

Supplementary Table 1. Antibodies used in this study.

Antibody	Species	Source	Catalogue Number	Dilution	Validation
Anti-UTX	Rabbit	Cell Signaling Technology	33510S	WB (1:1000)	PMID: 29227285
Anti-UTX	Rabbit	Millipore	ABE-409	IF (1:100); WB (1:1000); IP (6µl)	PMID: 29551674 Supplementary Fig2a;
Anti-UTX	Rabbit	Abcam	ab84190	IP/ChIP (6µl)	PMID: 28974674
Anti-RbBP5	Rabbit	Bethyl	A300-109A	IF (1:200); WB (1:1000)	PMID: 29263365
Anti-OCT4	Rabbit	Cell Signaling Technology	2840S	IF (1:300)	PMID: 30338036
Anti-MAP2	Chicken	Abcam	ab5392	IF (1:10,000)	PMID: 29348617
Anti-TBR1	Rabbit	Abcam	ab31940	IF (1:200)	PMID: 29275859
Anti-OTX2	Goat	R&D Systems	AF1979	IF (1:200)	PMID: 29988106
Anti-PTIP	Rabbit	Abcam	ab2614	WB (1:1000)	PMID: 25799990
Anti-YBX1	Rabbit	Abcam	ab12148	WB (1:1000)	PMID: 29866826
Anti-PAX6	Rabbit	Biologends	901301	IF (1:200)	PMID: 26879757
Anti-53BP1	Mouse	Millipore	05-725	WB (1:1000)	PMID: 12640136
Anti-53BP1	Rabbit	Novus	NB100-304	WB (1:1000); IP/ChIP (6µl)	PMID: 30046110

					Supplementary Fig2b;
Anti-53BP1	Rabbit	Abcam	ab36823	IF (1:200); WB (1:1000); IP/ChIP (6µl)	PMID: 29343827
Anti-γH2AX	Mouse	Millipore	05-636	IF (1:200)	PMID: 29403037
Anti-flag	Mouse	Sigma Aldrich	F1804-1MG	WB (1:1000)	PMID: 24603765
Anti-GST (680nm)	Goat	Rockland	600-144-200	WB (1:5000)	PMID: 25384973
Anti-6xHis	Rabbit	Abcam	ab9108	WB (1:1000)	PMID: 29849063
Anti-cmyc	Rabbit	Sigma Aldrich	C3956-.2MG	WB (1:1000)	PMID: 20453196
Anti-pS10 H3	Rabbit	Cell Signaling Technology	3465S	FACS (1:1000)	PMID: 26144554
APC Anti-BrdU	Mouse	Biolegend	339808	FACS (1:500)	PMID: 27671632
FITC Annexin V	N.A	Biolegend	640905	Followed manufacturer protocol	PMID: 23785121
Propidium Iodide	N.A	Biolegend	421301	Followed manufacturer protocol	PMID: 28150746
Anti-beta actin	Mouse	Sigma Aldrich	A1978	WB (1:1000)	PMID: 17296734
Anti-GAPDH	Mouse	Millipore	MAB374	WB (1:1000)	PMID: 26381214
Anti-βTubulin	Mouse	Sigma Aldrich	T8660	WB (1:1000)	PMID: 20074521

Anti-TBR2	Rabbit	Invitrogen	50-4877-42	IF (1:40)	PMID: 28768916
Anti-Nestin	Mouse	Santa Cruz Biotechnology	sc-23927	IF (1:200)	PMID: 28946814
Anti- Vimentin	Mouse	Abcam	ab22651	IF (1:200)	PMID: 30143638
Anti-CTIP2	Rat	Abcam	ab18465	IF (1:300)	PMID: 29275859
Anti-ZO-1	Mouse	Thermo Fisher Scientific	33-9100	IF (1:300)	PMID: 29021339
Anti- CNPase	Mouse	Abcam	ab6319	IF (1:200)	PMID: 29400711
Anti- Histone H3K27Ac	Rabbit	Active Motif	39133	ChIP (4µl)	PMID: 30464211
Anti- Histone H3K27me3	Rabbit	Active Motif	39155	ChIP (4µl)	PMID: 30305620
Anti- Histone H3K79me2	Rabbit	Active Motif	39144	ChIP (4µl)	PMID: 30270107

Supplementary Table 2. Expression vectors.

Vector Name	Source	Catalogue Number	Protein Tag	Expression	Bacterial Resistance Gene
lentiCRISPR v2	Addgene	52961	N.A	Mammalian	<i>Puro</i>
pDONR221	Thermo Fisher Scientific	12536017	N.A	N.A	<i>Kan</i>
pDEST15	Thermo Fisher Scientific	11802014	GST	<i>E. coli</i>	<i>Amp</i>
pDEST17	Thermo Fisher Scientific	11803012	His	<i>E. coli</i>	<i>Amp</i>
pGEX-6P-1*	Amersham	27-4597-01	GST	<i>E. coli</i>	<i>Amp</i>
pAMW	Drosophila Genomics Resource Center	1103	Myc	<i>Drosophila</i>	<i>Amp</i>
pAFW	Drosophila Genomics Resource Center	1111	Flag	<i>Drosophila</i>	<i>Amp</i>

Supplementary Table 3. Primers for expression constructs

Construct Primers	Oligo Sequences
h53BP1 GW dom1F	AAAAAGCAGGCTTCGACCCTACTGGAAGTCAG
h53BP1 GW dom1R	AGAAAGCTGGGTGTTACTGGTCAAACAAGTCTTCC
h53BP1 GW dom2F	AAAAAGCAGGCTTCGAGGTTTTGTCAACTCAGG
h53BP1 GW dom2R	AGAAAGCTGGGTGTTAGCAACCAGTGGCTAAAAT
h53BP1 GW dom3F	AAAAAGCAGGCTTCGATGATACAGACACCAGGG
h53BP1 and m53BP1 GW dom3R	AGAAAGCTGGGTGTTAAGGCAAAGTCAAATGAAATGG
m53BP1 GW dom3F	AAAAAGCAGGCTTCGAGGATGAAACGGAGGACAG
m53BP1 GW dom3iii F	AAAAAGCAGGCTTCCAAGTACTTGACCAGGAATTAGA
h53BP1 GW dom4F	AAAAAGCAGGCTTCTGTGAAAGTTCTAGTGAAACC
h53BP1 GW dom4R	AGAAAGCTGGGTGTTACTGGCTATGGAGCGACTC
h53BP1 GW dom5F	AAAAAGCAGGCTTCCAGGGAGAAGAAGAGTTTG
h53BP1 GW dom5R	AGAAAGCTGGGTGTTACAACACATCACATTCGTACC
h53BP1 GW dom6F	AAAAAGCAGGCTTCCGTGTTGTAGCCAAGTGG
h53BP1 GW dom6R	AGAAAGCTGGGTGTTATGTATACTGCTTGTTGAAAGG
h53BP1 GW dom7F	AAAAAGCAGGCTTCGGAGACAACACCGGTGAA
h53BP1 GW dom7R	AGAAAGCTGGGTGTTATTAGTGAGAAACATAATCGTGTTT AT
attB1-flag-53BP1d3-F	GGGGACAAGTTTGTACAAAAAAGCAGGCTTCGACTACAA AGACCATGACGGTGATGATACAGACACCAGGG
attB2-53BP1-nt642-R	GGGGACCACTTTGTACAAGAAAGCTGGGTTTTATAATCTA TTCTCAGCACATGGT
attB1-flag-53bp1- nt322-F	GGGGACAAGTTTGTACAAAAAAGCAGGCTTCGACTACAA AGACCATGACGGTACTCAGTCCCAAGGGTTG
attB2-53bp1-nt963-R	GGGGACCACTTTGTACAAGAAAGCTGGGTTTTAAGGCAA AGTGAAATGAAATGG
attB1-myc-53bp1- nt643-F	GGGGACAAGTTTGTACAAAAAAGCAGGCTTCGAGCAGAA GTTGATTTCCGAGGAGGATCTGGACACCAAGGAAGAAAA GA

Gateway Adapter attB1	GGGGACAAGTTTGTACAAAAAAGCAGGCT
Gateway Adapter attB2	GGGGACCACTTTGTACAAGAAAGCTGGGT

Supplementary Table 4. Primers for ChIP-qPCR. h and m denotes human and mouse, respectively.

ChIP qPCR Primers	Oligo Sequences 5'-Forward Primer-3' 5'-Reverse Primer-3'
hCHD5_ChIP	TTTAAATGAGCGCCTCCAGT CCTGGAACTTTTGCGTTCTT
hDLL1_ChIP	GCATGGCTAATGAGATGCAA GGAAAAGTGGCTCCTTTGTG
hZIC1_ChIP	CGAGCGTGAGAGAAAGGAGA ATAGAGGAATGTGAGCGCCA
hDLX2_ChIP	CCACTCGGCACTTGACATAA CTGCGGATTGGTTAAGAAGC
hFGF9_ChIP	GCCACCAACGTGAGATTTTT AGGCATGCGCTGTTTTTACT
hGRIK2_ChIP	GAACATGCAGCGATTGCTAA TGGGTTCCGGTAGAAATGAG
hPAX5_ChIP	CTCCCCACATCAAGTTCCAT CCCGGATTCATCTCCAGTA
hSIX3_ChIP	TGTTGTCATTAGGGCGATTG AGAGGAGAGGGAGAGCCAAC
hSOX11_ChIP	CTAGCTGGGGGAGTGATGTC CGCTCCTTCTGCAAAAAGTT
hFOXG1_ChIP	AAGCTGGGACTGTGAGATCC GCTTTTATTTTGTGCGGGCC
hIntergenic-1_ChIP	GCACTTTGACATGCTGAGGA CTTCCTGTGCTTTGGGAGAG
mChd5_ChIP	CACTGAGCTGCCCAAGACTA TTGTGACGTCCAGTCTGGTT
mDII1_ChIP	CCGCTCCCAGAGTGTTCTA ATGGCATTGGCTGAATTCTT
mZic1_ChIP	TGATGAATGGGAGCAGGGG TACCTGGGATTGATGAGGCG
mDlx2_ChIP	GCGCCTCCTCTGTCTATCTC GCCTAGACCGTAGCCTCATTT

mFgf9_ChIP	CTGGGAGGAGAGATTTGTCTG AGGCATGCGCTGTTTTACT
mGrik2_ChIP	CTGCATTTCCCATTCAGGTT GATTTCCCTGCCAGCTTCTTG
mPAX5_ChIP	CTCGCCATGTGAGATCATGT ACACCCTTTCCCTGGTTCTT
mSix3_ChIP	TCCGGCTAAGTGGTAAAACC CTATTGGTCTGTGGCGTGTC
mSox11_ChIP	CTCACTCGCTTGATTTCTCG GAGAGCCCTCAACTTTTTGC
mFoxg1_ChIP	GGAAGTAGACGCCCACTCAT TCCACCTCCTCTTCAGCTTC
mIntergenic-2_ChIP	TCATGTCCTCAGACTCAGCC ACTTGTCTCAAGCGAAGGA
GATA4_ChIP	ACAGTTCCTCCCACGCATAT TGATACATGGTCCCTGCGAG
H2AXp_ChIP	CGACATGCTAGCGAGGTAGA GTCCTGGGGGCTTATAAAGG
H2AXP_ChIP	CGACATGCTAGCGAGGTAGA GTCCTGGGGGCTTATAAAGG
PTIPp_ChIP	GCCCCAAGGATGTGTTAGAA TGGCTTGCTTCCTTGACTG
PRL27Ap_ChIP	TTTGGTGAGGAGCTCAGACA GAGGGCGAGAACTGTTGAAG
RPS6p_ChIP	AAAGGCGAGCCTTCTCCTAC TGGTGGCGAGTGTTAGACTG

Supplementary Table 5. gRNA sequences

gRNA Name (Targeting Strand)	Oligo Sequences 5'-Forward Primer-3' 5'-Reverse Primer-3'
TP53BP1-Ex3-A	AACGAGGAGACGGTAATAGT
TP53BP1-Ex4-C	CACATGTGGTTCCATCAGTC
TP53BP1-Ex2-A	GCCTGAAAGCCAGGTTCTAG
TP53BP1-Ex2-C	CAGGATTTTCTTTGTGCGTC
TP53BP1-Ex12-1	TGTGAAGAATCTTGCTCTAC
TP53BP1-Ex12-2	GCAGCTAAGCTCAGATGCAG
UTX-ex1-1	GGTAGCGAGCGACACTCCGC
UTX-ex1-2	CTCTCCTCGGCTGTCAGGCT
UTX-ex4	CAGCATTATCTGCATACCAG
UTX-ex6	TATGAGTCTAGTTTAAAGGT
mouse 53bp1-ex12-1	CGAACCTGTCAGACCCGA
mouse 53bp1-ex12-2	GGGCGCATGCCAGCAGCT

Supplementary Table 6. Primers for RT-qPCR. h and m denotes human and mouse, respectively.

qPCR Primers	Oligo Sequences 5'-Forward Primer-3' 5'-Reverse Primer-3'
hOCT4_cDNA	GACAACAATGAGAACCTTCAGGAGA CTGGCGCCGGTTACAGAACCA
hNANOG_cDNA	GCAATGGTGTGACGCAGAAGG AGGTTCCCAGTCGGGTTCA
hPAX6_cDNA	TGGGCAGGTATTACGAGACTG ACTCCCGCTTATACTGGGCTA
hGSC_cDNA	AGGAGAAAGTGGAGGTCTGGT CGACGACGTCTTGTTCCACT
hT_cDNA	AGAACGGCAGGAGGATGTTT GAAGGAGTACATGGCGTTGG
hSOX1_cDNA	CAACCAGGACCGGGTCAAAC TCGGACATGACCTTCCACTCG
hSOX2_cDNA	TACAGCATGTCCTACTCGCAG GAGGAAGAGGTAACCACAGGG
hDLL_cDNA	CTGATGACCTCGCAACAGAA ACACACGAAGCGGTAGGAGT
hADGRG1_cDNA	GAAACCTCGGGACTACACCA AAGTGCAGGAAGATGGCACT
hCHD5_cDNA	TGGTGACGGCTATGAGACAG GTCCAGGCATACGAGATGGT
hCDK5R1_cDNA	ATGCCGACCCACACTACTTC CTACAGTGCTCACCGATCCA
hNR4A3_cDNA	CRACTACACCAAGCTGACCA ATTTGGTACACGCAGGAAGG
hDLX2_cDNA	GCAGCTATGACCTGGGCTAC TCCTTCTCAGGCTCGTTGTT
hHES5_cDNA	GTGGGTGCCTCCACTATGAT GGCTTCCACGTGACTGAGA
hSIX3_cDNA	GCCATCAACAAACACGAGTC TGTGGTTCTCAAGGATGTGG

hPAX5_cDNA	CGTCAGTTCCATCAACAGGA ACGGAGCCAGTGGACACTAT
hASCL1_cDNA	CATCTCCCCCAACTACTCCA CCAGTTGGTGAAGTCGAGAA
hDCX_cDNA	ACCGCTACTTCAAGGGGATT TGAGGCAGGTTGATGTTGTC
hDLX5_cDNA	TCTCAGGAATCGCCAACTTT AGGAAGCCGAGGTAGGAGAG
hDLX6_cDNA	AGGGGACGACACAGATCAAC CGATGGTTTAAAGCCTGGAG
hGRIK2_cDNA	AGGCCTCACAGGCAGAATAA TCCCACGTTCCAATCTTTTC
hNEUR1_cDNA	AGATCCTCATGGACCTCAGC TTCAGCCTGACTTGCTCGTA
hPAX3_cDNA	CAAGGGGCATCAGGTACTGT TTCCTTCTTGGGTTGCTGTT
hWNT7A_cDNA	CCAACTACTGCGAGGAGGAC ACAGCACATGAGGTCACAGC
mNestin_cDNA	GTCTCAGGACAGTGCTGAGCCTTC TCCCCTGAGGACCAGGAGTCTC
mMusashi1_cDNA	GATGGCTCCCCCTCCAGGTT CATTGGTGAAGGCTGTGGCA
mPax6_cDNA	TCTTTGCTTGGGAAATCCG CTGCCCGTTCAACATCCTTAG
mSox1_cDNA	GTTTTTTGTAGTTGTTACCGC GCATTTACAAGAAATAATAC
mDcx_cDNA	CCTCTTTCTTCTTTTTATTTGCCTTA GGAACCACAGCAACTTTTCCAA
mGfap_cDNA	CAATGCTGGCTTCAAGGAGACACG TCAGTTCAGCTGCCAGCGCCT
mTubb3_cDNA	TCTGGCGCCTTTGGACACCTATT TTCTCACACTCTTTCCGCACGACA
mMap2_cDNA	TGTGCTGTGTGCTCCAAGTT GCTGGTGGTATGTTCTGGCT

mOlig1_cDNA	CTCGCCCAGGTGTTTTGTTG TATAAGCCTGCGCTACGACG
mSox2_cDNA	ACAGCATGTCCTACTCGCAG ATGCTGATCATGTCCCGGAG
mEno2_cDNA	CTCCCGCTGATCCTTCCCGATACA ATGCCGACGTTGGCTGTGAACTTG
mOlig2_cDNA	TGGAGAGATGCGTTCGTTCC GTGCTCTGCGTCTCGTCTAA
mDII1_cDNA	CAGGGATACACACAGCAAACG GCAGACAGAACATACACCGAC
mAdgrg1_cDNA	TGTTTTCTCTGGTGCAAGGTG AGAAGCGGGGAATATCTGGG
mChd5_cDNA	GCACAAGGTCCTAAACCAGC TGTACATCTGAGAGGAGCCG
mCdk5R1_cDNA	AGAACGCCAAGGACAAGAACC CACAGGACAGCGACTTCTTCA
mNr4a3_cDNA	CATGAACCCCGACTACACCAA GCGACCCTCTTCCATCTTGAT
mDlx2_cDNA	AAACCACGCACCATCTACTCC TCGCCGCTTTTCCACATCTT
mHes5_cDNA	GAGAAAAACCGACTGCGGAA CGAAGGCTTTGCTGTGTTTC
mSix3_cDNA	CGCTTGCTCTCTCTAACTCG GTAACCCCTACCCTCATGC
mCdc7_cDNA	AGGAAAAGACGGAAAGGAGAGA GATTGCTTGATGAGTTTCTCTGC
mFam111a_cDNA	CACAGGACCAAGCATCTACCA ACAAAACCTGCCATCCTTCCT
mFen1_cDNA	ATTCCTCTTCGCCGCCATT GTCATTCTCACGGATGGCAC
mMcm5_cDNA	TAGGAGGGCTGAGGTACAGT TACTTGAAGGTGAAGCCCGT
mNasp_cDNA	GATGAGGAAGCAAGGGAAGAGT TCCACCCTTCTCCACTTCACT

mKdm6a_cDNA	CACTCAGGGGCTTCACAAAG ACTGAATTGCTAGGCAGGGT
mYars_cDNA	TATCCGTGTGGGCAAATCCT GCCTCTCATCTTCTGGGGTTT
mCars_cDNA	CTGAGCATTAGTGACGAGGCA CGCTTCTATGTGCCTGAACCA
mNars_cDNA	CAATCCTGCTGTGTCGCTTTC AGTAGTAAGGAGCGGGGTCAA
mLars_cDNA	AAAACGGACCGAGGGATCAA GGTGAGGTGGACTTTCTTGCT