



**MONOCLONAL ANTIBODY**

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**Catalog No. CE-039B**

# Anti Histone H3.1/H3.2 [ Clone : 1D4F2]

## BACKGROUND

Nucleosomes are composed of four different histone proteins, designated H3, H4, H2A, and H2B. Histone H3 has two main variants, H3.1 and H3.3, which show different genomic localization patterns in eukaryotes. Deposition of Histone H3.1 is coupled to DNA synthesis during DNA replication and possibly DNA repair.

<b>Product type</b>	Primary antibody
<b>Immunogen</b>	Synthetic peptide corresponding to N-terminus region (aa 21-39) of human Histone H3.1, ATKAARKSAPATGGVKKPH
<b>Rased in</b>	Mouse
<b>Myeloma</b>	SP2
<b>Clone number</b>	1D4F2
<b>Isotype</b>	IgG2b, $\kappa$
<b>Host</b>	-
<b>Source</b>	Culture supernatant
<b>Purification</b>	Ion-exchange chromatography
<b>Form</b>	Liquid
<b>Storage buffer</b>	PBS containing 50% Glycerol, 0.05% NaN <sub>3</sub> as a preservative
<b>Concentration</b>	1 mg / ml
<b>Volume</b>	50 ul
<b>Label</b>	Unlabeled
<b>Specificity</b>	Histone H3.1/3.2, Epitope <b>Histone H3.1/3.2 (21-39)</b> * Human(HeLa), Monkey(COS1), Mouse(NIH3T3), Rat(NRK), Dog(MDCK)
<b>Cross reactivity</b>	Human, Monkey, Mouse, Rat, Hamster Other species have not been tested.
<b>Storage</b>	Store below -20°C (below -70°C for prolonged storage) Aliquot to avoid cycles of freeze/thaw.
<b>Other</b>	<b>D Data Link</b> : UniProtKB/Swiss-Prot <a href="#">P68431</a>

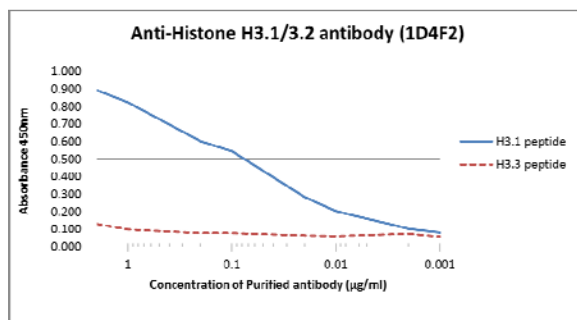
- Application notes**
- Recommended dilutions
- **Western blotting:** 1/1000 -1/5000
  - **Immunocytochemistry:** 1/100 -1/500
  - **Immunohistochemistry:** 1/100 -1/500
  - **ChIP**
  - **IP**

Other applications have not been tested.  
Optimal dilutions/concentrations should be determined by the end user.

- References**
- 1) Hake SB, *et al.*, Proc Natl Acad Sci U S A. 2006 Apr 25;103(17):6428-35.PMID: [16571659](#)
  - 2) Harada, *et al.*, EMBO J. 2012 Jun 29;31(13):2994-3007. PMID: [22569126](#)

\* This antibody is used in ref.2..

## ANTIBODY CHARACTERIZATION



H3.1 peptide 21 ATKAARKSAPATGGVKKPH 39  
 H3.3 peptide 21 ATKAARKSAPSTGGVKKPH 39

Fig.1 The composition of Histone H3 variants peptides and the reactivity of Histone H3.1/H3.2 antibody, 1D4F2.

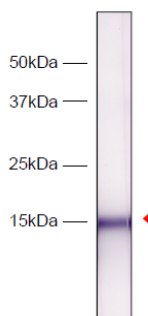


Fig.2 Western blot analysis of HeLa cell extracts using Histone H3.1/H3.2 antibody, 1D4F2.

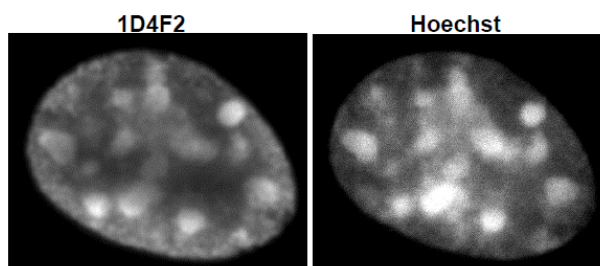


Fig.3 Immunocytochemical analysis of NIH3T3Cell using Histone H3.1/H3.2 antibody, 1D4F2.

### RELATED PRODUCTS:

Product Name	Clone	Application	Maker	Cat#
Anti Histone H3.1/3.2 (Variant) Monoclonal Antibody	6G3C7	WB	CAC	CE-039A
Anti Histone H3.1/3.2 (Variant) Monoclonal Antibody	1D4F2	ChIP/ WB/ IC/ IHC/ IP	CAC	CE-039B
Anti Histone H3.3 (Variant) Monoclonal Antibody	6C4A3	WB	CAC	CE-040A
Anti Histone H3.3 (Variant) Monoclonal Antibody	4H2D7	ChIP/ WB/ IC/ IHC/ IP	CAC	CE-040B
Anti Histone H3 S10ph Monoclonal Antibody	6G8B7	WB/ IC	CAC	CE-034A
Anti Histone H3 T11ph Monoclonal Antibody	6G12C5	WB/ IC	CAC	CE-035A
Anti Histone H3 T32ph Monoclonal Antibody	6C7G12	WB/ IC	CAC	CE-036A
Anti Histone H3 K9Ac Monoclonal Antibody	2G1F9	WB/ IC	CAC	CE-037A
Anti RNA polymerase 2, CTD Ser2ph Monoclonal Antibody	3E7C7	ChIP/ WB/ IC	CAC	CE-030A
Anti RNA polymerase 2, CTD Ser5ph Monoclonal Antibody	1H4B6	ChIP/ WB/ IC	CAC	CE-031A

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世界初

コスモ・バイオから

# ヒストンH3 バリエントモノクローナル抗体

Anti Histone H3.1/H3.2 [Clone: 6G3C7]

Anti Histone H3.3 [Clone: 6C4A3]

Anti Histone H3.1/H3.2 [Clone: 1D4F2]

Anti Histone H3.3 [Clone: 4H2D7]

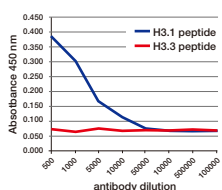
ヌクレオソームは H2A、H2B、H3 および H4 の 4 種のヒストンタンパク質で構成されています。また、ヒストンにはバリエントが存在し、特にヒト由来のヒストン H3 には、H3.1、H3.2、H3.3、H3t、および CENP-A の 5 種類のバリエントが報告されています。主なバリエントである H3.1、および H3.3 は真核生物においては異なったゲノム局在パターンを示しています。Histone H3.1 は転写因子および転写補因子、DNA 複製因子、DNA 修復タンパク質への関与が、ヒストン H3.3 は DNA 合成に依存しないデポジションパスウェイにおいて、交換バリエントとしての

機能が知られております。新製品ヒストン H3.1 抗体、ヒストン H3.3 抗体は、その機能解析に有用です。

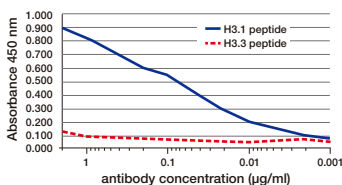
また、最近、ゲノム上の骨格筋形成にかかわる遺伝子群は、細胞が筋肉形成される以前に H3.3 タンパク質で予めマーキングされ、このマーキングが形成されることで、細胞が筋肉組織を形成する能力を獲得することが、H3.3 抗体の使用によって明らかになりました (参考文献 2)。再生医療研究にも有用な本抗体を是非お試しください。

## 抗体の特異性を ELISA 法で確認

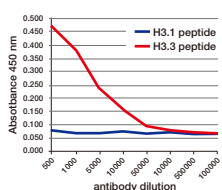
Histone H3.1/H3.2 MAb (6G3C7)



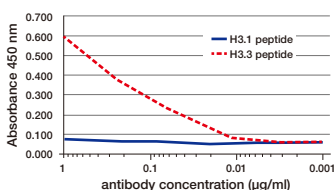
Histone H3.1/H3.2 MAb (1D4F2)



Histone H3.3 MAb (6C4A3)



Histone H3.3 MAb (4H2D7)

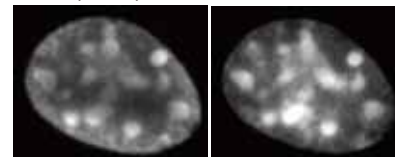


H3.1 peptide 79 KTDLRFQSSAVMALQEASEA 97  
H3.3 peptide 79 KTDLRFQSAALIGALQEASEA 97

H3.1 peptide 21 ATKAAARKSAPATGGVKKPH 39  
H3.3 peptide 21 ATKAAARKSAPSTGGVKKPH 39

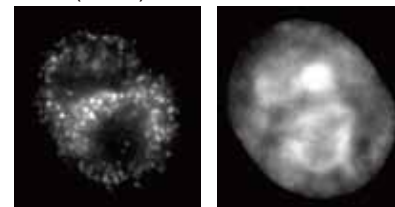
## 細胞の蛍光染色

Histone H3.1/H3.2 MAb (1D4F2)



NIH3T3 細胞

Histone H3.3 MAb (4H2D7)



HeLa 細胞

## H3.3 抗体での実験例

ES 細胞、幹細胞など特定の組織に変化する能力 (分化能) を持った細胞は、あらかじめ H3.3 と呼ばれる特殊なヒストン (ヒストンバリエント) により、必要な遺伝子がマーキングされることが明らかになりました。骨格筋形成時に、転写因子 MyoD が骨格筋遺伝子に選択的に結合し、MyoD に結合したシャペロンである Chd2 タンパク質が H3.3 をゲノムに組み込むことでマーキングしていることが発見されました。一方で、マーキング機構を失った細胞では、骨格筋の形成がなされなかったことから、骨格筋形成を事前に予測できる細胞内のメカニズムを明らかにした世界初の知見となりました (参考文献 2)。

九州大学大学院医学研究院 准教授 大川 恭行 先生

## 遺伝子「マーキング」により骨格筋となる

マーキングがある場合



マーキングがない場合



参考文献 1) Hake and Allis, (2006) *PNAS*, 103, 6428-6435.  
2) Harada et al., (2012) *EMBO J*, 31, 2994-3007.

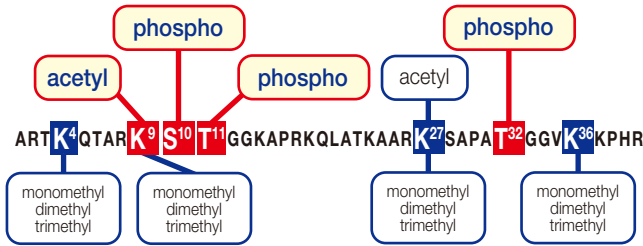
コスモ・バイオ株式会社 メーカー略号: CAC

品名	クローン	アイソタイプ	エピトープ	適用	品番	包装	希望販売価格
Anti Histone H3.1/H3.2	6G3C7	Rat-IgG1, λ	H3.1/H3.2 (79-94)	WB	CE-039A	100 µL (100 µg)	¥ 58,000
Anti Histone H3.1/H3.2	1D4F2	Mouse-IgG2b, κ	H3.1/H3.2 (21-39)	ChIP/ WB/ IC	CE-039B	50 µL (50 µg)	¥ 58,000
Anti Histone H3.3	6C4A3	Rat-IgG2a, κ	H3.3 (79-97)	WB	CE-040A	100 µL (100 µg)	¥ 58,000
Anti Histone H3.3	4H2D7	Rat-IgG2a, κ	H3.3 (21-39)	ChIP/ WB/ IC	CE-040B	50 µL (50 µg)	¥ 58,000

売れています

# ChIP、免疫染色、WB グレード 修飾ヒストン H3/H2B モノクローナル抗体

## Histone H3 N-terminal modifications



ヌクレオソームのヒストンタンパク質 (H2A, H2B, H3, H4) は、クロマチンの主要な構成要素になっています。ヒストンの N 末端はヒストンテールとよばれヌクレオソームコアから少し離れて存在しています。この N 末端の部分で様々な修飾を受け細胞のシグナル刺激に応答し、アセチル化、リン酸化、メチル化など様々な修飾を受け遺伝子発現に影響を与えます。エピジェネティクス研究での ChIP アッセイに不可欠な修飾ヒストン抗体を、是非コスモラインアップからご活用ください。

M で始まる品番：株式会社モノクローナル抗体研究所      メーカー略号：MCA  
C で始まる品番：コスモ・バイオ株式会社                      メーカー略号：CAC

品名	免疫動物	残基	修飾	クローン	適用	品番	包装	希望販売価格
Anti Histone H3	Mouse	-	unmodified	MAB10301	ChIP/ WB/ IC	MAB10001-20	20 µL (20 µg)	¥18,000
						MAB10001-100	100 µL (100 µg)	¥58,000
Anti Monomethyl Histone H3 (Lys4)	Mouse	K4 (Lysine 4)	monomethyl	MAB10302	ChIP/ WB/ IC	MAB10002-20	20 µL (20 µg)	¥18,000
						MAB10002-100	100 µL (100 µg)	¥58,000
Anti Dimethyl Histone H3 (Lys4)	Mouse		dimethyl	MAB10303	ChIP/ WB/ IC	MAB10003-20	20 µL (20 µg)	¥18,000
						MAB10003-100	100 µL (100 µg)	¥58,000
Anti Trimethyl Histone H3 (Lys4)	Mouse		trimethyl	MAB10304	ChIP/ WB/ IC	MAB10004-20	20 µL (20 µg)	¥18,000
						MAB10004-100	100 µL (100 µg)	¥58,000
Anti Histone H3 K9Ac	Rat	K9 (Lysine 9)	acetyl	2G1F9	ChIP/ WB/ IC/ IHC	CE-037A	100 µL (100 µg)	¥58,000
Anti Acethyl Histone H3(Lys9)	Mouse		acetyl	MAB10305	ChIP/ WB/ IC	MAB10005-20	20 µL (20 µg)	¥18,000
						MAB10005-100	100 µL (100 µg)	¥58,000
Anti Monomethyl Histone H3 (Lys9)	Mouse		monomethyl	MAB10306	ChIP/ WB/ IC	MAB10006-20	20 µL (20 µg)	¥18,000
						MAB10006-100	100 µL (100 µg)	¥58,000
Anti Dimethyl Histone H3 (Lys9)	Mouse		dimethyl	MAB10307	ChIP/ WB/ IC	MAB10007-20	20 µL (20 µg)	¥18,000
					MAB10007-100	100 µL (100 µg)	¥58,000	
Anti Trimethyl Histone H3 (Lys9)	Mouse		trimethyl	MAB10308	ChIP/ WB/ IC	MAB10008-20	20 µL (20 µg)	¥18,000
						MAB10008-100	100 µL (100 µg)	¥58,000
Anti Acetyl Histone H3 (Lys9/27)	Mouse	K9/27 (Lysine 9/27)	acetyl	MAB10310	ChIP/ WB/ IC	MAB10010-20	20 µL (20 µg)	¥18,000
						MAB10010-100	100 µL (100 µg)	¥58,000
Anti Acetyl Histone H3 (Lys27)	Mouse	K27 (Lysine 27)	acetyl	MAB10309	ChIP/ WB/ IC	MAB10009-20	20 µL (20 µg)	¥18,000
						MAB10009-100	100 µL (100 µg)	¥58,000
Anti Monomethyl Histone H3 (Lys27)	Mouse		monomethyl	MAB10321	ChIP/ WB/ IC	MAB10321-20	20 µL (20 µg)	¥18,000
						MAB10321-100	100 µL (100 µg)	¥58,000
Anti Dimethyl Histone H3 (Lys27)	Mouse		dimethyl	MAB10322	ChIP/ WB/ IC	MAB10324-20	20 µL (20 µg)	¥18,000
						MAB10324-100	100 µL (100 µg)	¥58,000
Anti Trimethyl Histone H3 (Lys27)	Mouse		trimethyl	MAB10323	ChIP/ WB/ IC	MAB10323-20	20 µL (20 µg)	¥18,000
						MAB10323-100	100 µL (100 µg)	¥58,000
Anti Monomethyl Histone H3 (Lys36)	Mouse	K36 (Lysine 36)	monomethyl	MAB10331	ChIP/ WB/ IC	MAB10331-20	20 µL (20 µg)	¥18,000
						MAB10331-100	100 µL (100 µg)	¥58,000
Anti Dimethyl Histone H3 (Lys36)	Mouse		dimethyl	MAB10332	ChIP/ WB/ IC	MAB10332-20	20 µL (20 µg)	¥18,000
						MAB10332-100	100 µL (100 µg)	¥58,000
Anti Trimethyl Histone H3 (Lys36)	Mouse		trimethyl	MAB10333	ChIP/ WB/ IC	MAB10333-20	20 µL (20 µg)	¥18,000
						MAB10333-100	100 µL (100 µg)	¥58,000
Anti Histone H3 S10ph	Rat	S10 (Serine 10)	phospho	6G8B7	WB/ IC	CE-034A	100 µL (100 µg)	¥58,000
Anti phospho Histone H3 (Ser10)	Mouse		phospho	MAB10312	ChIP/ WB/ IC	MAB10012-20	20 µL (20 µg)	¥18,000
						MAB10012-100	100 µL (100 µg)	¥58,000
Anti Histone H3 T11ph	Rat	T11 (Threonine 11)	phospho	6G12C5	WB/ IC	CE-035A	100 µL (100 µg)	¥58,000
Anti Histone H3 T32ph	Rat	T32 (Threonine 32)	phospho	6C7G12	WB/ IC	CE-036A	100 µL (100 µg)	¥58,000
Anti phospho Histone H2B (Ser14)	Mouse	S14 (Serine 14)	phospho	MAB10251	ChIP/ WB/ IC	MAB10251-20	20 µL (20 µg)	¥18,000
						MAB10251-100	100 µL (100 µg)	¥58,000

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(12146)

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**New**

**World's First !!!**

# Histone Variant Monoclonal Antibodies

Anti Histone H3.1/H3.2 [Clone: 6G3C7]

Anti Histone H3.3 [Clone: 6C4A3]

Anti Histone H3.1/H3.2 [Clone: 1D4F2]

Anti Histone H3.3 [Clone: 4H2D7]

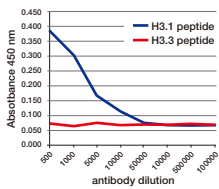
Nucleosomes are composed of four different histone proteins designated H2A, H2B, H3, and H4. In humans, five variants of histone H3 are reported: H3.1, H3.2, H3.3, H3t, and CENP-A. The two major Histone H3 variants, H3.1 and H3.3, are the main variants displaying distinct genomic localization patterns in eukaryotes. Deposition of Histone H3.1 is associated with DNA synthesis during DNA replication and possibly DNA repair, while Histone H3.3 is incorporated independently of DNA synthesis and is the predominant form of H3 found in non-dividing cells. Hence, these new Histone H3 variant monoclonal antibodies

offer great utility for dissecting the functional significance of these H3 variants and the molecular mechanisms associated with their deposition.

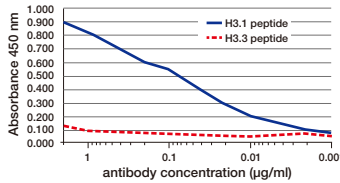
Recently, it was shown that a genomic gene cluster regulating skeletal myogenesis is marked by H3.3 protein prior to cellular muscle formation and that H3.3 marking of this region enables myogenic gene activation (Ref. 2). These results suggest that monitoring H3.3 marking at specific loci may be useful in the prediction of cell fate. These H3.3 monoclonal antibodies are expected to be useful probes in the field of regenerative medicine.

## Antibody specificity by competition peptide ELISA

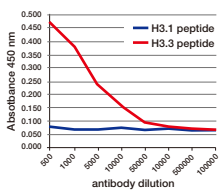
### Histone H3.1/H3.2 MAb (6G3C7)



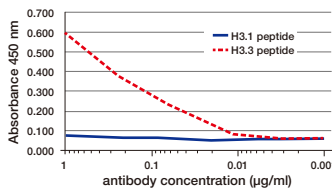
### Histone H3.1/H3.2 MAb (1D4F2)



### Histone H3.3 MAb (6C4A3)



### Histone H3.3 MAb (4H2D7)

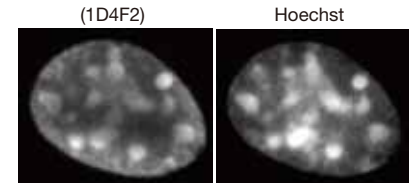


H3.1 peptide 79 KTDLRFQSSAVMALQEASEA 97  
H3.3 peptide 79 KTDLRFQSAALGALQEASEA 97

H3.1 peptide 21 ATKAARKSAPATGGVKKPH 39  
H3.3 peptide 21 ATKAARKSAPSTGGVKKPH 39

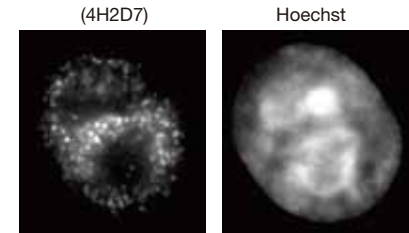
## Fluorescence immunostaining

### Histone H3.1/H3.2 MAb



NIH3T3

### Histone H3.3 MAb



HeLa

## Experimental example

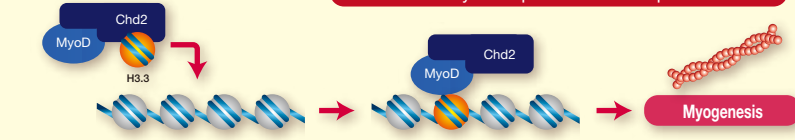
These H3 variant antibodies were essential tools in a first of kind study showing that differentiation specific genes are marked for lineage specific expression by the deposition of Histone H3.3 at the onset of differentiation signaling (Ref. 2).

### Reference

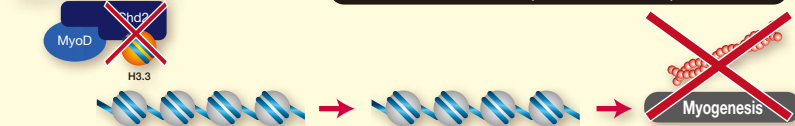
- 1) Hake and Allis, (2006) *PNAS*, 103, 6428-6435.
- 2) Harada et. al., (2012) *EMBO J.* 36, 2994-3007.

## H3.3 gene marking in skeletal muscle differentiation

### MARKING



### Non-MARKING



Description	Clone	Isotype	Epitope	Application	Cat. No.	Quantity
Anti Histone H3.1/H3.2	6G3C7	Rat-IgG1, $\lambda$	H3.1/H3.2 (79-94)	WB	CAC-CE-039A	100 $\mu$ L (100 $\mu$ g)
Anti Histone H3.1/H3.2	1D4F2	Mouse-IgG2b, $\kappa$	H3.1/H3.2 (21-39)	ChIP/ IP/ WB/ IC	CAC-CE-039B	50 $\mu$ L (50 $\mu$ g)
Anti Histone H3.3	6C4A3	Rat-IgG2a, $\kappa$	H3.3 (79-97)	WB	CAC-CE-040A	100 $\mu$ L (100 $\mu$ g)
Anti Histone H3.3	4H2D7	Rat-IgG2a, $\kappa$	H3.3 (21-39)	ChIP/ IP/ WB/ IC	CAC-CE-040B	50 $\mu$ L (50 $\mu$ g)

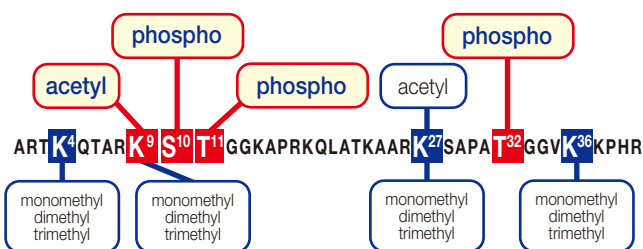


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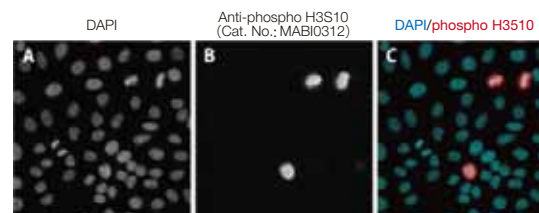
# Monoclonal Antibodies to Histone Modifications

Histones are the main protein components of chromatin. To facilitate nuclear packaging and control of gene expression, DNA in chromatin is wound around nucleosome particles composed primarily of the Histones H2A, H2B, H3, and H4. Histone N-terminal regions (histone tails) protrude from the nucleosome core and are subject to a variety of reversible, regulated modifications (including acetylation, phosphorylation, and methylation) influencing transcription and chromatin structure. How such modifications are regulated and how these modifications effect gene expression continues to be an area of intense interest and research. In such studies, chromatin immunoprecipitation (ChIP) is perhaps the most widely used experimental procedure. Due to the inherent variability and limited supply of polyclonal antibodies, well characterized monoclonal antibodies are preferred reagents for ChIP. The versatile set of anti-histone monoclonal antibodies offered here are therefore highly valuable reagents to your lab's epigenetic toolbox.

## Histone H3 N-terminal modifications



## Histone H3 phospho Ser10 immunostaining



Description	Host	Residue	Modification	Clone	Application	Cat. No.	Quantity
Anti Histone H3	Mouse	-	unmodified	MABI0301	ChIP/ WB/ IC	MCA-MABI0001-100-EX	100 µL (100 µg)
Anti Monomethyl Histone H3 (Lys4)	Mouse	K4 (Lysine 4)	monomethyl	MABI0302	ChIP/ WB/ IC	MCA-MABI0002-100-EX	100 µL (100 µg)
Anti Dimethyl Histone H3 (Lys4)	Mouse		dimethyl	MABI0303	ChIP/ WB/ IC	MCA-MABI0003-100-EX	100 µL (100 µg)
Anti Trimethyl Histone H3 (Lys4)	Mouse		trimethyl	MABI0304	ChIP/ WB/ IC	MCA-MABI0004-100-EX	100 µL (100 µg)
Anti Histone H3 K9Ac	Rat	K9 (Lysine 9)	acetyl	2G1F9	ChIP/ WB/ IC/ IHC	CAC-CE-037A	100 µL (100 µg)
Anti Acethyl Histone H3 (Lys9)	Mouse		acetyl	MABI0305	ChIP/ WB/ IC	MCA-MABI0005-100-EX	100 µL (100 µg)
Anti Monomethyl Histone H3 (Lys9)	Mouse		monomethyl	MABI0306	ChIP/ WB/ IC	MCA-MABI0006-100-EX	100 µL (100 µg)
Anti Dimethyl Histone H3 (Lys9)	Mouse		dimethyl	MABI0307	ChIP/ WB/ IC	MCA-MABI0007-100-EX	100 µL (100 µg)
Anti Trimethyl Histone H3 (Lys9)	Mouse		trimethyl	MABI0308	ChIP/ WB/ IC	MCA-MABI0008-100-EX	100 µL (100 µg)
Anti Acetyl Histone H3 (Lys9/27)	Mouse	K9/27 (Lysine 9/27)	acetyl	MABI0310	ChIP/ WB/ IC	MCA-MABI0010-100-EX	100 µL (100 µg)
Anti Acetyl Histone H3 (Lys27)	Mouse						
Anti Monomethyl Histone H3 (Lys27)	Mouse	K27 (Lysine 27)	monomethyl	MABI0321	ChIP/ WB/ IC	MCA-MABI0321-100-EX	100 µL (100 µg)
Anti Dimethyl Histone H3 (Lys27)	Mouse		dimethyl	MABI0322	ChIP/ WB/ IC	MCA-MABI0324-100-EX	100 µL (100 µg)
Anti Trimethyl Histone H3 (Lys27)	Mouse		trimethyl	MABI0323	ChIP/ WB/ IC	MCA-MABI0323-100-EX	100 µL (100 µg)
Anti Monomethyl Histone H3 (Lys36)	Mouse	K36 (Lysine 36)	monomethyl	MABI0331	ChIP/ WB/ IC	MCA-MABI0331-100-EX	100 µL (100 µg)
Anti Dimethyl Histone H3 (Lys36)	Mouse		dimethyl	MABI0332	ChIP/ WB/ IC	MCA-MABI0332-100-EX	100 µL (100 µg)
Anti Trimethyl Histone H3 (Lys36)	Mouse		trimethyl	MABI0333	ChIP/ WB/ IC	MCA-MABI0333-100-EX	100 µL (100 µg)
Anti Histone H3 S10ph	Rat	S10 (Serine 10)	phospho	6G8B7	WB/ IC	CAC-CE-034A	100 µL (100 µg)
Anti phospho Histone H3 (Ser10)	Mouse		phospho	MABI0312	ChIP/ WB/ IC	MCA-MABI0012-100-EX	100 µL (100 µg)
Anti Histone H3 T11ph	Rat	T11 (Threonine 11)	phospho	6G12C5	WB/ IC	CAC-CE-035A	100 µL (100 µg)
Anti Histone H3 T32ph	Rat	T32 (Threonine 32)	phospho	6C7G12	WB/ IC	CAC-CE-036A	100 µL (100 µg)
Anti phospho Histone H2B (Ser14)	Mouse	S14 (Serine 14)	phospho	MABI0251	ChIP/ WB/ IC	MCA-MABI0251-100-EX	100 µL (100 µg)

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