



From Research to Discovery

PI3K-Akt-mTOR

Signalling pathway in cancer
PI3K-Akt-mTOR-related products from Covalab

PI3K - Akt - mTOR



The PI3K–Akt–mTOR signalling pathway plays a crucial role in various physiological processes including cell cycle progression, apoptosis, autophagy (see central page)... This cascade is also involved in tumorigenesis, and mutation or amplification of the phosphatidylinositol 3 kinase (PI3K) or Akt genes, as well as loss of function of PTEN protein, result in the activation of the mammalian target of rapamycin (mTOR) pathway which is associated with a poor prognosis in cancer and therapy resistance.

Incoming signals

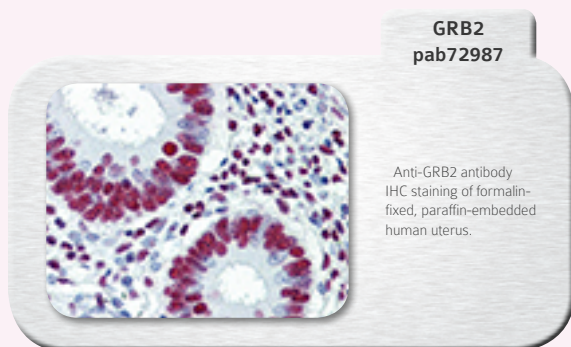
When growth factors or cytokines are sensed by their receptors of tyrosine kinase (RTKs) or G protein-coupled receptors (GPCRs), PI3K phosphorylates phosphatidylinositol (4,5)-biphosphate (PIP2) to generate phosphatidylinositol (3,4,5)-triphosphate (PIP3). PIP3 has an affinity for pleckstrin homology (PH) domain-containing molecules such as Akt and phosphoinositide-dependent protein kinase (PDK1) on the inner leaflet of the plasma membrane. At the plasma membrane, the interaction between the PH domain of Akt and PIP3 induces important conformational changes in Akt, which allow subsequent modifications of Akt such as phosphorylation at threonine 308 by PDK1. Akt is fully activated when phosphorylated at Thr308 and at Ser473 by the mTORC2 complex.

Three closely related isoforms of Akt exist in mammals and are encoded by distinct genetic loci. Akt1 (also referred to as Akt) is ubiquitously expressed at high levels except in kidney, liver and spleen^{1,2}, Akt2 expression varies depending on the tissue, with high expression levels in the muscle, intestinal organs and reproductive tissues³. Akt3 is expressed the highest in brain and testis, and exhibits low expression levels in intestinal organs and muscle tissue⁴. Since different Akt isoforms are activated similarly and phosphorylate downstream substrates with equal specificity and efficiency, it has been postulated that the different Akt isoforms are functionally redundant⁵.

1

Membrane proteins

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
GAB2 (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74281
GRB2	Rabbit	Hu	IHC - P, WB	pab72987
GRB2 (C-Terminus)	Goat	Hu, Ms, Rat, Bov, Ca	ELISA, IHC - P, WB	pab72922
GRB2 (C-Terminus)	Rabbit	Hu	IHC - P, WB	pab73178
IRS1 (Internal)	Rabbit	Hu, Ms	ICC, IHC - P, WB	pab71542
IRS1 (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P	pab73796
IRS1 (aa1223-1242)	Rabbit	Hu, Ms, Rat	IHC - P	pab72749



IRS1 ELISA kits

We now provide you with high efficiency tools to detect and quantify soluble proteins by ELISA. Take advantage of a full ELISA kit comprising antibodies, buffers and controls as well as ready-to-use plates, already coated with the capture antibody.

TARGET	SPECIES	APPLICATIONS	CAT #
IRS1	Hu	ELISA	kit20050
IRS1	Ms	ELISA	kit20051
IRS1	Rat	ELISA	kit20049

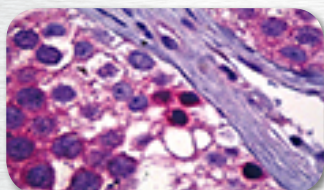
2

PI3K pathway

Phosphoinositide-dependent protein kinase-1 (PDPK1)

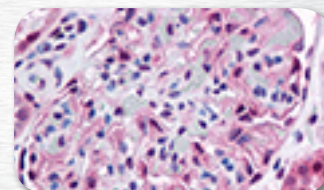
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PDPK1	Rabbit	Hu	ELISA, IHC - P, WB	pab75048
PDPK1 (pSer241)	Rabbit	Hu	ELISA, IHC - P	pab75769

PDPK1
pab75048



Anti-PDPK1 antibody
IHC staining of formalin-
fixed, paraffin-embedded
human spermatogonia.

PDPK1
pab75769

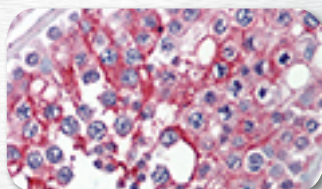


Anti-PDPK1 antibody
IHC staining of formalin-
fixed, paraffin-embedded
human kidney.

Phosphoinositide 3-kinase (PI3K)

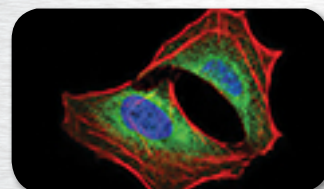
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PI3K catalytic subunit - α polypeptide / PI3K-CA	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab75824
PI3K catalytic subunit - α polypeptide / PI3K-CA (Internal)	Goat	Hu, Ms, Rat, Bov, Ca	ELISA, IHC - P	pab72400
PI3K catalytic subunit - γ polypeptide / PI3K-CG	Rabbit	Hu	IHC - P, WB	pab76164
PI3K class 2 - α polypeptide / PI3K-C2A (clone 3E7)	Mouse	Hu	ELISA, IHC - P, WB	mab71053
PI3K regulatory subunit α / PI3K-R1 (clone 6G10)	Mouse	Hu	ELISA, FC, ICC, IF, IHC - P, WB	mab71666
PI3K regulatory subunit β / PI3K-R2 (Tyr467)	Rabbit	Hu	IHC - P, WB	pab76052

PI3K-CG
pab76164



Anti-PI3K catalytic, γ
polypeptide antibody IHC
staining of formalin-fixed,
paraffin-embedded
human testis.

PI3K-R1
mab71666



Anti-PI3K regulatory
subunit α antibody
IF staining (green) of
HeLa cells. DNA and
actin filaments were
counterstained with
DRAQ5 fluorescent dye
(red) and Alexa Fluor-555
conjugated phalloidin
(green), respectively.

PI3K ELISA kits

TARGET	SPECIES	APPLICATIONS	CAT #
PI3K	Hu	ELISA	kit20054
PI3K	Ms	ELISA	kit20052
PI3K	Rat	ELISA	kit20053

PTEN kits

TARGET	SPECIES	APPLICATIONS	CAT #
PTEN	Hu	ELISA	kit20055
PTEN	Ms	ELISA	kit20056
PTEN	Rat	ELISA	kit20057
PTEN	Ca	ELISA	kit20058

3

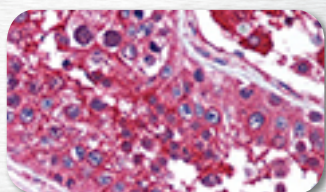
mTOR complex 2

mTOR

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
mTOR	Rabbit	Hu, Ms	ELISA, IHC, WB	pab0894-P
mTOR	Rabbit	Hu, Ms, Rat	IP	pab60223
mTOR	Rabbit	Hu, Ms, Rat	IP, WB	pab60224
mTOR (N-Terminus)	Rabbit	Hu, Ms	ICC, IHC - P, WB	pab71788
mTOR (C-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74323
mTOR (aa2415-2464)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74267
mTOR (aa2440-2457)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab70158
mTOR (Ser2442)	Rabbit	Hu, Ms, Rat	IF, IHC - P, WB	pab76178
mTOR (pSer2448)	Rabbit	Hu	ELISA, IHC - P, WB	pab70076

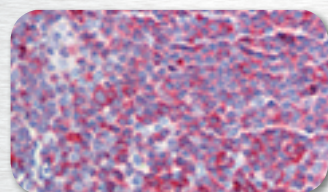
mTOR
pab70158

Anti-mTOR antibody
IHC staining of formalin-
fixed, paraffin-embedded
human testis.



mTOR
pab76178

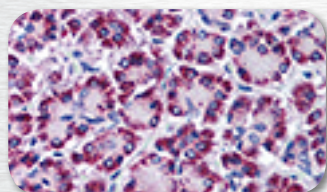
Anti-mTOR antibody
IHC staining of formalin-
fixed, paraffin-embedded
human tonsil.



Other mTOR complex 2-related proteins

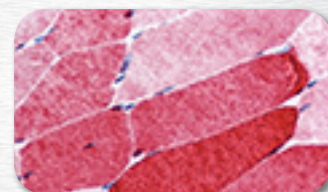
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Deptor (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab77477
GβL (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab71043
GβL (aa150-200)	Rabbit	Hu, Ms, Rat ...	IHC - P, WB	pab74502
Protor-1 / PRR5 (C-Terminus)	Rabbit	Hu	IF, IHC - P, WB	pab72514
Protor-2	Rabbit	Hu	ELISA, IHC, WB	pab0500
Raptor	Rabbit	Hu	IHC - P, WB	pab72114
Raptor	Rabbit	Hu, Ms	ICC, IHC - P, WB	pab72901
Raptor (N-Terminus)	Rabbit	Hu, Ms	ICC, IHC - P, WB	pab72900
Raptor (aa900-950)	Rabbit	Hu, Ms	IHC - P, WB	pab74797
Rheb	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab72847
Rictor (clone 1F3)	Mouse	Hu	ELISA, IHC - P, IP, WB	mab71077
Rictor (C-Terminus)	Goat	Hu, Ms, Ca	ELISA, IHC - P	pab74051
SIN1 (N-Terminus)	Rabbit	Hu, Ms, Rat	IF, IHC - P, WB	pab73207
SIN1 (Internal)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab73206
SIN1 (aa100-150)	Rabbit	Hu, Ms, Rat, Bov, Ca	IHC - P, WB	pab73961

SIN1
pab73206



Anti-SIN1 antibody IHC
staining of formalin-fixed,
paraffin-embedded
human pancreas.

Raptor
pab72900



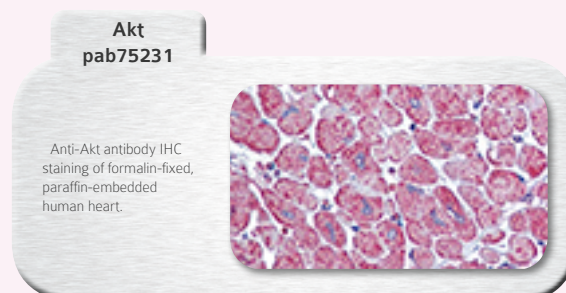
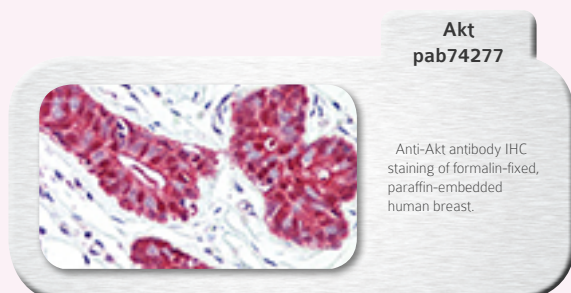
Anti-Raptor antibody
IHC staining of formalin-
fixed, paraffin-embedded
human skeletal muscle.

4

Akt family

Akt - all isoforms

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
Akt	Rabbit	Hu, Ms, Rat	IHC - P, IP, WB	pab75231
Akt 1/2/3 (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74277
Akt 1/2/3 (C-Terminus)	Rabbit	Hu, Ms, Rat, Chick	ELISA, IF, IHC - P, IP, WB	pab75459



Akt 1

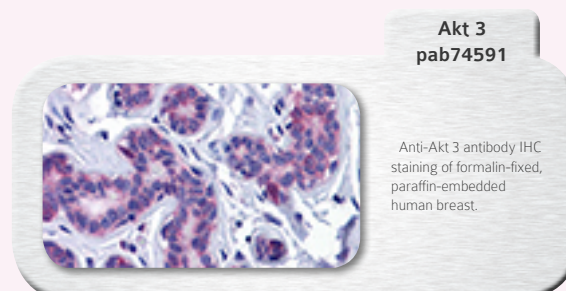
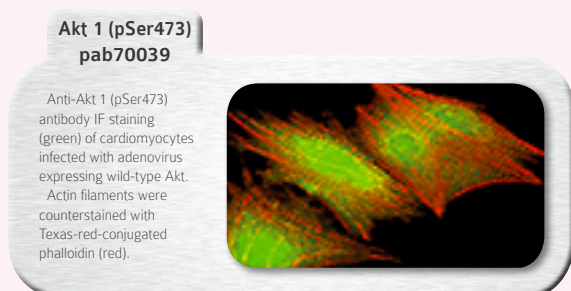
ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
Akt 1	Rabbit	Hu, Ms, Rat, Chick	ELISA, IHC, WB	pab0895-P
Akt 1 (N-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab70307
Akt 1 (pSer473)	Rabbit	Hu, Ms, Rat, Chick	ELISA, WB	pab0834-P
Akt 1 (pSer473)	Rabbit	Hu	ELISA, IHC - P, WB	pab70039
Akt 1 (pThr308)	Rabbit	Hu, Ms, Rat, Chick	ELISA, WB	pab0832-P
Akt 1 (pThr308)	Rabbit	Hu	ELISA, IHC - P, WB	pab70040
Akt 1 (Thr308)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab71951
Akt 1 (pThr450)	Rabbit	Hu, Ms, Rat, Chick	ELISA, WB	pab0833-P

Akt 2

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
Akt 2 (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, IP, WB	pab75420

Akt 3

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
Akt 3 (N-Terminus)	Rabbit	Hu, Ms	IHC - P, WB	pab70308
Akt 3 (Internal)	Goat	Hu, Ms, Rat, Bov, Ca	ELISA, IHC - P, WB	pab72934
Akt 3 (aa119-136) (clone 66C1247.1)	Mouse	Hu, Ms, Rat	IHC - P, WB	mab70131
Akt 3 (aa119-136)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab74591



5

Akt antagonists

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
PHLPP1 (N-Terminus)	Rabbit	Hu	IHC - P, WB	pab75912
PHLPP2 (C-Terminus)	Rabbit	Hu	IHC - P, WB	pab75913
PPP2CA (clone P6C7)	Mouse	Hu	ELISA, IHC - P, IP, WB	mab70258
PPP2CA	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab75149
THEM4 (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IHC, WB	pab73519

The role of Akt in preventing apoptosis

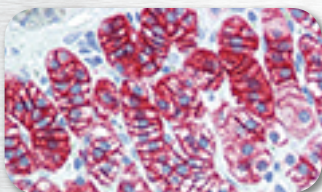
Akt was first described as an homolog of a viral oncogene and thereafter a role for Akt in promoting cell survival in a variety of apoptotic paradigms was discovered^{11 for review}. Different partners of Akt can promote cell survival. Activated Akt can inhibit pro-apoptotic Bcl-2 family members, Bad, Bax, Bim or FoxO1. As a result, all these changes lead to the Akt-dependent suppression of apoptosis and differentiation, and to increased cell cycle progression.

6

Anti-apoptotic effectors

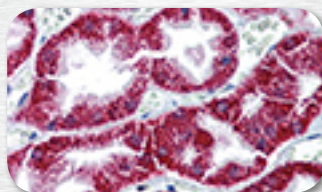
ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
BAD (N-Terminus) (clone BYC001)	Mouse	Hu, Ms	IHC - P, IP, WB	mab70326
BAD (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P	pab74329
BAD (C-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74258
BAD (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab74999
BAD (Ser112)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab71955
BAX (clone 2D2)	Mouse	Hu	IHC, WB	mab60036
BAX (clone 6A7)	Mouse	Hu, Ms, Rat, Mk	IHC - P, IP, WB	mab60037
BAX (N-Terminus)	Rabbit	Hu	ICC, IHC - P, WB	pab74874
BAX (N-Terminus)	Rabbit	Ms, Hu, Rat	IHC - P, IP, WB	pab74913
BAX (aa1-50)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P	pab73965
Bcl-2 (clone 11C5)	Mouse	Hu	ELISA, IHC - P, IP, WB	mab71374
Bcl-2	Rabbit	Hu	IHC - P, WB	pab75275
Bcl-2 [Biotin]	Rabbit	Hu	ICC, IF, WB	pab51439
Bcl-2 [HRP]	Rabbit	Hu	ICC, IF, WB	pab51442
Bcl-2 [DyLight 488]	Rabbit	Hu	ICC, IF, WB	pab51441
Bcl-2 [DyLight 550]	Rabbit	Hu	ICC, IF, WB	pab51443
Bcl-2 [DyLight 650]	Rabbit	Hu	ICC, IF, WB	pab51440

BAD
mab70326



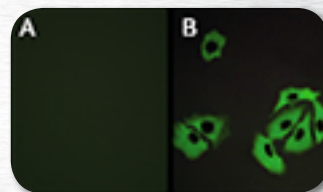
Anti-BAD antibody IHC staining of formalin-fixed, paraffin-embedded human adrenal.

BAX
pab71211



Anti-BAX antibody IHC staining of formalin-fixed, paraffin-embedded human kidney.

BAX
pab73965

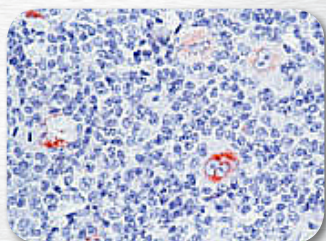


Anti-BAX antibody IF staining of A549 cells incubated with (A) or without (B) the immunising peptide.

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
Bcl-X _L (clone 2H12)	Mouse	Hu, Ms	FC, ICC, IF, IHC - P, WB	mab60039
BIM (Internal)	Rabbit	Hu, Ms, Rat	WB	pab60048
BIM (Internal)	Rabbit	Hu, Ms, Rat	ICC, IHC - P, WB	pab70412
Cytochrome C (clone 7H8.2C12)	Mouse	Hu, Ms, Rat, Eq, Pgn	FC, ICC, IHC - P, WB	mab70143
FoxO1 (aa242-655) (clone 7h3)	Mouse	Hu	IHC - P, WB	mab70133
FoxO1 (N-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, ICC, IHC - P, WB	pab70979
FoxO1 (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab74237
FoxO1 (C-Terminus)	Goat	Hu, Ms, Rat, Bov	IHC - P	pab73015
XIAP	Rabbit	Hu	WB	pab51048
XIAP	Rabbit	Hu	ICC, IF, IHC - P, WB	pab73363
XIAP (C-Terminus)	Rabbit	Hu, Ms	IHC - P, WB	pab74231

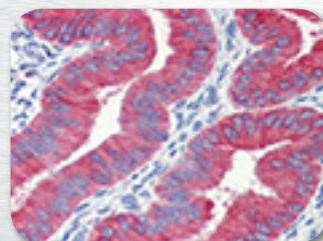
Bcl-X_L
mab60039

Anti-Bcl-X_L antibody
IHC staining of human
Hodgkin's lymphoma.



Cytochrome C
mab70143

Anti-Cytochrome C
antibody IHC staining of
formalin-fixed, paraffin-
embedded human uterus.



BAX ELISA kits

TARGET	SPECIES	APPLICATIONS	CAT #
BAX	Hu	ELISA	kit20059
BAX	Rat	ELISA	kit20061
BAX	Po	ELISA	kit20063

Bcl-2 ELISA kits

TARGET	SPECIES	APPLICATIONS	CAT #
Bcl-2	Hu	ELISA	kit20060
Bcl-2	Ms	ELISA	kit20065
Bcl-2	Rat	ELISA	kit20062
Bcl-2	Po	ELISA	kit20064

Cytochrome C ELISA kits

TARGET	SPECIES	APPLICATIONS	CAT #
Cytochrome C	Hu	ELISA	kit20067
Cytochrome C	Ms	ELISA	kit20068
Cytochrome C	Rat	ELISA	kit20069
Cytochrome C	Fi	ELISA	kit20070

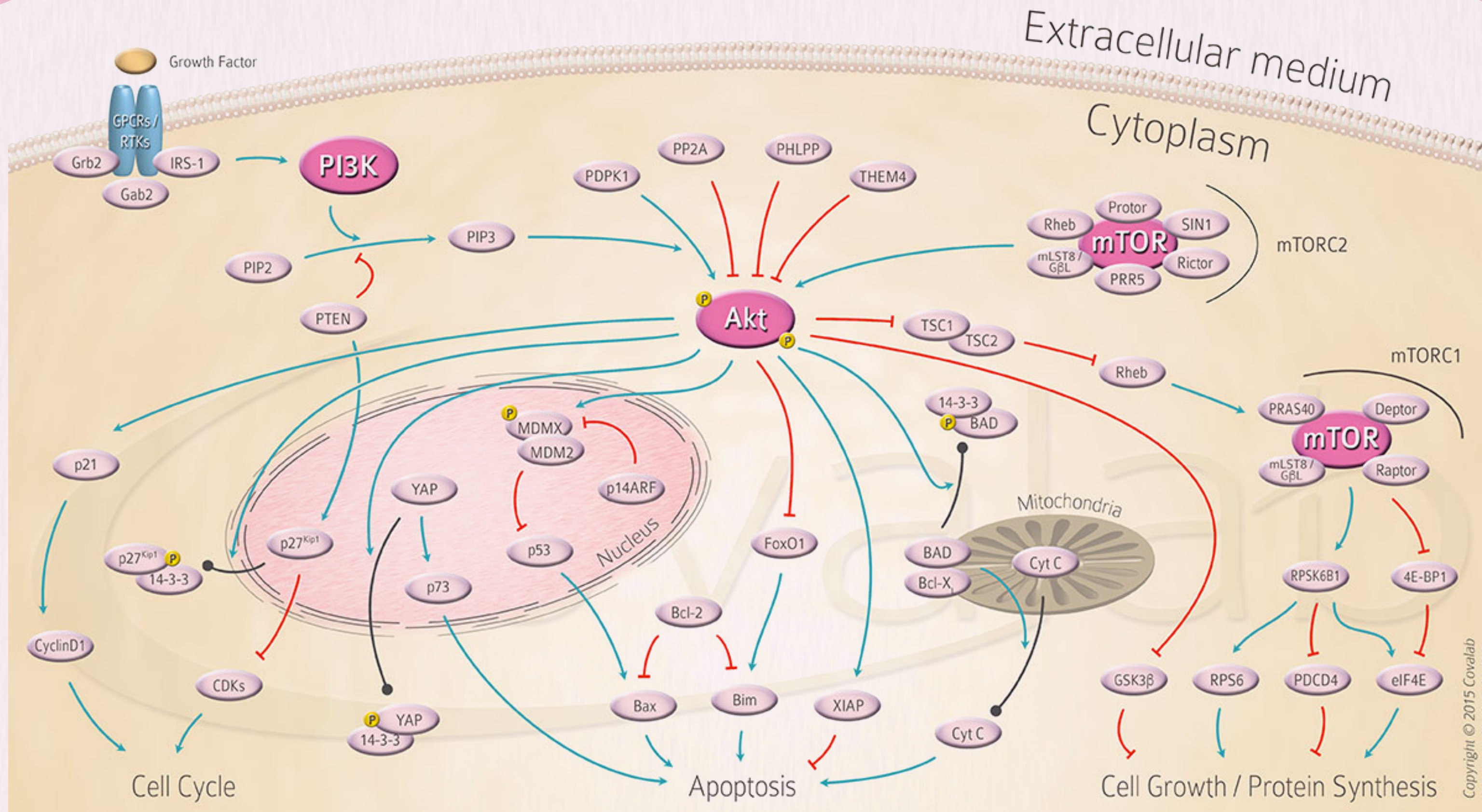


Figure: Overview of the PI3K-Akt-mTOR signalling pathway

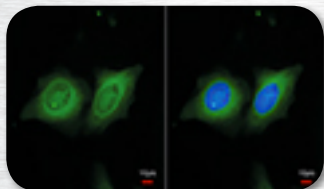
References:

- 1 - Molecular cloning and characterisation of a novel putative protein-serine kinase related to the cAMP-dependent and protein kinase C families: Coffey PJ, 8 Woodgett JR.; *Eur. J. Biochem.* 1991 Oct 15;201(2):475-81.
- 2 - The proteins encoded by c-akt and v-akt differ in post-translational modification, subcellular localization and oncogenic potential: Ahmed NN, et al.; *Oncogene*. 1993 Jul;8(7):1957-63.
- 3 - The pleckstrin homology domain of RAC protein kinase associates with the regulatory domain of protein kinase C zeta: Konishi H, et al.; *Biochem. Biophys. Res. Commun.* 1994 Dec 30;205(3):1770-5.
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- 8 - MdmX protects p53 from Mdm2-mediated degradation: Jackson MW, 8 Berberich SJ.; *Mol. Cell. Biol.* 2000 Feb;20(3):1001-7.
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- 11 - Unravelling the activation mechanisms of protein kinase B/Akt: Scheid MP, 8 Woodgett JR.; *FEBS Lett.* 2003 Jul 3;546(1):108-12. Review.
- 12 - TOR regulation of AGC kinases in yeast and mammals: Jacinto E, 8 Lorbberg A.; *Biochem. J.* 2008 Feb 15;410(1):19-37. Review.
- 13 - Role of PI3K/Akt/mTOR signaling in the cell cycle progression of human prostate cancer: Gao N, et al.; *Biochem. Biophys. Res. Commun.* 2003 Oct 31;310(4):1124-32.

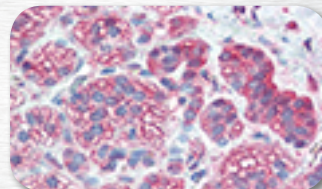
14-3-3 proteins

14-3-3 Beta pab73314



Anti-14-3-3 Beta antibody IF staining (green) of paraformaldehyde-fixed HeLa cells. Nuclei were counterstained with DAPI (blue).

14-3-3 Beta pab72731

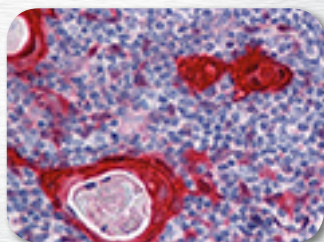


Anti-14-3-3 Beta antibody IHC staining of formalin-fixed, paraffin-embedded human prostate.

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
14-3-3 (<i>clone 60C10</i>)	Mouse	Hu, Ms, Rat	IHC - P, WB	mab71368
14-3-3	Rabbit	Hu, Ms, Rat, Sh, Bov	IHC - P, IP, WB	pab74800
14-3-3 (C-Terminus)	Rabbit	Hu, Ms, Rat, Chick ...	IHC - P, WB	pab70029
14-3-3 β (aa1-246) (<i>clone J2E9</i>)	Mouse	Hu	ELISA, IHC - P, WB	mab70291
14-3-3 β	Rabbit	Hu, Zfi	ICC, IF, IHC - P, WB	pab73313
14-3-3 β	Rabbit	Hu, Zfi	ICC, IF, IHC - P, WB	pab73314
14-3-3 β	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab75102
14-3-3 β (N-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P	pab72731
14-3-3 γ (aa1-247) (<i>clone J3H10</i>)	Mouse	Hu	ELISA, IHC - P, WB	mab70294
14-3-3 ϵ (aa1-255) (<i>clone 5A5</i>)	Mouse	Hu	ELISA, IHC - P, WB	mab70282
14-3-3 ϵ (N-Terminus)	Rabbit	Hu, Ms, Rat, Rab ...	ELISA, IHC - P, WB	pab75464
14-3-3 ζ (Internal)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab75446
14-3-3 ζ (Internal)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74404
14-3-3 ζ (C-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab74327
14-3-3 ζ (aa200-245)	Rabbit	Hu, Ms, Rat, Mk ...	IHC - P, WB	pab75793
14-3-3 ζ (Ser58)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab72083
14-3-3 ζ (pSer184)	Rabbit	Hu	ELISA, IHC, WB	pab0644
14-3-3 η	Mouse	Hu, Ms, Rat	IF, IHC - P, WB	mab71747
14-3-3 η (N-Terminus)	Rabbit	Hu, Ms, Sh, Chick, Ma	IHC - P, WB	pab74766
14-3-3 σ (<i>clone 3C3</i>)	Mouse	Hu	IHC - P, WB	mab70613
14-3-3 σ	Rabbit	Hu, Ms, Rat	ELISA, IHC, WB	pab0392
14-3-3 σ (N-Terminus)	Rabbit	Hu, Ms, Rat, Sh ...	IHC - P, WB	pab75460
14-3-3 σ (Internal)	Goat	Hu, Ms, Rat, Mk ...	ELISA, IHC - P, WB	pab73985
14-3-3 σ (aa120-170)	Rabbit	Hu, Mk, Bov ...	IHC - P, WB	pab75792
14-3-3 σ (pSer248)	Rabbit	Hu	ELISA, IHC, WB	pab0713
14-3-3 τ (aa1-245) (<i>clone AT1A1</i>)	Mouse	Hu	ELISA, IHC - P, WB	mab70297

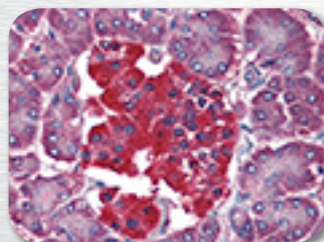
14-3-3 Sigma mab70613

Anti-14-3-3 Sigma antibody IHC staining of formalin-fixed, paraffin-embedded human thymus.



14-3-3 Tau mab70297

Anti-14-3-3 Tau antibody IHC staining of formalin-fixed, paraffin-embedded human pancreas.



The involvement of nuclear effectors

Akt can modulate the activity of several transcription factors. It phosphorylates MDM2 leading to its stabilisation and nuclear translocation. MDM2 forms an heterocomplex with MDMX that efficiently ubiquitylates p53 transcription factor⁶⁻⁷. This leads to the degradation of this tumor suppressor and thus promotes oncogenic pathways. MDM2 can also bind to the transactivation domain of p53 to prevent downstream targets transcription or maintain low level of p53 under non-stressed conditions. MDMX also suppresses p53 transcriptional activity by binding to its transactivation domain⁸⁻¹⁰.

8

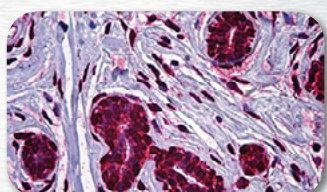
p53 pathway

Double minute proteins

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
MDM2 (clone 1A7)	Mouse	Hu	ELISA, IHC - P, WB	mab70863
MDM2 (aa154-167) (clone SMP14)	Mouse	Hu, Ms	IHC, IP, WB	mab71411
MDM2 (pSer395)	Rabbit	Hu	ELISA, IHC - P	pab71722
MDMX (clone 4G5)	Mouse	Hu	IF, IHC - P, WB	mab71710

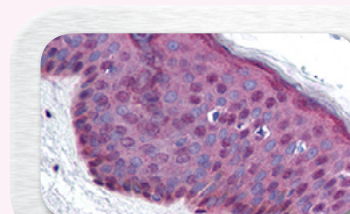
MDM2
mab70863

Anti-MDM2 antibody
IHC staining of formalin-
fixed, paraffin-embedded
human breast.



MDM2
mab71411

Anti-MDM2 antibody
IHC staining of formalin-
fixed, paraffin-embedded
human skin.

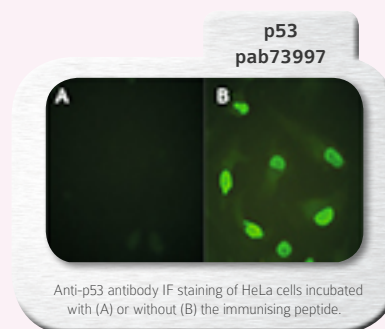
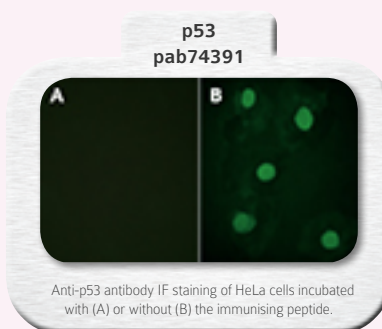
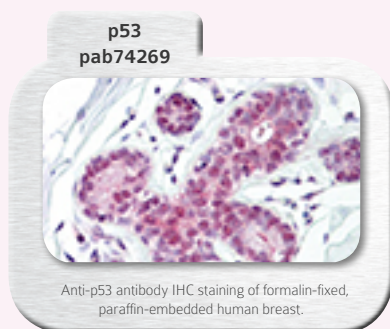


Tumor suppressor p14ARF

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
p14ARF	Rabbit	Hu	IF, WB	pab50079
p14ARF	Rabbit	Hu	WB	pab50297
p14ARF [Biotin]	Rabbit	Hu	IF, WB	pab51655
p14ARF [Biotin]	Rabbit	Hu	IF, WB	pab51689
p14ARF [Biotin]	Rabbit	Hu	WB	pab51378
p14ARF [Biotin]	Rabbit	Hu	WB	pab51694
p14ARF [HRP]	Rabbit	Hu	IF, WB	pab51658
p14ARF [HRP]	Rabbit	Hu	IF, WB	pab51692
p14ARF [HRP]	Rabbit	Hu	WB	pab51381
p14ARF [HRP]	Rabbit	Hu	WB	pab51697
p14ARF [DyLight 488]	Rabbit	Hu	IF, WB	pab51657
p14ARF [DyLight 488]	Rabbit	Hu	IF, WB	pab51691
p14ARF [DyLight 488]	Rabbit	Hu	WB	pab51380
p14ARF [DyLight 488]	Rabbit	Hu	WB	pab51696
p14ARF [DyLight 550]	Rabbit	Hu	IF, WB	pab51659
p14ARF [DyLight 550]	Rabbit	Hu	IF, WB	pab51693
p14ARF [DyLight 550]	Rabbit	Hu	WB	pab51382
p14ARF [DyLight 550]	Rabbit	Hu	WB	pab51698
p14ARF [DyLight 650]	Rabbit	Hu	IF, WB	pab51656
p14ARF [DyLight 650]	Rabbit	Hu	IF, WB	pab51690
p14ARF [DyLight 650]	Rabbit	Hu	WB	pab51695
p14ARF [DyLight 650]	Rabbit	Hu	WB	pab51379

Tumor suppressor p53

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
p53 (clone 240)	Mouse	Hu	FC, IHC, IP, WB	mab60388
p53 (clone B-F34)	Mouse	Hu	ELISA	mab30071
p53 (clone B-P3)	Mouse	Hu, Mk	ELISA, FC, IHC, IP, WB	mab30056
p53 (clone B-P3) [Biotin]	Mouse	Hu	ELISA-D	mab30420
p53 (clone BP53-12)	Mouse	Hu	ELISA, ICC, IF, IHC - P, IP, WB	mab70600
p53 (clone D01)	Mouse	Hu	ELISA, IHC, IP, WB	mab60389
p53 (clone H53C2)	Mouse	Hu	ELISA, IHC, IP, WB	mab0052-P
p53 (clone PAb1801)	Mouse	Hu	ELISA, IHC, IP, WB	mab60390
p53 (N-Terminus)	Rabbit	Hu, Rat	ELISA, IHC - P, WB	pab74269
p53 (N-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab74271
p53 (aa283-332)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab74391
p53 (aa344-393)	Rabbit	Hu	ELISA, ICC, IF, IHC - P, WB	pab74272
p53 (aa344-393)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab74392
p53 (acLys379)	Rabbit	Hu, Ms, Rat	ELISA, ICC, IF, IHC - P	pab73997
p53 (Ser315)	Rabbit	Hu	IF, IHC - P, WB	pab76008
p53R2 (N-Terminus)	Rabbit	Hu, Ms, Rat	IHC, WB	pab60248



Tumor suppressor p53 ELISA kit

TARGET	SPECIES	APPLICATIONS	CAT #
p53	Hu	ELISA	kit30202

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p73 pathway

Tumor suppressor p73

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
p73 (N-Terminus) (clone 5B429)	Mouse	Hu, Ms	ICC, IHC - P, IP, WB	mab70185
p73 (aa2-13) (clone 38C674.2)	Mouse	Hu, Ms, Rat	ChIP, IHC - P, WB	mab70184
p73 (Internal)	Rabbit	Hu	ELISA, IHC - P, WB	pab73990
p73 (aa75-125)	Rabbit	Hu	IHC - P, WB	pab72294

Yes-associated protein 1 (YAP1)

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
YAP1 (clone 12b4)	Mouse	Hu	IF, IHC, WB	mab0133-P
YAP1 (clone 1A12)	Mouse	Hu	ELISA, FC, IHC - P, WB	mab71662
YAP1 (clone 1C5)	Mouse	Hu	IF, IHC, WB	mab0132-P
YAP1 (clone 2F12)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70705
YAP1 (clone 2H1)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70706
YAP1	Rabbit	Hu	IF, IHC, WB	pab0848-P
YAP1	Guinea pig	Hu	IF, ICC, WB	pab0964-P
YAP1	Rabbit	Hu, Ms	ICC, IF, IHC - P, IP, WB	pab50282
YAP1 (pSer127)	Rabbit	Hu, Ms, Rat ...	ELISA, IF, IHC, WB	pab0950-P
YAP1 [Biotin]	Rabbit	Hu, Ms	IHC - P, IP, WB	pab51306
YAP1 [HRP]	Rabbit	Hu, Ms	IHC - P, IP, WB	pab51309
YAP1 [DyLight 488]	Rabbit	Hu, Ms	IHC - P, IP, WB	pab51308
YAP1 [DyLight 550]	Rabbit	Hu, Ms	IHC - P, IP, WB	pab51310
YAP1 [DyLight 650]	Rabbit	Hu, Ms	IHC - P, IP, WB	pab51307

How Akt and the mTOR complex enhance cell growth

The mammalian target of rapamycin (mTOR) is conserved in any species known to date and is involved in the regulation of cellular growth, survival and metabolism in response to environmental cues. mTOR can be found associated to Raptor, mLST8, GβL, PRAS40 and Deptor to form the mTOR complex 1 (mTORC1). This complex regulates temporal aspect of cell growth by phosphorylating the translational regulators p70 ribosomal S6 kinase 1 (S6K1) and eukaryotic initiation factor 4E (eIF4E) binding protein 1 (4EBP1) to coordinately upregulate protein synthesis^{12 for review}.

10 Cell growth-related proteins

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
eIF4E (N-Terminus)	Rabbit	Hu	IHC - P, WB	pab72277
eIF4E (C-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74060
GSK3	Rabbit	P. falc.	ELISA, IF, WB	pab0250
GSK3 α (aa448-478)	Rabbit	Hu	IHC - P, WB	pab76581
GSK3 β	Rabbit	Hu, Ms, Rat, Bov	IF, IHC - P, WB	pab75234
GSK3 β (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC, WB	pab75210
GSK3 β (pSer9)	Rabbit	Hu	ELISA, GS, IF, IHC - P, IP, WB	pab70152
GSK3 β2	Rabbit	Hu	ELISA, IF, WB	pab0668
PDCD4 (aa1-469) (clone K4C1)	Mouse	Hu	ELISA, IHC - P, WB	mab70283
PDCD4	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab75081
PDCD4 (C-Terminus)	Rabbit	Hu, Ms, Rat, Fg	ELISA, IHC - P, WB	pab70157
PDCD4 (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab72099
PDCD4 (aa210-221)	Goat	Hu, Ms, Rat, Rab ...	ELISA, IHC - P, WB	pab76175
PDCD4 (pSer457)	Rabbit	Hu, Ms, Rat, Fg	ELISA, IHC - P, WB	pab70146
RPS6 (C-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IF, IHC - P, WB	pab73900
RPS6 (Ser235)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab72108
S6K1 (clone 1C4)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70910
S6K1 (clone 3C4)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70911
S6K1 (clone 3E3)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70909
S6K1 (clone 3G8)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70912
S6K1 (aa419-431)	Rabbit	Hu	ELISA, IHC - P, WB	pab70167

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
TSC1	Rabbit	Hu, Ms, Rat	ICC, IHC - P, WB	pab73745
TSC1 (C-Terminus)	Goat	Hu, Ms, Rat, Ca	ELISA, IHC - P, WB	pab73166
TSC1 (C-Terminus)	Rabbit	Hu, Ms	IHC - P, WB	pab73744
TSC2 (N-Terminus)	Rabbit	Hu, Ms	ICC, IHC - P, WB	pab73747
TSC2 (C-Terminus)	Rabbit	Hu, Ms	IHC - P, WB	pab73746
TSC2 (pSer664)	Rabbit	Hu	IF, IHC - P	pab74899
TSC2 (Ser1798)	Rabbit	Hu	ELISA, IHC - P, WB	pab73749

mTOR inhibitors

NAME	CAS #	CAT #
Rapamycin	53123-88-9	chem10007
SMI-4a	327033-36-3	chem10325

Cell cycle promoting action of Akt

Akt plays an important role in metabolism by targeting glycogen synthase kinase 3 β (GSK3 β) to regulate glycogen synthesis. Akt regulates cell cycle and proliferation by directly targeting cyclin-dependent kinase inhibitors (CDKIs) such as p21^{Waf1/Cip1} and p27^{Kip1}, and indirectly by modulating levels of cyclin D1 as well as p53. Akt regulation of cell survival however involves direct inhibition (phosphorylation) of pro-apoptotic signals such as Bad and FoxOs.

In prostate cancer, it was demonstrated that inhibition of PI3K activity induces an inhibition of cell proliferation via a G1 cell cycle arrest¹³. This process involves Akt and G1-associated proteins including cyclin D1 or CDK4. This finding provides new information for anticancer drug design and development.

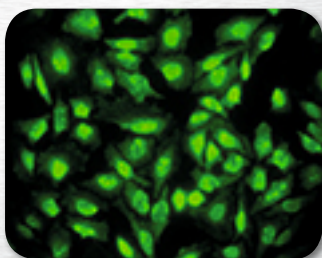
11

Cyclin-dependent kinase inhibitor p27

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
p27 ^{Kip1} (clone 4B4-E6)	Mouse	Hu	ELISA, IF, IHC - P, WB	mab70794
p27 ^{Kip1}	Rabbit	Hu	IHC - P, WB	pab74994
p27 ^{Kip1} (Internal)	Goat	Hu, Ms, Rat, Bov, Ma	ELISA, IHC - P, WB	pab72942
p27 ^{Kip1} (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, IP, WB	pab73599
p27 ^{Kip1} (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, IP, WB	pab74928
p27 ^{Kip1} (Ser10)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab72061
p27 ^{Kip1} (pThr187)	Rabbit	Hu	ELISA, IHC - P, WB	pab70627

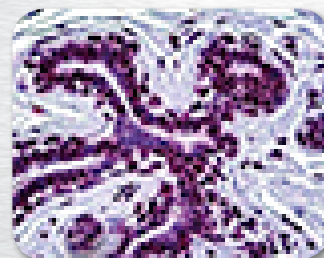
p27^{Kip1}
mab70794

Anti-p27^{Kip1} antibody IF
staining of HeLa cells.



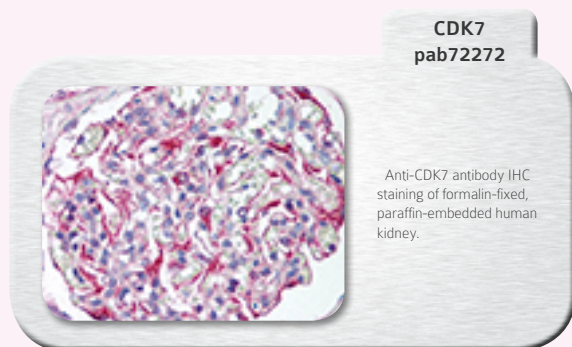
p27^{Kip1}
pab73599

Anti-p27^{Kip1} antibody
IHC staining of formalin-
fixed, paraffin-embedded
human breast.

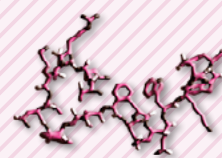


12 Cyclins & Cyclin-dependent kinases

ANTIBODY TARGET	HOST	SPECIES	APPLICATIONS	CAT #
Cyclin D1 (<i>clone CD1.1</i>)	Mouse	Hu, Rat	ELISA, FC, ICC, IHC, IP, WB	mab70713
Cyclin D1 (Ser90)	Rabbit	Hu, Ms	ELISA, IF, IHC - P, WB	pab70552
CDK1	Rabbit	Hu, Chick, Xe	ELISA, IHC, WB	pab0877-P
CDK1 (pThr14)	Rabbit	Hu, Chick, Xe	ELISA, IHC, WB	pab0876-IP
CDK2 (<i>clone AN4.3</i>)	Mouse	Hu, Ms, Xe	ELISA, IHC - P, IP, WB	mab70220
CDK2	Mouse	Hu, Ms, Rat	ELISA, IF, IHC - P, IP, WB	mab70528
CDK2 (C-Terminus)	Rabbit	Hu	ELISA, IF, IHC - P, IP, WB	pab75372
CDK2 (Thr160)	Rabbit	Hu, Ms, Rat	IHC - P, WB	pab72060
CDK4 (C-Terminus)	Rabbit	Hu, Ms, Rat	IHC - P, IP, WB	pab74915
CDK5 (N-Terminus)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab74058
CDK5 (C-Terminus)	Rabbit	Hu	ELISA, IF, IHC - P, IP, WB	pab75373
CDK6 (<i>clone 8H4</i>)	Mouse	Hu, Rat	ELISA, IF, IHC - P, WB	mab70793
CDK6	Mouse	Hu	ELISA, IHC - P, WB	mab71386
CDK7	Mouse	Hu	ELISA, IHC - P, IP, WB	mab71387
CDK7 (pSer167, pThr170)	Rabbit	Hu	IF, IHC - P	pab72272
CDK9	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, IP, WB	pab75462
CDK12 / CRKRS (Internal)	Rabbit	Hu	IHC - P	pab70626
CDK12 / CRKRS (C-Terminus)	Rabbit	Hu	IHC - P	pab70625
CDKN1A	Rabbit	Hu	ELISA, IHC, WB	pab0813-P
CDKN1A (aa111-160)	Rabbit	Hu, Ms, Rat	ELISA, IHC - P, WB	pab76755



NEW!



CDK1 pThr14
blocking peptide

Use the CDK1 pThr14 blocking peptide to reveal the specific staining of the anti-CDK1 pThr14 antibody (*Cat# pab0876-IP*).

SPECIES	APPLICATIONS	CAT #
Hu, Chick, Xe	ELISA, IHC, WB	pep0876

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PI3K-Akt-mTOR pathway!



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