Supplemental Information

Functional Crosstalk between Histone H2B Ubiquitylation and H2A Modifications and Variants

Wojcik et al.



Supplementary Figure 1. **ChIP-seq profile of H2BK120ub in HeLa cells.** H2BK120ub is localized within gene bodies and is correlated with active transcription. H2BK120ub ChIP-seq coverage was scaled to a 1kb distance from the TSS to the TES. Genes were divided into three groups, based on their RNA-seq levels (quantified as reads per kilobase per million reads; RPKM). Data processed as described in Materials and Methods (data source listed in Supplementary Table 3).





Supplementary Figure 2. *In vitro* ubiquitylation of H2BK120. (a) Schematic presentation of the RING-type ubiquitylation mechanism illustrated here using an HA-tagged ubiquitin as employed in the library-based screen. (b) Left: RNF20/40 expression and purification in SF9 cells analyzed by SDS-PAGE (stained with Coomassie Brilliant Blue). Right: α -RNF20 immunoblot with and without ubiquitylation master mix containing hE1 and UBE2A. Autoubiquitylation of functional RNF20/40 is observed in the presence of functional UBE2A. (c) *In vitro* ubiquitylation time course using MN substrates and native, unlabeled ubiquitin. Normalized H2BK120ub levels (α H2BK120ub/H3 α) are plotted relative to the 30 min time point. Data are mean \pm s.e.m. (n = 3). Full WB is shown in Supplementary Fig. 16a.



Supplementary Figure 3. Crosstalk between H2BK120ub and GlcNAcylation at the C-terminal helix of histone H2B. (a) Structure (PDB 1KX5) of the C-terminal helix of H2B within the nucleosome. GlcNAcylation sites are highlighted in blue and H2B K120 highlighted in red. Nucleosomal DNA is highlighted in green. (b) *In vitro* ubiquitylation of wt and GlcNAcylated mononucleosomes (MNs) (g112: H2BS112GlcNAc; g123: H2BS123GlcNAc; gg: H2BS112GlcNAc_S123GlcNAc) analyzed by western blotting. (c) Schematic presentation of the antibody-free Cy3-based *in vitro* ubiquitylation assay for a RING type E3 ligase. (d) *In vitro* ubiquitylation using Cy3-labeled ubiquitin and MNs as described in panel B. Cy3-readout by in-gel fluorescence and the corresponding protein stain used as loading control (SYPRO Ruby stain). (e) *In vitro* ubiquitylation of mononucleosomes with a minimal DNA overhang and mononucleosomes containing an asymmetrical 80 bp DNA overhang. Left: Representative western blot analysis after *in vitro* ubiquitylation. Right: Quantification of the immunoblotting data. Normalized H2BK120ub levels (α H2BK120ub/ α H3) are plotted relative to wt-MNs. Data are mean \pm s.e.m. (n = 3). Full gel images are presented in Supplementary Fig. 16b/c/d.



Supplementary Figure 4. *In vitro* ubiquitylation of 12mer chromatin arrays. (a) *In vitro* ubiquitylation time course using wt-12mer chromatin arrays and Cy3-labeled ubiquitin. Left: Representative SDS-PAGE after *in vitro* ubiquitylation (Cy3 fluorescence detection and SYPRO Ruby protein stain as loading control). The image was cropped for illustration purposes between lane 60 min and lane 120 min. Right: Quantification of the relative ubiquitylation levels by in-gel fluorescence. Normalized ubiquitylation levels (Cy3-H2Bub/H4) are plotted relative to the 60 min time point (n = 2). (b) *In vitro* ubiquitylation of mono- and oligonucleosomes. Left: Representative Cy3 readout and loading control. Right: Quantification of ubiquitylation activities (Cy3-H2Bub/H4) of wt mononucleosomes, 4mer and 12mer chromatin arrays. Ubiquitylation activities are normalized to MNs (n = 3). (c) *In vitro* ubiquitylation of wt- and GlcNAcylated-12mer chromatin arrays (g112: H2BS112GlcNAc; g123: H2BS112GlcNAc; g2: H2BS112GlcNAc_S123GlcNAc) using Cy3-labeled ubiquitin. Left: Representative Cy3 readout and loading control. Right: Quantification of ubiquitylation activities (Cy3-H2Bub/H4). Normalized ubiquitylation levels (Cy3-H2Bub/H4) are plotted relative to wt(n = 4). All data are mean \pm s.e.m. Full gel images are given in Supplementary Fig. 17.

H3**Y41** H3**R42** H3**K56**

b

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Supplementary Figure 5. Crosstalk between H2BK120ub and modification/mutants at the DNA entry/exit site. (a) Structure of the DNA entry/exit site of the nucleosome (PDB 1KX5). Positions H3Y41, H3R42A and H356 and their respective side chains are highlighted in blue. Nucleosomal DNA is highlighted in green. (b,c) In vitro ubiquitylation of wt- and modified MNs. (b) Left: Western blot analysis of *in vitro* ubiquitylation. Right: Quantification of immunoblot data (α H2BK120ub/ α H2B) relative to wt (n = 3). (c) Left: In-gel fluorescence and protein stain (SYPRO Ruby) as loading control. Right: Quantification of ubiquitylation levels (Cy3-H2Bub/H4) relative to wt (n = 4). (d,e) In vitro ubiquitylation of wt- and modified 12mer chromatin arrays. (d) Left: Western blot analysis of *in vitro* ubiquitylation. Right: Quantification of immunoblot data (αH2BK120ub/αH4) relative to wt (n = 4). (e) Left: In-gel fluorescence and protein stain (SYPRO Ruby) as loading control. Right: Quantification of ubiquitylation levels (Cy3-H2Bub/H4) relative to wt (n = 3). All data are mean \pm s.e.m. Full images are shown in Supplementary Fig. 18.

substrates

substrates



Traces of free DNA



Supplementary Figure 6. Addition of linker histone H1.3 inhibits ubiquitylation of H2BK120 *in vitro*. (a) Native gel electrophoresis of MNs with a 80bp DNA overhang and different amounts of linker histone H1.3 (SYBR Gold nucleic acid stain). The gel shift indicates binding of linker histone H1.3. (b,c) *In vitro* ubiquitylation of MNs with a 80bp DNA overhang in presence of linker histone H1.3. (b) Western blot analysis of the *in vitro* ubiquitylation assay. (c) Quantification of immunoblot data (α H2BK120ub/ α H3) relative to wt. Data are mean \pm s.e.m. (n = 3). *In vitro* ubiquitylation was performed using standard conditions as described in the methods section (substrate concentration: 1µM of nucleosomal H2B corresponds to 0.5 µM mononucleosomes).

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Supplementary Figure 7. Crosstalk between H2BK120ub and the N-terminal tail of H2A. (a) Structure of the H2A tail region within the nucleosome (PDB 1KX5). Positions H2AK15, H2AK13, H2AK9 and H2AK5 and the respective side chains are highlighted in blue. Nucleosomal DNA is highlighted in green. (b) *In vitro* ubiquitylation of MNs containing histone variant H2A.Z paired with H3.1 and H3.3. Western Blot analysis of *in vitro* ubiquitylation reactions. (c) Full amino acid sequences of H2A/H2A.Z mutants and chimeras employed in this study. Introduced changes to the canonical H2A/H2A.Z amino acid sequences are highlighted in red. Full WB is presented in Supplementary Fig. 19a.

Mus Musculus (Mouse)

UniProt ID:				
			K5 K9 K13 K15*	
Q8CGP5	H2A1F MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
Q8CGP7	H2A1K MOUSE	1	MSGRGKQGCKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
COHKE9	H2A1P MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
Q6GSS7	H2A2A MOUSE	1	MSGRGKQGCKARAKAKSRSSRAGLQFPVGRVHRLLRKGN-YAERVGAGAPVYMAAVLE	57
P27661	H2AX MOUSE	1	MSGRGKTGGKARAKAKSRSSRAGLQFPVGRVHRLLRKGH-YAERVGAGAPVYLAAVLE	57
COHKE2	H2A1C MOUSE	1	MSGRGKQGCKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
COHKE1	H2A1B MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
Q64522	H2A2B MOUSE	1	MSGRGKQGCKARAKAKSRSSRAGLQFPVGRVHRLLRKGN-YAERVGAGAPVYMAAVLE	57
Q64523	H2A2C MOUSE	1	MSGRGKQGGKARAKAKSRSSRAGLQFPVGRVHRLLRKGN-YAERVGAGAPVYMAAVLE	57
COHKE5	H2A1G MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
Q8CGP6	H2A1H MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
COHKE8	H2A10 MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
Q8R1M2	H2AJ MOUSE	1	MSGRGKQGGKVRAKAKSRSSRAGLQFPVGRVHRLLRKGN-YAERVGAGAPVYLAAVLE	57
COHKE4	H2A1E MOUSE	1	MSGRGKQGCKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
COHKE6	H2A11 MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
COHKE7	H2A1N MOUSE	1	MSGRGKQGGKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
Q8BFU2	H2A3 MOUSE	1	MSGRGKQGGKARAKAKSRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
COHKE3	H2A1D MOUSE	1	MSGRGKQGCKARAKAKTRSSRAGLQFPVGRVHRLLRKGN-YSERVGAGAPVYLAAVLE	57
POCOS6	H2AZ MOUSE	1	MAGGKAGKOSGKAKTKAVSRSQRAGLQFPVGRIHRHLKSRTTSHGRVGATAAVYSAAILE	60
Q3THW5	H2AV_MOUSE	1	MAGGKAGKDSGKAKAKAVSRSQRAGLQFPVGRIHRHLKTRTTSHGRVGATAAVYSAAILE	60

Xenapus laevis (African clawed frog)

Q6GM86	H2AX XENLA	1	MSGRGKAVSKTRAKAKTRSSRAGLQFPVGRVHRLLRKGN-YAHRVGAGAPVYLAAVLE	57
P06897	H2A1 XENLA	1	MSGRGKQGGKTRAKAKTRSSRAGLQFPVGRVHRLLRKGN-YAERVGAGAPVYLAAVLE	57
P06898	H2A2 XENLA	1	MSGRGKQGGKTRAKSKTRSSRAGLQFPVGRVHRLLRKGN-YAERVGAGAPVYLAAVLE	57
Q6GM74	H2AV XENLA	1	MAGGKAGKDSGKAKAKAVSRSQRAGLQFPVGRIHRHLKTRTTSHGRVGATAAVYSAAILE	60
P70094	H2AZL_XENLA	1	MAGGKAGKDTGKAKATSTTRSSRAGLQFPVGRIHRLLKNRTTSHGRVGGTAAVYTAAILE	60

Gallus gallus (Chicken)

Drosophila melanogaster (Fruit fly)

P84051	H2A_DROME	1	MSGRGK-GGKVKGKAKSRSNRAGLQFPVGRIHRLLRKGN-YAERVGAGAPVYLAAVME	56
P08985	H2AV_DROME	1	MAGGKAGKDSGKAKAKA <mark>V</mark> SRSARAGLQFPVGRIHRHLKSRTTSHGRVGATAAVYSAAILE	60
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Caenorhabditis elegans (Roundworm)

P09588	H2A_CAEEL	1	-MSGRGKGKAKTGGKAKSKSKAGLQFPVGRLHRILRKGN-YAQRVGAGAPVYLAAVLE	58
Q27511	H2AV_CAEEL	1	MAGGKGKAGKDSGKSKSKVVSRSARAGLQFPVGRIHRFLKQRTTSSGRVGATAAVYSAAILE	62

Saccharomyces cerevisiae (Baker's yeast)

P04911	H2A1 YEAST	1	MSGGKGGKAGSAAKASOSRSAKAGLTFPVGRVHRLLRRGN-YAQRIGSGAPVYLTAVLE	58
P04912	H2A2_YEAST	1	MSGGKGGKAGSAAKASQSRSAKAGLTFPVGRVHRLLRRGN-YAQRIGSGAPVYLTAVLE	58
Q12692	H2AZ_YEAST	1	MSGKAHGGKGKSGAKDSGSLRSOSSARAGLQFPVGRIKRYLKRHATGRTRVGSKAAIYLTAVLE	65

Supplementary Figure 8. Interplay between Lys-15 of H2A and Val-17 of H2A.Z (and H2A.V) is highly conserved in metazoans. Amino acid sequence of canonical H2A and H2A variants were aligned using the UniProt database (H2A variants H2A.bdd and macroH2A are not shown in the alignment). H2AZL_Xena (UniProt ID P70094) encodes for histone H2A.Z-like variant found in Xenopus lavis.



Supplementary Figure 9. Crosstalk between H2BK120ub and the N-terminal tail of H2A analyzed by *in vitro* ubiquitylation using Cy3-Ub. (a) *In vitro* ubiquitylation of mononucleosomes containing H2A/H2A.Z mutants using Cy3-Ub. Top: Cy3 readout and corresponding loading control (SYPRO Ruby stain). Bottom: Quantification of ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-MN (n = 4). (b) *In vitro* ubiquitylation of 12mer chromatin arrays containing H2A.Z and H2A.Z_TS measured by in-gel fluorescence. Top: Cy3 readout and corresponding loading control (SYPRO Ruby stain). Bottom: Quantification of ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-MN (n = 4). (b) *In vitro* ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-MN (n = 4). (b) *In vitro* ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-MN (n = 4). (b) *In vitro* ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-MN (n = 4). (b) *In vitro* ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-MN (n = 4). (b) *In vitro* ubiquitylation activities (Cy3-H2Bub/H4) plotted relative to wt-12mer chromatin arrays (n = 4). All data are mean \pm s.e.m. Full gel images are shown in Supplementary Fig. 19b/c.



Supplementary Figure 10. Regulation of H2BK120ub by the H2A N-terminal tail in HEK293T cells. (a) Analysis of ChIP input (after MNase digestion and DNA isolation), showing that MNase digestion provided predominately MNs. (b) Full image of WB analysis, which was cropped for illustration purposes in Fig. 5a. (c) WB analysis of H2BK120ub levels after ChIP using H2B as loading control. (d) Left: Representative WB including a negative control: H2BK120R (K120R). Right: Quantification of H2BK120ub levels after ChIP in HEK 293T cells. Each data set of ubiquitylation levels (α H2BK120ub/ α H3) was normalized to wt (100%) and H2BK120R (0%) followed by calculating the mean \pm s.e.m. (n = 4). (e) Previously determined *in vitro* ubiquitylation activities for comparison: MN containing H2A K \rightarrow Q mutants (Fig. 3d), acetylated H2A (Fig. 3a) and 12mer chromatin arrays containing acetylated H2A (Fig. 3b). Full WBs are shown in Supplementary Fig. 20. Ctrl: Control (mock transfection); wt: H2A-FLAG; Q1: H2A K15Q-FLAG; Q2: H2A K13/15Q-FLAG; pQ: H2A K5/9/13/15Q-FLAG).









Supplementary Figure 11. Characterization of recombinant and semisynthetic proteins used in this study. Left: MS spectra of the indicated proteins and RP-HPLC chromatogram (solvent gradients are individually noted). Right: Deconvoluted MS-spectra and comparison of calculated and found MW. Serine modified with N-acetylglucosamine: SGlcNAc; Tail swap mutant: TS (see Supplementary Fig. 7c); Lysine acetylation: KAc; tyrosine phosphorylation: YPh.



Supplementary Figure 12. Characterization of histone octamers. Individual histone octamers were analyzed by SDS-PAGE and stained with Coomassie Brilliant Blue.



Supplementary Figure 13. Characterization of mononucleosome substrates. Individual MNs were analyzed by native gel electrophoresis and stained with SYBR Gold nucleic acid stain.



Supplementary Figure 14. Characterization of 12mer chromatin array substrates. Individual 12mer chromatin arrays were analyzed by native gel electrophoresis (APAGE gel) and stained with SYBR Gold nucleic acid stain. Crude assemblies and purified samples are shown for wt-, g112,- g123 -and gg-12mer chromatin arrays.



Supplementary Figure 15. Full images for data presented in Fig. 3. Blots were cropped for illustration purposes. (a) Full image for WB analysis presented in Fig. 3a. WB was physically cut before antibody incubation. (b) Full image for WB analysis presented in Fig. 3b. (c) Full image for WB analysis presented in Fig. 3d. The asterisks mark non-specific antibody binding. (d) Full image for WB analysis presented in Fig. 3e.



Supplementary Figure 16. Full images for data presented in Supplementary Fig 2/3. Images were cropped for illustration purposes. (a) Full image for WB analysis presented in Supplementary Fig. 2c. (b) Full image for WB analysis presented in Supplementary Fig. 3b. (c) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 3d. (d) Full image for WB analysis presented in Supplementary Fig. 3e.



Supplementary Figure 17. Full images for data presented in Supplementary Fig. 4. Images were cropped for illustration purposes. (a) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 4a. (b) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 4b.



Supplementary Figure 18. Full images for data presented in Supplementary Fig. 5. Images were cropped for illustration purposes. (a) Full image for WB analysis presented in Supplementary Fig. 5b. (b) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 5c. (c) Full image for WB analysis presented in Supplementary Fig. 5d. (d) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented of Cy3 readout and loading control (SYPRO Ruby Fig. 5d. (d) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 5e.



Supplementary Figure 19. Full images for data presented in Supplementary Fig. 7/9. Images were cropped for illustration purposes. (a) Full image for WB analysis presented in Supplementary Fig. 7b. WB was physically cut before antibody incubation. (b) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 9a. (c) Full image of Cy3 readout and loading control (SYPRO Ruby protein stain) presented in Supplementary Fig. 9b.



Supplementary Figure 20. Full images for data presented in Supplementary Fig. 10. Images were cropped for illustration purposes. (a) Full image for WB analysis presented in Supplementary Fig. 10c. WB was physically cut before antibody incubation. (b) Full image for WB analysis presented in Supplementary Fig. 10d. WB was physically cut before antibody incubation.

Supplementary Table 1. Library-based screen for *de novo* **ubiquitylation activity.** Substrates are ranked by *de novo* ubiquitylation activity from least active to most active. DNA reads were normalized to library input and the average signal intensities of the six wt-controls. Data are mean of $log_2(fold change)$ values \pm s.e.m. (n = 3). Individual nucleosomes are color coded as in Fig. 2. Gray: Wt-controls; Red: Negative controls (pre-modified H2BK120); Light red: Free DNA; Dark blue: H2A N-terminal tail acetylation (single modification or combinations of K5Ac, K9Ac, K13Ac, K15Ac); Light blue: Nucleosomes containing histone variant H2A.Z; Orange: Entry/exit site modulators; Green: H2BS112GlcNAc. Rounded figures are displayed, the calculation of the mean and the s.e.m. was carried out with exact values.

							log2(fold change)	og2(fold change)	log2(fold change)	log2(fold change)	
	Barcode	Histone H2A	Histone H2B	Histone H3	Histone H4	Modified	IP1	IP2	IP3	Average	SEM
MN BC#116	CACTGT	H2AK5,9,13,15ac	H2B WT	H3 WT	H4 WT	H2A	-1.06	-0.60	-0.76	-0.81	0.13
MN BC#108	ACGCAG	H2A WT	H2BK120ac	H3 WT	H4 WT	H2B	-1.04	-0.50	-0.73	-0.76	0.16
MN BC#122	CTGCTA	H2AK5,9,13,15ac	H2BK5,11,12,16,20ac	H3K9,14,18,23,27ac	H4 WT	H2A, H2B, H3	-0.43	-0.57	-1.09	-0.70	0.20
MN BC#32	ACATGT	H2A WT	H2BK120ub	H3K9me3	H4 WT	H2B, H3	-1.17	-0.47	-0.41	-0.68	0.24
MN BC#135	ACGACT	H2A	H2BK120ub	H3 WT	H4R3me2a	H2B, H4	-1.08	-0.40	-0.56	-0.68	0.21
MN BC#31	CACAGT	H2A WT	H2BK120ub	H3K4me3	H4 WT	H2B, H3	-1.13	-0.35	-0.52	-0.66	0.24
MN BC#33	CGTCTG	H2A WT	H2BK120ub	H3K27me3	H4 WT	H2B, H3	-1.09	-0.45	-0.42	-0.65	0.22
MN BC#34	CTCTCG	H2A WT	H2BK120ub	H3K9,14,18,23,27ac	H4 WT	H2B, H3	-0.67	-0.19	-0.67	-0.51	0.16
MN BC#119	ACGTCG	H2A.Z	H2B WT	H3 WT	H4 WT	H2A	-0.72	-0.41	-0.40	-0.51	0.10
MN BC#120	CGAGAT	H2A.Z	H2B WT	H3.3	H4 WT	H2A, H3	-0.68	-0.37	-0.44	-0.50	0.09
MN BC#130	CTCTAT	H2AK15ac	H2B WT	H3 WT	H4 WT	H2A	-0.73	-0.42	-0.34	-0.50	0.12
MN BC#547	ACGTCT	x	x	x	x	free DNA no PST	-0.71	-0.07	-0.45	-0.41	0.19
MN BC#40	CTCAGT	H2A WT	H2B WT	H3K9,14,18,23,27ac	H4K5,8,12,16,20ac	H3, H4	0.13	-0.42	-0.87	-0.39	0.29
MN BC#121	ATCACG	H2AK5,9,13,15ac	H2BK5,11,12,16,20ac	H3K9,14,18,23,27ac	H4K5,8,12,16,20ac	H2A, H2B, H3, H4	-0.13	-0.36	-0.65	-0.38	0.15
IN BC#129	GCGCTG	H2AK13ac	H2B WT	H3 WT	H4 WT	H2A	-0.35	-0.28	-0.23	-0.29	0.03
MN BC#21	CATGAT	H2A WT	H2B WT	H3K9me3	H4K5 8 12 16 20ac	H3 H4	-0.16	-0.32	-0.28	-0.25	0.05
IN BC#136	AGCTCG	H2AK119ub	H2B WT	H3 WT	H4R3me2a	H2A H4	-0.33	-0.15	-0.27	-0.25	0.05
IN BC#18	AGCGTA	H2A WT	H2B WT	H3K9me3	H4K12ac	H3 H4	-0.15	-0.26	-0.24	-0.22	0.03
AN BC#30	AGAGCA	H2A WT	H2BK120ub	H3 WT	HA WT	H2B	0.29	0.00	0.35	-0.21	0.11
MN BC#3	CAGTAT	H2A WT	H2B W/T	H3 WT	HAKBac	HZD HA	0.23	0.20	0.35	-0.21	0.01
AN RC#14	GTATCT	HOAMAT	HOP WT	H3K/mo2	HAK5 8 12 16 20	114	-0.22	-0.20	-0.20	-0.21	0.07
NIN DG#14	ACCATA			HON4IIIEO	114 MT	H3, H4	-0.00	-0.20	-0.27	-0.21	0.07
IN BC#109	AGUAIA	HZA WI	HZBK125ac	H3 WI	H4 WI	HZB	-0.24	-0.08	-0.21	-0.17	0.05
AIN BC#96	GCAGCA	HZA WI	H2B W1	H3K/9ac	H4 WI	H3	-0.22	-0.12	-0.16	-0.17	0.03
WIN BC#5	ACGIGA	HZA WI	H2B W1	H3 W1	H4K16ac	H4	-u.15	-0.17	-u.16	-0.16	0.01
MN BC#6	CTCACG	H2A WT	H2B WT	H3 WT	H4K20ac	H4	-0.17	-0.20	-0.09	-0.16	0.03
VIN BC#28	AGCACG	H2A WT	H2B WT	H3K27me3	H4K5,8,12,16,20ac	H3, H4	-0.05	-0.16	-0.25	-0.15	0.06
AN BC#16	ATGTGT	H2A WT	H2B WT	H3K9me3	H4K5ac	H3, H4	0.01	-0.24	-0.22	-0.15	0.08
IN BC#111	GTATAT	H2AK5ac	H2B WT	H3 WT	H4 WT	H2A	-0.13	-0.12	-0.18	-0.14	0.02
/IN BC#20	CTGCGA	H2A WT	H2B WT	H3K9me3	H4K20ac	H3, H4	-0.09	-0.12	-0.17	-0.13	0.02
/IN BC#17	GCTCGA	H2A WT	H2B WT	H3K9me3	H4K8ac	H3, H4	-0.09	-0.13	-0.12	-0.11	0.01
AN BC#36	CTATAG	H2AK119ub	H2B WT	H3 WT	H4 WT	H2A	-0.22	-0.07	-0.05	-0.11	0.06
AN BC#10	CATACA	H2A WT	H2B WT	H3K4me3	H4K8ac	H3, H4	-0.14	-0.04	-0.14	-0.11	0.03
MN BC#2	ACGACG	H2A WT	H2B WT	H3 WT	H4K5ac	H4	-0.02	-0.12	-0.18	-0.11	0.05
IN BC#106	CGATCG	H2A WT	H2BK108ac	H3 WT	H4 WT	H2B	-0.10	-0.05	-0.15	-0.10	0.03
IN BC#112	GCTGAG	H2AK9ac	H2B WT	H3 WT	H4 WT	H2A	-0.12	-0.05	-0.14	-0.10	0.03
IN BC#12	CAGAGA	H2A WT	H2B WT	H3K4me3	H4K16ac	H3. H4	-0.02	-0.05	-0.24	-0.10	0.07
AN BC#64	CACACA	H2A WT	H2B WT	H3 WT	H4R174 R194	H4	-0.10	-0.04	-0.13	-0.09	0.03
AN BC#19	ATACAG	H2A WT	H2B WT	H3K9me3	H4K16ac	H3 H4	-0.02	-0.12	-0.14	-0.09	0.04
AN RCHOR	AGATCA	H2A WT	LIOD W/T	H2K122ac	LAINT	113, 114	-0.02	-0.12	-0.14	0.00	0.04
IN BC#30	AGATCA	H2A WT	H2B WT		LINKO1ee	114	-0.15	-0.00	-0.00	-0.09	0.03
IN BC#75	COCOCO	HZA WI			H4K9 Iac	F14	-0.09	-0.02	-0.17	-0.09	0.04
N BC#127	ACTGCT	H2A W1	H2B W1	H31118H	H4R1/A,R19A	H3, H4	-0.04	-0.09	-0.12	-0.08	0.02
IN BC#15	GAGCAG	H2A W1	H2B W1	H3K9me3	H4 WI	H3	-0.09	-0.09	-0.03	-0.07	0.02
MN BC#7	GTGACA	H2A WT	H2B WT	H3 WT	H4K5,8,12,16,20ac	H4	0.05	-0.11	-0.15	-0.07	0.06
IN BC#43	GTAGCT	H2A WT	H2B WT	H3K18ac	H4 WT	H3	0.02	-0.01	-0.18	-0.06	0.06
IN BC#23	GCTCAG	H2A WT	H2B WT	H3K27me3	H4K5ac	H3, H4	0.00	-0.10	-0.05	-0.05	0.03
IN BC#82	GATGCT	H2A WT	H2B WT	H3.3K27M	H4 WT	H3	0.07	0.03	-0.25	-0.05	0.10
MN BC#9	AGACTA	H2A WT	H2B WT	H3K4me3	H4K5ac	H3, H4	-0.03	-0.09	-0.01	-0.05	0.02
VIN BC#4	ACAGTA	H2A WT	H2B WT	H3 WT	H4K12ac	H4	-0.11	-0.05	0.02	-0.04	0.04
AN BC#11	GCACAG	H2A WT	H2B WT	H3K4me3	H4K12ac	H3, H4	-0.04	-0.11	0.02	-0.04	0.04
MN BC#1	CGAGAG	x	x	×	x	free DNA +PST	-0.04	0.34	-0.42	-0.04	0.22
MN BC#8	GCGACA	H2A WT	H2B WT	H3K4me3	H4 WT	H3	-0.01	-0.05	-0.06	-0.04	0.02
IN BC#26	GTATGA	H2A WT	H2B WT	H3K27me3	H4K16ac	H3, H4	0.04	-0.02	-0.12	-0.04	0.05
IN BC#342	CGCGCA	H2A WT	H2B WT	H3 WT	H4 WT	ALL WT	-0.03	0.01	-0.08	-0.03	0.02
IN BC#24	CATCTA	H2A WT	H2B WT	H3K27me3	H4K8ac	H3, H4	0.05	0.00	-0.15	-0.03	0.06
IN BC#63	CGACGT	H2A WT	H2B WT	H3 WT	H4 WT	ALL WT	-0.03	-0.02	-0.04	-0.03	0.01
N BC#344	GCAGTG	H2A WT	H2B WT	H3 WT	H4 WT	ALL WT	-0.04	0.02	-0.04	-0.02	0.02
IN BC#48	CACTGA	H2A WT	H2B WT	H3K18acK23ac	H4 WT	H3	0.07	0.01	-0.14	-0.02	0.06
N BC#128	ACACTA	H2A WT	H2B WT	H3 WT	H4 WT	CoG	-0.01	-0.03	-0.02	-0.02	0.01
N DO#120	CAGTOT		LIZE WT	L2K22ac		UD LD	-0.01	0.07	-0.02	0.02	0.07
N DC#490	ACGTAC			HORZOBC		10	0.05	0.07	-0.10	-0.02	0.07
N DC#139	ALGIAG		TZØ WI	LID W/T		F13	0.13	0.00	-0.18	-0.02	0.09
N BC#105	ATCGCA	HZA WI	H2BK5,11,12,16,20ac	H3 WI	H4 WI	HZB	0.02	0.03	-0.09	-0.01	0.04
IN BC#89	GICICA	H2A WT	H2B W1	H3S10ph	H4 WI	H3	-0.02	0.08	-0.09	-0.01	0.05
N BC#137	AIGTAT	H2A WT	H2B WT	H3K9cr	H4 WT	H3	0.07	0.07	-0.16	0.00	0.08
N BC#138	GACGCG	H2A WT	H2B WT	H3K14cr	H4 WT	H3	0.01	-0.02	0.00	0.00	0.01
IN BC#13	ATATCA	H2A WT	H2B WT	H3K4me3	H4K20ac	H3, H4	0.02	-0.04	0.04	0.01	0.02
N BC#351	ATACTG	H2A WT	H2B WT	H3 WT	H4 WT	ALL WT	0.01	0.02	-0.01	0.01	0.01
N BC#107	GTACGA	H2A WT	H2BK116ac	H3 WT	H4 WT	H2B	0.08	0.11	-0.17	0.01	0.09
N BC#132	GTACTA	H2A WT	H2B WT	H3K4me1	H4 WT	H3	0.08	0.05	-0.10	0.01	0.05
IN BC#45	GTGAGT	H2A WT	H2B WT	H3K27ac	H4 WT	H3	0.14	0.01	-0.09	0.02	0.07
IN BC#42	CTGTCG	H2A WT	H2B WT	H3K14ac	H4 WT	H3	0.05	0.08	-0.06	0.02	0.04
N BC#125	CGTAGA	H2A WT	H2B WT	H3T118H	H4R45A	H3. H4	0.10	0.07	-0.11	0.02	0.07
AN BC#41	CGACGA	H2A WT	H2B WT	H3K9ac	H4 WT	H3	0.08	0.07	-0.08	0.02	0.05
N BC#104	AGTGAT	H2A WT	H2BK20ac	H3 WT	H4 WT	H2R	0.06	0.09	-0.08	0.02	0.05
IN BC#352	ΔΤΔΤΔΤ	H2A WT	H2B WT	H3WT	H4 WT	ALL WT	0.03	-0.04	0.09	0.03	0.04
IN RC#27	GACTAG	LI2A M/T	LI2D WT	LI3 WT	HAR2mo2a		0.03	0.04	0.00	0.00	0.07
N DC#122	ATCCCA			H2K4mo2	H4 WT	r14 LL2	0.12	0.09	-0.09	0.04	0.07
IN DO#133	ATOCTO	H2A WI	HOD WIT	Harden C		r13	0.07	0.01	0.00	0.04	0.02
IN BC#27	AILGIG	HZA WI	H2B WI	H3K2/me3	H4K2Uac	H3, H4	0.05	0.06	0.03	0.05	0.01
IN BC#350	ACATCA	H2A WT	H2B WT	H3 WT	H4 WT	ALL WT	0.06	0.02	0.07	0.05	0.02
MN BC#100	ATGTCA	H2A WT	H2BK11ac	H3 WT	H4 WT	H2B	0.08	0.02	0.05	0.05	0.02

NN BC#99 CGAGTA H2A WT H2B KT H4 WT H2B 0.13 0.16 NN BC#24 GTGCTA H2A WT H2B WT H3K27me3 H4 WT H3 0.07 0.08 NN BC#24 GCGTGA H2A WT H2B WT H3K27me3 H4 WT H3 0.07 0.08 NN BC#27 GCGTGA H2A WT H2B WT H3K27me3 H4 WT H3 0.11 0.09 NN BC#74 GCACGA H2A WT H2B WT H3K27me3 H4 WT H3 0.19 0.08 NN BC#7140 CTATGT H2A WT H2B WT H3K27me3 H4 WT H3 0.19 0.08 NN BC#7140 CTATGT H2A WT H2B WT H3K27me3 H4 WT H3 0.13 0.01 NN BC#7140 CTATGT H2A WT H2B WT H3K27me3 H4 WT H3 0.15 0.11 NN BC#7140 CATGT H2A WT H3K97414 B22327ac H4 WT H3 0.15 0.11													
NN BC#24 GTGCTA H2A WT H2B WT H3K38me3 H4 WT H3 0.09 0.07 NN BC#24 GCGTGA H2A WT H2B WT H3K77me3 H4 WT H3 0.013 0.08 NN BC#25 CTCTCA H2A WT H2B WT H3K71me3 H4K73ac H3, H4 0.11 0.09 NN BC#37 GCACGA H2A WT H2B WT H3K115ac H4 WT H3 0.11 0.11 NN BC#37 GCACGA H2A WT H2B WT H3K27rc3 H4 WT H3 0.28 0.01 NN BC#31 GATCA H2A WT H2B WT H3K27rc7 H4 WT H3 0.28 0.01 NN BC#31 GAGTCA H2A WT H2B WT H3WT H4 WT H2A 0.21 0.06 NN BC#31 GAGTCA H2A WT H2B WT H3WT H4 WT H3 0.13 0.13 0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14<	MN BC#99	99 CGAGTA	H2A WT	H2BK5ac	H3 WT	H4 WT	H2B	0.13	0.15	-0.12	0.05	0.09	
NN BC#22 ASCTGY H2A WT H2B WT H3K2me3 H4 WT H3 0.07 0.08 NN BC#24 GCGTGA H2A WT H2B WT H3K17 H4K73ac H4, H4 0.13 0.08 NN BC#37 AGATAG H2A WT H2B WT H3K27me3 H4K17ac H3, H4 0.11 0.09 NN BC#37 GCACGA H2A WT H2B WT H3K27me3 H4 WT H3 0.19 0.08 NN BC#10 CATGTGT H2A WT H2B WT H3K27re H4 WT H3 0.28 0.01 NN BC#113 GAGTCA H2A WT H2B WT H3K27re H4 WT H3 0.35 0.11 NN BC#13 GAGTCA H2A WT H2B WT H3K7 H4 WT H3 0.35 0.11 NN BC#37 CGCACG H2A WT H2B WT H3WT H4 WT H3 0.23 0.15 0.14 NN BC#37 CGCACG H2A WT H2B WT H3X33 H4 WT H3 <	MN BC#84	84 GTGCTA	H2A WT	H2B WT	H3K36me3	H4 WT	H3	0.09	0.07	0.01	0.05	0.02	
NN BC#74 CCGTGA H2A WT H2B WT H3 WT H4K19ac H4 0.13 0.08 NN BC#35 CTCTCA H2A WT H2B WT H3K27me3 H4K112ac H3, H4 0.11 0.09 NN BC#37 AGATAG H2A WT H2B WT H3K21me3 H4 WT H3 0.11 0.11 0.01 NN BC#37 GCACGA H2A WT H2B WT H3K27c H4 WT H3 0.28 0.01 NN BC#102 CGTCGA H2A WT H2B WT H3K27c H4 WT H3 0.23 0.11 NN BC#102 CGCCGAT H2A WT H2B WT H3K9,14,18,22,27ac H4 WT H3 0.35 0.11 NN BC#101 CTGGTG H2A WT H2B WT H3K4ac H4 WT H3 0.15 0.14 0.14 NN BC#101 CTGGTG H2A WT H2B WT H3K3ac H4 WT H3 0.15 0.11 NN BC#101 CTGGTG H2A WT H2B WT H3K3ac H4	MN BC#22	22 AGCTGT	H2A WT	H2B WT	H3K27me3	H4 WT	H3	0.07	0.06	0.03	0.06	0.01	
NN BC#25 CTCTCA H2A WT H2B WT H3K2me3 H4K12ac H3, H4 0.11 0.09 NN BC#37 GCACGA H2A WT H2B WT H3K115ac H4 WT H3 0.19 0.08 NN BC#37 GCACGA H2A WT H2B WT H3R2me H4 WT H3 0.21 0.11 NN BC#140 CTGTGA H2A WT H2B WT H3K2Tcr H4 WT H3 0.28 0.01 NN BC#113 GAGTCA H2A WT H2B WT H3WT H4 WT H2A 0.21 0.06 NN BC#253 CGCACG H2A WT H2B WT H3WT H4 WT H3 0.35 0.11 NN BC#373 CGCACG H2A WT H2B WT H3K4ac H4 WT H3 0.12 0.13 0.14 NN BC#373 CGCACG H2A WT H2B WT H3K3G4 H4 WT H3 0.13 0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14 <td>MN BC#74</td> <td>74 GCGTGA</td> <td>H2A WT</td> <td>H2B WT</td> <td>H3 WT</td> <td>H4K79ac</td> <td>H4</td> <td>0.13</td> <td>0.08</td> <td>-0.02</td> <td>0.06</td> <td>0.04</td> <td></td>	MN BC#74	74 GCGTGA	H2A WT	H2B WT	H3 WT	H4K79ac	H4	0.13	0.08	-0.02	0.06	0.04	
NN BC#97 AGATAG H2A WT H2B WT H3K115ac H4 WT H3 0.19 0.08 NN BC#87 GCACGA H2A WT H2B WT H3R2me H4 WT H3 0.11 0.11 NN BC#140 CTATGT H2A WT H2B WT H3K27cr H4 WT H2 0.13 0.13 NN BC#113 GAGTCA H2A WT H2B WT H3K7 H4 WT H2 0.13 0.06 NN BC#113 GAGTCA H2A WT H2B WT H3 WT H4 WT H3 0.35 0.11 NN BC#113 GGAGCA H2A WT H2B WT H3K4ac H4 WT H3 0.35 0.11 NN BC#10 CTGGTG H2A WT H2B WT H3K4ac H4 WT H3 0.15 0.11 NN BC#10 CTGGTG H2A WT H2B WT H33G34W H4 WT H3 0.13 0.18 NN BC#118 AGCTAG H2A WT H33G34W H4 WT H3 0.14 0.13 >	MN BC#25	25 CTCTCA	H2A WT	H2B WT	H3K27me3	H4K12ac	H3, H4	0.11	0.09	0.01	0.07	0.03	
NN B C#87 GCACGA H2A WT H2B WT H3R2me H4 WT H3 0.11 0.11 NN BC#140 CTATGT H2A WT H2B WT H3K27cr H4 WT H2B 0.13 0.13 NN BC#110 GAGTCA H2A WT H2B WT H3 WT H4 WT H2B 0.13 0.13 NN BC#210 GGGCACA H2A WT H2B WT H3 WT H4 WT H2A 0.21 0.06 NN BC#210 GGCACG H2A WT H2B WT H3 WT H4 WT H2A 0.23 0.11 NN BC#310 CTCGGT6 H2A WT H2B WT H3 K4ac H4 WT H3 0.14 0.14 0.14 NN BC#310 CTCGT6 H2A WT H2B WT H3 X33 H4 WT H3 0.13 0.18 NN BC#37 ATGAT H2A WT H2B WT H3 X334W H4 WT H3 0.12 0.13 NN BC#37 ATGACT H2A WT H2B WT H3 X334W H4 WT H3 <	MN BC#97	97 AGATAG	H2A WT	H2B WT	H3K115ac	H4 WT	H3	0.19	0.08	-0.06	0.07	0.07	
NN BC#140 CTATGT H2A WT H2B WT H3K27r H4 WT H3 0.28 0.01 NN BC#113 GAGTCA H2A WT H2B WT H3 WT H4 WT H2A 0.13 0.13 NN BC#113 GAGTCA H2A WT H2B WT H3 WT H4 WT H2A 0.21 0.06 NN BC#3 CGCCAGT H2A WT H2B WT H3 WT H4 WT H3 0.35 0.11 NN BC#3 CGCACG H2A WT H2B WT H3 WT H3 0.35 0.14 NN BC#3 CACACG H2A WT H2B WT H3K4a H4 WT H3 0.15 0.14 NN BC#3 CACGAT H2A WT H2B WT H3333 H4 WT H3 0.12 0.13 NN BC#3 ACCAT H2A WT H2B WT H33G34V H4 WT H3 0.12 0.13 NN BC#3 ACTAT H2A WT H2B WT H33G34V H4 WT H3 0.12 0.13	MN BC#87	87 GCACGA	H2A WT	H2B WT	H3R2me	H4 WT	H3	0.11	0.11	0.02	0.08	0.03	
NN BC#1702 CGTCGA H2A WT H2BKTSac H3 WT H4 WT H2B 0.13 0.13 NN BC#113 GAGTCA H2A WT H2B WT H3 WT H4 WT H2A 0.21 0.06 NN BC#37 CGCGAT H2A WT H2B WT H3 WT H4 WT H3 0.35 0.11 NN BC#37 CGCACG H2A WT H2B WT H3 WT H4 WT H3 0.35 0.14 NN BC#37 CGCACG H2A WT H2B WT H3 K4ac H4 WT H3 0.15 0.14 NN BC#101 CTCGAT H2A WT H2B WT H3.33 H4 WT H3 0.15 0.11 NN BC#38 ATCTAT H2A WT H2B WT H3.3034R H4 WT H3 0.12 0.13 0.18 NN BC#38 ATCTAT H2A WT H2B WT H3.3034R H4 WT H3 0.12 0.13 0.18 NN BC#38 ATCAT H2A WT H2B WT H3.3034R H4 WT H	MN BC#140	40 CTATGT	H2A WT	H2B WT	H3K27cr	H4 WT	H3	0.28	0.01	-0.05	0.08	0.10	
NN BC#113 GAGTCA H2A KH18ac H2B WT H3 WT H4 WT H2A 0.21 0.06 NN BC#29 GGCGAT H2A WT H2B WT H3 WT H4 WT H3 0.35 0.11 NN BC#29 CGCACG H2A WT H2B WT H3 WT H4 WT H3 0.15 0.14 NN BC#10 CACACG H2A WT H2B WT H3 WT H4 WT H3 0.23 0.15 NN BC#10 CTCGTG H2A WT H2B WT H3X3 H4 WT H3 0.14 0.14 NN BC#110 CTCGAT H2A WT H2B WT H3.33 H4 WT H3 0.13 0.18 NN BC#17 ACTAT H2A WT H2B WT H3.3G34V H4 WT H3 0.12 0.13 NN BC#18 ACAAGA H2B WT H3.3G34V H4 WT H3 0.12 0.13 NN BC#18 ACAAGA H2A WT H2B WT H3.44 WT H3 0.23 0.23 0.23 0.23	MN BC#102	102 CGTCGA	H2A WT	H2BK15ac	H3 WT	H4 WT	H2B	0.13	0.13	-0.02	0.08	0.05	
NN BC#29 CGCCAT H2A WT H3K 9, 14, 18, 23, 27ac H4 WT H3 0.35 0.11 NN BC#3 CGCACG H2A WT H2B WT H3 WT H4K77ac H4 0.15 0.14 NN BC#1 CACACG H2A WT H2B WT H3 WT H4 WT H3 0.23 0.15 NN BC#101 CTCGT6 H2A WT H2B WT H3X4ac H4 WT H2B 0.14 0.14 0.14 NN BC#3 AGCTAG H2A WT H2B WT H3X3G4W H4 WT H3 0.13 0.18 NN BC#30 ATCAT H2A WT H2B WT H3XG34W H4 WT H3 0.14 0.13 NN BC#30 ATCAT H2A WT H2B WT H3XG34W H4 WT H3 0.14 0.13 NN BC#30 ATGACT H2A WT H2B WT H3XG34W H4 WT H3 0.23 0.23 0.23 0.23 0.23 0.23 0.23 0.24 0.24 0.24 0.24 0.24	MN BC#113	I13 GAGTCA	H2AK118ac	H2B WT	H3 WT	H4 WT	H2A	0.21	0.06	-0.02	0.08	0.07	
NN B C#73 CGCACG H2A WT H2B WT H3 WT H4WT H4 0.15 0.14 NN BC#91 CACACG H2A WT H2B WT H3K4ac H4 WT H3 0.23 0.15 NN BC#101 CTGGTG H2A WT H2B WT H3X4ac H4 WT H3 0.14 0.14 NN BC#101 CTGGTG H2A WT H2B WT H3.33 H4 WT H3 0.13 0.18 NN BC#10 CTCAT H2A WT H2B WT H3.3G34R H4 WT H3 0.14 0.13 NN BC#19 ATGACT H2A WT H2B WT H3.3G34V H4 WT H3 0.14 0.13 NN BC#19 ATGACT H2A WT H2B WT H3.3G34V H4 WT H3 0.23 0.23 0.23 NN BC#19 ATGACT H2A WT H2B WT H3.4Kme3K27me3 H4 WT H3 0.23 0.23 0.23 0.23 0.23 0.23 0.23 0.23 0.24 0.23 0.23 <td>MN BC#29</td> <td>29 CGCGAT</td> <td>H2A WT</td> <td>H2B WT</td> <td>H3K9,14,18,23,27ac</td> <td>H4 WT</td> <td>H3</td> <td>0.35</td> <td>0.11</td> <td>-0.19</td> <td>0.09</td> <td>0.16</td> <td></td>	MN BC#29	29 CGCGAT	H2A WT	H2B WT	H3K9,14,18,23,27ac	H4 WT	H3	0.35	0.11	-0.19	0.09	0.16	
NN B C691 CACACG H2A WT H2B WT H3K4ac H4 WT H3 0.23 0.16 NN BC/H01 CTGGTG H2A WT H2BK12ac H3 WT H4 WT H2B 0.14 0.14 NN BC/H3 AGCTAG H2A WT H2B WT H3.33 H4 WT H3 0.15 0.11 NN BC/H3 AGCTAG H2A WT H2B WT H3.3G34W H4 WT H3 0.13 0.18 NN BC/H3 ATCTAT H2A WT H2B WT H3.3G34W H4 WT H3 0.14 0.13 NN BC/H3 ATGACT H2A WT H2B WT H3.3G34V H4 WT H3 0.14 0.13 NN BC/H3 GTGCAT H2A WT H2B WT H3.3G34V H4 WT H3 0.23 0.16 NN BC/H3 GTGCAT H2A WT H2B WT H3.WT H4 WT H3 0.23 0.22 0.20 NN BC/H3 GTGCAT H2A WT H2B WT H3.WT H4 WT H3 0.2	MN BC#73	73 CGCACG	H2A WT	H2B WT	H3 WT	H4K77ac	H4	0.15	0.14	0.00	0.10	0.05	
NN BC#101 CTGGTG H2A WT H2BK12ac H3 WT H4 WT H2B 0.14 0.14 NN BC#178 AGCTAG H2A WT H2B WT H3.3 H4 WT H3 0.15 0.11 NN BC#31 CTGGAT H2A WT H2B WT H3.33 M H4 WT H3 0.13 0.18 NN BC#30 ATCAT H2A WT H2B WT H3.3034V H4 WT H3 0.14 0.13 NN BC#30 ATCAT H2A WT H2B WT H3.3034V H4 WT H3 0.14 0.13 NN BC#30 ATGACT H2A WT H2B WT H3.3034V H4 WT H3 0.14 0.13 NN BC#30 ATGACT H2A WT H2B WT H3.034V H4 WT H3 0.23 0.23 NN BC#35 ATATAG H2A WT H2B WT H3.27me3 H4 WT H3 0.24 0.23 0.23 NN BC#35 ATATAG H2A WT H2B WT H3.27me3 H4 WT H3	MN BC#91	91 CACACG	H2A WT	H2B WT	H3K4ac	H4 WT	H3	0.23	0.15	-0.07	0.10	0.09	
NN BC/#78 AGCTAG H2A WT H2B WT H3.3 H4 WT H3 0.15 0.11 NN BC/#80 ATCTAT H2A WT H2B WT H3.3G34W H4 WT H3 0.13 0.18 NN BC/#80 ATCTAT H2A WT H2B WT H3.3G34W H4 WT H3 0.12 0.13 NN BC/#17 ATGACT H2A WT H2B WT H3.3G34W H4 WT H3 0.14 0.13 NN BC/#18 ACAGAG H2A WT H2B WT H3.3G34W H4 WT H3 0.14 0.13 NN BC/#18 ACAGAG H2A WT H2B WT H3.WT H4 WT H3 0.35 0.16 NN BC/#5 ATATAG H2A WT H2B WT H3K4mes(Z7me3 H4 WT H3 0.22 0.20 NN BC/#5 ATATAG H2A WT H2B WT H3R7me2a H4 WT H3 0.24 0.23 0.22 0.20 NN BC/#52 CACTGG H2A WT H2B WT H3K64ac H4 WTW	MN BC#101	I01 CTCGTG	H2A WT	H2BK12ac	H3 WT	H4 WT	H2B	0.14	0.14	0.02	0.10	0.04	
NN BC#31 CTCGAT H2A WT H2B WT H3.3G34W H4 WT H3 0.13 0.18 NN BC#30 ATCTAT H2A WT H2B WT H3.3G34R H4 WT H3 0.12 0.13 NN BC#30 ATCACT H2A WT H2B WT H3.3G34R H4 WT H3 0.14 0.13 NN BC#37 ATGACT H2A WT H2B WT H3.3G34V H4 WT H3 0.14 0.13 NN BC#37 ATGACT H2A WT H2B WT H3.WT H4 WT H2A 0.27 0.15 NN BC#37 ACTAGA H2A WT H2B WT H3.WT H4 WT H3 0.23 0.29 NN BC#36 GTGCAT H2A WT H2B WT H3.WT H4 WT H3 0.22 0.20 NN BC#36 GCATG H2A WT H2B WT H3.WT H4 WT H3 0.34 0.28 NN BC#36 GCATG H2A WT H2B WT H3.K38ac H4 WT H3 0.35 0.25 <td>MN BC#78</td> <td>78 AGCTAG</td> <td>H2A WT</td> <td>H2B WT</td> <td>H3.3</td> <td>H4 WT</td> <td>H3</td> <td>0.15</td> <td>0.11</td> <td>0.07</td> <td>0.11</td> <td>0.02</td> <td></td>	MN BC#78	78 AGCTAG	H2A WT	H2B WT	H3.3	H4 WT	H3	0.15	0.11	0.07	0.11	0.02	
NN B C#30 ATCATT H2A WT H2B WT H3.334R H4 WT H3 0.12 0.13 NN BC#79 ATGACT H2A WT H2B WT H3.3G34V H4 WT H3 0.14 0.13 NN BC#719 ACGACA H2A WT H2B WT H3 WT H4 WT H3 0.14 0.13 NN BC#718 ACAGAG H2A WT H2B WT H3 WT H4 WT H3 0.27 0.15 NN BC#718 ACTAGA H2A WT H2B WT H3 WT H4 WT H3 0.23 0.29 NN BC#718 CATAAG H2A WT H2B WT H3 R2me2a H4 WT H3 0.28 0.23 NN BC#85 AGCATG H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 0.23 NN BC#85 AGCATG H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 0.25 NN BC#80 GACATG H2A WT H2B WT H3K67ac H4 WT <td< td=""><td>MN BC#81</td><td>81 CTCGAT</td><td>H2A WT</td><td>H2B WT</td><td>H3.3G34W</td><td>H4 WT</td><td>H3</td><td>0.13</td><td>0.18</td><td>0.05</td><td>0.12</td><td>0.04</td><td></td></td<>	MN BC#81	81 CTCGAT	H2A WT	H2B WT	H3.3G34W	H4 WT	H3	0.13	0.18	0.05	0.12	0.04	
NN BC#79 ATGACT H2A WT H2B WT H3.3G34V H4 WT H3 0.14 0.13 NN BC#18 ACAGAG H2A XT H2B WT H3 WT H4 WT H2A 0.27 0.15 NN BC#18 GTGCAT H2A XT H2B WT H3 WT H4 WT H3 0.35 0.16 NN BC#86 GTGCAT H2A WT H2B WT H3YTme3K H4 WT H3 0.23 0.29 NN BC#85 ATATAG H2A WT H2B WT H3YTM H4 WT H3 0.22 0.20 NN BC#85 CGTATA H2A WT H2B WT H3XGme2a H4 WT H3 0.22 0.20 NN BC#50 CACTGG H2A WT H2B WT H3X6ac H4 WT H3 0.34 0.28 NN BC#5103 GCAGTA H2A WT H2B WT H3X6ac H4 WT H3 0.33 0.22 NN BC#3103 GCAGTA H2A WT H2B WT H3X6ac H4 WT H3 0.34 0.28	MN BC#80	80 ATCTAT	H2A WT	H2B WT	H3.3G34R	H4 WT	H3	0.12	0.13	0.11	0.12	0.01	
NN BC#118 ACAGAG H2A X H2B WT H3 WT H4 WT H2A 0.27 0.15 NN BC#18 GTGCAT H2A WT H2B WT H3K4me3K27me3 H4 WT H3 0.35 0.16 NN BC#77 ACTAGA H2A WT H2B WT H3T118H H4 WT H3 0.23 0.29 NN BC#75 ACTAGA H2A WT H2B WT H3WT H44 WT H3 0.23 0.29 NN BC#85 ATATAG H2A WT H2B WT H3WT H44 WT H3 0.23 0.20 NN BC#85 ACATG H2A WT H2B WT H3K36ac H4 WT H3 0.34 0.28 0.23 NN BC#80 GCAGTA H2A WT H2B WT H3K36ac H4 WT H3 0.34 0.28 0.25 NN BC#80 GCAGTA H2A WT H2B WT H3K37ac H4 WT H3 0.44 0.36 NN BC#81 ACATGA H2A WT H2B WT H3K37ac H4 WT H	MN BC#79	79 ATGACT	H2A WT	H2B WT	H3.3G34V	H4 WT	H3	0.14	0.13	0.12	0.13	0.00	
NN B C6#86 GTGCAT H2A WT H2B WT H3K4me3K27me3 H4 WT H3 0.35 0.16 NN BC/#75 ACTAGA H2A WT H2B WT H3T118H H4 WT H3 0.23 0.29 MN BC/#75 ATATAG H2A WT H2B WT H3T118H H4 WT H3 0.27 0.16 NN BC/#35 AGCATG H2A WT H2B WT H3R2me2a H4 WT H3 0.22 0.20 NN BC#35 GCGATA H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 0.23 NN BC#35 CACTCG H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 0.23 NN BC#30 GCAGTA H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 0.25 MN BC#30 GCAGTA H2A WT H2B WT H3K42me2a H4 WT H3 0.44 0.36 0.22 MN BC#30 GCGAGA H2A WT H2B WT	MN BC#118	118 ACAGAG	H2A.X	H2B WT	H3 WT	H4 WT	H2A	0.27	0.15	-0.02	0.14	0.08	
NN BC#77 ACTAGA H2A WT H2B WT H3T119H H4 WT H3 0.23 0.29 NN BC#85 ATATAG H2A WT H2B WT H3 WT H4R4AA H4 0.27 0.16 NN BC#85 CGTATA H2A WT H2B WT H3 WT H4R4AA H4 0.27 0.16 NN BC#85 CGTATA H2A WT H2B WT H3RZme2a H4 WT H3 0.22 0.20 NN BC#50 CACTG H2A WT H2B WT H3K4ac H4 WT H3 0.24 0.28 NN BC#103 GCAGTA H2A WT H2B WT H3K3ac H4 WT H3 0.34 0.28 NN BC#103 GCAGTA H2A WT H2B WT H3K3rac H4 WT H3 0.34 0.25 NN BC#30 GCAGTA H2A WT H2B WT H3K3rac H4 WT H3 0.44 0.36 NN BC#33 AGTAGA H2A WT H2B WT H3K3rac H4 WT H3 0.42 0.35<	MN BC#86	86 GTGCAT	H2A WT	H2B WT	H3K4me3K27me3	H4 WT	H3	0.35	0.16	0.04	0.18	0.09	
NN BC665 ATATAG H2A WT H2B WT H3 WT H44A5A H4 0.27 0.16 NN BC665 AGCATG H2A WT H2B WT H3R2me2a H4 WT H3 0.22 0.20 NN BC695 AGCATG H2A WT H2B WT H3R2me2a H4 WT H3 0.28 0.23 NN BC692 CACTCG H2A WT H2B WT H3K64ac H4 WT H3 0.24 0.28 NN BC692 CACTCG H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 NN BC690 GAGTCT H2A WT H2B WT H3R42me2a H4 WT H3 0.33 0.22 NN BC690 GAGTCT H2A WT H2B WT H3R47ca H4 WT H3 0.44 0.36 NN BC693 ACATGA H2A WT H2B WT H3 K37ac H4 WT H3 0.51 0.42 NN BC693 AGTGT H2A WT H2B WT H3 K364ac H4 WT H3 0.51 <t< td=""><td>MN BC#77</td><td>77 ACTAGA</td><td>H2A WT</td><td>H2B WT</td><td>H3T118H</td><td>H4 WT</td><td>H3</td><td>0.23</td><td>0.29</td><td>0.04</td><td>0.19</td><td>0.07</td><td></td></t<>	MN BC#77	77 ACTAGA	H2A WT	H2B WT	H3T118H	H4 WT	H3	0.23	0.29	0.04	0.19	0.07	
NN B C#88 CGTATA H2A WT H2B WT H3R2me2a H4 WT H3 0.22 0.20 NN BC#95 AGCATG H2A WT H2B WT H3K64ac H4 WT H3 0.28 0.23 NN BC#95 CACTCG H2A WT H2B WT H3K64ac H4 WT H3 0.34 0.28 NN BC#92 CACTCG H2A WT H2B WT H3K36ac H4 WT H3 0.34 0.28 NN BC#90 GCAGTA H2A WT H2B WT H3K37ac H4 WT H3 0.33 0.22 NN BC#33 GCCAGA H2A WT H2B WT H3K37ac H4 WT H3 0.44 0.36 NN BC#33 GCAGA H2A WT H2B WT H3 WT H4 WT H3 0.44 0.36 NN BC#34 AGATGT H2A WT H2B WT H3 WT H4 H2 0.51 0.32 NN BC#34 AGTAGA H2A WT H2B WT H3 WT H4 R3me H4 0.47 0.49	MN BC#65	65 ATATAG	H2A WT	H2B WT	H3 WT	H4R45A	H4	0.27	0.16	0.18	0.20	0.03	
NN BC#95 AGCATG H2A WT H2B WT H3K48ac H4 WT H3 0.28 0.23 NN BC#92 CACTCG H2A WT H2B WT H3K38ac H4 WT H3 0.34 0.28 NN BC#103 GCAGTA H2A WT H2B WT H3K38ac H4 WT H3 0.35 0.25 NN BC#103 GCAGTA H2A WT H2B WT H3R42mc2a H4 WT H3 0.34 0.22 NN BC#30 GCAGTA H2A WT H2B WT H3R42mc2a H4 WT H3 0.34 0.22 NN BC#30 GCAGTA H2A WT H2B WT H3K37ac H4 WT H3 0.44 0.36 NN BC#30 GCAGTA H2A WT H2B WT H3 WT H4 MT H3 0.42 0.35 NN BC#30 AGTAGA H2A WT H2B WT H3 X33M H4 WT H3 0.51 0.42 NN BC#30 AGTAGA H2A WT H2B WT H3 X586ac H4 WT H3 0.62 <	MN BC#88	88 CGTATA	H2A WT	H2B WT	H3R2me2a	H4 WT	H3	0.22	0.20	0.21	0.21	0.01	
NN BC#32 CACTCG H2A WT H2B WT H3K36ac H4 WT H3 0.34 0.28 NN BC#103 GCAGTA H2A WT H2B WT H3K42me2a H4 WT H3 0.35 0.25 MN BC#03 GCAGTA H2A WT H2B WT H3K42me2a H4 WT H3 0.33 0.22 MN BC#03 GCGAGA H2A WT H2B WT H3K7ac H4 WT H3 0.44 0.36 MN BC#03 GCAGTA H2A WT H2B WT H3K7ac H4 WT H3 0.44 0.36 MN BC#33 ACATGA H2A H2BSH12GIcNAc H3 WT H4R3me2s H4 0.42 0.35 MN BC#34 AGATGT H2A H2BSH12GIcNAc H3 WT H4 H2B 0.51 0.42 MN BC#36 AGATGT H2A WT H2B WT H3 K35M H4 WT H3 0.62 0.45 MN BC#36 AGATGT H2A WT H2B WT H3K26ac H4 WT H3 0.62	MN BC#95	95 AGCATG	H2A WT	H2B WT	H3K64ac	H4 WT	H3	0.28	0.23	0.16	0.22	0.03	
NN BC#103 GCAGTA H2A WT H2BK16ac H3 WT H4 WT H2B 0.35 0.25 NN BC#30 GAGTCT H2A WT H2B WT H342me2a H4 WT H3 0.33 0.22 NN BC#30 GCCAGA H2A WT H2B WT H3K37ac H4 WT H3 0.44 0.36 NN BC#33 GCCAGA H2A WT H2B WT H3K37ac H4 WT H3 0.44 0.36 NN BC#34 AGATGA H2A WT H2B WT H3 WT H4Bme2s H4 0.42 0.35 NN BC#34 AGTAGA H2A WT H2B WT H3 WT H4 H2B 0.51 0.32 NN BC#34 AGTAGA H2A WT H2B WT H3 WT H4 WT H3 0.51 0.42 NN BC#34 AGTAGA H2A WT H2B WT H3 WT H4 WT H3 0.51 0.42 NN BC#326 AGTAGT H2A WT H3 WAT H4 WT H3 0.52 0.45	MN BC#92	92 CACTCG	H2A WT	H2B WT	H3K36ac	H4 WT	H3	0.34	0.28	0.10	0.24	0.07	
NN BC#09 GAGTCT H2A WT H2B WT H3R42me2a H4 WT H3 0.33 0.22 NN BC#03 GCGAGA H2A WT H2B WT H3R47ac H4 WT H3 0.44 0.36 NN BC#03 GCGAGA H2A WT H2B WT H3R47ac H4 WT H3 0.44 0.36 NN BC#03 AGATGA H2A WT H2B WT H3R47ac H4 WT 0.42 0.35 NN BC#33 AGTAGA H2A WT H2B WT H3 WT H4 H2B 0.51 0.42 NN BC#33 AGTAGA H2A WT H2B WT H3 K36a H4 WT H3 0.51 0.42 NN BC#34 GTCTA H2A WT H2B WT H3 K56ac H4 WT H3 0.62 0.45 NN BC#32 ATCATG H2A WT H2B WT H3R42A H4 WT H3 0.62 0.47 NN BC#76 CACGTG H2A WT H2B WT H3R42A H4 WT H3 0.80 0.66 <tr< td=""><td>MN BC#103</td><td>I03 GCAGTA</td><td>H2A WT</td><td>H2BK16ac</td><td>H3 WT</td><td>H4 WT</td><td>H2B</td><td>0.35</td><td>0.25</td><td>0.15</td><td>0.25</td><td>0.06</td><td>-</td></tr<>	MN BC#103	I03 GCAGTA	H2A WT	H2BK16ac	H3 WT	H4 WT	H2B	0.35	0.25	0.15	0.25	0.06	-
NN BC#33 GCGAGA H2A WT H2B WT H3K37ac H4 WT H3 0.44 0.36 NN BC#34 AGATGA H2A WT H2B WT H3 WT H4R3me2s H4 0.42 0.35 NN BC#343 AGATGA H2A WT H2B WT H3 WT H4 H2B 0.51 0.32 NN BC#343 AGATGA H2A WT H2B WT H3 WT H4 H2 0.51 0.42 NN BC#343 AGTCAGA H2A WT H2B WT H3 WT H4 H3 0.51 0.42 NN BC#46 AGCTCT H2A WT H2B WT H3 WT H4 M3 0.51 0.42 NN BC#126 ATCATG H2A WT H2B WT H3 K56ac H4 WT H3 0.62 0.45 NN BC#126 ATCATG H2A WT H3R42A H4R17A R19A H3, H4 0.64 0.47 NN BC#126 ATCATG H2A WT H3R42A H4 WT H3 0.80 0.56 NN BC#126 <td>MN BC#90</td> <td>90 GAGTCT</td> <td>H2A WT</td> <td>H2B WT</td> <td>H3R42me2a</td> <td>H4 WT</td> <td>H3</td> <td>0.33</td> <td>0.22</td> <td>0.21</td> <td>0.25</td> <td>0.04</td> <td>To S</td>	MN BC#90	90 GAGTCT	H2A WT	H2B WT	H3R42me2a	H4 WT	H3	0.33	0.22	0.21	0.25	0.04	To S
NN BC#88 ACATGA H2A WT H2B WT H3 WT H4R3me2s H4 0.42 0.35 NN BC#134 AGATGT H2A H2B5112GicNac H3 WT H4 H2B 0.51 0.32 NN BC#134 AGTAGA H2A WT H2B WT H3 WT H4 H2B 0.51 0.32 NN BC#33 AGTAGA H2A WT H2B WT H3 WT H4 WT H3 0.51 0.42 NN BC#66 AGCTCT H2A WT H2B WT H3 WT H4R3me H4 0.47 0.49 NN BC#126 ATCATG H2A WT H2B WT H3K56ac H4 WT H3 0.62 0.45 NN BC#126 ATCATG H2A WT H3R42A H4RT7A,R19A H3,H4 0.64 0.47 NN BC#126 ATCATG H2A WT H3R42A H4RT7A,R19A H3,H4 0.80 0.56 NN BC#126 ATCATG H2A WT H3R42A H4R45A H3. H4 0.80 0.58 NN BC#127	MN BC#93	93 GCGAGA	H2A WT	H2B WT	H3K37ac	H4 WT	H3	0.44	0.36	0.13	0.31	0.09	in Sec.
NN BC#134 AGATGT H2A H2BS112GICNAc H3 WT H4 H2B 0.51 0.32 NN BC#33 AGTAGA H2A WT H2B WT H3.3K36M H4 WT H3 0.51 0.42 NN BC#36 AGCTCT H2A WT H2B WT H3.3K36M H4 WT H3 0.51 0.42 NN BC#36 AGCTCT H2A WT H2B WT H3.3K36M H4 WT H3 0.61 0.42 NN BC#36 AGCTCT H2A WT H2B WT H3K7A H4 WT H3 0.62 0.45 NN BC#126 ATCATG H2A WT H3842A H4RTA,R19A H3,H4 0.64 0.47 NN BC#126 CAGCTG H2A WT H3842A H4 WT H3 0.80 0.56 NN BC#126 GTCTAT H2A WT H3842A H4R4A H3 0.80 0.56	MN BC#68	68 ACATGA	H2A WT	H2B WT	H3 WT	H4R3me2s	H4	0.42	0.35	0.22	0.33	0.06	I S G
NN BC#33 AGTAGA H2A WT H2B WT H3.3K30M H4V T H3 0.51 0.42 NN BC#68 AGCTCT H2A WT H2B WT H3 WT H4R3me H4 0.47 0.49 NN BC#416 GTCTAG H2A WT H2B WT H3 WT H4R3me H4 0.62 0.45 NN BC#4128 ATCATG H2A WT H2B WT H3K56ac H4 WT H3 0.62 0.45 NN BC#128 ATCATG H2A WT H2B WT H3R42A H4R17A R19A H3, H4 0.64 0.47 NN BC#126 GTCTAT H2B WT H3R42A H4R17A R19A H3, H4 0.80 0.56 NN BC#126 GTCTAT H2B WT H3R42A H4R45A H3, H4 0.80 0.58	MN BC#134	I34 AGATGT	H2A	H2BS112GlcNAc	H3 WT	H4	H2B	0.51	0.32	0.38	0.40	0.06	∃ Ω
NN B C6#66 AGCTCT H2A WT H2B WT H3 WT H4R3me H4 0.47 0.49 NN B C6#94 GTCTAG H2A WT H2B WT H3K56ac H4 WT H3 0.62 0.45 NN B C6#26 ATCATG H2A WT H2B WT H3R42A H4RTA,R19A H3, H4 0.64 0.47 NN B C6#26 ATCATG H2A WT H3R42A H4RTA,R19A H3, H4 0.64 0.47 NN B C6#26 CASCTG H2A WT H2B WT H3R42A H4 WT H3 0.80 0.56 NN B C6#24 GTCTAT H2B WT H3R42A H4R45A H3.44 0.88 0.58	MN BC#83	83 AGTAGA	H2A WT	H2B WT	H3.3K36M	H4 WT	H3	0.51	0.42	0.31	0.41	0.06	= = =
NN BC#94 GTCTAG H2A WT H2B WT H3K56ac H4 WT H3 0.62 0.45 NN BC#126 ATCATG H2A WT H2B WT H3K42A H4R17A,R19A H3, H4 0.64 0.47 NN BC#76 CAGCTG H2A WT H2B WT H3R42A H4R17A,R19A H3, H4 0.60 0.56 NN BC#74 GTCTAT H2B WT H3R42A H4R45A H3. H4 0.80 0.56	MN BC#66	66 AGCTCT	H2A WT	H2B WT	H3 WT	H4R3me	H4	0.47	0.49	0.34	0.44	0.05	- C
MN BC#128 ATCATG H2A WT H2B WT H3R42A H4R17A,R19A H3, H4 0.64 0.47 MN BC#126 CAGCTG H2A WT H2B WT H3R42A H4WT H3 0.60 0.56 MN BC#126 GTCTAT H2A WT H3R42A H4R45A H3. H4 0.80 0.56	MN BC#94	94 GTCTAG	H2A WT	H2B WT	H3K56ac	H4 WT	H3	0.62	0.45	0.27	0.45	0.10	ië s
MN BC#76 CAGCTG H2A WT H2B WT H3R42A H4 WT H3 0.80 0.56 MN BC#124 GTCTAT H2A WT H2B WT H3R42A H4R45A H3. H4 0.88 0.58	MN BC#126	126 ATCATG	H2A WT	H2B WT	H3R42A	H4R17A,R19A	H3, H4	0.64	0.47	0.48	0.53	0.05	12 5
MN BC#124 GTCTAT H2A WT H2B WT H3R42A H4R45A H3. H4 0.88 0.58	MN BC#76	76 CAGCTG	H2A WT	H2B WT	H3R42A	H4 WT	H3	0.80	0.56	0.53	0.63	0.08	l re st
	MN BC#124	124 GTCTAT	H2A WT	H2B WT	H3R42A	H4R45A	H3, H4	0.88	0.58	0.53	0.66	0.11	<u>2</u> a
MN BC#85 ATATGA H2A WT H2B WT H3Y41ph H4 WT H3 1.41 1.09	MN BC#85	85 ATATGA	H2A WT	H2B WT	H3Y41ph	H4 WT	H3	1.41	1.09	1.05	1.18	0.12	T m g

Supplementary Table 2. List of antibodies used in this study.

Epitope	Vendor (product #)	Antibody dilution	Application
Anti-H3	Abcam (Ab1791)	1:10000 in TBS-T	Loading control
Anti-H2B	Abcam (Ab1790)	1:10000 in TBS-T	Loading control
Anti-H4	Abcam (Ab31830)	1:2000 in TBS-T	Loading control
Anti-H2BK120ub	Medimabs (MM0029)	1:1000 in TBS-T	In vitro ubiquitylation levels
Anti-H2BK120ub	CST (Ubiquityl-Histone H2B XP® Rabbit mAb #5546)	1:1000 in TBS-T containing 5% BSA	<i>In vitro</i> ubiquitylation levels and cellular ubiquitylation levels
Anti-HA	Covance (anti-HA.11 Clone 16B12, MMS-101R)	See method section	<i>In vitro</i> ChIP of the MN-Library
Anti-FLAG	Sigma Aldrich (M2 clone, F3165)	See method section	ChIP of cellular MNs
Anti-RNF20	Abcam (Ab32629)	1:1000 in TBS-T	Autoubiquitylation of RNF20
Anti-Rabbit	Bio-Rad HRP conjugate (170- 6515)	1:10000 in TBS-T	Visualization of prim. antibody
Anti-Mouse	Bio-Rad HRP conjugate (170- 6516)	1:10000 in TBS-T	Visualization of prim. antibody
Anti-Rabbit	LI-COR (IRDye@800CW 926- 32211)	1:15000 in TBS-T	Visualization of prim. antibody
Anti-Rabbit	LI-COR (IRDye@680LT 877- 11081)	1:15000 in TBS-T	Visualization of prim. antibody
Anti-Mouse	LI-COR (IRDye@800CW 827- 08364)	1:15000 in TBS-T	Visualization of prim. antibody

Supplementary Table 3. Summary of ChIP-seq and RNA-seq datasets used in this study.

Dataset	Cell type	Data source	Laboratory responsible for data generation	Accession number
H2A.Z ChIP-seq	HeLa-S3	ENCODE consortium	Bradley Bernstein, Broad Institute	ENCFF532VFI
H3K79me2 ChIP-seq	HeLa-S3	ENCODE consortium	Bradley Bernstein, Broad Institute	ENCFF432DSJ
H3K4me3 ChIP-seq	HeLa-S3	ENCODE consortium	Bradley Bernstein, Broad Institute	ENCFF699TXY
Strand-specific, rRNA- depleted, poly(A)+ RNA-seq	HeLa-S3	ENCODE consortium	Thomas Gingeras, CSHL	ENCFF000FNX, ENCFF000FNY
Strand-specific, rRNA- depleted, poly(A)+ RNA-seq	HeLa-S3	ENCODE consortium	Thomas Gingeras, CSHL	ENCFF084ARU
MNase-seq	HeLa-S3	European Nucleotide Archive	Giuseppe Macino, Sapienza University of Rome	ERS345758
H2BK120ub ChIP-seq	HeLa	NCBI Gene Expression Omnibus	Didier Devys, Institut de Génétique et de Biologie Moléculaire et Cellulaire	GSM1277116