

**Supplemental Table 1: antibody information**

Name	Origin	Cat. Number	Applications
Rabbit anti-L3MBTL2	Sigma-Aldrich	HPA000815	IHC (1:100), WB (1:1000)
Rabbit anti-L3MBTL2	Boster	A08416	IHC (1:150)
Rabbit anti-H4tetraAcK	Abcam	ab177790	IF (1:4000), WB (1:10000)
Rabbit anti-H2BAcK16	Active Motif	#39121	IF(1:1600), WB (1:1000)
Mouse anti-Hup 1N (Protamine 1)	Briar Patch Bioscience	None	IF (1:100), WB (1:1000)
Rabbit anti-H4	Abcam	ab10158	WB (1:1000)
Goat anti-GAPDH	Santa Cruz	sc-25778	WB (1:800)
Rabbit anti-Lamin B1	Abcam	ab16048	WB (1:2000)
Goat anti-H2B	Santa Cruz	sc-8650	WB (1:1000)
Rabbit anti-P21	Santa Cruz	sc-397	WB (1:1000)
Rabbit anti-γH2AX	Cell Signaling	#9718	IF (1:400), WB(1:1000)
Rabbit anti-H2AX	Cell Signaling	#2595	WB (1:1000)
Rabbit anti-H3AcK18	Cell Signaling	#9675	WB (1:2000)
Rabbit anti-H3	ImmunoWay	YT2162	WB (1:1000)
Mouse anti-SYCP3	Abcam	ab97672	IF (1:200)
Rabbit anti-H3K27me3	Millipore	#07-449	IF (1:100)
Goat anti-SYCP1	Santa Cruz	sc-20837	IF (1:50)
Rabbit anti-MLH1	Abcam	ab92312	IF (1:50)
Rabbit anti-H3K9me1	Cell Signaling	14186	IF (1:1200)
Rabbit anti-53bp1	Bethyl	A300-273A	IF (1:100)
Rabbit anti-RNF8	Abcam	ab105362	WB (1:1000)
Rabbit anti-RNF8	Proteintech	14112-1-AP	IHC (1:100)
Rabbit anti-ubH2A	Cell Signaling	#8240	WB (1:1000); IHC (1:200)
Mouse anti-ubH2A	Millipore	05-678	IF (1:100)
Anti-Flag	Sigma- Aldrich	F1804	WB (1:1000)
Anti-HA	Abcam	ab18181	WB (1:1000)
Donkey anti-Goat (HRP)	Santa Cruz	sc-2058	WB (1:5000)
Rabbit Anti-Mouse (HRP)	Sigma- Aldrich	A-9044	WB (1:5000)
Goat Anti-Rabbit (HRP)	Santa Cruz	sc-2004	WB (1:5000)
Donkey anti- Goat (Alexa Fluor® 555)	Invitrogen	A21432	IF (1:400)
Donkey anti-Mouse (Alexa Fluor® 488)	Invitrogen	A21202	IF (1:100)
Donkey anti- Rabbit (Alexa Fluor® 555)	Invitrogen	A31572	IF (1:400)

**Supplemental Table 2 : Primers for real-time PCR**

Gene	Species	Primers forward (5'-3')	Primers reverse (5'-3')	Size (bp)	Accession #
L3mbtl2	Mouse	TCTACACAGAAGGTGGCTGGTTC	CATCAGGTAACCATCCAAGAGCAC	119	NM_001289711
Rpl19	Mouse	AGGCATATGGGCAT	TTGACCTTCAGGTAC	164	NM_009078
Piwil2	Mouse	TTGGCCTCAAGTCCTAGAC	GAACATGGACACCAAACCTACA	145	NM_021308
Stk31	Mouse	GGAACAGTTATTGCTCAGGCT	TTAGGATCAGGTTTCTTTGCCTC	131	NM_029916
Tcam1	Mouse	TGGTAGAGTTTGGACACTCCC	CTCCCCTGCACAAGAGAAGA	185	NM_029467
Hoxb8	Mouse	TGCGCCCAATTATTACTG	AACTCCTGGATTGCGAAGGG	115	NM_010461
Foxa2	Mouse	CCCTACGCCAACATGAACTCG	GTTCTGCCGGTAGAAAGGGA	222	NM_010446
Rhox5	Mouse	ACTCGGAAGAACAGCATGATG	CCCTGGTGCCACTATCCTT	204	NM_008818
Ddx4	Mouse	CCTCACGTGCTTCTATGTTCC	CATCTCTCCAGAAGGCCCATC	210	NM_001145885
Tnp1	Mouse	TCCTCACAAGGGCGTCAA	GCTCATTGCCGCATCACA	125	NM_009407
Tnp2	Mouse	ACAGAGCTAAGAGGCGTAGCTC	TCCCAACAGTCCCCTAGTGATG	111	NM_013694
Prm1	Mouse	AAGATGTCGCAGACGGAGGAG	CACCTATGGTGATGAGCGGC	84	NM_013637
Prm2	Mouse	ATGGTTCGCTACCGAATGAGG	CTCCGCCTTCTGCATGACC	221	NM_008933
Brdt	Mouse	AGTGGCGGGTTGACGAATC	AGTCAGGCAGCTTTAGTTTCAC	124	NM_054054
Rnf8	Mouse	TGTCCTAACGTCAAGAGACAGA	GCTTCAGGTCGCACTCTCC	206	NM_021419