nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our <u>Editorial Policies</u> and the <u>Editorial Policy Checklist</u>.

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For	all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.
n/a	Confirmed
	The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
\boxtimes	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
	The statistical test(s) used AND whether they are one- or two-sided Only common tests should be described solely by name; describe more complex techniques in the Methods section.
\boxtimes	A description of all covariates tested
\boxtimes	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
	For null hypothesis testing, the test statistic (e.g. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give P values as exact values whenever suitable.</i>
\boxtimes	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
\times	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
\times	Estimates of effect sizes (e.g. Cohen's <i>d</i> , Pearson's <i>r</i>), indicating how they were calculated
	Our web collection on <u>statistics for biologists</u> contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection

The size distributions and molar concentration of libraries were determined using an Agilent 4200 TapeStation. Up to 48 barcoded CUT&RUN libraries or 96 barcoded CUT&Tag libraries were pooled at approximately equimolar concentration for sequencing. Paired-end 50x50 bp sequencing on the Illumina NextSeq 2000 platform was performed by the Fred Hutchinson Cancer Research Center Genomics Shared Resources. This yielded 1-20 million reads per antibody. Adapters were clipped by cutadapt version 4.1 (51) with parameters -j 8 --nextseq-trim 20 -m 20 -a AGATCGGAAGAGCACACGTCTGAACTCCAGTCA -A AGATCGGAAGAGCGTCGTGTAGGGAAAGAGTGT -Z Clipped reads were aligned by Bowtie2 version 2.4.4 to the Mus musculus mm10 and Homo sapiens hg19 reference sequences from UCSC and to the Rhodococcus erythropolis complete genome (NZ_CP007255.1) from NCBI with parameters

--very-sensitive-local --soft-clipped-unmapped-tlen --dovetail --no-mixed --no-discordant -q --phred33 -l 10 -X 1000

Data analysis

Bedtools; Voom/Limma option on the Degust server https://degust.erc.monash.edu/degust/. Picard Tools: MarkDuplicates http://broadinstitute.github.io/picard/

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

All primary sequencing data have been deposited as paried-end fastq files in Gene Expression Omnibus under the accession code GSE224579.

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	Not applicable
Reporting on race, ethnicity, or other socially relevant groupings	Not applicable
Population characteristics	Not applicable
Recruitment	Not applicable
Ethics oversight	Not applicable

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for	your research.	If you are not sure,	read the appropriate se	ections before making	your selection.

Behavioural & social sciences For a reference copy of the document with all sections, see <u>nature.com/documents/nr-reporting-summary-flat.pdf</u>

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

One 5 or 10 micron section from an FFPE block or a dissected portion of an FFPE for each 5- or 10-micron specimen used in Voom/Limma Sample size analysis. Sample sizes were not determined in advance but rather by the amount of tissue on a section divided by the number of samples from the section.

X Life sciences

Data exclusions

Randomization

Sequencing reads mapping to the mitochondrial genome were removed from all datasets. This was pre-established and is standard practice in the field. The purpose of this study was to perform comparative analysis of chromatin profiles from the nuclear genome and this can be

Ecological, evolutionary & environmental sciences

Replication For Voom/Limma analysis at least 2 replicates were used. Replicates were successful.

confounded by variable read numbers from the mitochondrial genome.

n/a. The data and analysis for this study is objective and not prone to influence by the researchers bias.

Blinding n/a. The data and analysis for this study is objective and not prone to influence by researchers bias.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems	Methods
n/a Involved in the study	n/a Involved in the study
Antibodies	ChIP-seq
Eukaryotic cell lines	Flow cytometry
Palaeontology and archaeology	MRI-based neuroimaging
Animals and other organisms	
Clinical data	
Dual use research of concern	
'	
Antibodies	
RNAPII-Ser5p: Cell Signali H3K27me3: Cell Signaling	Hme3: Active Motif cat. no. 39159, lot no. 18122006; H3K27ac: Abcam cat. no. ab4729, lot no. 1033973; ing Technologies cat. no. 13523, lot 3; RNAPII-Ser2,5p: Cell Signaling Technologies cat. no. 13546, lot 1; g Technologies cat. no. 9733, lot 19; H3K4me2: Epicypher cat. no. 13-0027, lot 21090003-01; H3K36me3: 587, lot VE2997961. Secondary antibody: Guinea pig α -rabbit antibody (Antibodies online cat. no.
website. Links to manufar lys4-antibody-pab; H3K27 ab4729.html#lb RNAPII-S 13546: https://www.cells _requestid=265202; H3K. rabbit-mab/9733; H3K4m	s study were confirmed by the manufacturer to recognize the epitope as stated on the manufactures cturer's validations: H3K4me3: https://www.activemotif.com/catalog/details/39159/histone-h3-trimethyl-7ac: https://www.abcam.com/products/primary-antibodies/histone-h3-acetyl-k27-antibody-chip-grade-er5p: Cell Signaling Technologies cat. no. 13523, lot 3; RNAPII-Ser2,5p: Cell Signaling Technologies cat. no. signal.com/products/primary-antibodies/phospho-rpb1-ctd-ser2-ser5-d1g3k-rabbit-mab/13546? 27me3: https://www.cellsignal.com/products/primary-antibodies/tri-methyl-histone-h3-lys27-c36b11-ne2: https://www.epicypher.com/content/documents/tds/13-0027.pdf; H3K36me3: https://antibody/product/H3K36me3-Antibody-clone-RM155-Recombinant-Monoclonal/MA5-24687.

Eukaryotic cell lines

Policy information about cell lines and Sex and Gender in Research

Cell line source(s)

Human K562 cells were purchased from ATCC (Manassas, VA, Cat# CCL-243),
H1 hESCs were obtained from WiCell (Cat# WA01-lot# WB35186),
Mouse 3T3 cells were obtained from the Sarthy lab at Seattle Children's Hospital.

Authentication

All the cell lines used in this study are regularly submitted for karyotyping by the Fred Hutchinson Cancer Center Core
Facilities.

Mycoplasma contamination

All cell lines were confirmed as mycoplasma negative on a tri-monthly basis.

Commonly misidentified lines (See ICLAC register)

No commonly misidentified lines were used in this study.

Animals and other research organisms

Policy information about <u>studies involving animals</u>; <u>ARRIVE guidelines</u> recommended for reporting animal research, and <u>Sex and Gender in Research</u>

Laboratory animals

We used both male and female mice from Jackson lab mouse strain 3529: https://www.jax.org/strain/003529 (FVB/N;C57BL/6;129/Sv). Nestin (N)/tv-a Cdkn2a null pups (P0-P1; male and female) or adults (5-7 week old, male and female) were injected intracranially with either RCAS-PDGFB, RCAS-YAP1-FAM118B, or RCAS-ZFTA-RELA-expressing DF-1 cells and monitored daily for tumor related symptoms for the duration of the experiment. Upon weaning (~P21), mice were housed with same-sex littermates, with no more than 5 per cage and given access to food/water ad libitum. All animal experiments were approved by and conducted in accordance with the Institutional Animal Care and Use Committee of Fred Hutchinson Cancer Center (Protocol #50842: Tva-derived transgenic mouse model for studying brain tumors).

Wild animals No wild animals were used in this study.

Reporting on sex We used both male and female mice.

Field-collected samples No field-collected samples were used in this study.

rieid-collected samples (No field-collected samples were used in this study

Ethics oversight This research was approved by the Fred Hutch Institutional Animal Care and Use Committee (Protocol # 50842) and complies with all required ethical regulations.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Plants

Seed stocks	Not applicable
Novel plant genotypes	Not applicable
Authentication	Not applicable

ChIP-seq

Data deposition

Confirm that both raw and final processed data have been deposited in a public database such as GEO.

Confirm that you have deposited or provided access to graph files (e.g. BED files) for the called peaks.

Data access links

May remain private before publication

For "Initial submission" or "Revised version" documents, provide reviewer access links. For your "Final submission" document, provide a link to the deposited data.

Files in database submission

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GSE235876 Epigenomic analysis of Formalin-Fixed Paraffin-Embedded samples by CUT&Tag
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             Triton_75_K27me3_(221206_SH_Mm_K27m3_FF_TX75_1204)
GSM7511266
             Triton 75 P2S5p (221206 SH Mm P2S5p FF TX75 1204)
             Triton 79 K27me3 (221206 SH Mm K27m3 FF TX70 1204)
GSM7511267
GSM7511268
             Triton 80 K27me3 (221206 SH Mm K27m3 FF TX80 1204)
GSM7511269
             Triton_80_P2S5p_(221206_SH_Mm_P2S5p_FF_TX80_1204)
GSM7511270
             Triton_85_K27me3_(221206_SH_Mm_K27m3_FF_TX85_1204)
GSM7511271
             Triton 85 P2S5p (221206 SH Mm P2S5p FF TX85 1204)
GSM7511272
             Triton_90_K27me3_(221206_SH_Mm_K27m3_FF_TX90_1204)
             Triton 90 P2S5p (221206 SH Mm P2S5p FF TX90 1204)
GSM7511273
             Triton_95_K27me3_(221206_SH_Mm_K27m3_FF_TX95_1204)
GSM7511274
GSM7511275
             Triton_95_P2S5p_(221206_SH_Mm_P2S5p_FF_TX95_1204)
GSM7511276
             H1_H3K4me3_whole-cell_(230421_SH_Hs_K4m3_H1_0405)
GSM7511277
             K562_H3K4me3_40k_whole-cell_(230421_SH_Hs_K4m3_Kl_0405)
GSM7511278
             K562_H3K4me3_100k_whole-cell_(230421_SH_Hs_K4m3_Kh_0405)
GSM7746188
            RNAPol2-Ser25_Normal_brain_Biomag-amine_low_(230801_SH_Mm_P2S25_Nbl_0727)
GSM7746189
             RNAPol2-Ser25\_Normal\_brain\_onslide\_1\_(230801\_SH\_Mm\_P2S25s\_N1\_0727)
             RNAPol2-Ser25 Normal brain onslide 2 (230801 SH Mm P2S25s N2 0727)
GSM7746190
GSM7746191
             RNAPol2-Ser25_Normal_brain_onslide_3_(230801_SH_Mm_P2S25s_N3_0727)
             RNAPol2-Ser25_Normal_brain_onslide_4_(230801_SH_Mm_P2S25s_N4_0727)
GSM7746192
GSM7746193
             RNAPol2-Ser25_YAP1_Biomag-amine_low_(230801_SH_Mm_P2S25_Ybl_0727)
             RNAPol2-Ser25_YAP1_Glutathione_high_(230801_SH_Mm_P2S25_Yph_0727)
GSM7746194
GSM7746195
             RNAPol2-Ser25 YAP1 Glutathione low (230801 SH Mm P2S25 Ypl 0727)
GSM7746196
             RNAPol2-Ser25_YAP1_onslide_1_(230801_SH_Mm_P2S25s_Y1_0727)
GSM7746197
             RNAPol2-Ser25_YAP1_onslide_2_(230801_SH_Mm_P2S25s_Y2_0727)
GSM7746198
             RNAPol2-Ser25 YAP1 onslide 3 (230801 SH Mm P2S25s Y3 0727)
GSM7746199
             RNAPol2-Ser25_YAP1_onslide_4_(230801_SH_Mm_P2S25s_Y4_0727)
GSM7746200
             RNAPol2-Ser5_Normal_brain_Biomag-amine_low_(230801_SH_Mm_P2S5_Nbl_0727)
GSM7746201
             RNAPol2-Ser5 Normal brain onslide 1 (230801 SH Mm P2S5s N1 0722)
GSM7746202
             RNAPol2-Ser5_Normal_brain_onslide_10_(230725_SH_Mm_P2S5_N8_0720)
GSM7746203
             RNAPol2-Ser5_Normal_brain_onslide_2_(230801_SH_Mm_P2S5s_N2_0722)
GSM7746204
             RNAPol2-Ser5_Normal_brain_onslide_3_(230801_SH_Mm_P2S5s_N3_0722)
             RNAPol2-Ser5_Normal_brain_onslide_4_(230801_SH_Mm_P2S5_N1_0720)
GSM7746205
GSM7746206
             RNAPol2-Ser5 Normal brain onslide 5 (230801 SH Mm P2S5 N2 0720)
GSM7746207
             RNAPol2-Ser5_Normal_brain_onslide_6_(230801_SH_Mm_P2S5_N3_0720)
             RNAPol2-Ser5_Normal_brain_onslide_7_(230801_SH_Mm_P2S5_N5_0720)
GSM7746208
GSM7746209
             RNAPol2-Ser5 Normal brain onslide 8 (230801 SH Mm P2S5 N6 0720)
GSM7746210
            RNAPol2-Ser5 Normal brain onslide 9 (230801 SH Mm P2S5 N7 0720)
GSM7746211
             RNAPol2-Ser5_PDGFB_onslide_10_(230801_SH_Mm_P2S5_P1_0720)
GSM7746212
             RNAPol2-Ser5_PDGFB_onslide_30_(230801_SH_Mm_P2S5_P3_0720)
GSM7746213
             RNAPol2-Ser5_PDGFB_onslide_40_(230801_SH_Mm_P2S5_P4_0720)
             RNAPol2-Ser5 PDGFB onslide 50 (230801 SH Mm P2S5 P5 0720)
GSM7746214
             RNAPol2-Ser5_PDGFB_onslide_60_(230725_SH_Mm_P2S5_P6_0720)
GSM7746215
             RNAPol2-Ser5_PDGFB_onslide_70_(230801_SH_Mm_P2S5_P7_0720)
GSM7746216
GSM7746217
             RNAPol2-Ser5_PDGFB_onslide_80_(230801_SH_Mm_P2S5_P8_0720)
GSM7746218
             RNAPol2-Ser5_RELA_onslide_12_(230801_SH_Mm_P2S5s_R1_0722)
GSM7746219
             RNAPol2-Ser5_RELA_onslide_17_(230801_SH_Mm_P2S5s_R1_0727)
GSM7746220
             RNAPol2-Ser5 RELA onslide 22 (230801 SH Mm P2S5s R2 0722)
GSM7746221
             RNAPol2-Ser5_RELA_onslide_27_(230801_SH_Mm_P2S5s_R2_0727)
GSM7746222
             RNAPol2-Ser5_RELA_onslide_32_(230801_SH_Mm_P2S5s_R3_0722)
GSM7746223
             RNAPol2-Ser5_RELA_onslide_37_(230801_SH_Mm_P2S5s_R3_0727)
GSM7746224
             RNAPol2-Ser5_RELA_onslide_42_(230801_SH_Mm_P2S5s_R4_0722)
             RNAPol2-Ser5 RELA onslide 47 (230801 SH Mm P2S5s R4 0727)
GSM7746225
GSM7746226
             RNAPol2-Ser5 RELA onslide 52 (230801 SH Mm P2S5s R5 0722)
             RNAPol2-Ser5_RELA_onslide_57_(230801_SH_Mm_P2S5s_R5_0727)
GSM7746227
GSM7746228
             RNAPol2-Ser5_RELA_onslide_5micron27_(230801_SH_Mm_P2S5s_5R2_0727)
GSM7746229
             RNAPol2-Ser5 RELA onslide 5micron37 (230801 SH Mm P2S5s 5R3 0727)
             RNAPol2-Ser5 RELA onslide 5micron47 (230801 SH Mm P2S5s 5R4 0727)
GSM7746230
GSM7746231
             RNAPol2-Ser5 RELA onslide 67 (230801 SH Mm P2S5s R6 0727)
GSM7746232
             RNAPol2-Ser5_YAP1_Biomag-amine_low_(230801_SH_Mm_P2S5_Ybl_0727)
             RNAPol2-Ser5_YAP1_Glutathione_high_(230801_SH_Mm_P2S5_Yph_0727)
GSM7746233
GSM7746234
             RNAPol2-Ser5_YAP1_Glutathione_low_(230801_SH_Mm_P2S5_Ypl_0727)
```

Genome browser session (e.g. UCSC)

No longer applicable.

Methodology

Replicates

At least two replicates were used for Voom/Limma analysis. All replicates were successful

Sequencing depth

All Experiments were paired-end. Sequencing depths are reported in Supplementary Data 1.

Antibodies	All antibodies and sources are provided in the Methods section.
Peak calling parameters	MACS2 version 2.2.9.1 with parameters callpeak -t <bed-file-of-mapped-fragments> -f BEDPEkeep-dup all -p 1e-5</bed-file-of-mapped-fragments>
Data quality	Data quality assessment is the topic of this manuscript, and is reported.
Software	https://github.com/Henikoff/FFPE