



Product Information

Anti-cdk-1 (p34^{cdc2})

Developed in Rabbit
Affinity Isolated Antibody

Product Number **C4973**

Product Description

Anti-cdk1 (p34^{cdc2}) is developed in rabbit using a synthetic peptide corresponding to the C-terminal of human cdc2 (cdk1, cdc2)¹ coupled to KLH as immunogen.

Anti-cdk1 (p34^{cdc2}) recognizes human cdk1/cdc2 kinase (34 kDa protein) and also shows species cross reactivity with mouse and other mammalian cdk1/cdc2 kinases.²

This antibody can be used for immunoblotting and immunohistochemistry. It is not recommended for immunoprecipitation.

During the cell cycle of most somatic cells, DNA synthesis (S-phase) and mitosis (M-phase) are separated by two "growth" stages (G₁ and G₂) of varying duration. Thus, a typical eukaryotic cell sequentially passes through G₁, S, G₂, and M and back into G₁ during a single cycle.¹ Maturation-promoting factor (MPF), originally found during meiosis in frog oocytes, is a cytoplasmic factor which is highly conserved among a wide range of species and plays a key role in the progression of the cell cycle from interphase (G₂) to metaphase (M), in both meiosis and mitosis. One of the components of MPF is a 34 kD protein with kinase activity which is encoded in the fission yeast, *S. pombe*, by the cdc2 gene (p34^{cdc2}).² The kinase activity and substrate specificity of p34^{cdc2} (also known as Cdk1) change during the cell cycle. These changes have been correlated with both the phosphorylation state of p34^{cdc2} and its association with other proteins called cyclins. Complexes of 'cyclins' and Cdk1 (p34^{cdc2}) play a key role in cell cycle control. Within the complexes, the cyclin subunit serves a regulatory role, whereas Cdk1 has a catalytic protein kinase activity. Members of the cyclin family of proteins combine with Cdk1 kinase subunit to form active cdc2 kinase, which initiates M phase of mitosis and meiosis.

Deactivation of Cdk1 is required for exit from mitosis. Besides involvement in the G₂ to M transition, these complexes function as key regulators of each step of the cell cycle: Cdk1 acts as a catalytic subunit of MPF when it forms a complex with cyclin B. However, when Cdk1 combines with other types of cyclins, termed G₁ cyclins, it commits the cell to DNA replication. Therefore, the cell cycle can be considered as a Cdk1 cycle which is controlled by biochemical modifications such as phosphorylation of Cdk1 and formation of complex(es) with other proteins, including the cyclins. In every eukaryote examined, Cdk1 contains an evolutionary conserved 16 amino acid sequence called PSTAIR (EGVPSTAIRESLLKE) which distinguishes Cdk1 from other protein kinases. Nevertheless, other cyclin-dependent kinases, like Cdk2 and Cdk3, contain the PSTAIR motif. The PSTAIR region of Cdk1 is involved in the complex formation with cyclin B.

Cdk1 (p34^{cdc2}) shares 62% homology in protein sequence with p36^{cdc28} protein kinase. In evolutionarily divergent fission and budding yeasts, cdc2+ and Cdc28 genes are capable of cross-complementation in temperature sensitive mutants. The activity of cdk1 is regulated by association with two distinct peptides, cyclins A or B and p13^{SUC1}. The molecular model of cdk1 is divided into a small and a large lobe with cleft in between. The small lobe is associated with nucleotide binding, the cyclin binding site and the conserved PSTAIRE sequence. A cluster of acidic residues (E38, E40, E41, E42) in the small lobe immediately preceding the PSTAIRE sequence is apparently important for cyclin binding. The large lobe is associated with peptide binding, catalysis and contains two non-contiguous p13^{SUC1} binding sites. p13^{SUC1} is not a substrate for cdk1 but is clearly a critical regulatory component of the cdk1 complex. Mutants that can bind cyclins but have lost the ability to bind p13^{SUC1} are non-functional in *S. pombe*. Cyclin binding precedes and is necessary for the phosphorylation of Thr-161, one of two major

phosphorylation sites located on the large lobe at the edge of the cleft. Thr-161 phosphorylation is essential for cdk1 activation, perhaps through stabilization of the cyclin complex. In contrast, phosphorylation of Y15 within the ATP binding site by the Wee1 protein kinase inactivates cdk1 and dephosphorylation by cdc25 protein phosphatase activates cdk1.

Reagent

Anti-cdk-1 (p34^{cdc2}) is supplied as affinity isolated antibody in phosphate buffered saline containing 0.05% sodium azide.

Protein concentration is approximately 1 mg/ml by Bradford.

Precautions and Disclaimer

Due to the sodium azide content a material safety data sheet (MSDS) for this product has been sent to the attention of the safety officer of your institution. Consult the MSDS for information regarding hazardous and safe handling practices.

Storage/Stability

Store at -20 °C. Freeze in working aliquots to avoid repeated freezing and thawing. Do not store in "frost-free" freezer. If slight turbidity occurs upon prolonged storage, clarify the solution by centrifugation before use.

Product Profile

For immunoblotting, a working concentration of 0.5-2 µg/ml will detect cdk1/cdk2 using RIPA lysates of human A431 carcinoma cells or mouse 3T3/A31 fibroblasts.

For immunohistochemistry, the recommended concentration is 5 µg/ml.

References

1. Rattner, J.B., et al., *Cell Motility and Cytoskeleton*, **17**, 227 (1990).
2. Lew, et al., *J. Biol. Chem.*, **267**, 13383 (1992).

General References

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