regulating inflammation and innate immunity. Fer-deficient mice display enhanced recruitment of leukocytes in response to local lipopolysaccharide challenge. Moreover, FER is required for cell-cycle progression in malignant cells and knocking down FER expression impedes the proliferation of prostate and breast carcinoma cells by leading to cell cycle arrest at the G0/G1 phase.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FER, Active	F16-11G	Mouse	Insect	N-terminal GST tag	542-end	59 kDa

FES	Alias	Product Substrate	Genbank ID
	FPS	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_0020052

FES (Feline Sarcoma Kinase) is a protein-tyrosine kinase that was originally identified as the cellular homolog of several transforming retroviral oncoproteins. FES plays a role in regulating cytoskeletal rearrangements and inside out signalling that accompany receptor ligand, cell matrix and cell-cell interactions. FES plays a role in regulating inflammation and innate immunity. In response to lipopolysaccharide challenge, FES modulates the innate immune response of macrophages through the internalization and down-regulation of the TLR4 receptor complex.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FES, Active	F03-10G	Human	Insect	N-terminal GST tag	Full Length	125 kDa

FGFR1	Alias	Product Substrate	Genbank ID
	FLT2, CEK, FLG, KAL2, BFGFR, C-FGR, CD331, N-SAM, FGFBR ¹ , FGFR1OP: FOP FGFR1 ³	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_023110 ^{1,2,3} , BC011902 ³

FGFR1 (Fibroblast Growth Factor Receptor 1) is a member of the fibroblast growth factor receptor family of membrane-spanning tyrosine kinases (FGFR1-4). FGF receptors serve as high-affinity receptors for 17 growth factors (FGF1-17). The FGF receptor family plays an important role in multiple biological processes, including mesoderm induction and patterning, cell growth and migration, organ formation and bone growth. FGFR1 has multiple splice variants that are differentially expressed during embryo development and in the adult body.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FGFR1 (FLT2), Active ¹	F04-11G	Human	Insect	N-terminal GST tag	399-822	73 kDa
FGFR1 Mutant (V561M), Active ²	F04-13G	Human	Insect	N-terminal GST tag	399-822 (V561M)	75 kDa
FGFR1OP-FGFR1 Mutant, Active ³	F04-19BG	Human	Insect	N-terminal GST tag	1-173 (FGFR1OP) 429-end (FGFR1)	108 kDa

FGFR2	Alias	Product Substrate	Genbank ID
	K-SAM, BFR-1, CEK3, ECT1, TK14, TK25, CD332, JWS, TK14	Poly (4:1 Glu, Tyr) Peptide (P61-58)	BC039243

FGFR2 (Fibroblast Growth Factor Receptor 2) is a member of the fibroblast growth factor receptor family which play a role in mitogenesis and differentiation. FGFR2 is a high-affinity receptor for acidic, basic and/or keratinocyte growth factor, and mutations in FGFR2 are associated with Crouzon syndrome, Pfeiffer syndrome, Craniosynostosis, Apert syndrome, Jackson-Weiss syndrome, Saethre-Chotzen syndrome, and syndromic craniosynostosis. FGFR2 is required for early post-implantation development between implantation and the formation of the egg cylinder. FGFR2 contributes to the outgrowth, differentiation, and maintenance of the inner cell mass.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FGFR2, Active	F05-11G	Human	Insect	N-terminal GST tag	285-end	72 kDa
FGFR2 Mutant (E565G), Active	F05-12CG	Human	Insect	N-terminal GST tag	285-end	72 kDa
FGFR2 Mutant (K526E), Active	F05-12BG	Human	Insect	N-terminal GST tag	285-end	72 kDa
FGFR2 Mutant (K641R), Active	F05-12DG	Human	Insect	N-terminal GST tag	285-end	72 kDa
FGFR2 Mutant (K659N), Active	F05-12EG	Human	Insect	N-terminal GST tag	285-end	72 kDa
FGFR2 Mutant (N549H), Active	F05-12G	Human	Insect	N-terminal GST tag	285-end	72 kDa
FGFR2 Mutant (R612T), Active	F05-12GG	Human	Insect	N-terminal GST tag	285-end	74 kDa
FGFR2 Mutant (V564F), Active	F05-12FG	Human	Insect	N-terminal GST tag	285-end	74 kDa

TK KINASES

FGFR3	Alias	Product Substrate	Genbank ID
	ACH, CEK2, JTK4, CD333, HSFGR3EX	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_000142

FGFR3 (Fibroblast Growth Factor Receptor 3) is a member of the fibroblast growth factor receptor family. FGFR3 plays a role in several important cellular processes, including regulation of cell growth and division, cell fate determination, angiogenesis, wound healing and embryonic development. Mutations in FGFR3 have been implicated in causing bladder cancer, cancer of white blood cells (multiple myeloma) and cervical cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FGFR3, Active	F06-11G	Human	Insect	N-terminal GST tag	397-end	73 kDa
FGFR3 Mutant (G697C), Active	F06-12FG	Human	Insect	N-terminal GST tag	397-end	73 kDa
FGFR3 Mutant (K650E), Active	F06-12CG	Human	Insect	N-terminal GST tag	397-end	73 kDa
FGFR3 Mutant (K650M), Active	F06-12DG	Human	Insect	N-terminal GST tag	397-end	73 kDa
FGFR3 Mutant (K650Q), Active	F06-12EG	Human	Insect	N-terminal GST tag	397-end	73 kDa
FGFR3 Mutant (V555M), Active	F06-12GG	Human	Insect	N-terminal GST tag	397-end	73 kDa

FGFR4	Alias	Product Substrate	Genbank ID
	TKF, JTK2, CD334, MGC20292	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002011

FGFR4 (Fibroblast Growth Factor Receptor 4) is a member of the fibroblast growth factor receptor family which play a role in mitogenesis and differentiation. FGFR4 preferentially binds acidic fibroblast growth factor and is overexpressed in gynecological tumor samples, suggesting a role in breast and ovarian tumorigenesis. Ectopic expression of FGFR4 in cancer cells leads to reduced apoptosis sensitivity on treatment with doxorubicin or cyclophosphamide, whereas knockdown of endogenous FGFR4 expression in breast cancer cell lines have the opposite effect.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FGFR4, Active	F07-11G	Human	Insect	N-terminal GST tag	460-end	65 kDa
FGFR4 Mutant (N535K)	F07-12G	Human	Insect	N-terminal GST tag	460-end	65 kDa
FGFR4 Mutant (V550E), Active	F07-12BG	Human	Insect	N-terminal GST tag	460-end	65 kDa
FGFR4 Mutant (V550L), Active	F07-12CG	Human	Insect	N-terminal GST tag	460-end	65 kDa
FGFR4 Mutant (V550M), Active	F07-12DG	Human	Insect	N-terminal GST tag	460-end	65 kDa

FGR	Alias	Product Substrate	Genbank ID
	SRC2; c-fgr; c-src2; FLJ43153; MGC75096; p55c-fgr; p58c-fgr	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005248

FGR (Feline Gardner-Rasheed Sarcoma Viral Oncogene Homolog) is a proto-oncogene that is a unique member of the tyrosine kinase gene family. Certain lymphomas, with the exception of sarcomas or carcinomas, express FGR-related messenger RNA. Normally, FGR mRNA is expressed at 50 to 100 copies per cell. Expression is limited to normal peripheral blood granulocytes, monocytes and alveolar macrophages.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FGR, Active	F10-10G	Human	Insect	N-terminal GST tag	Full Length	86 kDa

FLT1	Alias	Product Substrate	Genbank ID
	FLT, VEGFR1	IGF1Rtide (I15-58)	NM_002019

FLT1 (Fms-like Tyrosine Kinase 1) is a member of the VEGFR family and is related to the proto-oncogene ROS. FLT1 plays a key role in control of cell proliferation and differentiation through its interaction with its ligand VEGF+B267. FLT1 exists in two forms via alternative splicing, the full-length receptor and a soluble form. Both the full length and soluble variants of FLT1 demonstrate strong binding affinity for VEGF. The ratio of FLT1 mRNA to VEGF mRNA correlates with tumor angiogenesis and prognosis in non-small cell lung cancers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FLT1, Active	F11-11G	Human	Insect	N-terminal GST tag	784-end	94 kDa

TK KINASES

FLT3	Alias	Product Substrate	Genbank ID
	FLT3-ITD, FLK2, STK1, CD135	MBP Protein (M42-51N)	NM_004119

FLT3 (Fms-like Tyrosine Kinase 1) is a receptor tyrosine kinase that has been shown to play a role in proliferation and survival of hematopoietic progenitor cells as well as differentiation of early B lymphoid progenitors. FLT3 consists of an extracellular domain composed of five immunoglobulin-like domains, one transmembrane region, and a cytoplasmic kinase domain split into two parts by a kinase-insert domain. FLT3 is the most frequently mutated gene in cases of acute myelogenous leukemia (AML). Approximately one-third of all AML patients have either internal tandem duplications (ITDs) in the juxtamembrane domain or mutations in the activating loop of FLT3. These types of mutations lead to constitutive activation of the FLT3.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FLT3, Active	F12-11G	Human	Insect	N-terminal GST tag	571-993	73 kDa
FLT3 Mutant (D835Y), Active	F12-12BG	Human	Insect	N-terminal GST tag	571-993	73 kDa
FLT3 Mutant (F594_R595insR), Active	F12-12EG	Human	Insect	N-terminal GST tag	571-993	73 kDa
FLT3 Mutant (F594_R595insREY), Active	F12-12FG	Human	Insect	N-terminal GST tag	571-993	73 kDa
FLT3 Mutant (N676K), Active	F12-12IG	Human	Insect	N-terminal GST tag	571-993	75 kDa
FLT3 Mutant (R595_E596insEY), Active	F12-12GG	Human	Insect	N-terminal GST tag	571-993	73 kDa
FLT3 Mutant (Y591-V592insVDFREYED), Active	F12-12HG	Human	Insect	N-terminal GST tag	571-993	76 kDa
FLT3-ITD-NPOS Mutant, Active	F12-12DG	Human	Insect	N-terminal GST tag	571-993	82 kDa
FLT3-ITD-W51 Mutant, Active	F12-12CG	Human	Insect	N-terminal GST tag	571-993	76 kDa

FLT4	Alias	Product Substrate	Genbank ID
	VEGFR3; FLT41; LMPH1A; PCL	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002020

FLT4 (FMS-related Tyrosine Kinase 4) is a tyrosine kinase receptor for vascular endothelial growth factors C and D and highly expressed in lymphangiogenesis and maintenance of the lymphatic endothelium. FLT4 is a marker for lymphatic vessels and some high endothelial venules in human adult tissues and also supported the theory of the venous origin of lymphatic vessels. FLT4 plays an essential role in the development of the embryonic cardiovascular system before the emergence of the lymphatic vessels

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FLT4, Active	F13-11G	Human	Insect	N-terminal GST tag	800-end	85 kDa

FMS	Alias	Product Substrate	Genbank ID
	CSF1R, CSFR, FIM2, C-FMS, CD115	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005211

FMS (Feline McDonough Sarcoma Kinase) is a proto-oncogene that encodes the tyrosine kinase transmembrane receptor for the colony stimulating factor 1 (CSF1) ligand. FMS is a member of the CSF1/PDGF receptor family of tyrosine-protein kinases. FMS acts as a homodimer and is suspected to mediate all of the biological effects of CSF1 which control the production, differentiation, and function of cell of the monocyte/macrophage lineage. Activating mutations FMS provide sustained signals for cell growth and result in a predisposition to myeloid malignancy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FMS, Active	C74-11G	Human	Insect	N-terminal GST tag	539-end	76 kDa

FRK	Alias	Product Substrate	Genbank ID
	GTK; RAK; PTK5	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002031

FRK (FYN-related Kinase) is a nuclear tyrosine kinase and member of the SRC sub-family. Restricted expression of FRK is detected in a broad range of cell lines with highest levels in epithelial cells. Increased expression of FRK has been shown in breast and renal cell carcinoma cell lines. In addition the retinoblastoma tumor susceptibility gene product pRb associates with FRK in vitro and in vivo. Overexpression of FRK in beta-cells from the pancreas increases the susceptibility of these cells to beta-cell-toxic events, contributing towards Type I diabetes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FRK, Active	F14-11G	Human	Insect	N-terminal GST tag	208-end	60 kDa

TK KINASES

FYN	Alias	Product Substrate	Genbank ID
	SLK, SYN, MGC45350	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002037

FYN is a member of the SRC tyrosine kinase oncogene family showing high homology to YES1, FGR and SRC kinases. FYN phosphorylates and interacts with the adaptor protein Dab1, which leads to the phosphorylation, trafficking, and processing of amyloid precursor protein (APP) and apoE receptor 2 (apoEr2). FYN expression has been shown to be significantly increased in Chronic Myelogenous Leukemia (CML). Knockdown of Fyn with shRNA slows leukemia cell growth, inhibits clonogenicity and increases cell sensitivity to imatinib, a TK inhibitor used for treating CML and gastrointestinal stromal tumors (GIST).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
FYN A, Active	F15-10G	Human	Insect	N-terminal GST tag	Full Length	85 kDa

HCK	Alias	Product Substrate	Genbank ID
	JTK9	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002110

HCK (Hematopoietic Cell Kinase) is a tyrosine kinase belonging to the Src family. HCK is expressed in certain hematopoietic cells and especially prominent in cells of myeloid lineage, particularly mature granulocytes and monocytes. HCK gene is located on a chromosome locus that is frequently affected by interstitial deletions in some acute myeloid leukemias and myeloproliferative disorders. This suggests that damage to HCK may contribute to the pathogenesis of these conditions.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HCK, Active	H02-11G	Human	Insect	N-terminal GST tag	230-497	57 kDa

HER2	Alias	Product Substrate	Genbank ID
	NEU; NGL; HER2; TKR1; ERBB2; c-erb B2; HER-2/neu	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004448 ^{1,2,3,6,8,12,14} , NM_004452 ⁴ , NM_004453 ⁵ , NM_004449 ⁷ , NM_004459 ⁹ , NM_004450 ¹⁰ , NM_004451 ¹¹ , NM_004456 ¹³ , NM_004454 ¹⁵ , NM_004455 ¹⁶

HER2 (Human Epidermal Growth Factor Receptor 2) is a tyrosine kinase receptor that is homologous to epidermal growth factor receptor (EGFR). HER2 is amplified in approximately a third of primary human breast malignancies. Overexpressed HER2 is associated with the most aggressive tumors that show uncontrolled proliferation, resistance to apoptosis and increased motility. In NIH 3T3 cell lines, overexpressing wildtype HER2 leads to cellular transformation and tumorigenesis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HER2, Active ¹	E27-11G	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (A775_G776insYVMA), Active ²	E27-13BG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (d755-759), Active ³	E27-12BG	Human	Insect	N-terminal GST tag	676-end	115 kDa
HER2 Mutant (D769H), Active ⁴	E27-12GG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (D769Y), Active ⁵	E27-12HG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (E719G) Protein ⁶	E27-12CG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (E719K) Protein ⁷	E27-12DG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (G776VC), Active ⁸	E27-13EG	Human	Insect	N-terminal GST tag	676-end	115 kDa
HER2 Mutant (I767M), Active ⁹	E27-12NG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (L755S), Active ¹⁰	E27-12EG	Human	Insect	N-terminal GST tag	676-end	110 kDa
HER2 Mutant (L755W), Active ¹¹	E27-12FG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (P780_Y781insGSP), Active ¹²	E27-13DG	Human	Insect	N-terminal GST tag	676-end	110 kDa
HER2 Mutant (R896C), Active ¹³	E27-12KG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (V777_G778insCG), Active ¹⁴	E27-13CG	Human	Insect	N-terminal GST tag	676-end	116 kDa
HER2 Mutant (V777L), Active ¹⁵	E27-12IG	Human	Insect	N-terminal GST tag	676-end	110 kDa
HER2 Mutant (V842I), Active ¹⁶	E27-12JG	Human	Insect	N-terminal GST tag	676-end	116 kDa

TK KINASES

HER4	Alias	Product Substrate	Genbank ID
	ERBB4, MGC138404, p180erbB4	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005235

HER4 (Human Epidermal Growth Factor Receptor 2) is a receptor tyrosine kinase that belongs to epidermal growth factor receptor family. Through interaction with its ligand Heregulin (HRG), HER4 regulates cellular proliferation and differentiation. The ectodomain of HER is cleaved by the metalloprotease gamma-secretase, releasing HER4 intracellular domain from the membrane and facilitating its translocation to the nucleus. The kinase activity of HER4 is both necessary and sufficient to trigger an anti-proliferative response in human breast cancer cells. Increased expression of HER4 has been detected in various cancers and this correlates with better survival rates.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HER4, Active	E29-11G	Human	Insect	N-terminal GST tag	682-993	57 kDa

HPK1	Alias	Product Substrate	Genbank ID
	MAP4K1	MBP Protein (M42-51N)	NM_007181

HPK1 (Hematopoietic Progenitor Kinase 1) is a hematopoietic cell-restricted member of the Ste20 serine/threonine kinase super family. HPK1 is also known as mitogen-activated protein kinase kinase kinase kinase 1 (MAP4K1). HPK1 is a tissue-specific upstream activator of the MEKK/JNK/SAPK signaling pathway. HPK1 diminishes T cell receptor (TCR) signaling activity and T cell proliferation by phosphorylating the adaptor protein SLP-76 .

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
HPK1, Active	M23-11G	Human	Insect	N-terminal GST tag	1-346	65 kDa

IGF1R	Alias	Product Substrate	Genbank ID
	CD221, IGFIR, JTK13, MGC142170, MGC142172	IGF1Rtide (I15-58)	NM_000875

IGF1R (Insulin-like Growth Factor 1) is a transmembrane tyrosine kinase receptor that is activated by IGF-1 and IGF-2. IGF1R plays an important role in growth and anabolic effects in adults. The IGF1R is implicated in several cancers, most notably breast cancer where it is highly overexpressed and functions as an anti-apoptotic agent by enhancing cell survival. The anti-apoptotic properties of IGF1R overexpression allows cancerous cells to resist the cytotoxic properties of chemotherapeutic drugs or radiotherapy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IGF1R, Active	I02-11H	Human	Insect	N-terminal HIS tag	960-end	53 kDa

InsR	Alias	Product Substrate	Genbank ID
	HHF5, CD220	Axltide (A16-58)	NM_000208

InsR (Insulin Receptor Kinase) is the receptor tyrosine kinase that is required for insulin signaling. InsR is post-translationally cleaved into two chains, alpha and beta, which remain covalently linked. Binding of insulin to the InsR stimulates signaling pathways that are critical to glucose uptake and metabolic homeostasis. Normal InsR function promotes the regeneration of adult β cells and the central control of nutrient homeostasis. Loss of insulin receptor substrate 2 (IRS2) in the pancreatic beta cells and parts of the brain in mice results in increased appetite, elevated lean and fat body mass and diabetes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
InsR, Active	I08-11G	Human	Insect	N-terminal GST tag	1011-end	70 kDa

IRR	Alias	Product Substrate	Genbank ID
	INSRR	Axltide (A16-58)	NM_014215

IRR (Insulin Receptor-Related Receptor) is a tyrosine protein kinase that is required for male sexual differentiation. IRR is normally expressed in only a few tissue types, but it has also been detected in neuronal tissues as well as in certain neuroblastomas. Due to its occurrence in neuroblastomas, it is suggested that IRR signaling could be involved in tumorigenesis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IRR, Active	I07-11G	Human	Insect	N-terminal GST tag	945-end	65 kDa

TK KINASES

ITK	Alias	Product Substrate	Genbank ID
	EMT; LYK; PSCTK2; MGC126257; MGC126258	MBP Protein (M42-51N)	NM_005546

ITK (Interleukin-2-Inducible T-cell Kinase) is a member of the TEC family of non-receptor tyrosine kinases. ITK is involved in the regulation of cytoskeletal reorganization. In T-cell development, ITK is important for its activation through the antigen receptor. ITK shares phosphorylation targets with the other kinases, LCK and ZAP70. Mice, which lack ITK, have defects in T cell development and cytokine production. Cells which lack ITK display altered actin polymerization and cell polarity defects.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ITK, Active	I13-10G	Human	Insect	N-terminal GST tag	Full Length	108 kDa
ITK, Active	I13-11G	Human	Insect	N-terminal GST tag	352-end	53 kDa

JAK1	Alias	Product Substrate	Genbank ID
	JAK1A, JAK1B	IRS1 (Y608) Peptide (I40-58)	NM_002227

JAK1 (Janus Kinase 1) is a tyrosine kinase which has two phosphotransferase-related domains. JAK1 is a membrane-associated phosphoprotein that is involved in the interferon-alpha/beta and -gamma signal transduction pathways. JAK1 plays an essential and non-redundant role in promoting biologic responses induced by a select set of cytokine receptors. JAK kinases activate STAT transcription factors which regulate a wide range of physiological processes through various homo- and hetero-dimer pairings.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
JAK1, Active	J01-11G	Human	Insect	N-terminal GST tag	438-end	108 kDa
JAK1 Mutant (d966-989) Protein	J01-12DG	Human	Insect	N-terminal GST tag	438-end	105 kDa
JAK1 Mutant (E966V) Protein	J01-12CG	Human	Insect	N-terminal GST tag	438-end	105 kDa
JAK1 Mutant (R724H), Active	J01-12BG	Human	Insect	N-terminal GST tag	438-end	105 kDa

JAK2	Alias	Product Substrate	Genbank ID
	N/A	IGF1Rtide (I15-58)	NM_004972

JAK2 (Janus Kinase 2) is an intracellular non-receptor tyrosine kinases that transduces cytokine-mediated signals via the JAK-STAT pathway. JAK2 has two near-identical phosphate-transferring domains. One domain exhibits the kinase activity while the other stabilizes the JAK conformational structure. JAK2 is the predominant JAK kinase activated in response to several growth factors and cytokines such as IL-3, GM-CSF and erythropoietin. JAK2 has been found to be constitutively associated with the prolactin receptor and is required for responses to gamma interferon.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
JAK2, Active	J02-11G	Human	Insect	N-terminal GST tag	804-end	63 kDa

JAK3	Alias	Product Substrate	Genbank ID
	JAKL, LJAK, JAK-3, L-JAK, JAK3_HUMAN	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_000215

JAK3 (Janus Kinase 3) is a member of the JAK family of tyrosine kinases involved in cytokine receptor-mediated intracellular signal transduction. Low levels of JAK3 expression is detected in immature hematopoietic cells, which dramatically increases during terminal differentiation of these cells suggesting a role of JAK3 in the differentiation of hematopoietic cells. Mutations in JAK3 are associated with autosomal SCID (Severe Combined Immunodeficiency Disease). Mice which lack JAK3 display a severe block in B-cell development at the pre-B stage in bone marrow.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
JAK3, Active	J03-11G	Human	Insect	N-terminal GST tag	781-end	64 kDa

TK KINASES

KDR	Alias	Product Substrate	Genbank ID
	FLK1; VEGFR; VEGFR2	MBP Protein (M42-51N)	NM_002253

KDR (Kinase Insert Domain Receptor) is a growth factor receptor tyrosine kinase plays a pivotal role in endothelial cell proliferation and differentiation. KDR is implicated in the development of new blood vessels though its interaction with the ligand VEGF. Induction of angiogenesis is a critical step in tumor progression and inhibitors of KDR have been demonstrated both to induce tumor regression and reduce metastatic potential in preclinical models. Under normal circumstances, the expression levels of VEGF and KDR are highly correlated during the development of ocular vasculature.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
KDR, Active	K01-11G	Human	Insect	N-terminal GST tag	789-end	110 kDa

LCK	Alias	Product Substrate	Genbank ID
	YT16, p56lck, pp58lck	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005356

LCK (Lymphocyte-Specific Protein Tyrosine Kinase) is a member of the Src family of non-receptor tyrosine kinases. It was identified as a gene that was rearranged and overexpressed in the murine lymphoma LSTRA, most likely as a result of the insertion of Moloney Murine Leukemia Virus DNA immediately adjacent to the gene. LCK is a proto-oncogene, which promotes cell transformation when activated. LCK overexpression has been identified in several human cancer cell lines and has been linked to in the initiation and maintenance of the transformed state in human cancers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LCK, Active	L03-10G	Human	Insect	N-terminal GST tag	Full Length	84 kDa

LTK	Alias	Product Substrate	Genbank ID
	TYK1	Abtide (A02-58)	NM_002344

LTK (Leukocyte Receptor Tyrosine Kinase) is a member of the ROS/insulin receptor family of tyrosine kinases. LTK has a putative transmembrane protein-kinase but also lacks an extracellular domain. Therefore, LTK likely interacts with one or more of the hematopoietic receptors to activate intracellular signaling through the PI3K pathway. LTK signaling has been implicated in the susceptibility to abnormal proliferation of self-reactive B cells in Systemic Lupus Erythematosus (SLE).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LTK, Active	L11-11G	Human	Insect	N-terminal GST tag	498-796	70 kDa

LYN A	Alias	Product Substrate	Genbank ID
	JTK8, FLJ26625	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002350

LYN A is a member of the Src-family of protein kinases that participate in signaling pathways of a variety of cell surface receptors. LYN A is transported to the plasma membrane via the Golgi pool of caveolin along the secretory pathway; a process which requires the kinase domain of the enzyme. The results of gene expression profiling studies suggest that LYN A may be involved in the pathogenesis of tumors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LYN A, Active	L13-18G	Human	Insect	N-terminal GST tag	Full Length	81 kDa

LYN B	Alias	Product Substrate	Genbank ID
	JTK8; FLJ26625; p65	SRC Substrate (S30-58)	BC059394

LYN B is a 56 kd tyrosine kinase that is similar to several enzymes, including mouse the T-lymphocyte-specific tyrosine kinase LCK. LYN B coimmunoprecipitates with IgM suggesting that the kinase is physically associated with membrane-bound IgM, and participates in antigen-mediated signal transduction. Crosslinking of membrane-bound IgM with antibody induces rapid increase in activities of LYN B and LYN B-associated phosphatidylinositol 3-kinase signaling.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LYN B, Active	L13-10G	Human	Insect	N-terminal GST tag	Full Length	85 kDa

TK KINASES

MATK	Alias	Product Substrate	Genbank ID
	CHK; CTK; HHYLTk; HYL; HYLTK; LSK	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_139355

MATK (Megakaryocyte-Associated Tyrosine Kinase) belongs the CSK subfamily of tyrosine kinases. MATK plays a significant role in the signal transduction of hematopoietic cells through inactivating the Src family kinase activity by specifically phosphorylating their C-terminal regulatory tyrosine residues. MATK also inhibits the function of FYN through physical interactions by competitively binding to phosphorylation sites on the kinase c-KIT. MATK has been shown to be involved in signaling in some cases of breast cancer.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MATK (CTK), Active	M49-10G	Human	Insect	N-terminal GST tag	Full Length	83 kDa

MET	Alias	Product Substrate	Genbank ID
	HGFR, RCCP2	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_000245 ¹ , X96786 ²

The MET proto-oncogene encodes a transmembrane growth factor receptor comprised of a disulphide linked heterodimer [50 kd (alpha) and 145 kd (beta)]. MET is widely expressed in the kidney, brain, lung, skin, and embryonic tissue. Hepatocyte growth factor (HGF) binds to MET and activates its tyrosine kinase activity. The overexpression of MET is involved in tumor cell migration and invasion and leads to an elevated activity of MET in variety of human cancers including pancreatic, colon, gastric, cervical and ovarian cancers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MET, Active ¹	M52-18G	Human	Insect	N-terminal GST tag	958-end	74 kDa
MET, Active ²	M52-11G	Rat	Insect	N-terminal GST tag	958-end	74 kDa
MET Mutant (D1228H), Active ¹	M52-12HG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (D1228N), Active	M52-12IG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (Del Ex14), Active ¹	M52-12PG	Human	Insect	N-terminal GST tag	956-end (Del Ex14)	71 kDa
MET Mutant (F1200I), Active ¹	M52-12GG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (M1250T), Active ¹	M52-12BG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (P991S), Active ¹	M52-12CG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (R970C), Active ¹	M52-12OG	Human	Insect	N-terminal GST tag	956-end (R970C)	81 kDa
MET Mutant (T1173I), Active ¹	M52-12FG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (T992I), Active ¹	M52-12DG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (V1092I), Active ¹	M52-12EG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (Y1230A), Active ¹	M52-12JG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (Y1230C), Active ¹	M52-12KG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (Y1230D), Active ¹	M52-12LG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (Y1230H), Active ¹	M52-12MG	Human	Insect	N-terminal GST tag	956-end	81 kDa
MET Mutant (Y1235D), Active ¹	M52-12NG	Human	Insect	N-terminal GST tag	956-end	80 kDa

MUSK	Alias	Product Substrate	Genbank ID
	MGC126323, MGC126324	MBP Protein (M42-51N)	NM_005592

MUSK (Muscle-Specific Kinase) is a receptor tyrosine kinase necessary for neuromuscular junction formation. Upon activation by its ligand agrin, MUSK binds with the adaptor protein DOK-7, resulting in the clustering acetylcholine receptors on the postsynaptic membrane of the neuromuscular junction (NMJ).

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MUSK, Active	M60-11G	Human	Insect	N-terminal GST tag	519-end	63 kDa

TK KINASES

PDGFR alpha	Alias	Product Substrate	Genbank ID
	CD140A, PDGFR2, MGC74795, Rhe-PDGFR A	Poly (4:1 Glu, Tyr) Peptide (P61-58)	AI115593 ¹ , NM_006206 ² , AM392758 ³

PDGFR alpha (Platelet-Derived Growth Factor Receptor alpha) is a member of the PDGFR family of receptor tyrosine kinases. PDGF and its receptor PDGFR alpha are inducers of fibrosis in the repair phase of inflammatory bowel disease and they may also be involved in the active inflammatory phase. There is widespread expression of PDGFR alpha in renal cell types involved in fibrotic and sclerosing processes. Aberrant expression of PDGFR alpha has been linked to developmental abnormalities in vertebrate models and has been implicated in multiple human disease states.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDGFR alpha, Active ¹	P12-11G	Mouse	Insect	N-terminal GST tag	550-end	100 kDa
PDGFR alpha, Active ²	P12-18G	Human	Insect	N-terminal GST tag	550-end	95 kDa
FIP1L1-PDGFR alpha Mutant, Active ^{2,3}	P12-19BG	Human	Insect	N-terminal GST tag	FIP1L1 (1-265)-PDG-FRA (579-end)	130 kDa
PDGFR alpha Mutant (D842V), Active ²	P12-12BG	Human	Insect	N-terminal GST tag	550-end	95 kDa
PDGFR alpha Mutant (T674I), Active ²	P12-12CG	Human	Insect	N-terminal GST tag	550-end	95 kDa

PDGFR beta	Alias	Product Substrate	Genbank ID
	JTK12; PDGFR; CD140B; PDGFR1	IGF1Rtide (I15-58) ¹ , Poly (4:1 Glu, Tyr) Peptide (P61-58) ²	NM_002609 ^{1,2} , NM_152263 ²

PDGFR beta (Platelet-Derived Growth Factor Receptor beta) is a member of the PDGFR family of receptor tyrosine kinases. PDGFR beta deficient mice are hemorrhagic, severely anemic and exhibit a defect in kidney glomeruli function PDGFR beta expression and activity is elevated in several cancers and inhibition of PDGFR beta activity blocks progression of renal carcinoma in animal models.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PDGFR beta, Active ¹	P13-11G	Human	Insect	N-terminal GST tag	557-end	104 kDa
TPM3-PDGFR beta Mutant, Active ²	P13-19DG	Human	Insect	N-terminal GST tag	1-258 (TPM3) - 528-end (PDGFRB)	150 kDa

PYK2	Alias	Product Substrate	Genbank ID
	FAK2, PTK2B, CADTK, FADK2, CAKB, PKB, PTK, RAFTK; PYK2	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_004103

PYK2 (Protein Tyrosine Kinase 2) is a member of the focal adhesion PTK family. PYK2 is activated by a variety of extracellular signals that elevate intracellular calcium concentration and by stress signals. PYK2 is expressed mainly in the central nervous system and in cells derived from hematopoietic lineages. PYK2 appears to be the predominant mediator of integrin alpha(v)beta-3 signaling events that influence osteoclast physiology and pathology.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PYK2, Active	P92-11H	Human	Insect	N-terminal HIS tag	360-690	39 kDa

RET	Alias	Product Substrate	Genbank ID
	CCDC6 ² : H4, PTC, TPC PRKAR1A ³ : PKR1, CAR, CNC NCOA4 ⁴ : ELE1, RFG, ARA70	IGF1Rtide (I15-58)	BC066122-NM_020630 ^{1,2,4} , NM_002734-NM_020630 ³

RET (REarranged during Transfection Kinase) is a transmembrane tyrosine kinase comprised of a multimeric complex which acts as a receptor for four structurally related molecules: GDNF, neurturin, artemin and persephin. Several single nucleotide polymorphisms of the RET gene have been described. Germline mutations of RET cause a dominantly inherited dysgenesis of the enteric nervous system known as Hirschsprung's disease. RET is constitutively activated by point mutations in hereditary Medullary Thyroid Carcinomas (MTCs). Multiple Endocrine Neoplasia Type 2A (MEN 2A) have been reported to be associated with two mutations of the proto-oncogene RET.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BCR-RET Mutant, Active ¹	R02-19EG	Human	Insect	N-terminal GST tag	713-end	140 kDa

TK KINASES

RET (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
PTC1 Mutant (CCDC6-RET), Active ²	R02-19BG	Human	Insect	N-terminal GST tag	CCDC6 (1-101) RET (713-end)	80 kDa
PTC2 Mutant (PRKAR1A-RET), Active ³	R02-19CG	Human	Insect	N-terminal GST tag	PRKAR1A (1-236) RET (713-end)	105 kDa
PTC3 Mutant (NCOA4-RET), Active ⁴	R02-19DG	Human	Insect	N-terminal GST tag	NCOA4 (1-238) RET (713-end)	98 kDa

RET	Alias	Product Substrate	Genbank ID
	PTC, MTC1, HSCR1, MEN2A, MEN2B, RET51, CDHF12, RET-ELE1	IGF1Rtide (I15-58)	NM_020630

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RET, Active	R02-11G	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET (S904A), Active	R02-12OG	Human	Insect	N-terminal GST tag	658-end	75 kDa
RET Mutant (A883F), Active	R02-12MG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (E762Q), Active	R02-12FG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (G691S), Active	R02-12DG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (L790F), Active	R02-12LG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (M918T), Active	R02-12JG	Human	Insect	N-terminal GST tag	658-end	75 kDa
RET Mutant (R749T), Active	R02-12EG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (R813Q), Active	R02-12HG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (S891A), Active	R02-12IG	Human	Insect	N-terminal GST tag	658-end	75 kDa
RET Mutant (S904F), Active	R02-12NG	Human	Insect	N-terminal GST tag	658-end	75 kDa
RET Mutant (V778I), Active	R02-12KG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (V804L), Active	R02-12BG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (V804M), Active	R02-12GG	Human	Insect	N-terminal GST tag	658-end	74 kDa
RET Mutant (Y791F), Active	R02-12CG	Human	Insect	N-terminal GST tag	658-end	74 kDa

RON	Alias	Product Substrate	Genbank ID
	MST1R, PTK8, CDw136	Axltide (A16-58)	NM_002447

RON (Recepteur d'Origine Nantais Kinase) is a macrophage stimulating 1 receptor c-MET-related tyrosine kinase. RON is functionally inactive when bound to the HYAL2 tumor-suppressor protein. HYAL2 is a glycosylphosphatidylinositol-anchored cell-surface protein that serves as an entry receptor for jaagsiekte sheep retrovirus, a virus that causes a lung cancer in sheep that is analogous to human bronchioloalveolar carcinoma. Unbound RON activates the AKT and mitogen-activated protein kinase pathways.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RON, Active	M58-11G	Human	Insect	N-terminal GST tag	983-end	71 kDa

ROR1	Alias	Product Substrate	Genbank ID
	dJ537F10.1; NTRKR1	MBP Protein (M42-51N)	NM_005012

ROR1 (Receptor Tyrosine Kinase-like Orphan Receptor 1) is a glycosylated type I membrane protein. It belongs to the ROR subfamily of cell surface receptors, which play roles in the control of most basic cellular processes including cell proliferation, differentiation, migration and metabolism. Many human breast cancers express the ROR1 protein and high-level expression is associated with aggressive disease. Downregulating ROR1 expression in human breast cancer cell lines and immune-deficient mice modles impaired cancerous growth.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ROR1, Active	R12-11G	Human	Insect	N-terminal GST tag	429-end	82 kDa

TK KINASES

ROR2	Alias	Product Substrate	Genbank ID
	BDB, BDB1, NTRKR2, MGC163394	IMBP Protein (M42-51N)	NM_004560

ROR2 (Receptor Tyrosine Kinase-like Orphan Receptor 2) is a receptor protein tyrosine kinase and type I transmembrane protein that belongs to the ROR subfamily of cell surface receptors. ROR2 is selectively expressed in the chondrocytes of all developing cartilage, where it is essential during initial growth and patterning, as well as playing a role in the subsequent expansion of mature growth plates through chondrocyte proliferation. Loss of ROR2 leads to profound skeletal abnormalities.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ROR2, Active	R13-11G	Human	Insect	N-terminal GST tag	427-end	86 kDa

ROS1	Alias	Product Substrate	Genbank ID
	<u>GOPC</u> : CAL; dJ94G16.2; FIG; GOPC1; PIST <u>ROS1</u> : c-ros-1; MCF3; ROS	IGF1Rtide (I15-58)	NM_002944 ^{1,2,3} , NM_020399 ² , NM_152263 ³

ROS1 is a proto-oncogene and member of the sevenless subfamily of tyrosine kinase insulin receptors. ROS1 is highly-expressed in a variety of tumor cell lines where it drives growth and differentiation. The FIG gene can fuse with the ROS1 gene in glioblastoma cell lines resulting in a constitutively activated tyrosine kinase. The phosphatase PTPN6 (SHP1) is required for the efficient downregulation of ROS1-mediated signaling.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ROS1, Active ¹	R14-11G	Human	Insect	N-terminal GST tag	1883-end	82 kDa
GOPC-ROS1 Mutant, Active ²	R14-19BG	Human	Insect	N-terminal GST tag	GOPC (1-419)-ROS1 (1881-end)	145 kDa
TPM3-ROS1 Mutant, Active ³	R14-19CG	Human	Insect	N-terminal GST tag	TPM3 (1-258)-ROS1 (1881-end)	108 kDa

ROS1 (G)	Alias	Product Substrate	Genbank ID
	c-ros-1; MCF3; ROS	IGF1Rtide (I15-58)	NM_002944

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ROS1 (G2032R), Active	R14-12BG	Human	Insect	N-terminal GST tag	1881-end	82 kDa

SRC	Alias	Product Substrate	Genbank ID
	ASV; SRC1; c-SRC; p60-Src	SRC Substrate (S30-58)	M11753 ¹ , NM_005417 ²

SRC is a non-receptor proto-oncogene tyrosine-protein kinase which was originally identified as a viral-derived enzyme that was able to phosphorylate tyrosine residues in protein substrates. SRC is overexpressed and activated in a large number of human malignancies and it is also involved in the progression of cancers to distant metastases. In addition to increasing cell proliferation, a key role of SRC in cancer seems to be the ability to promote invasion and motility, functions that likely contribute to its oncogenic functions.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SRC, Active ¹	S19-10G	Rous Sarcoma Virus	Insect	N-terminal GST tag	Full Length	85 kDa
SRC, Active ²	S19-18G	Human	E. coli	N-terminal GST tag	Full Length	83 kDa

SRMS	Alias	Product Substrate	Genbank ID
	SRM, C20orf148, dJ697K14.1	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_080823

SRMS (Src-Related Kinase Lacking C-Terminal Regulatory Tyrosine And N-Terminal Myristylation Sites) is a Src-related kinase which lacks C-terminal regulatory tyrosine and N-terminal myristylation sites. SRMS can act either in the membrane or at the nucleus and may change localization patterns depending on the type of external stimuli. SRMS functions as a rapid downstream signaling intermediate following calcium-induced differentiation in keratinocytes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SRMS, Active	S20-11G	Human	Insect	N-terminal GST tag	215-end	54 kDa

TK KINASES

SYK	Alias	Product Substrate	Genbank ID
	N/A	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_003177

SYK (Spleen Associated Kinase) is a non-receptor protein tyrosine kinase that is widely expressed in hematopoietic cells. It couples activated immunoreceptors to downstream signaling events that mediate diverse cellular responses, including proliferation, differentiation, and phagocytosis. In B-cells, SYK plays a crucial role in intracellular signal transduction induced by oxidative stress as well as antigen receptor engagement. SYK has been shown to act as a potential tumor suppressor in breast cancer. Absence of SYK protein in primary breast tumors is correlated with poor outcomes. SYK deficient cells have increased motility that is restored to normalcy by replacement with wild-type SYK.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
SYK, Active	S52-10G	Human	Insect	N-terminal GST tag	Full Length	100 kDa

TEC	Alias	Product Substrate	Genbank ID
	PSCTK4 ^{1,2} , MGC126760 ² , MGC126762 ²	MBP Protein (M42-51N)	BC166730 ¹ , NM_003215 ²

TEC is a non-receptor protein-tyrosine kinases that is involved in the intracellular signaling mechanisms of cytokine receptors, lymphocyte surface antigens, heterotrimeric G-protein coupled receptors and integrin molecules. TEC plays a crucial role in regulating FGF2 secretion under various physiological conditions and it inhibits CD25 expression in human T-lymphocyte. Since TEC has a distinct role in T cell activation and defects in kinase are sometimes associated with myelodysplastic syndrome.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TEC, Active ¹	T03-10CG	Rat	Insect	N-terminal GST tag	Full Length	100 kDa
TEC, Active ²	T03-10G	Human	Insect	N-terminal GST tag	Full Length	103 kDa

TIE2	Alias	Product Substrate	Genbank ID
	TIE-2, TEK, VMCM, VMCM1, CD202B	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_000459

TIE2 (Angiopoietin-1 Receptor) is a receptor tyrosine kinase that is expressed principally on vascular endothelium. Angiopoietin-1 is a secreted growth factor that binds to and activates TIE2. SHP2 and GRB2 are recruited to the activated TIE2 kinase domain and are part of the cellular responses that mediate TIE2 function. TIE2 expression is upregulated in the endothelium of vascular "hot spots" in human breast cancer specimens. However, TIE2 is also overexpressed in areas of active angiogenesis in normal tissues. Studies in mice have shown that disruption of TIE2 results in embryonic lethality with defects in embryonic vasculature, suggesting a role in blood vessel maturation and maintenance.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TIE2, Active	T04-11G	Human	Insect	N-terminal GST tag	771-end	63 kDa
TIE2 Mutant (A1124V), Active	T04-12GG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (L914F), Active	T04-12IG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (P883A), Active	T04-12CG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (R849W), Active	T04-12BG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (R915C), Active	T04-12JG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (Y1108F), Active	T04-12FG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (Y897C), Active	T04-12DG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (Y897H R915C), Active	T04-12KG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (Y897H), Active	T04-12HG	Human	Insect	N-terminal GST tag	771-end	65 kDa
TIE2 Mutant (Y897S), Active	T04-12EG	Human	Insect	N-terminal GST tag	771-end	65 kDa

TNK1	Alias	Product Substrate	Genbank ID
	MGC46193	CSKtide (C63-58)	NM_003985

TNK1 (Tyrosine Kinase Non-Receptor 1) is a tyrosine kinase that mediates cellular proliferation, survival, and development. TNK1 is highly expressed in fetal tissues and at lower levels in only some adult tissues suggesting that the TNK1 signaling is broadly utilized during fetal development and more selectively in adult tissues. TNK1 plays a negative regulatory role in the RAS-RAF1-MAPK pathway. Knockout mice to develop spontaneous tumors, suggesting a role for TNK1 as a tumor suppressor gene.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TNK1, Active	T12-11G	Human	Insect	N-terminal GST tag	1-510	85 kDa

TK KINASES

TRKA	Alias	Product Substrate	Genbank ID
	NTRK1; MTC; TRK; TRK1; p140-TrkA; DKFZp781114186	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_002529 ^{1,2,3,4,5,6} NM_152263 ⁴ , NM_001195478 ⁵ , NM_003292 ⁶

TRKA (Tropomyosin Receptor Kinase A) is a proto-oncogene which functions as a membrane-spanning protein tyrosine kinase. The ligand for TRKA is nerve growth factor (NGF). Activation by NGF elicits the rapid phosphorylation of TRKA on tyrosine residues leading to increased c-Fos expression, DNA synthesis and morphologic transformation. Decreased TRKA expression on the striatal cholinergic neurons correlates with the death of cholinergic neurons in Alzheimer disease, suggesting a causal link between the kinase and neuropathy.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TRKA, Active ¹	N16-11G	Human	Insect	N-terminal GST tag	440-end	66 kDa
TRKA (G667C), Active ²	N16-12CG	Human	Insect	N-terminal GST tag	440-end	66 kDa
TRKA (G595R), Active ³	N16-12BG	Human	Insect	N-terminal GST tag	440-end	66 kDa
TPM3-TRKA Mutant, Active ⁴	N16-19DG	Human	Insect	N-terminal GST tag	TPM3 (1-258) TRKA (399-end)	105 kDa
TFG-TRKA Mutant (TRK-T3), Active ⁵	N16-19CG	Human	Insect	N-terminal GST tag	399-end protein	100 kDa
TPR-TRKA Mutant (TRK-T1), Active ⁶	N16-19BG	Human	Insect	N-terminal GST tag	TPR (1-191) TRKA (399-end)	96 kDa

TRKB	Alias	Product Substrate	Genbank ID
	NTRK2, GP145-TrkB	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_001018064

TRKB (Tropomyosin Receptor Kinase B) is a membrane-bound receptor that is a part of neurotrophic tyrosine receptor kinase (NTRK) family. TRKB has high affinity for several "neurotrophins", which are small protein growth factors that induce the survival and differentiation of distinct cell populations. Upon neurotrophin binding, TRKB autophosphorylates and subsequently activates members of the MAPK pathway. Mutations in the TRKB gene have been link to metabolic disease and mood disorders.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TRKB, Active	N17-11G	Human	Insect	N-terminal GST tag	455-end	67 kDa

TRKC	Alias	Product Substrate	Genbank ID
	NTRK3, gp145(trkC)	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_001018064

TRKC (Tropomyosin Receptor Kinase C) is a member of the TRK family of tyrosine kinase receptors and is the high affinity catalytic receptor for the neurotrophin NT-3 (Neurotrophin-3). Activated TRKC mediates multiple cellular effects, which includes neuronal differentiation and survival. TRKC is implicated in insulin signaling pathway through interactions with the MUSK protein receptor and the VEGF receptor. Mutations in the TRKC gene have been associated with medulloblastomas, secretory breast carcinomas and other cancers.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TRKC, Active	N18-11H	Human	Insect	N-terminal HIS tag	507-end	38 kDa

TXK	Alias	Product Substrate	Genbank ID
	RLK ^{1,2} ; TKL ^{1,2} ; BTKL ^{1,2} ; PTK4 ^{1,2} ; PSCTK5 ^{1,2} , MGC22473 ²	MBP Protein (M42-51N)	BC095847 ¹ , NM_003328 ²

TXK is a member of the TEC family of non-receptor tyrosine kinases. TXK is expressed in T-cells and is an important component of signaling pathways downstream of lymphocyte antigen receptor. TXK is phosphorylated in response to T-cell receptor stimulation and can be activated by phosphorylation by Src family kinases. Excessive TXK protein expression is seen in patients with Behcet's disease.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TXK, Active ¹	T19-11CG	Rat	Insect	N-terminal GST tag	190-end	64 kDa
TXK, Active ²	N18-11H	Human	Insect	N-terminal GST tag	239-end	53 kDa

TK KINASES

TYK2	Alias	Product Substrate	Genbank ID
	PSCTK4, MGC126760, MGC126762	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_003331

TYK2 (Tyrosine Kinase 2) is a member the Janus kinase (JAKs) tyrosine kinase family. TYK2 associates with the cytoplasmic domain of type I and type II cytokine receptors and propagate cytokine signals. TYK2 is also involved in type I and type III interferon signaling pathways. TYK2 plays a role in anti-viral immunity and has an indispensable role in controlling responses to multiple cytokines in humans. TYK2 contributes selectively to signals triggered by various biologic stimuli and cytokine receptors. TYK2 is also an important regulator of lymphoid tumor surveillance.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TYK2 (JTK1), Active	T21-11G	Human	Insect	N-terminal GST tag	442-end	110 kDa

TYRO3	Alias	Product Substrate	Genbank ID
	BYK; RSE; Dtk; Sky; Tif; Brt	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_006293

TYRO3, along with AXL and MER form the TAM family of receptor tyrosine kinases. TAM kinases play essential roles in spermatogenesis, immunoregulation, cell adhesion and phagocytosis. Gas6 is the ligand for all three TAM kinases. TYRO3 is expressed in the CNS, lymphoid, vascular and reproductive tissue and in primary and tumor cell lines. In the brain, TYRO3 is involved in protecting neurons from undergoing apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TYRO3, Active	T22-11G	Human	Insect	N-terminal GST tag	455-end	77 kDa

YES1	Alias	Product Substrate	Genbank ID
	Yes, c-yes, HsT441, P61-YES	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_005433

YES1 is a Src-related tyrosine kinase that is the cellular homolog of the Yamaguchi Sarcoma Virus oncogene. YES1 is important for maintaining embryonic stem cells in an undifferentiated state. YES1 induction results in increased cancer cell motility suggesting that this kinase is involved in promoting the spread of cancer and metastasis. Aberrant activation or overexpression of YES1 is suspected to promote the malignant transformation of hepatocytes and it plays a key role in the tumorigenesis and metastasis of gastric cancer. Therefore, YES1 is a useful marker to detecting early-stage hepatocellular carcinoma.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
YES1, Active	Y01-10G	Human	Insect	N-terminal GST tag	Full Length	91 kDa
YES1 Mutant (T348I), Active	Y01-12BG	Human	Insect	N-terminal GST tag	Full Length	88 kDa

ZAP70	Alias	Product Substrate	Genbank ID
	SRK; STD; ZAP-70	Poly (4:1 Glu, Tyr) Peptide (P61-58)	NM_001079

ZAP70 (Zeta-Chain-Associated Protein Kinase 70) is a member of the SYK/ZAP70 family of non-receptor protein tyrosine kinases. ZAP70 mediates signaling by the T-cell antigen receptor (TCR). Ligation of the TCR/CD3 receptor in Jurkat T-cells induces the phosphorylation of TCR by LCK, leading to the subsequent recruitment of ZAP70 to the plasma membrane via its SH2 domain. ZAP70 also phosphorylates other proteins in the TCR-phosphoprotein complex. One of the endogenous substrates for ZAP70 is the zeta-chain dimer of the TCR/CD3 complex.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ZAP70, Active	Z02-10G	Human	Insect	N-terminal GST tag	Full Length	96 kDa
ZAP70 Mutant (Y319F), Active	Z02-12BG	Human	Insect	N-terminal GST tag	Full Length	95 kDa

TKL Kinases

The TKL subfamily share sequence similarity to tyrosine kinases. This divergent group includes several smaller groups, including IL1 Receptor Associated Kinases (IRAKs) and Receptor Interacting Protein Kinases (RIPKs). IRAKs and RIPKs activate innate and active immune responses as effectors of Toll-like receptors (TLRs). IRAK4 deficiency provides protection from developing rheumatoid arthritis (RA), prompting the development of drugs IRAK4-targeted drugs to treat autoimmune diseases. RIPKs 1 and 3 are instrumental inhibiting and triggering necroptosis, a condition which causes leakage of cellular contents. In turn, byproducts of necroptosis are recognized by TLRs; thus driving a mechanism that promotes inflammation in a feed-forward manner.

ALK1	Alias	Product Substrate	Genbank ID
	ACVRL1, ACVRLK1, ALK1, HHT, HHT2, ORW2, SKR3, ALK1, TSR-I	Casein, Dephosphorylated (C03-54BN)	NM_000020

ALK1 (Activin Receptor-like Kinase-1) is a receptor serine/threonine-protein kinase that functions as a TGF-beta type 1 receptor in endothelial cells. ALK1 mediates signal by the TGF-beta superfamily. Distinct Smad proteins (i.e., SMAD2/SMAD3 and SMAD1/SMAD5) show interaction with ALK1 and mediate TGF beta signaling. Northern blot and RT-PCR analysis show that ALK1 specifically induces the expression of Smad6, Smad7, Id1, Id2, endoglin, STAT1 and interleukin I receptor in endothelial cells.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ALK1, Active	A09-11G	Human	Insect	N-terminal GST tag	144-end	64 kDa

ALK2	Alias	Product Substrate	Genbank ID
	ACVR1, ACTRI, ACVR1A, ACVRLK2, FOP, SKR1, TSRI	Casein, Dephosphorylated (C03-54BN)	NM_001105

ALK2 (Activin Receptor-like Kinase-2) is a receptor serine/threonine-protein kinase that acts upstream of signaling pathway involving the SMAD and BMP proteins. ALK2 is mainly responsible for the development and repair of the skeletal system. ALK2 is the key gene involved in Fibrodysplasia ossificans progressive (FOP), a rare autosomal dominant congenital disorder characterized by progressive heterotopic bone formation in muscle tissues.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ALK2, Active	A06-11G	Human	Insect	N-terminal GST tag	147-end	67 kDa
ALK2 Mutant (PF197_198L), Active	A06-12FG	Human	Insect	N-terminal GST tag	147-end	69 kDa
ALK2 Mutant (Q207D), Active	A06-13CG	Human	Insect	N-terminal GST tag	147-end	67 kDa
ALK2 Mutant (Q207E), Active	A06-13DG	Human	Insect	N-terminal GST tag	147-end	67 kDa
ALK2 Mutant (R206H), Active	A06-12BG	Human	Insect	N-terminal GST tag	147-end	67 kDa

ALK3	Alias	Product Substrate	Genbank ID
	ALK3; BMPR1A; 10q23del; ACVRLK3; CD292; SKR5	TGFBR1 Peptide (T36-58)	NM_004329

ALK3 (Activin Receptor-like Kinase-3) is a receptor serine/threonine kinase ALK3 regulates a PTEN protein levels by decreasing PTENs association with the degradative pathway. ALK3 trafficking plays a significant role in FOP pathogenesis and is also involved in human T-cell differentiation. ALK3 acts a minor susceptibility gene for PTEN-mutation-negative Cowden syndrome.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ALK3 (BMPR1A), Active	B04-11G	Human	Insect	N-terminal GST tag	187-end	66 kDa
ALK3 Mutant (Q233D), Active	B04-12BG	Human	Insect	N-terminal GST tag	187-end	66 kDa
ALK3 Mutant (R486Q), Active	B04-12CG	Human	Insect	N-terminal GST tag	187-end	64 kDa

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ALK4	Alias	Product Substrate	Genbank ID
	ACVR1B, SKR2, ACTRIB, ACVRLK4	Casein, Dephosphorylated (C03-54BN)	NM_004302

ALK4 (Activin Receptor-like Kinase-4) is a receptor serine/threonine kinase that mediates signaling by activins. Activins form a complex with ALK4 and recruit SMAD proteins. ALK4 also transduce signals of Nodal, GDF-1 and Vg1 however, they require co-receptor molecules like protein Cripto. Truncated ALK4 predominately expressed in human pituitary adenomas function as dominant negative receptors to interfere with wild-type receptor function and blocks anti-proliferative effect of activin contributing to development of human pituitary tumors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ALK4, Active	A07-11G	Human	Insect	N-terminal GST tag	150-end	64 kDa

ALK6	Alias	Product Substrate	Genbank ID
	ALK-6; ALK6; CDw293	TGFBR1 Peptide (T36-58)	NM_001203

ALK6 (Activin Receptor-like Kinase-6) is a transmembrane serine/threonine kinase that is a member of the bone morphogenetic protein (BMP) receptor family. ALK6 is mainly involved in endochondral bone formation and embryogenesis and play a role in the formation of middle and proximal phalanges. ALK6 expressed in normal and cancerous prostate tissues and used in the endocrine therapy given to prostate cancer patients.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ALK6 (BMPR1B), Active	B05-11G	Human	Insect	N-terminal GST tag	149-end	68 kDa

ANKK1	Alias	Product Substrate	Genbank ID
	X-kinase, PKK2, SGK288	MBP Protein (M42-51N)	NM_178510

ANKK1 (Ankyrin Repeat and Kinase Domain Containing 1) is a member of the serine/threonine protein kinase family, a kinase super family that is thoroughly involved in signal transduction pathways. ANKK1 is linked closely to the DRD2 gene on chromosome 11 where it contains a single nucleotide polymorphism that causes an amino acid substitution, TaqA1. TaqA1 was originally associated with DRD2 gene, however it was later determined to be located in exon 8 of ANNK gene. Since ANKK1 is closely linked to DRD2 receptor it has influence on serotonin and other neurotransmitters in the brain.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ANKK1 (SGK288), Active	A20-10G	Human	Insect	N-terminal GST tag	149-end	115 kDa

BMPR2	Alias	Product Substrate	Genbank ID
	BMPR-II; BMPR3; BMR2; BRK-3; FLJ41585; FLJ76945; PPH1; T-ALK	MBP Protein (M42-51N)	NM_001204

BMPR2 (Bone Morphogenetic Protein Receptor Type 2) is a member of the bone morphogenetic protein (BMP) receptor family of transmembrane serine-threonine kinases and plays a role in endochondral bone formation and embryogenesis. BMPR2 does not have a high affinity for BMP-2, BMP-7 and BMP-4, unless it is co-expressed with a type I BMP receptor. When ligand binding occurs, BMPR2 forms a 4 kinase receptor complex (2 type II and 2 type I transmembrane serine/threonine kinases). The loss of interaction and lack of phosphorylation of TCTEL1 by BMPR2 may contribute to the pathogenesis of primary pulmonary hypertension (PPH). BMPR2 also plays an essential role in human t-cell differentiation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BMPR2, Active	B06-11H	Human	Insect	N-terminal His tag	174-end	115 kDa

BRAF	Alias	Product Substrate	Genbank ID
	<u>BRAF</u> ¹²³⁴⁵⁶ : BRAF1, RAFB1, B-raf, B-raf 1, MGC126806, MGC138284 <u>RNF130</u> ⁵ : G1RZFP, GOLIATH, GP ; <u>SRGAP3</u> ⁶ : ARHGAP14; MEGAP; SRGAP2; WRP	MEK1, Unactive (M02-14G)	NM_004333 ^{1,2,4} , BC050543 ² , NM_001164665 ³ , NM_001164665 ⁴ , BC108306 ⁵ , NM_014850 ⁶

BRAF (B-Raf Proto-Oncogene) is a member of the RAF family that plays a role in regulating the activation of MAPK/ERK signaling pathways ultimately affecting cell division, differentiation and secretion. Active Ras can induce the heterodimerization of cRAF and BRAF and this may explain the observed cooperativity of cRAF and BRAF in cells responding to growth factor signals. Activating mutations in the BRAF gene are present in a large percentage of human malignant melanomas and colon cancers. The vast majority of these mutations result in a valine to glutamic acid change at residue 599 within the activation of BRAF.

TKL KINASES

BRAF (continued)

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
BRAF, Active ¹	B08-11G	Human	Insect	N-terminal GST tag	416-766	63 kDa
BRAF, Active ¹	B08-11BG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF (G466V) Protein ¹	B08-12GG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (d485-489 P490Y), Active ¹	B08-12IG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (G464V), Active ¹	B08-12JG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (G469A), Active ¹	B08-12FG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (K601E), Active ¹	B08-12BG	Human	Insect	N-terminal GST tag	416-end protein	63 kDa
BRAF Mutant (L597V), Active ¹	B08-12HG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (R506_K607insVLR), Active ¹	B08-13CG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (T599_V600insT), Active ¹	B08-13BG	Human	Insect	N-terminal GST tag	416-end protein	63 kDa
BRAF Mutant (V600A), Active ¹	B08-12EG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (V600D), Active ¹	B08-12CG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
BRAF Mutant (V600E), Active ¹	B08-12G	Human	Insect	N-terminal GST tag	416-end protein	63 kDa
BRAF Mutant (V600K), Active ¹	B08-12DG	Human	Insect	N-terminal GST tag	381-end or exon 9-18 protein	69 kDa
FAM131B-BRAF Mutant (Fex2Bex9), Active ²	B08-19EG	Human	Insect	N-terminal GST tag	FAB131B (1-30 exon2)-BRAF (381-end or exon9-18)	75 kDa
KIAA1549-BRAF Mutant (Kex-15Bex9), Active ³	B08-19CG	Human	Insect	N-terminal GST tag	381-end or exon9-18 protein	118 kDa
KIAA1549-BRAF Mutant (Kex-16Bex9), Active ⁴	B08-19BG	Human	Insect	N-terminal GST tag	381-end or exon9-18 protein	125 kDa
RNF130-BRAF Mutant (Rex3Bex9), Active ⁵	B08-19GG	Human	Insect	N-terminal GST tag	NF130 (1-231 exon3)-BRAF (381-end or exon9-18)	98 kDa
SRGAP3-BRAF (Sex12Bex9), Active ⁶	B08-19FG	Human	Insect	N-terminal GST tag	SRGAP3 (1-513 exon12)-BRAF (381-end or exon9-18)	128 kDa

IRAK2

Alias

Product Substrate

Genbank ID

IRAK-2, MGC150550

MBP Protein (M42-51N)

NM_001570

IRAK2 (Interleukin-1 Receptor-Associated Kinase-2) is an important downstream signaling component of toll-like receptors (TLR) is it one of two putative serine-threonine kinases that become associated with IL1R upon stimulation. IRAK2 is reported to play a part in the IL-1 induced upregulation of NF-kappaB. Recent studies show that IRAK-2 could be used as an additional therapeutic target for inhibiting IL-1-induced inflammation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IRAK2, Active	I10-10BG	Human	Insect	N-terminal GST tag	Full Length	103 kDa

TKL KINASES

IRAK4	Alias	Product Substrate	Genbank ID
	IPD1, REN64, NY-REN-64	MBP Protein (M42-51N)	BC013316

IRAK4 (Interleukin-1 Receptor-Associated Kinase-4) is an important mediator in the signal transduction of toll-like receptor (TLR) and IL1R receptor signaling pathway leading to apoptosis. IRAK4 is responsible for protein binding, ATP binding, kinase activity and magnesium ion binding and use the Ser/Thr kinase activity to couple early signaling events in a receptors complex at the plasma membrane to larger signalosomes in the cytosol. Animals without IRAK4 are more susceptible to viruses and bacteria.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
IRAK4, Active	I12-10G	Human	Insect	N-terminal GST tag	Full Length	81 kDa

KSR1	Alias	Product Substrate	Genbank ID
	Q8IVT5^KSR; RSU2	CREBtide (C50-58)	BC013316

KSR1 (Kinase Suppressor of Ras1) is a protein kinase scaffold protein apart of a multiprotein signaling complex which interacts with various kinases of the RAF/MEK/ERK pathway to enhance its activation. KSR1 is regulated in response to side-to-side dimerization of its kinase domain and can also participates in form side-to-side dimers with RAF to trigger RAF activation. KSR1 functions as a scaffold that enhances iNOS activity and is crucial to the pulmonary response to *P. aeruginosa* infection.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
KSR1, Active	K07-11BG	Human	Insect	N-terminal GST tag	431-end	66 kDa
KSR1, Active	K07-11CG	Human	Insect	N-terminal GST tag	335-end	105 kDa
KSR1 (A635F), Active	K07-122G	Human	Insect	N-terminal GST tag	335-end	105 kDa
KSR1 (L639F), Active	K07-122BG	Human	Insect	N-terminal GST tag	335-end	105 kDa
KSR1 Mutant (A635F), Active	K07-12G	Human	Insect	N-terminal GST tag	431-end	66 kDa
KSR1 Mutant (L639F), Active	K07-12BG	Human	Insect	N-terminal GST tag	431-end	66 kDa

KSR2	Alias	Product Substrate	Genbank ID
	Q6VAB6 (Protein ID)	CREBtide (C50-58)	NM_004329

KSR2 (Kinase Suppressor of Ras2) is a location-regulated scaffold protein that specifically regulates the activity of MEKK3 and COT by connecting MEK to Raf. KSR2 interacts with a regulatory Raf molecule in cis to induce a conformations switch of MEK facilitating MEK's phosphorylation by a separate Raf molecule in trans. KSR2 mutation reduces the glucose and fatty acid oxidation process but speeds up growth factor EGF reaction to stimulate cell growth and sometimes cause insulin resistance. KSR2 mutations usually cause diabetes.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
KSR2, Active	K08-12BG	Human	Insect	N-terminal GST tag	554-end	72 kDa
KSR2 Mutant (R676S), Active	B04-12BG	Human	Insect	N-terminal GST tag	554-end	72 kDa

LIMK1	Alias	Product Substrate	Genbank ID
	LIMK, KIZ	Cofilin 1 Protein (C37-54H); MBP Protein (M42-51N)	NM_002314

LIMK1 (LIM Domain Kinase 1) is a protein coding gene which contains a unique combination of 2 N-terminal LIM domains and a C-terminal protein kinase domain. LIM domains are highly conserved cis-rich structures containing 2 zinc fingers that bind to DNA/RNA while also mediating protein-protein interactions. LIMK1 may play an important role in areas of the brain that are responsible for processing visual-spatial information (visuospatial constructive cognition). As well, LIMK1 can regulate aspects of the cell cytoskeleton.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LIMK1, Active	L04-11G	Human	Insect	N-terminal GST tag	285-638	65 kDa

TKL KINASES

LIMK2	Alias	Product Substrate	Genbank ID
	N/A	Cofilin 1 Protein (C37-54H)	CR456513

LIMK2 (LIM Domain Kinase 2) is a protein coding gene which contains a unique combination of 2 N-terminal LIM domains and a C-terminal protein kinase domain. LIM domains are highly conserved cis-rich structures containing 2 zinc fingers that bind to DNA/RNA while also mediating protein-protein interactions. LIMK2 is phosphorylated and activated by ROCK then LIMK2 is able to phosphorylate cofilin, inhibiting its actin-depolymerizing activity which contributes to Rho-induced reorganization of the actin cytoskeleton.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LIMK2, Active	L05-10G	Human	Insect	N-terminal GST tag	Full Length	96 kDa

LRRK2	Alias	Product Substrate	Genbank ID
	PARK8; RIPK7; ROCO2; AURA17; DARDARIN	LRRKtide (L10-58)	NM_198578

LRRK2 (Leucine-Rich Repeat Kinase 2) is an enzyme with a leucine-rich repeat (LRR) domain, a kinase domain, a DFG-like motif, a RAS domain, a GTPase domain, a MLK-like domain, and a WD40 domain. Mutations in LRRK2 are the most associated with Parkinson's disease with prevalent mutations being found within the GTPase and kinase domains. LRRK2 cooperates with MET to promote efficient tumor cell growth and survival in various cancers. Down-regulation of LRRK2 in cultured tumor cells compromises MET activation and selectively reduces downstream MET signaling to mTOR and STAT3.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
LRRK2, Active	L10-11G	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (D1994A), Active	L10-12FG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (G2019S), Active	L10-12GG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (G2385R), Active	L10-12IG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (I2020T), Active	L10-12HG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (R1441C), Active	L10-12G	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (R1441G), Active	L10-12BG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (R1441H), Active	L10-12CG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (Y1699C), Active	L10-12DG	Human	Insect	N-terminal GST tag	968-end	210 kDa
LRRK2 Mutant (Y1699G), Active	L10-12EG	Human	Insect	N-terminal GST tag	968-end	210 kDa

MLK1	Alias	Product Substrate	Genbank ID
	MAP3K9, MEKK9; PRKE1	MBP Protein (M42-51N)	NM_033141

MLK1 (Mixed Lineage Kinase 1) is a member of the mitogen activated kinase kinase kinase (MAP3K) family of dual-specificity protein kinase capable of activating the c-Jun NH2 terminal kinase (JNK) pathway in response to agonists and stress. The catalytic domain of MLK1 has amino acid sequence similar to both the Tyr-specific and the Ser/Thr-specific kinase classes while also containing 2 leu/ile-zipper motifs and a basic sequence near its C-termini. MLK1 is threonine (and possibly serine) phosphorylated at multiple sites in the activation loop, with phosphorylation of Thr312 required for full activation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MLK1, Active	M17-11G	Human	Insect	N-terminal GST tag	1-433	77 kDa

MLK2	Alias	Product Substrate	Genbank ID
	MAP3K10, MST	MBP Protein (M42-51N)	NM_002446

MLK2 (Mixed Lineage Kinase 2) is a member of the mitogen activated kinase kinase kinase (MAP3K) family of dual-specificity protein kinase capable of activating MAPK8, JNK and MKK4/SEK1. MLK2 itself can be phosphorylated and activated by JNK kinases. MLK2 functions preferentially on the JNK signaling pathway which is involved in nerve growth factor (NGF) induced neuronal apoptosis.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MLK2, Active	M18-11G	Human	Insect	N-terminal GST tag	1-446	76 kDa

TKL KINASES

MLK3	Alias	Product Substrate	Genbank ID
	MAP3K11, PTK1, SPRK, MLK3, MGC17114, MLK-3	MBP Protein (M42-51N)	NM_002419

MLK3 (Mixed Lineage Kinase 3) is a member of the mitogen activated kinase kinase kinase (MAPKKK) family of dual-specificity protein kinase capable of activating MAPK8/JNK kinase and functions as a positive regulator of JNK signaling pathway. MLK3 can directly phosphorylate and activate JNK, p38, I κ B kinase α/β . MLK3 is found to be involved in the transcription activity of NF- κ B mediated by Rho family GTPases and CDC42. MLK3 is a signal-integrating kinase with conventional MAP3K catalytic activity and additional non-catalytic functions that contribute to RAF/ERK signaling.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MLK3, Active	M19-11G	Human	Insect	N-terminal GST tag	1-488	83 kDa

MLK4	Alias	Product Substrate	Genbank ID
	dj862P8.3; KIAA1804; RP5-862P8.2	MBP Protein (M42-51N)	NM_032435

MLK4 (Mixed Lineage Kinase 4) is a member of the mitogen activated kinase kinase kinase (MAP3K) family of dual-specificity protein kinase which acts as a negative regulator of TLP4. MLK4 does not activate JNK1/MAPK8, p38/MAPK14 or ERK2/MAPK1 pathways. The structure of MLK4 incorporates an N-terminal SRC homology (SH3) domain, followed by the kinase domain, a leucine zipper region, and a CDC42 /RAC -interactive binding (CRIB) motif and divergent C-terminal regions. MLK4 is highly expressed in kidney and pancreas.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
MLK4, Active	M48-11G	Human	Insect	N-terminal GST tag	114-420	61 kDa

RAF1	Alias	Product Substrate	Genbank ID
	NS5; CRAF; Raf-1; c-Raf	MEK1, Unactive (M02-14G); ERK1, Unactive (M29-14G); MBP Protein (M42-54G)	NM_002880

RAF1 (proto-oncogene c-RAF) is a member of the MAP kinase kinase kinase (MAP3K) family which functions downstream of the Ras family of membrane associated GTPases to which it binds directly. Activated RAF1 initiates the MAPK cascade and phosphorylates and activates the dual specificity protein kinases MEK1 and MEK2, which go on to phosphorylate and activate the serine/threonine specific protein kinases ERK1 and ERK2. Activated ERK's are pleiotropic effectors of cell physiology and play an important role in the control of gene expression involved in the cell division cycle, apoptosis, cell differentiation and cell migration.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RAF1 (EE), Active	R01-13G	Human	Insect	N-terminal GST tag	RAF1(Y340E-Y341E, 306-end)	63 kDa

RIPK1	Alias	Product Substrate	Genbank ID
	RCK; MAP3K19	MBP Protein (M42-54G)	NM_003804

RIPK1 (Receptor Interacting Serine/Threonine Kinase 1) is a member of the receptor-interacting protein (RIP) family of serine/threonine protein kinases which plays a key role in the signal transduction machinery that mediates programmed cell death. RIPK1 has been shown to interact with TRADD, TRAF1 TRAF2 and TRAF3 and TRADD can act as an adaptor protein to recruit RIPK1 to the TNFR1 complex in a TNF-dependent process. TNF- α is capable of activating the non-canonical NF- κ B pathway, but this activation of this pathway is negatively regulated by RIPK1.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RIPK1, Active	R07-10G	Human	Insect	N-terminal GST tag	Full Length	108 kDa

TKL KINASES

RIPK2	Alias	Product Substrate	Genbank ID
	RICK; RIP2; CARD3; CARDIAK; CCK; GIG30	MBP Protein (M42-54G)	NM_003821

RIPK2 (Receptor Interacting Serine/Threonine Kinase 2) is a member of the receptor-interacting protein (RIP) family of serine/threonine protein kinases with a death domain-containing protein kinase encoding a ~540-amino acid protein which contains an N-terminal serine/threonine kinase catalytic domain and a C-terminal caspase activation and recruitment domain. RIPK2 is thought to regulate apoptosis induced by the FAS receptor pathway. As well, RIPK2 has been shown to interact with CARD of ICE/caspase-1 and this interaction correlates with the processing of pro-caspase-1 and the formation of the active caspase-1 p20.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RIPK2, Active	R08-11G	Human	Insect	N-terminal GST tag	1-299	59 kDa

RIPK3	Alias	Product Substrate	Genbank ID
	RIP3	MBP Protein (M42-54G)	NM_006871

RIPK3 (Receptor Interacting Serine/Threonine Kinase 3) is a member of the receptor-interacting protein (RIP) family of serine/threonine protein kinases which contain a unique C-terminal domain. RIPK3 is predominantly localized to the cytoplasm and specifically co-localized in the mitochondrion, which can undergo nucleocytoplasmic shuttling dependent on novel nuclear localization and export signals. RIPK3 is a component of the tumor necrosis factor (TNF) receptor-I signaling complex, and can induce apoptosis and weakly activate the NF-kappaB transcription factor and caspase-8, thereby preventing RIPK3-dependent necrosis without inducing apoptosis. RIP3 does this by functioning in a proteolytically active complex with CFLAR and that this complex is required for the protective function.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RIPK3, Active	R09-10G	Human	Insect	N-terminal GST tag	Full Length	96 kDa

RIPK5	Alias	Product Substrate	Genbank ID
	DSTYK; DustyPK; HDCMD38P; KIAA0472; RIP5	MBP Protein (M42-54G)	NM_015375

RIPK5 (Receptor Interacting Serine/Threonine Kinase 5) is a member of the receptor-interacting protein (RIP) family of serine/threonine protein kinases while also being a dual specific serine/threonine and tyrosine protein kinase. RIPK5 has been shown to function as a regulators of cell death. RIPK5 induces both caspase-dependent and caspase-independent cell death and N- and C-terminal RIPK5 deletion mutants retained the ability to induce cell death. Overexpression of RIPK5 leads to cell death as evidenced by DNA fragmentation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
RIPK5, Active	R27-10G	Human	Insect	N-terminal GST tag	Full Length	140 kDa

TAK1	Alias	Product Substrate	Genbank ID
	TAK1: MAP3K7, TGF1a; TAB1: MAP-3K7IP1, 3'-Tab1, MGC57664	MBP Protein (M42-54G)	NM_003188-NM_006116

TAK1 (Transforming Growth Factor beta-Activated Kinase 1) is a serine/threonine protein kinase that mediates signaling by TGF beta and morphogenetic protein. In response to IL-1, TAK1 forms a kinase complex with TAB1, required for the activation of NfκB. TAK1 can also activate MAPK8/JNK and MAP2K4/MKK4 and participate in the cell response to environmental stress. TAK1 is also essential for thymocyte development. Activation and deletion of TAK1 prevents maturation of single-positive thymocytes displaying CD4 or CD8. Thymocytes lacking TAK1 fail to activate NfκB and JNK and are prone to apoptosis upon stimulation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TAK1-TAB1, Active	M15-13G	Human	Insect	N-terminal GST tag	TAK1 (1-303) and TAB1 (437-end), linked by a small peptide (DFGGGGG)	74 kDa

TKL KINASES

TESK2	Alias	Product Substrate	Genbank ID
	N/A	MBP Protein (M42-54G)	NM_007170

TESK2 (Testis-Specific Kinase 2) is a member of the LIMK/TESK family and is a serine/threonine protein kinase that contains an N-terminal protein kinase domain. The kinase domain of TESK2 is structurally similar to the kinase domain of Testis-Specific Protein Kinase-1 and the LIM motif-containing protein kinases (LIMKs). TESK2 is primarily expressed in testis and prostate and plays an important role in spermatogenesis. TESK2 also phosphorylates cofilin specifically at Ser-3 and induces formation of actin stress fibers and focal adhesions.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TESK2, Active	T06-10G	Human	Insect	N-terminal GST tag	Full Length	92 kDa

TGFBR1	Alias	Product Substrate	Genbank ID
	AAT5 ^{2,3} , ALK5 ^{1,2,3} , SKR4 ^{1,2,3} , ALK-5 ^{1,2,3} , LDS1A ^{1,3} , LSD2A ^{1,3} , TGFR-1 ^{2,3} , ACVRLK4 ² , TbetaR-1 ² , TbetaR1 ²	TGFBR1 Peptide (T36-58)	BC071181 ^{1,3} , BC063260 ²

TGFBR1 (Transforming Growth Factor beta Receptor 1) is a member of the TGF-beta receptor subfamily and is a serine/threonine protein kinase that forms a heteromeric complex with type II TGF-beta receptors when bound to TGF-beta, transducing the TGF-beta signal from the cell surface to the cytoplasm. TGFBR1-dependent signaling is required for angiogenesis, but not for the development of hematopoietic progenitor cells and functional hematopoiesis. Mutations in TGFBR1 gene are associated with Marfan syndrome, Loeys-Deitz Aortic Aneurysm Syndrome and the development of various types of tumors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TGFBR1 (ALK5), Active ¹	T07-11G	Human	Insect	N-terminal GST tag	80-end	66 kDa
TGFBR1 (ALK5), Active ²	T07-11BG	Mouse	Insect	N-terminal GST tag	148-end	67 kDa
TGFBR1 Mutant (T204D), Active ³	T07-13G	Human	Insect	N-terminal GST tag	80-end	66 kDa

TGFBR2	Alias	Product Substrate	Genbank ID
	AAT3 ¹ , FAA3 ¹ , MFS2 ¹ , RIIC ¹ , HNPCC6 ¹ , TGFR-2 ¹ , TGFbeta-RII ¹ , TAAD2 ¹ ; 1110020H15Rik ² ; AU042018 ² ; DNIIR ² ; RIIDN; TbetaR-II ² ; TbetaRII ² ; TBR-II ²	MBP Protein (M42-51N)	NM_003242 ¹ , BC052629 ²

TGFBR2 (Transforming Growth Factor beta Receptor 1) is a serine/threonine protein of the TGF-beta receptor family and its phosphorylation plays a key role in signal transduction leading to mitogenic responses. The TGFBR2 receptor transmits signals from the cell surface to the nucleus and provides the instructions needed to make transforming growth factor (TGF)-beta type II receptor. Mutations in TGFBR2 gene are associated with Marfan Syndrome, Loeys-Deitz Aortic Aneurysm Syndrome and the development of various types of tumors.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
TGFBR2, Active ¹	T08-11G	Human	Insect	N-terminal GST tag	190-end	68 kDa
TGFBR2, Active ²	T08-11BG	Mouse	Insect	N-terminal GST tag	215-end	69 kDa

ZAK	Alias	Product Substrate	Genbank ID
	AZK, MLT, MRK, MLK7, MLTK, mlklak	MBP Protein (M42-54G)	NM_133646

ZAK (Sterile Alpha Motif And Leucine Zipper Containing Kinase AZK) is a member of the MAPKKK family which encodes a protein with a N-terminal kinase catalytic domain and is responsible for mediating gamma radiation signaling leading to cell cycle arrest. ZAK activity plays a role in cell cycle checkpoint regulation as well as being involved in regulating actin organization. ZAK can activate JNK through MKK4/MKK7 and ERK5/p38-gamma via MKK3/MKK6. Expression of ZAK increases the population of cells in the G2/M-phase of the cell cycle, whereas dominant-negative ZAK attenuated the G2 arrest caused by gamma radiation.

Product Name	Cat #	Source	Expression	Tag	Sequence	Size
ZAK, Active	Z01-10G	Human	Insect	N-terminal GST tag	Full Length	82 kDa



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