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PLK1 Antibody

Purified Mouse Monoclonal Antibody
Catalog # AO1743a

Product Information

Application	WB, ICC, E
Primary Accession	P53350
Reactivity	Human
Host	Mouse
Clonality	Monoclonal
Clone Names	1D1
Isotype	IgG1
Calculated MW	68255
Description	PLK1 is critical for the initiation of centrosome maturation. Polo-like kinases (PLKs) are a family of four serine/threonine protein kinases that are critical regulators of cell cycle progression, mitosis, cytokinesis, and the DNA damage response. PLK1, -2 and -3 are ubiquitously expressed, whereas PLK4 is restricted to a few tissues including the testes and the thymus. The mRNA and protein expression of PLK1, -2 and -4 are coordinately regulated during cell cycle progression, but PLK3 levels are independent of the other three family members. Furthermore, PLK3 is a much more stable protein than PLK1, -2 or -4. PLK1 is the most well characterized member of this family and strongly promotes the progression of cells through mitosis. During the various stages of mitosis PLK1 localizes to the centrosomes, kinetochores and central spindle. PLKs are dysregulated in a variety of human cancers. PLK1 overexpression correlates with cellular proliferation and poor prognosis. PLK2 and PLK3 are involved in checkpoint-mediated cell cycle arrest to ensure genetic stability. Loss-of-function mutations in these enzymes can lead to oncogenic transformation.
Immunogen	Purified recombinant fragment of human PLK1 (AA: 331-508) expressed in E. Coli.
Formulation	Purified antibody in PBS with 0.05% sodium azide

Additional Information

Gene ID	5347
Other Names	Serine/threonine-protein kinase PLK1, 2.7.11.21, Polo-like kinase 1, PLK-1, Serine/threonine-protein kinase 13, STPK13, PLK1, PLK
Dilution	WB~~1/500 - 1/2000 ICC~~N/A E~~1/10000
Storage	Maintain refrigerated at 2-8°C for up to 6 months. For long term storage store at -20°C in small aliquots to prevent freeze-thaw cycles.

Precautions	PLK1 Antibody is for research use only and not for use in diagnostic or therapeutic procedures.

Protein Information

Name	PLK1
Synonyms	PLK
Function	Serine/threonine-protein kinase that performs several important functions throughout M phase of the cell cycle, including the regulation of centrosome maturation and spindle assembly, the removal of cohesins from chromosome arms, the inactivation of anaphase- promoting complex/cyclosome (APC/C) inhibitors, and the regulation of mitotic exit and cytokinesis (PubMed:11202906, PubMed:12207013, PubMed:12447691, PubMed:12524548, PubMed:12738781, PubMed:12852856, PubMed:12939256, PubMed:14532005, PubMed:14734534, PubMed:15070733, PubMed:15148369, PubMed:15469984, PubMed:16198290, PubMed:16247472, PubMed:16980960, PubMed:17081991, PubMed:17351640, PubMed:17376779, PubMed:17617734, PubMed:18174154, PubMed:18331714, PubMed:18418051, PubMed:18477460, PubMed:18521620, PubMed:18615013, PubMed:19160488, PubMed:19351716, PubMed:19468300, PubMed:19468302, PubMed:19473992, PubMed:19509060, PubMed:19597481, PubMed:23455478, PubMed:23509069, PubMed:28512243, PubMed:8991084). Polo-like kinase proteins act by binding and phosphorylating proteins that are already phosphorylated on a specific motif recognized by the POLO box domains (PubMed:11202906, PubMed:12207013, PubMed:12447691, PubMed:12524548, PubMed:12738781, PubMed:12852856, PubMed:12939256, PubMed:14532005, PubMed:14734534, PubMed:15070733, PubMed:15148369, PubMed:15469984, PubMed:16198290, PubMed:16247472, PubMed:16980960, PubMed:17081991, PubMed:17351640, PubMed:17376779, PubMed:17617734, PubMed:18174154, PubMed:18331714, PubMed:18418051, PubMed:18477460, PubMed:18521620, PubMed:18615013, PubMed:19160488, PubMed:19351716, PubMed:19468300, PubMed:19468302, PubMed:19473992, PubMed:19509060, PubMed:19597481, PubMed:23455478, PubMed:23509069, PubMed:28512243, PubMed:8991084). Phosphorylates BORA, BUB1B/BUBR1, CCNB1, CDC25C, CEP55, ECT2, ERCC6L, FBXO5/EMI1, FOXM1, KIF20A/MKLP2, CENPU, NEDD1, NINL, NPM1, NUDC, PKMYT1/MYT1, KIZ, MRE11, PPP1R12A/MYPT1, POLQ, PRC1, RACGAP1/CYK4, RAD51, RHNO1, SGO1, STAG2/SA2, TEX14, TOPORS, p73/TP73, TPT1, WEE1 and HNRNPU (PubMed:11202906, PubMed:12207013, PubMed:12447691, PubMed:12524548, PubMed:12738781, PubMed:12852856, PubMed:12939256, PubMed:14532005, PubMed:14734534, PubMed:15070733, PubMed:15148369, PubMed:15469984, PubMed:16198290, PubMed:16247472, PubMed:16980960, PubMed:17081991, PubMed:17218258, PubMed:17351640, PubMed:17376779, PubMed:17617734, PubMed:18174154, PubMed:18331714, PubMed:18418051, PubMed:18477460, PubMed:18521620, PubMed:18615013, PubMed:19160488, PubMed:19351716, PubMed:19468300, PubMed:19468302, PubMed:19473992, PubMed:19509060, PubMed:19597481, PubMed:22325354, PubMed:23455478, PubMed:23509069, PubMed:25986610, PubMed:26811421, PubMed:28512243, PubMed:37440612, PubMed:37674080, PubMed:8991084). Plays a key role in

centrosome functions and the assembly of bipolar spindles by phosphorylating KIZ, NEDD1 and NINL (PubMed:16980960, PubMed:19509060). NEDD1 phosphorylation promotes subsequent targeting of the gamma-tubulin ring complex (gTuRC) to the centrosome, an important step for spindle formation (PubMed:19509060). Phosphorylation of NINL component of the centrosome leads to NINL dissociation from other centrosomal proteins (PubMed:12852856). Involved in mitosis exit and cytokinesis by phosphorylating CEP55, ECT2, KIF20A/MKLP2, CENPU, PRC1 and RACGAP1 (PubMed:12939256, PubMed:16247472, PubMed:17351640, PubMed:19468300, PubMed:19468302). Recruited at the central spindle by phosphorylating and docking PRC1 and KIF20A/MKLP2; creates its own docking sites on PRC1 and KIF20A/MKLP2 by mediating phosphorylation of sites subsequently recognized by the POLO box domains (PubMed:12939256, PubMed:17351640). Phosphorylates RACGAP1, thereby creating a docking site for the Rho GTP exchange factor ECT2 that is essential for the cleavage furrow formation (PubMed:19468300, PubMed:19468302). Promotes the central spindle recruitment of ECT2 (PubMed:16247472). Plays a central role in G2/M transition of mitotic cell cycle by phosphorylating CCNB1, CDC25C, FOXM1, CENPU, PKMYT1/MYT1, PPP1R12A/MYPT1 and WEE1 (PubMed:11202906, PubMed:12447691, PubMed:12524548, PubMed:19160488). Part of a regulatory circuit that promotes the activation of CDK1 by phosphorylating the positive regulator CDC25C and inhibiting the negative regulators WEE1 and PKMYT1/MYT1 (PubMed:11202906). Also acts by mediating phosphorylation of cyclin-B1 (CCNB1) on centrosomes in prophase (PubMed:12447691, PubMed:12524548). Phosphorylates FOXM1, a key mitotic transcription regulator, leading to enhance FOXM1 transcriptional activity (PubMed:19160488). Involved in kinetochore functions and sister chromatid cohesion by phosphorylating BUB1B/BUBR1, FBXO5/EMI1 and STAG2/SA2 (PubMed:15148369, PubMed:15469984, PubMed:17376779, PubMed:18331714). PLK1 is high on non-attached kinetochores suggesting a role of PLK1 in kinetochore attachment or in spindle assembly checkpoint (SAC) regulation (PubMed:17617734). Required for kinetochore localization of BUB1B (PubMed:17376779). Regulates the dissociation of cohesin from chromosomes by phosphorylating cohesin subunits such as STAG2/SA2 (By similarity). Phosphorylates SGO1: required for spindle pole localization of isoform 3 of SGO1 and plays a role in regulating its centriole cohesion function (PubMed:18331714). Mediates phosphorylation of FBXO5/EMI1, a negative regulator of the APC/C complex during prophase, leading to FBXO5/EMI1 ubiquitination and degradation by the proteasome (PubMed:15148369, PubMed:15469984). Acts as a negative regulator of p53 family members: phosphorylates TOPORS, leading to inhibit the sumoylation of p53/TP53 and simultaneously enhance the ubiquitination and subsequent degradation of p53/TP53 (PubMed:19473992). Phosphorylates the transactivation domain of the transcription factor p73/TP73, leading to inhibit p73/TP73-mediated transcriptional activation and pro-apoptotic functions. Phosphorylates BORA, and thereby promotes the degradation of BORA (PubMed:18521620). Contributes to the regulation of AURKA function (PubMed:18615013, PubMed:18662541). Also required for recovery after DNA damage checkpoint and entry into mitosis (PubMed:18615013, PubMed:18662541). Phosphorylates MISP, leading to stabilization of cortical and astral microtubule attachments required for proper spindle positioning (PubMed:23509069). Together with MEIKIN, acts as a regulator of kinetochore function during meiosis I: required both for mono- orientation of kinetochores on sister chromosomes and protection of centromeric cohesin from separase-mediated cleavage (By similarity). Phosphorylates CEP68 and is required for its degradation (PubMed:25503564). Regulates nuclear envelope breakdown during prophase by phosphorylating DCTN1 resulting in its localization in the nuclear envelope (PubMed:20679239). Phosphorylates the heat shock transcription factor HSF1, promoting HSF1 nuclear translocation upon heat shock (PubMed:15661742). Phosphorylates HSF1 also in the early

	mitotic period; this phosphorylation regulates HSF1 localization to the spindle pole, the recruitment of the SCF(BTRC) ubiquitin ligase complex induicing HSF1 degradation, and hence mitotic progression (PubMed:18794143). Regulates mitotic progression by phosphorylating RIOK2 (PubMed:21880710). Through the phosphorylation of DZIP1 regulates the localization during mitosis of the BBSome, a ciliary protein complex involved in cilium biogenesis (PubMed:27979967). Regulates DNA repair during mitosis by mediating phosphorylation of POLQ and RHNO1, thereby promoting POLQ recruitment to DNA damage sites (PubMed:37440612, PubMed:37674080). Phosphorylates ATXN10 which may play a role in the regulation of cytokinesis and may stimulate the proteasome-mediated degradation of ATXN10 (PubMed:21857149).
Cellular Location	Nucleus. Chromosome, centromere, kinetochore. Cytoplasm, cytoskeleton, microtubule organizing center, centrosome. Cytoplasm, cytoskeleton, spindle. Midbody. Note=localization at the centrosome starts at the G1/S transition (PubMed:24018379). During early stages of mitosis, the phosphorylated form is detected on centrosomes and kinetochores. Localizes to the outer kinetochore. Presence of SGO1 and interaction with the phosphorylated form of BUB1 is required for the kinetochore localization. Localizes onto the central spindle by phosphorylating and docking at midzone proteins KIF20A/MKLP2 and PRC1 Colocalizes with FRY to separating centrosomes and spindle poles from prophase to metaphase in mitosis, but not in other stages of the cell cycle. Localization to the centrosome is required for S phase progression (PubMed:24018379). Colocalizes with HSF1 at the spindle poles during prometaphase (PubMed:18794143)
Tissue Location	Placenta and colon.

References

1.J Cell Biol. 2011 Dec 26;195(7):1093-101.2.Eur J Cancer. 2011 Sep;47(14):2166-74.

Images

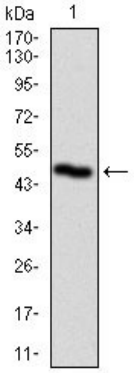
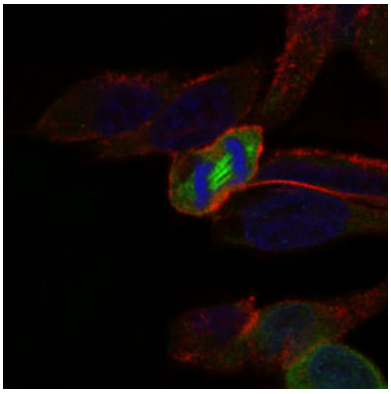


Figure 1: Western blot analysis using PLK1 mAb against human PLK1 recombinant protein. (Expected MW is 45.7 kDa)

Figure 2: Immunofluorescence analysis of HeLa cells using PLK1 mouse mAb (green). Blue: DRAQ5 fluorescent DNA dye. Red: Actin filaments have been labeled with Alexa Fluor-555 phalloidin.



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