Heterochromatin Protein 1, alpha (HP1a, Antigen p25, Chromobox Homolog 5 (Drosophila), Cbx5, HP1Hs-alpha)

Catalog number

H2034-50B

Supplier

United States Biological

Heterochromatin protein-1 (HP1) is a methyl-lysine binding protein localized at heterochromatin sites, where it mediates gene silencing. It has been shown that mammalian methyltransferases that selectively methylate histone H3 on lysine-9 generate a binding site for HP1 proteins, a family of heterochromatic adaptor molecules implicated in both gene silencing and supranucleosomal chromatin structure. High-affinity in vitro recognition of a methylated histone H3 peptide by HP1 requires a functional chromodomain. Thus, the HP1 chromodomain is a specific interaction motif for the methyl epitope on lysine-9 of histone H3. In vivo, heterochromatin association of HP1 proteins is lost in Suv39h double-null primary mouse fibroblasts but is restored after reintroduction of a catalytically active SUV39H1 HMTase. A molecular mechanism through which the SUV39H-HP1 methylation system can contribute to the propagation of heterochromatic subdomains in native chromatin has been defined. It has been demonstrated that HP1 can bind with high affinity to histone H3 methylated at lysine-9 but not at lysine-4. The chromodomain of HP1 as its methyl-lysine-binding domain has been identified. A point mutation in the chromodomain, which destroys the gene silencing activity of HP1 in Drosophila, abolished methyl-lysine-binding activity. Genetic and biochemical analysis in S. pombe showed that the methylase activity of Clr4 (the SUV39H1 homolog) is necessary for the correct localization of Swi6 (the HP1 equivalent) at centromeric heterochromatin and for gene silencing. A stepwise model for the formation of a transcriptionally silent heterochromatin: SUV39H1 places a methyl marker on histone H3, which is then recognized by HP1 through its chromodomain has been suggested. This model may also explain the stable inheritance of the heterochromatic state. SUV39H1 and HP1 are both involved in the repressive functions of the retinoblastoma protein. Rb associates with SUV39H1 and HP1 in vivo by means of its pocket domain. SUV39H1 cooperates with Rb to repress the cyclin E promoter, and in fibroblasts that are disrupted for SUV39H1, the activity of the cyclin E and cyclin A2 genes are specifically elevated. The SUV39H1-HP1 complex is not only involved in heterochromatic silencing but also has a role in repression of euchromatic genes by Rb and perhaps other corepressor proteins.

Cellular Localization

Nuclear

Applications

Suitable for use in Western Blot, Flow Cytometry, Immunocytochemistry and Immunofluorescence. Other applications not tested.

Recommended Dilution

Optimal dilutions to be determined by the researcher.

Storage and Stability

May be stored at 4°C for short-term only. Aliquot to avoid repeated freezing and thawing. Store at

-20°C. Aliquots are stable for 12 months after receipt. For maximum recovery of product, centrifuge the original vial after thawing and prior to removing the cap.

Immunogen

Synthetic peptide corresponding to the N-terminal region of human HP 1 alpha (within residues 1-100). Species sequence homology: mouse, Arabidopsis suecica, Rye and Triticum aestivum

Formulation

Supplied as a liquid in PBS, pH 7.2, 0.02% sodium azide.

Purity

Purified

Specificity

Recognizes human HP 1 alpha.

Product Type

Pab

Source

human

Isotype

IgG

Grade

Purified

Applications

FC IC IF WB

Crossreactivity

Hu

Storage

-20°C

Reference

1. Bannister AJ et al. Selective recognition of methylated lysine 9 on histone H3 by the HP1 chromo domain. Nature 410:120-4 (2001). <PUBMED:11242054>
2. Lachner M et al. Methylation of histone H3 lysine 9 creates a binding site for HP1 proteins. Nature 410:116-20 (2001). <PUBMED:11242053>
3. Nielsen SJ et al. Rb targets histone H3 methylation and HP1 to promoters. Nature 412:561-5 (2001). <PUBMED:11484059>