



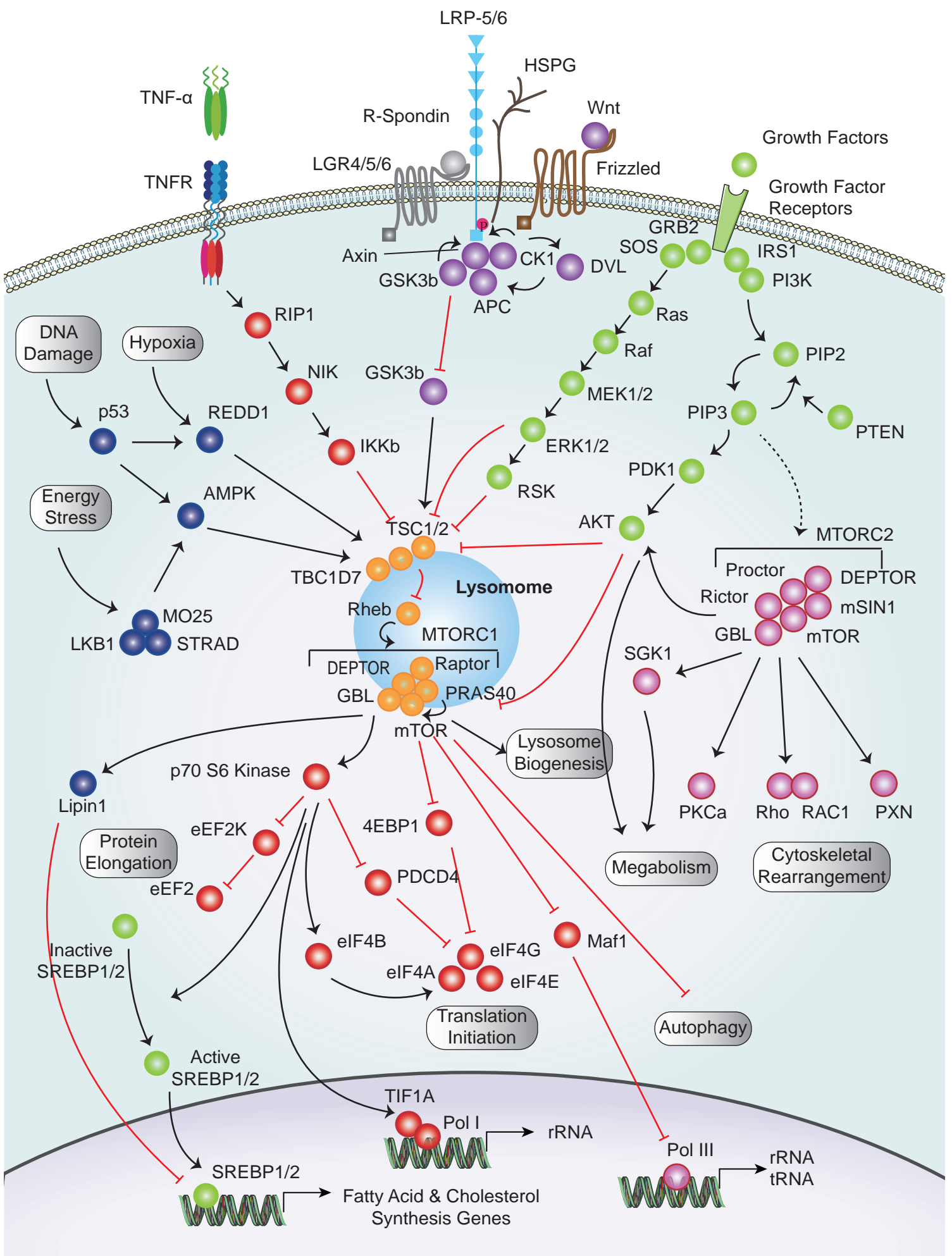
CREATIVE BIOMART®



# mTOR Signaling Pathway

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### mTOR Signaling Pathway



The mammalian target of rapamycin (mTOR) signaling pathway integrates both intracellular and extracellular signals and serves as a central regulator for cell metabolism, growth, proliferation, and survival.

mTOR links with other proteins and is a core component of two distinct protein complexes, mTOR complex 1 and mTOR complex 2. Both regulate different cellular processes.

### **mTORC1**

mTORC1 has five components: mTOR is the catalytic subunit of the complex; Raptor, the regulatory-associated protein of mTOR, affects mTORC1 activity by regulating the assembly of the complex and by recruiting substrates for mTOR; mammalian lethal with Sec13 protein 8 (mLST8); prolinerich AKT substrate 40 kDa (PRAS40); and DEP-domain-containing mTOR-interacting protein (Deptor). PRAS40 and Deptor have been characterized as distinct negative regulators of mTORC1.

mTORC1 regulates cell growth and proliferation by controlling protein synthesis, lipid synthesis, autophagy, and metabolic programs.

mTORC1 controls protein synthesis by phosphorylating the eukaryotic initiation factor 4E (eIF4E)-binding protein 1 (4E-BP1) and the p70 ribosomal S6 kinase 1 (S6K1). The phosphorylation of 4E-BP1 prevents its binding to eIF4E, enabling eIF4E to promote cap-dependent translation. The stimulation of S6K1 activity leads to increases in mRNA biogenesis, cap-dependent translation and elongation, and the translation of ribosomal proteins through regulation of the activity of many proteins.

mTORC1 regulates lipid synthesis by regulating the activity of sterol regulatory element binding protein 1 (SREBP1) and peroxisome proliferator-activated receptor-g (PPARg), two transcription factors that control the expression of gene encoding proteins involved in lipid and cholesterol homeostasis.

Autophagy is a catabolic process that is important in organelle degradation and protein turnover. Studies have shown that mTORC1 inhibition increases autophagy, whereas the stimulation of mTORC1 reduces this process.

Mitochondrial metabolism and biogenesis are both regulated by mTORC1. Inhibition of mTORC1 by rapamycin lowers mitochondrial membrane potential, oxygen consumption, and cellular ATP levels, and profoundly alters the mitochondrial phosphoproteome.

mTORC1 can be activated by various stimuli such as growth factors, nutrients, energy, and stress signals.

Studies on rapamycin revealed that mTORC1 is a downstream mediator of several growth factors and mitogen-dependent signaling pathways, all of which inhibit a key negative regulator of mTORC1 signaling known as the Tuberous Sclerosis Complex (TSC) complex. TSC is a heterotrimeric complex comprised of TSC1, TSC2, and TBC1D7, and functions as a GTPase activating protein (GAP) for the small GTPase Rheb that directly binds and activates mTORC1.

mTORC1 also responds to intracellular and environmental stresses that are incompatible with growth such as low ATP levels, hypoxia, or DNA damage. Amino acids represent a strong signal that

positively regulates mTORC1. As amino acids are not only essential building blocks of proteins but also sources of energy and carbon for many other metabolic pathways, mTORC1 activation is tightly coupled to diet-induced changes in amino acid concentrations.



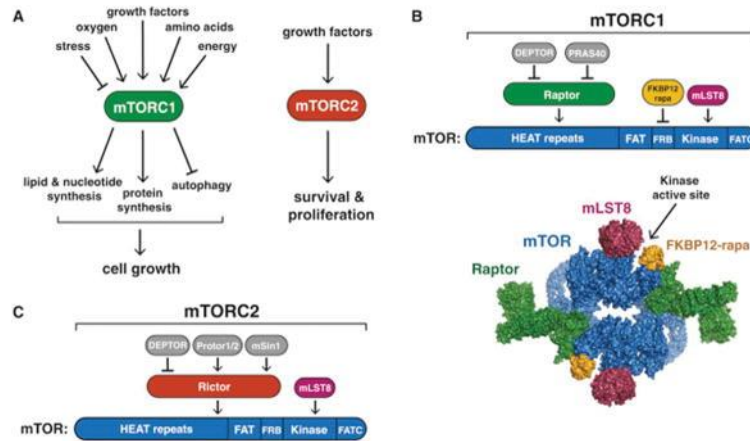


Fig1. mTORC1 and mTORC2

## mTORC2

mTORC2 comprises six different proteins: mTOR, rapamycin-insensitive companion of mTOR (Rictor), mammalian stress-activated protein kinase interacting protein (mSin1), protein observed with Rictor-1 (Protor-1), mLST8 essential for mTORC2 function, and Deptor that negatively regulates mTORC2 activity. Rictor and mSin1 stabilize each other, establishing the structural foundation of mTORC2.

The mTORC2 complex regulates cell survival and cytoskeletal organization and can be activated by growth factor binding.

mTORC2 controls proliferation and survival primarily by phosphorylating several members of the AGC (PKA/PKG/PKC) family of protein kinases. The first mTORC2 substrate identified was PKC $\alpha$ , a regulator of the actin cytoskeleton. mTORC2 has also been shown to phosphorylate several other members of the PKC family, including PKC $\delta$ , PKC $\zeta$ , as well as PKC $\gamma$  and PKC $\epsilon$ , all of which regulate various aspects of cytoskeletal remodeling and cell migration.

The most important role of mTORC2 is likely the phosphorylation and activation of Akt, a key effector of insulin/PI3K signaling. Once active, Akt promotes cell survival, proliferation, and growth through the phosphorylation and inhibition of several key substrates including the FoxO1/3a transcription factors, the metabolic regulator GSK3 $\beta$ , and the mTORC1 inhibitor TSC2.

mTORC2 primarily functions as an effector of insulin/PI3K signaling. Like most PI3K regulated proteins, the mTORC2 subunit mSin1 contains a phosphoinositide-binding PH domain that is critical for the insulin-dependent regulation of mTORC2 activity.

## Physiological roles of mTOR

mTOR signaling is essential for proper metabolic regulation. Constitutive mTOR activation is also associated with negative physiological outcomes. Proper modulation of mTOR signaling in response to changing environmental conditions thus becomes crucial.

mTORC1 signaling plays an important role in glucose homeostasis by regulating pancreatic  $\beta$ -cell function. Studies show that mTORC1 hyperactivation from genetic or dietary manipulation results in insulin resistance has led many to speculate that mTORC1 inhibitors could improve glucose tolerance and protect against type 2 diabetes.

Additionally, the mTOR signaling pathway is also related to muscle mass and function, adipogenesis and lipid homeostasis, immune function, and brain function.

### mTOR in Cancer

mTORC1 functions as a downstream effector for many frequently mutated oncogenic pathways, such as the PI3K/Akt pathway and the Ras/Raf/Mek/Erk (MAPK) pathway, resulting in mTORC1 hyperactivation in a high percentage of human cancers. Furthermore, the common tumor suppressors TP53 and LKB1 are negative regulators of mTORC1 upstream of TSC1 and TSC2, which are also tumor suppressors originally identified through genetic analysis of the familial cancer syndrome TSC. mTORC2 signaling is also implicated in cancer largely due to its role in activating Akt, which drives pro-proliferative processes such as glucose uptake and glycolysis while also inhibiting apoptosis.

We have compiled key proteins involved in the mTOR signaling pathway into one handbook for your reference.

### Featured Products Catalog

Group	Cat.No.	Product Name	Tag	Species	Source
TNFA	TNFA-386H	Recombinant Human TNFA Protein, GST-tagged	GST	Human	E.coli
	TNF-39H	Recombinant Human TNFa	N/A	Human	HEK293
	TNFA-3314H	Recombinant Human TNFA, His-tagged	His	Human	E.coli
TNFRSF1A	TNFRSF1A-1690H	Recombinant Human TNFRSF1A, Fc&His-tagged	FcHis	Human	NSO
	TNFRSF1A-1908H	Recombinant Human TNFRSF1A, Fc-His	Fc	Human	NSO
	TNFRSF1A-30481TH	Recombinant Human TNFRSF1A, Fc-tagged	Fc	Human	HEK293
	TNFRSF1A-31571TH	Recombinant Human TNFRSF1A, His-tagged	His	Human	E.coli
	TNFRSF1A-3190H	Recombinant Human TNFRSF1A Protein, His & Avi-tagged, Biotinylated	His Avi	Human	HEK293
	TNFRSF1A-46H	Recombinant Human TNFRSF1A protein, hlgG-His-tagged	His HlgG	Human	Insect Cell
	TNFRSF1A-707H	Recombinant Human TNFRSF1A, Fc-tagged, Biotinylated	Fc	Human	Human Cell
TNFRSF1B	TNFRSF1B-1689H	Recombinant Human TNFRSF1B, Fc&His-tagged	FcHis	Human	NSO
	TNFRSF1B-31575TH	Recombinant Human TNFRSF1B, His-tagged	His	Human	E.coli

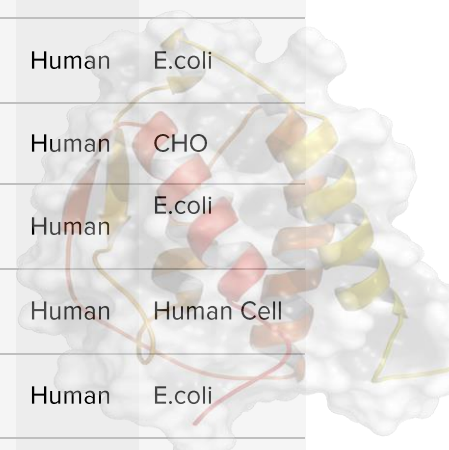
Group	Cat.No.	Product Name	Tag	Species	Source
	TNFRSF1B-62H	Recombinant Human TNFRSF1B protein, His-tagged	His	Human	Insect Cell
	TNFRSF1B-66H	Recombinant Human TNF-R2, Fc-tagged	Fc	Human	HEK293
	TNFRSF1B-7055H	Recombinant Human TNFRSF1B protein, His & GST-tagged	His GST	Human	E.coli
	TNFRSF1B-708H	Recombinant Human TNFRSF1B, Fc-tagged, Biotinylated	Fc	Human	Human Cell
	TNFRSF1B-76H	Recombinant Human TNFRSF1B	N/A	Human	CHO
LRP5	LRP5-284H	Recombinant Human LRP5 protein, Mouse IgG Fc-tagged	Moues IgG Fc	Human	HEK293
	LRP5-29428TH	Recombinant Human LRP5	N/A	Human	Wheat Germ
	LRP5-4689H	Recombinant Human LRP5 Protein, GST-tagged	GST	Human	Wheat Germ
	LRP5-7870H	Recombinant Human LRP5 protein, His-tagged	His	Human	E.coli
	LRP5-849H	Recombinant Human LRP5 Protein, MYC/DDK-tagged	Myc DDK	Human	HEK293
LRP6	LRP6-552H	Recombinant Human LRP6 protein, Mouse IgG Fc-tagged	Moues IgG Fc	Human	HEK293
	LRP6-1040H	Recombinant Human LRP6 Protein, Fc Chimera	Fc	Human	NS0
	LRP6-7875H	Recombinant Human LRP6 protein, His-tagged	His	Human	E.coli
HSPG2	HSPG2-29309TH	Recombinant Human HSPG2	N/A	Human	Wheat Germ
	HSPG2-5262H	Recombinant Human HSPG2 Protein, GST-tagged	GST	Human	Wheat Germ
	HSPG2-8046H	Recombinant Human HSPG2 protein, His-tagged	His	Human	E.coli
RSPO1	RSPO1-2024H	Recombinant Human RSPO1 Protein, His-tagged	His	Human	HEK293
	RSPO1-053H	Recombinant Human RSPO1 Protein, Fc-tagged	Fc	Human	HEK293
	RSPO1-169H	Recombinant Human RSPO1 Protein, Biotinylated	N/A	Human	CHO
	RSPO1-1942H	Recombinant Human RSPO1 protein, His & T7-tagged	His T7	Human	E.coli
	RSPO1-265H	Recombinant Human RSPO1, His-tagged, Biotinylated	His	Human	HEK293

Group	Cat.No.	Product Name	Tag	Species	Source
	RSPO1-670H	Recombinant Human RSPO1, Fc-tagged, Biotinylated	Fc	Human	Human Cell
	RSPO1-8392H	Recombinant Human RSPO1 protein	N/A	Human	CHO
RSPO2	RSPO2-171H	Recombinant Human RSPO2 Protein	N/A	Human	CHO
	RSPO2-480H	Recombinant Human RSPO2 Protein, Fc-tagged	Fc	Human	HEK293
	RSPO2-866H	Recombinant Human RSPO2 Protein, His-tagged	His	Human	NS0
RSPO3	RSPO3-1946H	Recombinant Human RSPO3 protein, His & T7-tagged	HisIT7	Human	E.coli
	RSPO3-2455H	Recombinant Human RSPO3, GST-tagged	GST	Human	E.coli
	RSPO3-3883H	Recombinant Human RSPO3 protein, His-tagged	His	Human	HEK293
	RSPO3-441H	Recombinant Human RSPO3 Protein, Fc/His-tagged	FcHis	Human	HEK293
	RSPO3-442H	Recombinant Human RSPO3 Protein	N/A	Human	CHO
RSPO4	RSPO4-1001H	Recombinant Human RSPO4	His	Human	Mammalian Cell
LGR5	LGR5-1441H	Recombinant Human LGR5 Protein (22-561 aa), His-tagged	His	Human	Yeast
	LGR5-2271H	Recombinant Human LGR5 Protein (22-561 aa), His-Myc-tagged	HisMyc	Human	E.coli
	LGR5-12HCL	Recombinant Human LGR5 HEK293T cell lysate	MycDDK	Human	HEK293T
	LGR5-641H	Recombinant Human LGR5 Protein, Fc-tagged	Fc	Human	HEK293
LGR6	LGR6-26H	Recombinant Human LGR6 Protein, Fc-tagged	Fc	Human	CHO
	LGR6-22H	Recombinant Human LGR6 protein, GST-tagged	GST	Human	Wheat Germ
	LGR6-559H	Recombinant Human LGR6, His-tagged	His	Human	E.coli
WNT1	WNT1-204H	Recombinant Human WNT1, StrepII-tagged	Strep II	Human	Human Cell
	WNT1-31526TH	Recombinant Human WNT1	N/A	Human	E.coli
WNT2	WNT2-2217H	Recombinant Human WNT2 Protein (26-360 aa), His-tagged	His	Human	Yeast

Group	Cat.No.	Product Name	Tag	Species	Source
	WNT2-1893H	Recombinant Human WNT2 protein, His-tagged	His	Human	E.coli
WNT3	WNT3-205H	Recombinant Human WNT3, StrepII-tagged	Strep II	Human	Human Cell
	WNT3-3738H	Recombinant Human WNT3, His-tagged	His	Human	E.coli
	WNT3-5161H	Recombinant Human WNT3, GST-tagged	GST	Human	Wheat Germ
WNT4	WNT4-1891H	Recombinant Human WNT4 protein, His-tagged	His	Human	E.coli
	WNT4-3740H	Recombinant Human WNT4, GST-tagged	GST	Human	E.coli
	WNT4-413H	Recombinant Human WNT4 Protein, GST/His-tagged	GST/His	Human	E.coli
WNT5A	WNT5A-2474H	Recombinant Human WNT5A Protein (62-380 aa), His-tagged	His	Human	Yeast
	WNT5A-19H	Recombinant Human WNT5A protein	N/A	Human	CHO
	WNT5A-2052H	Recombinant Human WNT5A, GST-tagged	GST	Human	Wheat Germ
	WNT5A-2053H	Recombinant Human WNT5A, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	WNT5A-206H	Recombinant Human WNT5A, StrepII-tagged	Strep II	Human	Human Cell
WNT5B	WNT5B-207H	Recombinant Human WNT5B, StrepII-tagged	Strep II	Human	Human Cell
	WNT5B-773H	Recombinant Human WNT5B	N/A	Human	CHO
WNT6	WNT6-12H	Recombinant Human WNT6 Protein, GST-tagged	GST	Human	Wheat Germ
WNT7A	WNT7A-208H	Recombinant Human WNT7A, StrepII-tagged	Strep II	Human	Human Cell
	WNT7A-278H	Recombinant Human wingless-type MMTV integration site family, member 7A, His-tagged	His	Human	E.coli
	WNT7A-42H	Recombinant Human WNT7A Protein	N/A	Human	HEK293
WNT7B	WNT7B-2291H	Recombinant Human WNT7B Protein (25-349 aa), His-SUMO-Myc-tagged	His/SUMO/Myc	Human	E.coli
	WNT7B-2786H	Recombinant Human WNT7B Protein (25-349 aa), His-Myc-tagged	His/Myc	Human	Insect Cell



Group	Cat.No.	Product Name	Tag	Species	Source
	WNT7B-15H	Recombinant Human WNT7B protein, GST-tagged	GST	Human	Wheat Germ
	WNT7B-241H	Recombinant Human WNT7B protein, StrepII/His-tagged	HisIStrepII	Human	HEK293
WNT8A	WNT8A-209H	Recombinant Human WNT8A, StrepII-tagged	Strep II	Human	Human Cell
	WNT8A-254H	Recombinant Human WNT8A protein, MYC/DDK-tagged	MycI/DDK	Human	HEK293
WNT8B	WNT8B-210H	Recombinant Human WNT8B, StrepII-tagged	Strep II	Human	Human Cell
	WNT9B-332H	Recombinant Human WNT9B protein, GST-tagged	GST	Human	Wheat Germ
WNT10A	WNT10A-1721H	Recombinant Human WNT10A Protein (36-417 aa), His-tagged	His	Human	Yeast
	WNT10A-36H	Recombinant Human WNT10A, His-tagged	His	Human	Insect Cell
WNT10B	WNT10B-1494H	Recombinant Human WNT10B protein, His & T7-tagged	HisI/T7	Human	E.coli
	WNT10B-534H	Recombinant Human WNT10B	N/A	Human	CHO
WNT11	WNT11-1493H	Recombinant Human WNT11 protein, His-tagged	His	Human	E.coli
	WNT11-242H	Recombinant Human WNT11, StrepII-tagged	Strep II	Human	Human Cell
	WNT11-3737H	Recombinant Human WNT11, GST-tagged	GST	Human	E.coli
	WNT11-553H	Recombinant Human WNT11	N/A	Human	CHO
FZD1	FZD1-1238H	Recombinant Human FZD1 protein, His & T7-tagged	HisI/T7	Human	E.coli
FZD2	FZD2-321H	Recombinant Human FZD2 protein, Fc-tagged	humanIgG1/Fc	Human	HEK293
	FZD2-26287TH	Recombinant Human FZD2	N/A	Human	Wheat Germ
	FZD2-4591H	Recombinant Human FZD2 Protein, GST-tagged	GST	Human	Wheat Germ
FZD3	FZD3-6207H	Recombinant Human FZD3 Protein, GST-tagged	GST	Human	Wheat Germ
FZD4	FZD4-381H	Recombinant Human FZD4 Protein, His-tagged	His	Human	HEK293
	FZD4-382H	Recombinant Human FZD4 protein, Fc-tagged	humanIgG1/Fc	Human	HEK293

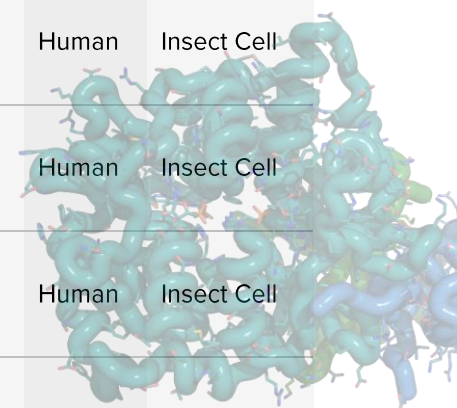


Group	Cat.No.	Product Name	Tag	Species	Source
	FZD4-4593H	Recombinant Human FZD4 Protein, GST-tagged	GST	Human	Wheat Germ
FZD5	FZD5-13068H	Recombinant Human FZD5, His-tagged	His	Human	E.coli
	FZD5-167H	Recombinant Human FZD5 protein, Fc-tagged	humanIgG1Fc	Human	HEK293
	FZD5-4595H	Recombinant Human FZD5 Protein, GST-tagged	GST	Human	Wheat Germ
	FZD5-536H	Recombinant Human FZD5 Protein, Fc Chimera	Fc	Human	CHO
FZD6	FZD6-13069H	Recombinant Human FZD6, His-tagged	His	Human	E.coli
	FZD6-4597H	Recombinant Human FZD6 Protein, GST-tagged	GST	Human	Wheat Germ
	FZD6-738H	Recombinant Human FZD6 Protein, Fc-tagged	Fc	Human	HEK293
	FZD6-739H	Recombinant Human FZD6 Protein, His-tagged	His	Human	HEK293
FZD7	FZD7-12H	Recombinant Human FZD7 protein, Fc-tagged	humanIgG1Fc	Human	HEK293
	FZD7-2166H	Recombinant Human FZD7 Protein, GST-tagged	GST	Human	Wheat Germ
	FZD7-537H	Recombinant Human FZD7 Protein, Fc-tagged	Fc	Human	CHO
	FZD7-643H	Recombinant Human FZD7 protein, His-tagged	His	Human	HEK293
FZD8	FZD8-4600H	Recombinant Human FZD8 Protein, GST-tagged	GST	Human	Wheat Germ
	FZD8-597H	Recombinant Human Frizzled Family Receptor 8, Fc-tagged	Fc	Human	CHO
FZD9	FZD9-13071H	Recombinant Human FZD9, GST-tagged	GST	Human	E.coli
FZD10	FZD10-13064H	Recombinant Human FZD10, GST-tagged	GST	Human	E.coli
	FZD10-4589H	Recombinant Human FZD10 Protein	N/A	Human	Wheat Germ
	FZD10-4590H	Recombinant Human FZD10 Protein, GST-tagged	GST	Human	Wheat Germ
	FZD10-581H	Recombinant Human Frizzled Family Receptor 10, Fc-tagged	Fc	Human	NSO
AXIN	AXIN-3795H	Recombinant Human AXIN	N/A	Human	E.coli

Group	Cat.No.	Product Name	Tag	Species	Source
GSK3B	GSK3B-2129H	Recombinant Human GSK3B Protein (1-420 aa), His-tagged	His	Human	Yeast
	GSK3B-120H	Recombinant Human GSK3B Protein, DDK-tagged	DDK	Human	Insect Cell
	GSK3B-1540H	Recombinant Human GSK3 beta, Unactive, GST-tagged	GST	Human	E.coli
	GSK3B-2350H	Recombinant Human GSK3B Protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	GSK3B-2857H	Recombinant Human GSK3B (C-79aa), His-tagged	His	Human	E.coli
	GSK3B-2858H	Recombinant Human GSK3B (1-351aa), His-tagged	His	Human	E.coli
	GSK3B-326H	Recombinant Human GSK3B protein, GST-tagged	GST	Human	Insect Cell
	GSK3B-376H	Recombinant Human GSK3B Protein, His-tagged	His	Human	Insect Cell
APC	APC-12H	Recombinant Human APC protein, GST-tagged	GST	Human	Wheat Germ
	APC-27359TH	Recombinant Human APC, His-tagged	His	Human	E.coli
DVL1	DVL1-1682H	Recombinant Human DVL1 protein, His & T7-tagged	His/T7	Human	E.coli
	DVL1-28351TH	Recombinant Human DVL1	N/A	Human	Wheat Germ
	DVL1-2959H	Recombinant Human DVL1 Protein, GST-tagged	GST	Human	Wheat Germ
DVL2	DVL2-107H	Recombinant Human DVL2, GST-tagged	GST	Human	Wheat Germ
	DVL2-1844H	Recombinant Human DVL2 protein, His-tagged	His	Human	E.coli
DVL3	DVL3-1843H	Recombinant Human DVL3 protein, His & GST-tagged	His/GST	Human	E.coli
	DVL3-28353TH	Recombinant Human DVL3	N/A	Human	Wheat Germ
	DVL3-2961H	Recombinant Human DVL3 Protein, GST-tagged	GST	Human	Wheat Germ
GRB2	GRB2-127H	Recombinant Human GRB2 protein, T7/His-tagged	T7/His	Human	E.coli
	GRB2-28345TH	Recombinant Human GRB2, His-tagged	His	Human	E.coli
	GRB2-435H	Recombinant Human GRB2 protein, His-tagged	His	Human	HEK293F

Group	Cat.No.	Product Name	Tag	Species	Source
	GRB2-5038H	Recombinant Human GRB2 Protein, GST-tagged	GST	Human	Wheat Germ
	GRB2-5248H	Recombinant Human GRB2 Protein, GST/His-tagged	GST His	Human	E.coli
KRAS	KRAS-358H	Recombinant Human KRAS Protein, His-tagged	His	Human	E. coli
	KRAS-75H	Recombinant Human KRAS Protein, GST-tagged	GST	Human	E.coli
	KRAS-163H	Recombinant Human KRAS protein, MYC/DDK-tagged	Myc DDK	Human	HEK293
	KRAS-4888H	Recombinant Human KRAS Protein, GST-tagged	GST	Human	Wheat Germ
ERAS	ERAS-1261H	Recombinant Human ERAS Protein (3-230 aa), His-tagged	His	Human	E.coli
	ERAS-3440H	Recombinant Human ERAS Protein, GST-tagged	GST	Human	Wheat Germ
MRAS	MRAS-5533H	Recombinant Human MRAS Protein, GST-tagged	GST	Human	Wheat Germ
	MRAS-703H	Recombinant Human MRAS (Q71L) Protein, His-tagged	His	Human	E.coli
	MRAS-885H	Recombinant Human MRAS	His	Human	Mammalian Cell
NRAS	NRAS-165H	Recombinant Human NRAS protein, MYC/DDK-tagged	Myc DDK	Human	HEK293
	NRAS-30411TH	Recombinant Human NRAS Protein	N/A	Human	E.coli
	NRAS-447H	Recombinant Human NRAS Protein, His-tagged	His	Human	E.coli
	NRAS-6106H	Recombinant Human NRAS Protein, GST-tagged	GST	Human	Wheat Germ
RAF1	RAF1-413H	Recombinant Human RAF1 Protein (Ser306-Phe648), His-GST-tagged	His GST	Human	Insect Cell
	RAF1-16H	Recombinant Human RAF1, GST-tagged	GST	Human	Sf9 Insect Cell
	RAF1-352H	Recombinant Human RAF1 protein, His/MBP-tagged	His MBP	Human	E.coli
	RAF1-416H	Recombinant Human RAF1 protein, GST-tagged	GST	Human	Insect Cell
	RAF1-442H	Recombinant Human RAF1 Protein, His-tagged	His	Human	Insect Cell
	RAF1-552H	Recombinant Human RAF1, MYC/DDK-tagged	Myc DDK	Human	HEK293

Group	Cat.No.	Product Name	Tag	Species	Source
MAP2K1	MAP2K1-175H	Recombinant Human MAP2K1, GST-tagged	GST	Human	E.coli
	MAP2K1-299H	Recombinant Human MAP2K1 protein, His/MBP-tagged	HisIMBP	Human	E.coli
	MAP2K1-596H	Recombinant Human MAP2K1, His-tagged	His	Human	Sf9 Insect Cell
	MAP2K1-62H	Recombinant Human MAP2K1 protein, Flag-tagged, Biotinylated	Flag	Human	Insect Cell
ERK1	ERK1-12538H	Recombinant Human ERK1, His-tagged	His	Human	E.coli
MAPK1	MAPK1-26227TH	Recombinant Human MAPK1 protein	N/A	Human	E.coli
	MAPK1-27H	Biotinylated Recombinant Human ERK2, His-tagged	His	Human	E.coli
	MAPK1-385H	Recombinant Human MAPK1 Protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	MAPK1-7267H	Recombinant Human MAPK1, GST tagged	GST	Human	Insect Cell
PIK3CA	PIK3CA&PIK3R1-150H	Recombinant Human PIK3CA(E545K)/PIK3R1 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CA&PIK3R1-151H	Recombinant Human PIK3CA(N345K)/PIK3R1 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CA&PIK3R1-152H	Recombinant Human PIK3CA(E542K)/PIK3R1 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CA&PIK3R1-153H	Recombinant Human PIK3CA/PIK3R1 protein, GST-tagged, Active	GST	Human	Insect Cell
	PIK3CA&PIK3R1-154H	Recombinant Human PIK3CA/PIK3R1 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CA&PIK3R3-152H	Recombinant Human PIK3CA/PIK3R3 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CA-70H	Recombinant Human PIK3CA protein, Flag-tagged, Biotinylated	Flag	Human	Insect Cell
PIK3CA; PIK3R1	PIK3CA/PIK3R1-389H	Recombinant Human PIK3CA/PIK3R1, His-tagged, Active	His	Human	Sf9 Insect Cell
	PIK3CA/PIK3R1-631H	Recombinant Human PIK3CA/PIK3R1, FLAG-tagged	Flag	Human	Sf9 Insect Cell





Group	Cat.No.	Product Name	Tag	Species	Source
PIK3CB	PIK3CB&PIK3R1-155H	Recombinant Human PIK3CB/PIK3R1 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CB&PIK3R2-156H	Recombinant Human PIK3CB/PIK3R2 protein, His-tagged, Active	His	Human	Insect Cell
	PIK3CB-1724H	Recombinant Human PIK3CB protein, His-tagged	His	Human	E.coli
PIK3CB; PIK3R1	PIK3CB/PIK3R1-391H	Recombinant Human PIK3CB/PIK3R1, His-tagged, Active	His	Human	Sf9 Insect Cell
	PIK3CB/PIK3R1-632H	Recombinant Human PIK3CB/PIK3R1, FLAG-tagged	Flag	Human	Sf9 Insect Cell
PIK3CD	PIK3CD-1727H	Recombinant Human PIK3CD protein, His & T7-tagged	HisIT7	Human	E.coli
	PIK3CD-1896H	Recombinant Human Phosphoinositide-3-Kinase, Catalytic, Delta Polypeptide, His-tagged	His	Human	Sf9 Insect Cell
	PIK3CD-52H	Recombinant Human PIK3CD, GST-tagged	GST	Human	Sf9 Insect Cell
PIK3CG	PIK3CG-31759TH	Recombinant Human PIK3CG & PIK3R5 protein	N/A	Human	Insect Cell
	PIK3CG-53H	Recombinant Human PIK3CG, His-tagged	His	Human	Sf9 Insect Cell
	PIK3CG-55H	Recombinant Human PIK3CG, GST-tagged	GST	Human	Sf9 Insect Cell
IRS1	IRS1-1466H	Recombinant Human Insulin Receptor Substrate 1, GST-tagged	GST	Human	Sf9 Insect Cell
	IRS1-28643TH	Recombinant Human IRS1	N/A	Human	E.coli
RPS6KA1	RPS6KA1-1934H	Recombinant Human RPS6KA1 protein, His & T7-tagged	HisIT7	Human	E.coli
	RPS6KA1-555H	Recombinant Human RPS6KA1, GST-tagged	GST	Human	Sf9 Insect Cell
PTEN	PTEN-2042H	Recombinant Human PTEN, GST-tagged	GST	Human	E.coli
	PTEN-342H	Recombinant Human PTEN Protein, His-tagged	His	Human	E.coli
	PTEN-663H	Recombinant Human PTEN Protein, His-tagged	His	Human	Sf9 Insect Cell
PDK1	PDK1-124H	Recombinant Human PDK1 Protein, GST-tagged	GST	Human	Insect cells

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	PDK1-824H	Recombinant Human PDK1 Protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	PDK1-904H	Recombinant Human PDK1, His tagged	His	Human	Insect Cell
AKT1	AKT1-14H	Recombinant Human AKT1 Protein, His-tagged	His	Human	Insect Cell
	AKT1-336H	Recombinant Human AKT1 protein, His/Strep-tagged	His/Strep	Human	HEK293
	AKT1-101H	Recombinant Human AKT1, GST-tagged	GST	Human	Sf9 Insect Cell
	AKT1-155H	Recombinant Human AKT1 protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	AKT1-307H	Recombinant Human AKT1 protein, His/MBP-tagged	His/MBP	Human	E.coli
	AKT1-30H	Recombinant Human AKT1 protein, Flag-tagged, Biotinylated	Flag	Human	Insect Cell
	AKT1-420H	Recombinant Human AKT1 Protein, GST-His tagged	GST/His	Human	Insect Cell
AKT2	AKT2-166H	Recombinant Human AKT2, His-tagged	His	Human	Sf9 Insect Cell
	AKT2-1841H	Recombinant Human AKT2 protein, His & T7-tagged	His/T7	Human	E.coli
	AKT2-248H	Recombinant Human AKT2 Protein, His & GST-tagged	His/GST	Human	Insect Cell
	AKT2-31H	Recombinant Human AKT2 protein, Flag-tagged, Biotinylated	Flag	Human	Insect Cell
	AKT2-802H	Recombinant Human AKT2, GST-tagged	GST	Human	Sf9 Insect Cell
AKT3	AKT3-26H	Recombinant Human AKT3 (E17K), GST-tagged	GST	Human	Sf9 Insect Cell
	AKT3-308H	Recombinant Human AKT3 protein, His/MBP-tagged	His/MBP	Human	E.coli
	AKT3-427H	Recombinant Human AKT3 Protein, GST-tagged	GST	Human	Wheat Germ
	AKT3-550H	Recombinant Human AKT3 Protein, His-tagged	His	Human	E.coli
	AKT3-804H	Recombinant Human AKT3 protein, GST-His-tagged	GST/His	Human	Insect Cell
MAP3K14	MAP3K14-894H	Recombinant Human MAP3K14 Protein, His/GST-tagged	His&GST	Human	Insect cell
	MAP3K14-1065H	Recombinant Human MAP3K14, GST-tagged	GST	Human	Sf9 Insect Cell

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TSC2	TSC2-31631TH	Recombinant Human TSC2, His-tagged	His	Human	E.coli
TP53	TP53-171H	Recombinant Human TP53 Protein, Myc/DDK-tagged	Myc/DDK	Human	HEK293
	TP53-172H	Recombinant Human TP53 Protein, DDK-tagged	DDK	Human	Insect Cell
	TP53-325H	Recombinant Human Tumor Protein P53, GST-tagged	GST	Human	Sf9 Insect Cell
	TP53-3436H	Recombinant Human TP53, His-tagged	His	Human	HEK293
	TP53-75H	Recombinant Human TP53 protein, Flag-tagged	Flag	Human	E.coli
PRKAB1	PRKAB1-1785H	Recombinant Human PRKAB1 protein, His & GST-tagged	His/GST	Human	E.coli
	PRKAB1-1945H	Recombinant Human PRKAB1, His-tagged	His	Human	E.coli
	PRKAB1-370H	Recombinant Human PRKAB1 protein, His/MBP-tagged	His/MBP	Human	E.coli
PRKAB2	PRKAB2-1946H	Recombinant Human PRKAB2, GST-tagged	GST	Human	E.coli
	PRKAB2-368H	Recombinant Human PRKAB2 protein, His/MBP-tagged	His/MBP	Human	E.coli
	PRKAB2-427H	Recombinant Human PRKAB2 Protein, His-tagged	His	Human	E.coli
RHEB	RHEB-1144H	Recombinant Human Ras Homolog Enriched In Brain, GST-tagged	GST	Human	E.coli
	RHEB-1181H	Recombinant Human RHEB Protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	RHEB-521H	Recombinant Human RHEB, His tagged	His	Human	Insect Cell
CAB39	CAB39-0251H	Recombinant Human CAB39 Protein, His-Tagged	His	Human	E.coli
	CAB39-1471H	Recombinant Human Calcium Binding Protein 39, GST-tagged	GST	Human	Sf9 Insect Cell
STK11	STK11-23H	Recombinant Human STK11 protein, His-tagged	His	Human	E.coli
	STK11-240H	Recombinant Human STK11 protein, GST/His-tagged	GST/His	Human	E.coli
STRADA	STRADA-449H	Recombinant Human STRADA Protein, His-tagged	His	Human	E.coli
	STRADA-4560H	Recombinant Human STRADA Protein, GST-tagged	GST	Human	Wheat Germ

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DEPTOR	DEPTOR-5182H	Recombinant Human DEPTOR Protein, GST-tagged	GST	Human	Wheat Germ
RPTOR	RPTOR-30506TH	Recombinant Human RPTOR	N/A	Human	Wheat Germ
MLST8	MLST8-1444H	Recombinant Human MLST8 protein, His & T7-tagged	HisIT7	Human	E.coli
	MLST8-26546TH	Recombinant Human MLST8, T7 -tagged	T7	Human	E.coli
	MLST8-5397H	Recombinant Human MLST8 Protein, GST-tagged	GST	Human	Wheat Germ
AKT1S1	AKT1S1-1854H	Recombinant Human AKT1 Substrate 1 (proline-rich), His-tagged And Myc-tagged	HisIMyc	Human	E.coli
	AKT1S1-25H	Recombinant Human AKT1S1 protein, MYC/DDK-tagged	MycIDDK	Human	HEK293
	AKT1S1-423H	Recombinant Human AKT1S1 Protein, GST-tagged	GST	Human	Wheat Germ
RPS6KB1	RPS6KB1-195H	Recombinant Human RPS6KB1, GST-tagged	GST	Human	Sf9 Insect Cell
	RPS6KB1-556H	Recombinant Human RPS6KB1, His-tagged	His	Human	Sf9 Insect Cell
RPS6KB2	RPS6KB2-1935H	Recombinant Human RPS6KB2 protein, His & GST-tagged	HisIGST	Human	E.coli
	RPS6KB2-2437H	Recombinant Human RPS6KB2, His-tagged	His	Human	E.coli
	RPS6KB2-360H	Recombinant Human RPS6KB2 protein, His/MBP-tagged	HisIMBP	Human	E.coli
	RPS6KB2-377H	Recombinant Human RPS6KB2, GST-tagged, Active	GST	Human	Sf9 Insect Cell
EEF2	EEF2-382H	Recombinant Human EEF2, GST-tagged	GST	Human	Wheat Germ
	EEF2-694H	Recombinant Human EEF2 Protein, His-tagged	His	Human	E.coli
	EEF2-859H	Recombinant Human EEF2, MYC/DDK-tagged	MycIDDK	Human	HEK293
EEF2K	EEF2K-1398H	Recombinant Human EEF2K (Active), GST-tagged	GST	Human	Sf9 Insect Cell
	EEF2K-3076H	Recombinant Human EEF2K Protein, GST-tagged	GST	Human	Wheat Germ
	EEF2K-614H	Recombinant Human eukaryotic elongation factor-2 kinase, His-tagged	His	Human	E.coli

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TRIM24	TRIM24-335H	Recombinant Human TRIM24 Protein, Flag-tagged	Flag	Human	Insect Cells
	TRIM24-1546H	Recombinant Human TRIM24 Protein (891-1012 aa), His-tagged	His	Human	Yeast
	TRIM24-224H	Recombinant Human TRIM24 Protein, His-tagged	His	Human	E.coli
	TRIM24-314H	Recombinant Human TRIM24 protein, His/FLAG-tagged	His/Flag	Human	E.coli
	TRIM24-315H	Recombinant Human TRIM24 protein, GST-tagged	GST	Human	Wheat Germ
EIF4EBP1	EIF4EBP1-1845H	Recombinant Human EIF4EBP1 protein, His-tagged	His	Human	E.coli
	EIF4EBP1-3203H	Recombinant Human EIF4EBP1 Protein, GST-tagged	GST	Human	Wheat Germ
EIF4E	EIF4E-26389TH	Recombinant Human EIF4E protein, His-tagged	His	Human	E.coli
	EIF4E-3198H	Recombinant Human EIF4E Protein, GST-tagged	GST	Human	Wheat Germ
EIF4B	EIF4B-27411TH	Recombinant Human EIF4B	N/A	Human	Wheat Germ
	EIF4B-3197H	Recombinant Human EIF4B Protein, GST-tagged	GST	Human	Wheat Germ
EIF4A1	EIF4A1-1394H	Recombinant Human EIF4A1 protein, His & T7-tagged	His/T7	Human	E.coli
	EIF4A1-24H	Recombinant Human EIF4A1 protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
	EIF4A1-3194H	Recombinant Human EIF4A1 Protein, GST-tagged	GST	Human	Wheat Germ
	EIF4A1-602H	Recombinant Human EIF4A1	His	Human	Mammalian Cell
EIF4A2	EIF4A2-3195H	Recombinant Human EIF4A2 Protein, GST-tagged	GST	Human	Wheat Germ
	EIF4A2-47H	Recombinant Human EIF4A2 protein, His-tagged	His	Human	E.coli
EIF4A3	EIF4A3-2494H	Recombinant Human EIF4A3 Protein, GST-tagged	GST	Human	Wheat Germ
	EIF4A3-27410TH	Recombinant Human EIF4A3, His-tagged	His	Human	E.coli
EIF4G1	EIF4G1-1387H	Recombinant Human EIF4G1 Protein (1250-1599 aa), His-tagged	His	Human	Yeast
	EIF4G1-477H	Recombinant Human EIF4G1 Protein (1250-1599 aa), GST-tagged	GST	Human	E.coli



Group	Cat.No.	Product Name	Tag	Species	Source
EIF4G2	EIF4G2-3211H	Recombinant Human EIF4G2 Protein, GST-tagged	GST	Human	Wheat Germ
EIF4G3	EIF4G3-3212H	Recombinant Human EIF4G3 Protein, GST-tagged	GST	Human	Wheat Germ
PDCD4	PDCD4-1593H	Recombinant Human PDCD4, GST-tagged	GST	Human	E.coli
	PDCD4-30797TH	Recombinant Human PDCD4	N/A	Human	Wheat Germ
	PDCD4-484H	Recombinant Human PDCD4 Protein, His-tagged	His	Human	E.coli
MAF1	MAF1-1016H	Recombinant Human MAF1, His-tagged	His	Human	Human
RICTOR	RICTOR-31328TH	Recombinant Human RICTOR	N/A	Human	Wheat Germ
MAPKAP1	MAPKAP1-1797H	Recombinant Human MAPKAP1 Protein (2-522 aa), His-SUMO-tagged	His SUMO	Human	E.coli
	MAPKAP1-29583TH	Recombinant Human MAPKAP1, His-tagged	His	Human	E.coli
SGK1	SGK1-22H	Recombinant Human SGK1 Protein, His-tagged	His	Human	E. coli
	SGK1-1080H	Recombinant Human SGK1 Protein, MYC/DDK-tagged	Myc DDK	Human	HEK293
	SGK1-4993H	Recombinant Human SGK1 protein, GST-tagged	GST	Human	Insect Cell
	SGK1-755H	Recombinant Human SGK1, T7-tagged	T7	Human	E.coli
RHOA	RHOA-1182H	Recombinant Human RHOA Protein, MYC/DDK-tagged	Myc DDK	Human	HEK293
	RHOA-34H	Recombinant Human RHOA protein, GST-tagged	GST	Human	E.coli
	RHOA-3975H	Recombinant Human RHOA, His tagged	His	Human	Insect Cell
RHOB	RHOB-2291H	Recombinant Human RHOB, GST-tagged	GST	Human	E.coli
	RHOB-27380TH	Recombinant Human RHOB, His-tagged	His	Human	E.coli
	RHOB-30284TH	Recombinant Human RHOB	N/A	Human	E.coli
RHOA	RHOA-1182H	Recombinant Human RHOA Protein, MYC/DDK-tagged	Myc DDK	Human	HEK293



Group	Cat.No.	Product Name	Tag	Species	Source
	RHOA-34H	Recombinant Human RHOA protein, GST-tagged	GST	Human	E.coli
	RHOA-3975H	Recombinant Human RHOA, His tagged	His	Human	Insect Cell
<b>RHOD</b>	RHOD-28246TH	Recombinant Human RHOD, His-tagged	His	Human	E.coli
<b>RHOH</b>	RHOH-2294H	Recombinant Human RHOH, GST-tagged	GST	Human	E.coli
<b>RHOF</b>	RHOF-1180H	Recombinant Human RHOF Protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
<b>RHOQ</b>	RHOQ-1192H	Recombinant Human RHOQ protein, His & GST-tagged	His/GST	Human	E.coli
	RHOQ-2296H	Recombinant Human RHOQ, His-tagged	His	Human	E.coli
<b>RAC1</b>	RAC1-190H	Recombinant Human RAC1, His-tagged	His	Human	E.coli
	RAC1-191H	Recombinant Human RAC1(Q61L), His-tagged	His	Human	E.coli
	RAC1-193H	Recombinant Human RAC1(Y72C) protein, His-tagged	His	Human	E.coli
	RAC1-2213H	Recombinant Human RAC1, GST tagged	GST	Human	Insect Cell
	RAC1-445H	Recombinant Human RAC1 Protein, MYC/DDK-tagged	Myc/DDK	Human	HEK293
<b>PXN</b>	PXN-029H	Recombinant Human PXN Protein, Trx, His and S-tags-tagged	Trx/His/S	Human	E.coli
	PXN-030H	Recombinant Human PXN Protein, His-tagged	His	Human	E.coli
	PXN-2413H	Recombinant Human Paxillin, GST-tagged	GST	Human	E.coli