PI3K-Akt-mTORC Signaling

The PI3K-Akt-mTORC signaling pathway plays a critical role in cell survival. It transduces signals from receptor tyrosine kinases on the cell membrane to transcription factors, regulating gene expression. Notably, Akt activation enhances survival by inhibiting pro-apoptotic proteins and promoting proliferation. This pathway is aberrantly activated in many cancers, leading to uncontrolled growth and driving tumorigenesis. In stem cell research, it regulates the balance between proliferation and differentiation.

mTOR

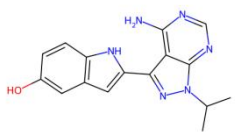


Figure 1 Chemical structure of PP-242

mTOR is a serine/threonine kinase and the catalytic subunit of the mTORC1 and mTORC2 complexes. mTORC1 is involved in energy homeostasis signaling. Akt phosphorylation regulates TSC2, inhibiting the activity of the TSC1/TSC2 heterodimer, relieving its suppression of mTORC1 and sustaining activation. mTORC2 is involved in cell survival, responsible for phosphorylating Akt, activating it, and triggering anti-apoptotic effects. mTOR inhibitors have therapeutic benefits in the treatment of cancers.

Name	ID
Aloe-emodin	A424182、A111278、A111277
AZD2014	A127600、V408523
AZD-8055	A126366、A408287
BEZ235	B126286
Curcumin	series products
Emodin	E106692、E106693、E409173
Everolimus	E125341、E409231
GDC-0980	G126387、A408320
GSK2126458	G127233、O408911
INK128	I128086、S408069
MHY-1685	M646757
NVP-BGT226	N125612、B408695
OSI-027	O127920、O408797
PF-04691502	P408101、P126369
PKI-402	P127674
PP-242	P129635、T409136
Rapamycin	series products
Sunitinib Malate	E129728、S408002
Temsirolimus	T126606、T408907
Torin 1	T420960、T129642
Torin 2	T408205、T129646
Triacetyl Aloe-emodin	T275537

PI3K

PI3Ks are a class of enzymes responsible for generating phosphatidylinositol-3-phosphate (PIP) and its derivatives (such as PIP2 and PIP3). PI3Ks are divided into three classes, with class I PI3Ks primarily involved in cell survival signaling. Class I PI3Ks consist of a p85 regulatory subunit and a p110 catalytic subunit. Growth factors and survival factor receptor tyrosine kinases activate PI3Ks, promoting the generation of PIP3 and activating Akt in conjunction with mTOR. Specific isoforms of the p110 subunit of class I PI3Ks are being investigated as novel targets for anticancer compounds.

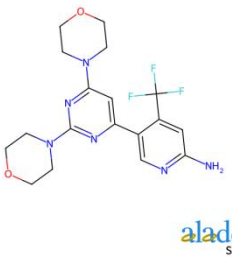
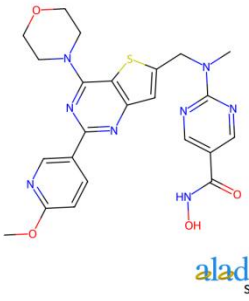


Figure 2 Chemical structure of BKM120



Name	ID
A66	A408153、A128051
Apigenin	series products
AS-252424	A408539、A129503
BAY80-6946	B129540
BEZ235	B126286
BKM120	N127553、B408526
BYL719	B127311、A408653
CAL101	C127044
CUDC-907	C126527、F409247
GDC-0032	T421136、T413710
GSK2636771	G125299、G409258
GDC-0980	G126387、A408320
GSK2126458	O408911、G127233
LY294002	L124970、L276596
3-Methyladenine	M424419、M486160、M129496
PF-04691502	P408101、P126369
Piceatannol	P108001、P580488
PKI-402	P127674
PP-121	P408944、P126419
PX-866	P274838
Wogonin	W425209、W101155
Wortmannin	W100984、W409260
ZSTK474	Z408540、Z126804

Figure 3 Chemical structure of CUDC - 907

AKT

Name	ID
AZD5363	A128036、C408664
Canertinib 2HCl	C423017、C169301
CCT-128930	C127073
Curcumin	series products
Dacomitinib	D129347、D407963
Gabexate Mesylate	G129271
Gambogic Acid	G101480、G422968
GDC-0068	G127588
Goserelin	rp174163
GSK-690693	G127527
MK2206	M671171
Nitidine Chloride	N421189、N117977
Pelitinib	P125444、P409066
Perifosine	P421889、P124979
PHT-427	P409008、P127286
Piceatannol	P580488、P108001
SU-1498	S422089、S167823
Tandutinib	T125150、T408501
Withaferin A	W133732、W134988

Akt is a serine/threonine kinase involved in anti-apoptotic signaling. Akt inhibits pro-apoptotic protein Bad through phosphorylation and inactivation, and regulates IκB kinase activity, activating NF-κB and promoting expression of anti-apoptotic genes. The tumor suppressor protein PTEN suppresses Akt activation by dephosphorylating PIP3. Akt activity is closely linked to cancer progression and tumor development.

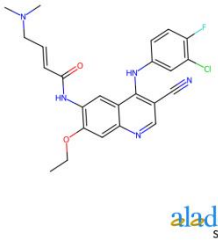


Figure 4 Chemical structure of Pelitinib

PDK1

PDK1 is a key enzyme in the PI3K-Akt signaling pathway that regulates AGC protein kinase activity and is involved in cell survival, metabolism, and tumorigenesis. Targeting PDK1 with small molecule inhibitors can delay tumor growth and metastasis.

Name	ID
BX-795	B408917、B126947
BX-12	B408913、B126138
GSK-2334470	G126481
OSU-03012	O407997、O126958
PHT-427	P409008、P127286

Aladdin: https://www.aladdinsci.com/