



HTRF® G9A HISTONE H3K9 DI-METHYLATION ASSAY (me0 → me2)

TECHNICAL NOTE

ABSTRACT G9a Histone H3K9 di-methylation assay measures the dimethylation of a biotinylated histone H3(1-21) peptide at lysine 9.

The HTRF G9a Histone H3K9 dimethylation assay uses a H3(1-21) lysine 9 un-methylated biotinylated peptide (substrate), a Eu3+-cryptate labeled anti-H3K9 me2 detection antibody and XL665-conjugated Streptavidin (SA-XL665).

The assay is performed in a single well and run in two steps: the enzymatic step and the detection step. HTRF signal is proportional to the concentration of dimethylated H3(1-21) peptide. The assays within this technical note were performed in a 384-well plate in a 20 µL final volume.

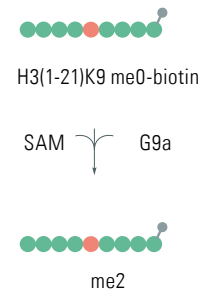
Enzyme	G9a
Substrate	H3(1-21)K9 me0-biotin ARTKQTARKSTGGKAPRKQ- LA-GG-K(Biotin)
Detection Antibody	Anti-H3K9 me2-Eu(K)

G9A HISTONE H3K9 DI-METHYLATION ASSAY AND REAGENTS

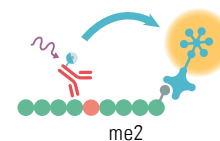
H3K9 me2-Eu(K) Ab.	Cisbio Bioassays	# 61KB2KAE
Streptavidin XL-665	Cisbio Bioassays	# 610SAXLA
Detection buffer	Cisbio Bioassays	# 62SDBRDD
G9a	BPS Bioscience	# 51000
Histone H3(1-21) lysine 9 un-methylated biotinylated peptide	AnaSpec	# 61702
S-(5'-Adenosyl)-L-methionine chloride (SAM)	Sigma	# A7007
BIX01294	Cayman Chemical	# 13124
Enzymatic buffer	50 mM Tris-HCl, pH 8.8, 10 mM NaCl, 4 mM DTT, 0.01% Tween20	

Data shown on this application note has been obtained using Greiner # 784075, 384-well white microplates. For more information on the white plates we recommend, please visit <http://www.htrf.com/htrf-technology/microplate-recommendations>.

Enzymatic step



Detection step



ASSAY PROTOCOL

ENZYMATIC STEP

- Prepare working solutions of enzyme, peptide substrate, cofactors and inhibitor in enzymatic buffer just prior to use.
- Add to a 384-well small volume plate in the following order:
 - 4 μ L of inhibitor (2.5X) or enzymatic buffer
 - 2 μ L of G9a enzyme (5X)
 - Incubate for 5 min at room temperature
 - 4 μ L of H3(1-21)K9 me0-biotin peptide/ SAM pre-mixture (2.5X)
- Cover the plate with a plate sealer and incubate at room temperature.

DETECTION STEP

- Prepare detection mixture containing the anti-H3K9 me2-Eu(K) 2X according to the product datasheet recommended final concentration and SA-XL665 at 20 nM in detection buffer. Final concentration of 10 nM for SA-XL665 corresponds to 0.25X the final concentration of peptide substrate.
- Add 10 μ L of detection mixture (2X) to the plate.
- Cover the plate with a plate sealer and incubate 1h at room temperature.
- Remove plate sealer and read fluorescence emission at 665nm and 620nm wavelengths on an HTRF compatible reader.

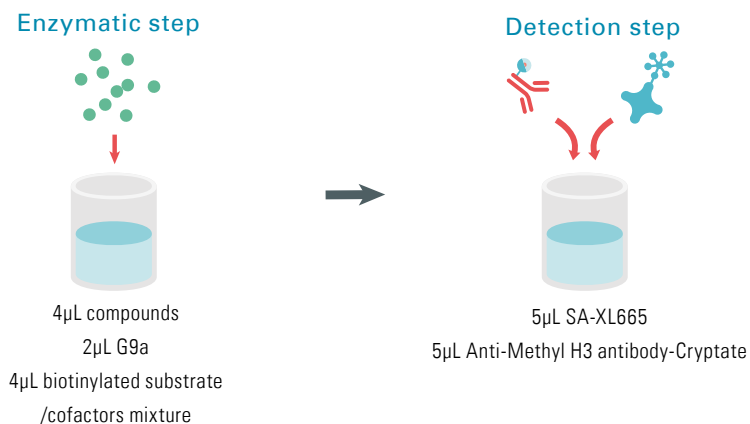
$$\text{HTRF Ratio} = (665\text{nm}/620\text{nm}) \times 10^4$$

$$\text{Delta Ratio} = \text{Sample Ratio} - \text{Ratio negative}$$

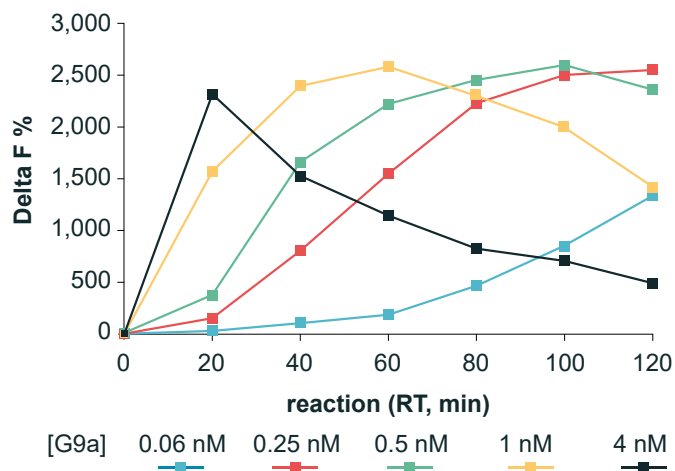
$$\text{Delta F\%} = (\text{Delta Ratio}/\text{Ratio Negative}) \times 100$$

DISTRIBUTION: ENZYME INHIBITION STUDY

	ENZYMATIC STEP				DETECTION STEP	
	ENZYMATIC BUFFER	INHIBITOR	G9A	COFACTOR/SUBSTRATE MIXTURE	CRYPTATE-Ab	SA-XL 665
SAMPLE	-	4 μ L	2 μ L	4 μ L	5 μ L	5 μ L
POSITIVE CONTROL	4 μ L	-	2 μ L	4 μ L	5 μ L	5 μ L
NEGATIVE CONTROL	6 μ L	-	-	4 μ L	5 μ L	5 μ L

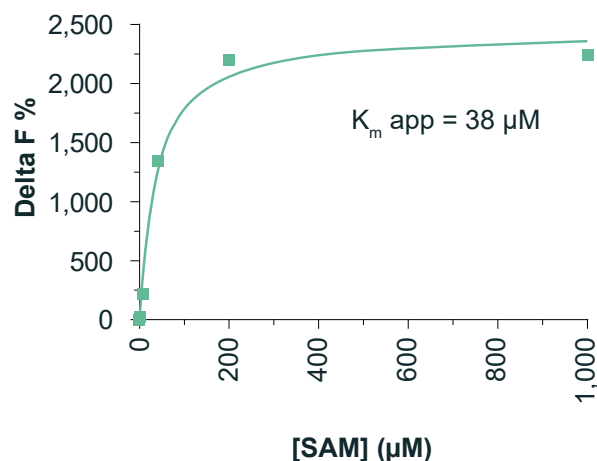


1. TIME COURSE AND ENZYME TITRATION



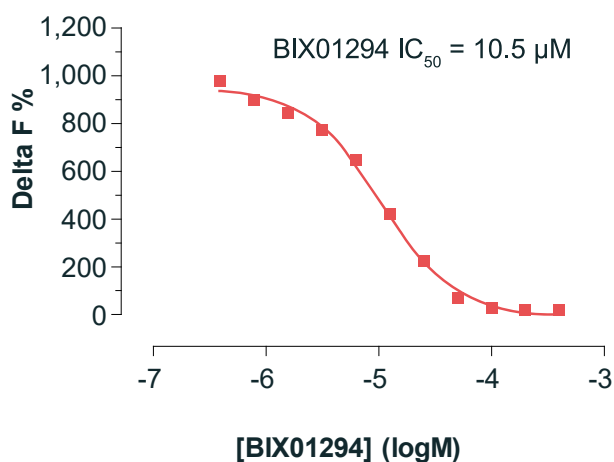
This step allows the optimal enzyme concentration and enzyme reaction time to be determined. Human recombinant G9a was serially diluted to the concentrations indicated in the figure (0.03, 0.13, 0.2, 0.5, 2 nM), and the assay was carried out with 80 nM biotinylated H3(1-21) me0 peptide substrate and 200 μ M SAM. Enzyme kinetics depends on the G9a specific activity and substrate concentrations. The enzymatic reaction was carried out at RT and then stopped by adding H3K9me2-K Ab and SA-XL665 (detection reagents) after each time point (20, 40, 60, 80, 100, 120 min). For further experiments, a reaction time of 60 min at RT and 0.5 nM enzyme were selected.

2. SAM TITRATION



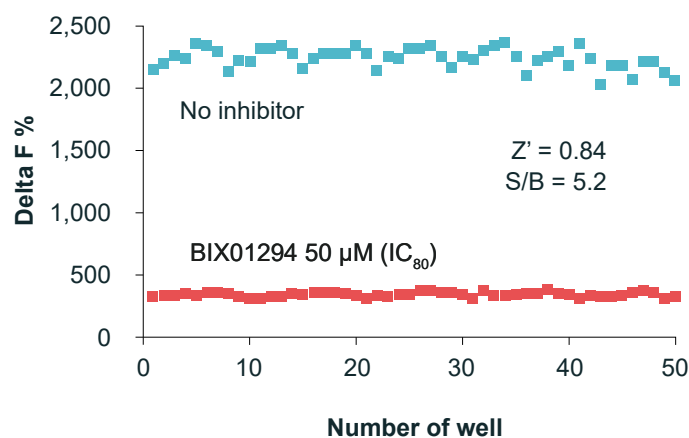
This step allows the determination of K_m for SAM. The K_m value was determined with 0.5 nM G9a and 80 nM biotinylated H3K9(1-21)me0 substrate in the enzymatic step. We recommend testing SAM concentrations ranging from 1,000 μ M to 0.195 μ M (serial dilutions). The enzyme reaction was stopped by adding the detection reagents at the optimal incubation period (RT, 60 min). The 38 μ M K_m value for SAM was determined from this experiment using a Michaelis-Menten.

3. ENZYME INHIBITION



G9a H3K9 dimethylation inhibitor assay was validated by measuring the activity of BIX01294 inhibitor. This assay was performed using 50 μ M SAM and 0.5 nM G9a. Serial dilutions of BIX01294 ranged from 6.1 nM to 100 μ M and were pre-incubated for 5 min with G9a. Enzymatic reaction was initiated by the addition of 80 nM biotinylated H3K9 (1-21) me0 peptide substrate plus 50 μ M SAM. The enzyme reaction was stopped with the detection reagents after 60 min incubation at RT. IC50 value calculated from the inhibition curve was 10.5 μ M.

4. Z' FACTOR DETERMINATION



The robustness of the assay was proven by performing a Z' determination with BIX01294 at IC80 (50 μ M). The enzyme reaction was carried out with 1 nM G9a, 100 μ M SAM and 200 nM H3K9(1-21)me0 substrate for 60 min at RT. Z' of 0.84 shows the robustness of the assay.

For more information, please visit us at www.htrf.com/epigenetic-toolbox-reagents

RELATED ARTICLES

EPIgeneous™ Methyltransferase assay: a new HTRF Universal, SAH detection assay to assess methyltransferase activity.

Roux T, Douayry N, Junique S, Sergeant L, Donsimoni G, Bourrier E, Trinquet E, LaRose R, Degorce F. - EpiCongress 2013, Boston, MA, USA.

High-Throughput, Homogeneous Histone Demethylase JARID1A, and JARID1C Enzymatic applications with HTRF Technology.

Adachi K, Tokuda C, Roux T, Trinquet E, Degorce F - Miptec 2013, Basel, Switzerland.

High-Throughput, Homogeneous Histone H3 Methyltransferase, (HMT) and Demethylase (HDM) Enzyme Assays using HTRF®, Technology: G9a H3K-27dimethylation assay example.

Roux T, Adachi K, Tokuda C, Verdi J, Junique S, Trinquet E, Gonzalez-Moya A, Degorce F - SLAS 2013, Orlando, USA.

High-Throughput, Homogeneous Histone H3 Methyltransferase (HMT) and Demethylase (HDM) Enzyme Assays using HTRF Technology.

Adachi K, Tokuda C, Chevallier F, Roux T, Gonzalez-Moya A, Degorce F. - Discovery on Target 2012, Boston, MA, USA.

Development of a panel of HTRF assay reagents for epigenetic targets.

Chevallier F, Jean A, Raynaldy D, Romier M, Servent F, Tokuda C, Adachi K. - Miptec 2011, Basel, Switzerland.

Development of G9a (Histone H3K9 methyltransferase) assay using HTRF technology.

Adachi K, Tokuda C, Chevallier F, Preaudat M. - SBS 2011, Orlando, USA.

FOR MORE INFORMATION

Europe and other countries +33(0)466 796 705 U.S. and Canada 1-888-963-4567

China +86 10 8080 9288 Japan +81-(0)43-306-8712

Visit www.cisbio.com to find a list of our regional distributors



cisbio