

ab115054 – Histone H3 (mono- methyl K4) Quantification Kit (Colorimetric)

Instructions for Use

For the measurement of global H3K4me

This product is for research use only and is not intended for diagnostic use.

Table of Contents

INTRODUCTION

1. BACKGROUND	2
2. ASSAY SUMMARY	3

GENERAL INFORMATION

3. PRECAUTIONS	4
4. STORAGE AND STABILITY	4
5. MATERIALS SUPPLIED	5
6. MATERIALS REQUIRED, NOT SUPPLIED	5
7. LIMITATIONS	6
8. TECHNICAL HINTS	6

ASSAY PREPARATION

9. REAGENT PREPARATION	7
10. SAMPLE PREPARATION	7

ASSAY PROCEDURE

11. ASSAY PROCEDURE	9
---------------------	---

DATA ANALYSIS

12. ANALYSIS	10
--------------	----

RESOURCES

13. TROUBLESHOOTING	11
14. NOTES	12

1. BACKGROUND

Epigenetic activation or inactivation of genes plays a critical role in many important human diseases, especially in cancer. A major mechanism for epigenetic inactivation of the genes is methylation of CpG islands in genome DNA caused by DNA methyltransferases. Histone methyltransferases (HMTs) control or regulate DNA methylation through chromatin-dependent transcription repression or activation. HMTs transfer 1-3 methyl groups from S-adenosyl-L-methionine to the lysine and arginine residues of histone proteins. SET1, SET7/9, Ash1, ALL-1, MLL, ALR, Trx, and SMYD3 are histone methyltransferases that catalyze methylation of histone H3 at lysine 4 (H3K4) in mammalian cells. H3K4 mono-methylation is associated with silenced euchromatin regions in the genome and may serve as a global epigenetic mark and function in gene repression. The global H3K4 mono-methylation can also be changed by inhibition or activation of HMTs. Thus, quantitative detection of global mono-methyl histone H3K4 would provide useful information for better understanding epigenetic regulation of gene activation/repression and for developing HMT-targeted drugs.

ab115054 provides a tool for measuring global mono-methylation of histone H3K4.

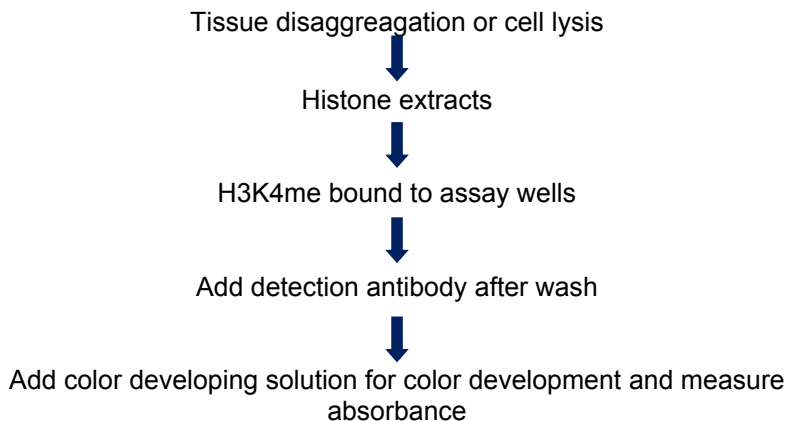
This kit has the following features:

- Quick and efficient procedure, which can be finished within 2.5 hours
- Innovative colorimetric assay without the need for radioactivity, electrophoresis, or chromatography
- Specifically captures H3K4me with the detection limit as low as 2 ng/well and detection range from 20 ng-5 µg/well of histone extracts
- The control is conveniently included for the quantification of the amount of H3K4me
- Strip microplate format makes the assay flexible: manual or high throughput

- Simple, reliable, and consistent assay conditions

Abcam's Histone H3 (mono-methyl K4) Quantification Kit (Colorimetric) is designed for measuring global histone H3K4 mono-methylation. In an assay with this kit, the mono-methylated histone H3 at lysine 4 is captured to the strip wells coated with an anti-H3K4me antibody. The captured H3K4me can then be detected with a labeled detection antibody, followed by a color development reagent. The ratio of H3K4me is proportional to the intensity of absorbance. The absolute amount of H3K4me can be quantified by comparing to the standard control.

2. ASSAY SUMMARY



3. PRECAUTIONS

Please read these instructions carefully prior to beginning the assay.

All kit components have been formulated and quality control tested to function successfully as a kit. Modifications to the kit components or procedures may result in loss of performance.

4. STORAGE AND STABILITY

Store kit as given in the table and away from light upon receipt.

Observe the storage conditions for individual prepared components in sections 9 & 10.

For maximum recovery of the products, centrifuge the original vial prior to opening the cap.

Check if the 10X Wash Buffer and Antibody Buffer contain salt precipitates before use. If so, warm at room temperature or 37°C and shake the buffer until the salts are re-dissolved.

5. MATERIALS SUPPLIED

Item	48 Tests	96 Tests	Storage Condition (Before Preparation)
10X Wash Buffer	10 mL	20 mL	4°C
Antibody Buffer	6 mL	12 mL	4°C
Detection Antibody, 1 mg/mL	5 µL	10 µL	-20°C
Color Developer	5 mL	10 mL	4°C
Stop Solution	3 mL	6 mL	4°C
Standard Control, 100 µg/mL	10 µL	20 µL	-20°C
8-Well Sample Strips (with Frame)	4	9	4°C
8-Well Standard Control Strips*	2	3	4°C

*These wells are identified by a green ring around the top.

6. MATERIALS REQUIRED, NOT SUPPLIED

These materials are not included in the kit, but will be required to successfully utilize this assay:

- Pipettes and pipette tips
- Reagent reservoirs
- Orbital shaker
- Microplate reader

7. LIMITATIONS

- Assay kit intended for research use only. Not for use in diagnostic procedures
- Do not use kit or components if it has exceeded the expiration date on the kit labels
- Do not mix or substitute reagents or materials from other kit lots or vendors. Kits are QC tested as a set of components and performance cannot be guaranteed if utilized separately or substituted
- Any variation in operator, pipetting technique, washing technique, incubation time or temperature, and kit age can cause variation in binding

8. TECHNICAL HINTS

- Avoid foaming or bubbles when mixing or reconstituting components
- Avoid cross contamination of samples or reagents by changing tips between sample, standard and reagent additions
- Ensure plates are properly sealed or covered during incubation steps
- Complete removal of all solutions and buffers during wash steps
- **This kit is sold based on number of tests. A ‘test’ simply refers to a single assay well. The number of wells that contain sample, control or standard will vary by product. Review the protocol completely to confirm this kit meets your requirements. Please contact our Technical Support staff with any questions**

9. REAGENT PREPARATION

All reagents provided are ready to use.

10. SAMPLE PREPARATION

Prepare histone extracts from cells/tissues treated or untreated by using your own successful method (acid extraction or high salt extraction). For your convenience and the best results, Abcam offers the Histone Extraction Kit (ab113476) optimized for use in Abcam's modified histone quantification series. Alternatively, preparation of histone extracts can also be performed using the procedure below:

10.1 For tissues (treated and untreated), weigh the sample and cut the sample into small pieces (1-2 mm³) with a scalpel or scissors. Transfer tissue pieces to a Dounce homogenizer. Add TEB buffer (PBS containing 0.5% Triton X 100, 2 mM PMSF and 0.02% NaN₃) at 200 mg/mL, and disaggregate tissue pieces by 50-60 strokes. Transfer homogenized mixture to a 15 mL conical tube and centrifuge at 3000 rpm for 5 minutes at 4°C. If total mixture volume is less than 2 mL, transfer mixture to a 2 mL vial and centrifuge at 10,000 rpm for 1 minute at 4°C. Remove supernatant.

For cells (treated and untreated), harvest cells and pellet the cells by centrifugation at 1000 rpm for 5 minutes at 4°C. Resuspend cells in TEB buffer at 10⁷ cells/mL and lyse cells on ice for 10 minutes with gentle stirring. Centrifuge at 3000 rpm for 5 minutes at 4°C. If total volume is less than 2 mL, transfer cell lysates to a 2 mL vial and centrifuge at 10,000 rpm for 1 minute at 4°C. Remove supernatant.

10.2 Resuspend cell/tissue pellet in 3 volumes (approx. 200 µL/10⁷ cells or 200 mg tissues) of extraction buffer (0.5N HCl + 10% glycerol) and incubate on ice for 30 minutes.

10.3 Centrifuge at 12,000 rpm for 5 minutes at 4°C and remove the supernatant fraction to a new vial.

- 10.4 Add 8 volumes (approx. 0.6 mL/ 10^7 cells or 200 mg tissues) of acetone and leave at -20°C overnight.
- 10.5 Centrifuge at 12,000 rpm for 5 minutes and air-dry the pellet. Dissolve the pellet in distilled water (30-50 $\mu\text{L}/10^7$ cells or 200 mg tissues).
- 10.6 Quantify the protein concentration. Aliquot the extract and store the extract at -20°C or -80°C .

Histone extracts can be used immediately or stored at -80°C for future use.

11. ASSAY PROCEDURE

- 11.1 Predetermine the number of strip wells required. Remove un-needed strip wells from the plate frame and place them back in the bag (seal the bag tightly and store at 4°C). Dilute the 10X Wash Buffer with distilled water (pH 7.2-7.5) at a 1:10 ratio to make 1X Wash Buffer (e.g. 1 mL of 10X Wash Buffer + 9 mL of water).
- 11.2 Add 50 µL of Antibody Buffer into each well. For the sample, add 1-2 µg of the histone extract into the sample wells. For the standard curve, dilute the Standard Control with Antibody Buffer to 1-100 ng/µL at 5-7 points (e.g., 1.5, 3, 6, 12, 25, 50, and 100 ng/µL). Add 1 µL of the Standard Control at the different concentrations into the standard wells (ringed in green). For the blank, do not add any nuclear extracts or standard control protein. Mix and cover the strip wells with Parafilm M and incubate at room temperature for 1-2 hours.
- 11.3 Aspirate and wash the wells with 150 µL of 1X Wash Buffer three times.
- 11.4 Dilute the Detection Antibody (at a 1:1000 ratio) to 1 µg/mL with Antibody Buffer. Add 50 µL of the Diluted Detection Antibody solution to each well and incubate at room temperature for 60 minutes on an orbital shaker (100 rpm).
- 11.5 Aspirate and wash the wells with 150 µL of 1X Wash Buffer six times
- 11.6 Add 100 µL of the Color Developer into the wells and incubate at room temperature for 2-10 minutes away from light. Monitor the color development in the sample and standard wells (blue).
- 11.7 Add 50 µL of Stop Solution to each well to stop enzyme reaction when the color in the standard wells containing the higher concentrations of standard control turns medium blue. The color should change to yellow and absorbance can be read on a microplate reader at 450 nm within 1-15 minutes.
- 11.8 Calculate % histone H3K4 mono-methylation using the formulae provided in Section 12 – Data Analysis.

12. ANALYSIS

Calculate the % Histone H3K4 mono-methylation using the following formula:

$$\text{Mono Methylation \%} = \frac{\text{Treated (Tested) Sample OD} - \text{Blank OD}}{\text{Untreated (Control) Sample OD} - \text{Blank OD}} \times 100\%$$

For the amount quantification, plot OD versus amount of Standard Control and determine the slope as delta OD/ng.

Calculate the amount of H3K4me using the following formula:

$$\text{Amount (ng/mg protein)} = \frac{\text{Sample OD} - \text{Blank OD}}{\text{Protein } (\mu\text{g})^* \times \text{Slope}} \times 1000$$

*Histone extract amount added into the sample well at step 11.2.

13. TROUBLESHOOTING

Problem	Cause	Solution
No Signal for Both the Standard Control and the Samples	Reagents are added incorrectly	Check if reagents are added in order and if some steps of the procedure are omitted by mistake
	Incubation time and temperature is incorrect	Ensure the incubation time and temperature described in the protocol is followed correctly
No Signal or Very Weak Signal for Only the Standard Control	The amount of Standard control is not added into the "standard control wells or is added insufficiently	Ensure a sufficient amount of control is added to the well
No Signal for Only the Sample	The protein sample is not properly extracted	Ensure the procedure and reagents are correct for the nuclear protein extraction
	The protein amount is added into well insufficiently	Ensure extract contains a sufficient amount of protein
	Protein extracts are incorrectly stored	Ensure the protein extracts are stored at -20°C or -80°C
High Background Present for the Blank	The well is not washed enough	Check if wash at each step is performed according to the protocol
	Contaminated by the Standard control	Ensure the well is not contaminated from adding the control protein or by using control protein contaminated tips
	Overdevelopment	Decrease development time in step 11.6

14. NOTES

UK, EU and ROW

Email: technical@abcam.com | Tel: +44-(0)1223-696000

Austria

Email: wissenschaftlicherdienst@abcam.com | Tel: 019-288-259

France

Email: supportscientifique@abcam.com | Tel: 01-46-94-62-96

Germany

Email: wissenschaftlicherdienst@abcam.com | Tel: 030-896-779-154

Spain

Email: soportecientifico@abcam.com | Tel: 911-146-554

Switzerland

Email: technical@abcam.com

Tel (Deutsch): 0435-016-424 | Tel (Français): 0615-000-530

US and Latin America

Email: us.technical@abcam.com | Tel: 888-77-ABCAM (22226)

Canada

Email: ca.technical@abcam.com | Tel: 877-749-8807

China and Asia Pacific

Email: hk.technical@abcam.com | Tel: 108008523689 (中國聯通)

Japan

Email: technical@abcam.co.jp | Tel: +81-(0)3-6231-0940

www.abcam.com | www.abcam.cn | www.abcam.co.jp