TECHNICAL NOTE

LANCE *Ultra* LSD1 Histone H3-Lysine 4 Demethylase Assay

U-TRF #38

LANCE® *Ultra*

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This LANCE *Ultra* immunodetection assay measures the demethylation of a biotinylated Histone H3 (1-21) peptide mono-methylated at lysine 4.

Europium-anti-unmodified Histone H3 Lysine 4 (H3K4) Antibody

- TRF0404-D: 10 µg, 1,562 assay points*
- TRF0404-M: 100 µg, 15,625 assay points*

**40 fmol/assay point*

Peptidic Substrate Sequence:

ART**K**(**me1**)QTARKSTGGKAPRKQLA-GG-K(Biotin)-NH_2

LANCE *Ultra* Assays

LANCE *Ultra* time-resolved fluorescence resonance energy transfer (TR-FRET) assays use a proprietary europium chelate donor dye, W1024 (Eu), together with U*Light*™, a small molecular weight acceptor dye with a red-shifted fluorescent emission.

In this technical note, we present the optimization of an epigenetic enzymatic assay using a biotinylated Histone H3-derived methylated peptide as substrate. The unmodified peptide is captured by the Eu-labeled antibody (Eu-Ab) and U*Light*-Streptavidin (U*Light*-SA), which brings the Eu donor and U*Light* acceptor dye molecules into close proximity. Upon irradiation at 320 or 340 nm, the energy from the Eu donor is transferred to the U*Light* acceptor dye which, in turn, generates light at 665 nm. The intensity of the light emission is proportional to the level of biotinylated reaction product.

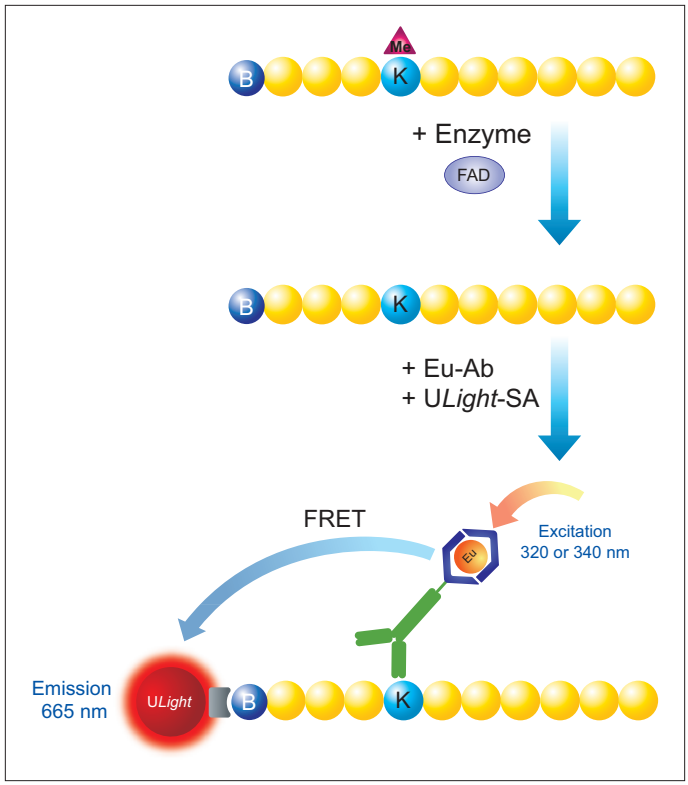

Figure 1. Schematic representation of the LANCE *Ultra* detection of a modified histone peptide.

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Development of a LSD1 Histone H3-Lysine 4 Demethylase Assay:

Reagents needed for the assay:

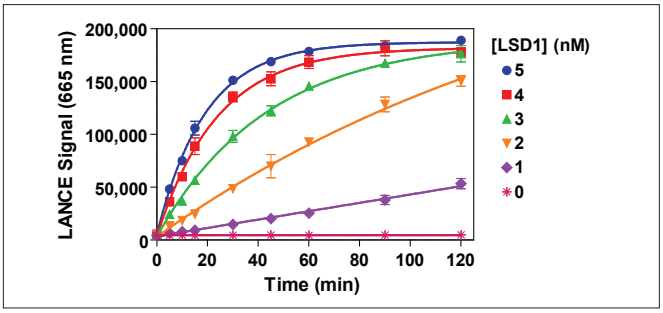
Europium-anti-unmodified Histone H3 Lysine 4 (H3K4) Antibody	PerkinElmer # TRF0404
LANCE *Ultra* U*Light*-Streptavidin	PerkinElmer # TRF0102
Histone H3 (1-21), H3K4(me1) peptide, biotinylated	AnaSpec # 64355
LANCE Detection Buffer, 10X	PerkinElmer # CR97-100
LSD1 (human), recombinant	BPS BioScience # 50100
White opaque OptiPlate™-384	PerkinElmer # 6007299
TopSeal™-A films	PerkinElmer # 6005185
Trans-2-Phenylcyclopropylamine (Tranylcypromine)	Sigma # P8511

Assay Buffer: 50 mM Tris-HCl pH 9.0, 50 mM NaCl, 1 mM DTT and 0.01% Tween-20.

Standard Protocol

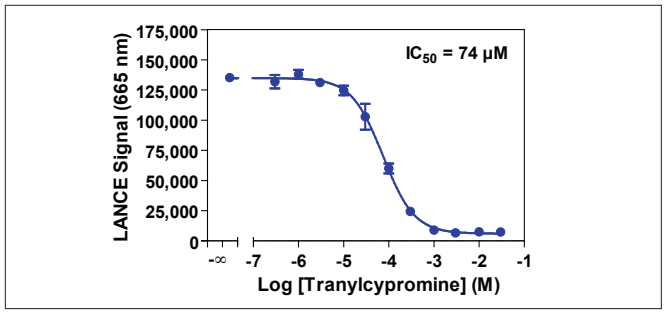
- Dilute LSD1 enzyme, tranylcypromine (inhibitor) and biotinylated peptide substrate in Assay Buffer just before use.
- Add to the wells of a white OptiPlate-384:
  - 5 µL of inhibitor (2X) or Assay Buffer
  - 2.5 µL of enzyme (4X)
  - 2.5 µL of biotinylated Histone H3K4me1 peptide (4X)
- Cover the plate with TopSeal-A film and incubate at room temperature (RT).
- Prepare a 4X Detection Mix by diluting the Eu-Ab to 8 nM and U*Light*-Streptavidin to 200 nM in 1X LANCE Detection Buffer (final concentrations of 2 nM and 50 nM, respectively, in 20 µL total assay volume).
- Prepare a 4X Stop Solution containing 1.2 mM tranylcypromine in 1X LANCE Detection Buffer (final concentration of 300 µM in 20 µL total assay volume).
  - 5 µL of Tranylcypromine Stop Solution and incubate 5 min at RT
  - 5 µL of Detection Mix
- Cover with TopSeal-A film and incubate for 60 min at RT.
- Remove the TopSeal-A film and read signal with the EnVision® Multilabel Reader in TR-FRET mode (excitation at 320 or 340 nm & emission at 665 nm).

Experiment 1: Enzyme Titration and Time-Course



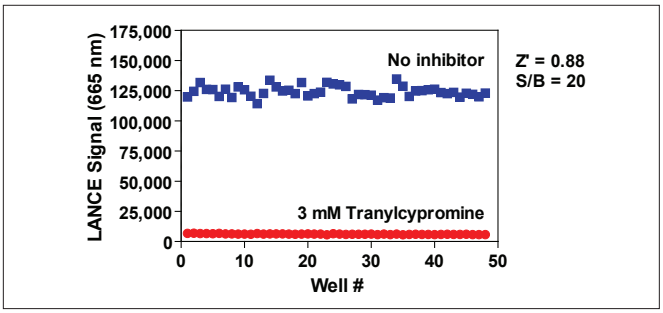
Enzymatic progress curves were performed by incubating LSD1 at concentrations ranging from 1 to 5 nM with 200 nM biotinylated Histone H3K4me1 peptide substrate. Reactions were stopped by the addition of tranylcypromine at indicated times. The Detection Mix was then added and signal was read after 60 min. A 60 min reaction time using 2 nM enzyme was selected for all subsequent experiments.

Experiment 2: Enzyme Inhibition



Serial dilutions of tranylcypromine from 300 nM to 30 mM were pre-incubated for 10 min with 2 nM LSD1. Enzymatic reactions were initiated by the addition of 200 nM biotinylated Histone H3K4me1 peptide substrate. Enzymatic reactions contain 1% DMSO.

Experiment 3: Z'-factor Determination



LSD1 (2 nM) was pre-incubated with or without 3 mM tranylcypromine for 10 min. Enzymatic reactions were initiated by the addition of 200 nM biotinylated Histone H3K4me1 peptide substrate. Enzymatic reactions contain 1% DMSO.

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009569_01 Printed in USA Mar. 2011