



Recombinant Human RAC-alpha serine/threonine-protein kinase (AKT1)

Product Code	CSB-EP001553HU
Relevance	<p>AKT1 is one of 3 closely related serine/threonine-protein kinases (AKT1, AKT2 and AKT3) called the AKT kinase, and which regulate many processes including metabolism, proliferation, cell survival, growth and angiogenesis. This is mediated through serine and/or threonine phosphorylation of a range of downstream substrates. Over 100 substrate candidates have been reported so far, but for most of th, no isoform specificity has been reported. AKT is responsible of the regulation of glucose uptake by mediating insulin-induced translocation of the SLC2A4/GLUT4 glucose transporter to the cell surface. Phosphorylation of PTPN1 at 'Ser-50' negatively modulates its phosphatase activity preventing dephosphorylation of the insulin receptor and the attenuation of insulin signaling. Phosphorylation of TBC1D4 triggers the binding of this effector to inhibitory 14-3-3 proteins, which is required for insulin-stimulated glucose transport. AKT regulates also the storage of glucose in the form of glycogen by phosphorylating GSK3A at 'Ser-21' and GSK3B at 'Ser-9', resulting in inhibition of its kinase activity. Phosphorylation of GSK3 isoforms by AKT is also thought to be one mechanism by which cell proliferation is driven. AKT regulates also cell survival via the phosphorylation of MAP3K5 (apoptosis signal-related kinase). Phosphorylation of 'Ser-83' decreases MAP3K5 kinase activity stimulated by oxidative stress and thereby prevents apoptosis. AKT mediates insulin-stimulated protein synthesis by phosphorylating TSC2 at 'Ser-939' and 'Thr-1462', thereby activating mTORC1 signaling and leading to both phosphorylation of 4E-BP1 and in activation of RPS6KB1. AKT is involved in the phosphorylation of mbers of the FOXO factors (Forkhead family of transcription factors), leading to binding of 14-3-3 proteins and Cytoplasmic domain localization. In particular, FOXO1 is phosphorylated at 'Thr-24', 'Ser-256' and 'Ser-319'. FOXO3 and FOXO4 are phosphorylated on equivalent sites. AKT has an important role in the regulation of NF-kappa-B-dependent gene transcription and positively regulates the activity of CREB1 (cyclic AMP (cAMP)-response elent binding protein). The phosphorylation of CREB1 induces the binding of accessory proteins that are necessary for the transcription of pro-survival genes such as BCL2 and MCL1. AKT phosphorylates 'Ser-454' on ATP citrate lyase (ACLY), thereby potentially regulating ACLY activity and fatty acid synthesis. Activates the 3B isoform of cyclic nucleotide phosphodiesterase (PDE3B) via phosphorylation of 'Ser-273', resulting in reduced cyclic AMP levels and inhibition of lipolysis. Phosphorylates PIKFYVE on 'Ser-318', which results in increased PI3P-5 activity. The Rho GTPase-activating protein DLC1 is another substrate and its phosphorylation is implicated in the regulation cell proliferation and cell growth. AKT plays a role as key modulator of the AKT-mTOR signaling pathway controlling the tpo of the process of newborn neurons integration during adult neurogenesis, including correct neuron positioning, dendritic development and synapse formation. Signals downstream of phosphatidylinositol 3-kinase (PI3K) to mediate the effects of various growth factors such as platelet-derived growth factor (PDGF), epidermal growth factor</p>



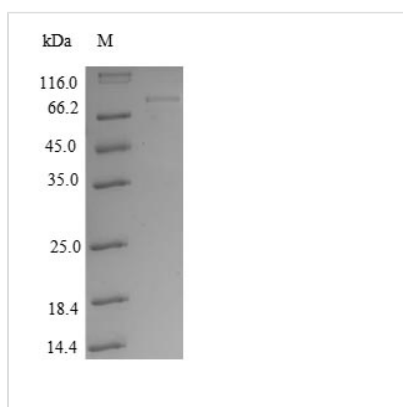
(EGF), insulin and insulin-like growth factor I (IGF-I). AKT mediates the antiapoptotic effects of IGF-I. Essential for the SPATA13-mediated regulation of cell migration and adhesion assembly and disassembly. May be involved in the regulation of the placental development. Phosphorylates STK4/MST1 at 'Thr-120' and 'Thr-387' leading to inhibition of its: kinase activity, nuclear translocation, autophosphorylation and ability to phosphorylate FOXO3. Phosphorylates STK3/MST2 at 'Thr-117' and 'Thr-384' leading to inhibition of its: cleavage, kinase activity, autophosphorylation at Thr-180, binding to RASSF1 and nuclear translocation. Phosphorylates SRPK2 and enhances its kinase activity towards SRSF2 and ACIN1 and promotes its nuclear translocation. Phosphorylates RAF1 at 'Ser-259' and negatively regulates its activity. Phosphorylation of BAD stimulates its pro-apoptotic activity. Phosphorylates KAT6A at 'Thr-369' and this phosphorylation inhibits the interaction of KAT6A with PML and negatively regulates its acetylation activity towards p53/TP53. AKT1-specific substrates have been recently identified, including palladin (PALLD), which phosphorylation modulates cytoskeletal organization and cell motility; prohibitin (PHB), playing an important role in cell metabolism and proliferation; and CDKN1A, for which phosphorylation at 'Thr-145' induces its release from CDK2 and Cytoplasmic domain relocation. These recent findings indicate that the AKT1 isoform has a more specific role in cell motility and proliferation. Phosphorylates CLK2 thereby controlling cell survival to ionizing radiation.

Abbreviation	Recombinant Human AKT1 protein
Storage	The shelf life is related to many factors, storage state, buffer ingredients, storage temperature and the stability of the protein itself. Generally, the shelf life of liquid form is 6 months at -20°C/-80°C. The shelf life of lyophilized form is 12 months at -20°C/-80°C.
Uniprot No.	P31749
Alias	Protein kinase B ;PKBProtein kinase B alpha ;PKB alphaProto-oncogene c-AktRAC-PK-alpha
Product Type	Recombinant Protein
Immunogen Species	Homo sapiens (Human)
Purity	Greater than 90% as determined by SDS-PAGE.
Sequence	MSDVAIVKEGWLHKRGEYIKTWRPRYFLLKNDGTFIGYKERPQDVDQREAPLN NFSVAQCQLMKTERPRPNTFIIRCLQWTTVIERTFHVETPEEREETTAIQTVA DGLKKQEEEEMDFRSGSPSDNSGAEEMEVS LAKPKHRVTMNEFEYLKLLGKG TFGKVLVKEKATGRYYAMKILKKEVIVAKDEVAHTLTENRVLQNSRHPFLTALK YSFQTHDRLCFVMEYANGGELFFHLSRERVFSEDRARFYGAEIVSALDYLHSE KNVVYRDLKLENLMLDKDGHKIDTDFGLCKEGIKDGATMKTFCGTPEYLAPEVL EDNDYGRAVDWWGLGVVMMYEMMCGRLPFYNQDHEKLFELILMEEIRFPRTL GPEAKSLLSGLLKDPKQRLGGGSEDAKEIMQHRFFAGIVWQHVVYEKKLSPPFK PQVTSETDTRYFDEEFTAQMITITPPDQDDSMCEVDSERRPHFPQFSYSASGT A
Research Area	Apoptosis
Source	E.coli



Target Names	AKT1
Expression Region	1-480aa
Notes	Repeated freezing and thawing is not recommended. Store working aliquots at 4°C for up to one week.
Tag Info	N-terminal GST-tagged
Mol. Weight	82.7kDa
Protein Length	Full Length

Image



(Tris-Glycine gel) Discontinuous SDS-PAGE (reduced) with 5% enrichment gel and 15% separation gel.

Description

To produce recombinant human AKT1 in *E. coli*, the gene of interest is co-cloned into a vector with an N-terminal GST-tag gene and transformed into *E. coli* cells. The gene of interest encodes the full-length human AKT1 (1-480aa). The cells are cultured to express the AKT1 protein and then lysed to extract it. The harvested protein is purified using affinity chromatography. Its purity is checked with SDS-PAGE, reaching over 90%.

The Human AKT1 protein is a serine/threonine-protein kinase that belongs to the protein kinase B (PKB) family. AKT1 phosphorylates various substrates, indicating its role in diverse cellular processes [1]. It plays a crucial role in various cellular processes such as cell growth, survival, glucose metabolism, genome stability, and neovascularization [2][3]. The phosphorylation-dependent substrate selectivity of AKT1 underscores its specificity in signaling cascades [4]. AKT1 is a key mediator of the PI3K/AKT/mTOR signaling pathway, which is essential for regulating cell proliferation and inhibiting apoptosis, particularly in cancer [5]. Human AKT1 has been identified to have 215 unique human proteins as its experimentally verified substrates, highlighting its significance in cellular signaling networks [6]. The activation of AKT1 is initiated by binding its pleckstrin homology (PH) domain to phosphoinositides, followed by phosphorylation at specific regulatory amino acids, serine 473 and threonine 308 [7].

References:

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Reconstitution

We recommend that this vial be briefly centrifuged prior to opening to bring the contents to the bottom. Please reconstitute protein in deionized sterile water to a concentration of 0.1-1.0 mg/mL. We recommend to add 5-50% of glycerol (final concentration) and aliquot for long-term storage at -20°C/-80°C. Our default final concentration of glycerol is 50%. Customers could use it as reference.

Shelf Life

The shelf life is related to many factors, storage state, buffer ingredients, storage temperature and the stability of the protein itself. Generally, the shelf life of liquid form is 6 months at -20°C/-80°C. The shelf life of lyophilized form is 12 months at -20°C/-80°C.