

Filtered Proteins	Name	Complex	kD	NC	NA	CC	CA
Transcription elongation factor SPT5	SUPT5H	DSIF	120 kD	0	0	0	11
Splicing factor 3A	SF3A		89 kD	0	4	0	8
RNA polymerase-associated protein CTR9 homolog	CTR9	PAF	134 kD	0	0	0	6
DNA-directed RNA polymerase II subunit RPB2	RNA pol II B2	core RNA pol II	134 kD	0	0	0	6
DNA-directed RNA polymerase II subunit RPB1	RNA pol II B1	core RNA pol II	217 kD	1	0	0	5
RNA polymerase II-associated factor 1 homolog	PAF1	PAF	60 kD	0	0	0	4
Transcription elongation factor SPT6	SUPT6H	chromatin/ elongation	199 kD	0	0	0	4
Lamin-B2	Lamin B2		68 kD	0	0	0	4
DNA topoisomerase I	DNA Topo I		91 kD	0	0	0	2
ATP-dependent RNA helicase DDX3Y	DDX3Y		72 kD	0	1	0	2
Interleukin enhancer binding factor 3	IL3IF		77 kD	0	1	0	2
RNA polymerase-associated protein LEO1	LEO1	PAF	75 kD	0	0	0	2
DNA replication licensing factor MCM5	MCM5		82 kD	0	0	0	2
WD40 repeat-containing protein SMU1	SMU1		57 kD	0	0	0	2
Nuclease-sensitive element-binding protein 1	YBOX1		36 kD	0	1	0	1
Pre-mRNA-processing factor 6	PRP6		107 kD	0	1	0	1
Putative uncharacterized protein	Unknown		72 kD	0	0	0	1
U4/U6 small nuclear ribonucleoprotein Prp4	PRP4		58 kD	0	0	0	1
FACT complex subunit SPT16	SPT16	FACT	120 kD	0	0	0	1
ATP-dependent RNA helicase DDX1	DDX1		82 kD	0	0	0	1
FACT complex subunit SSRP1	SSRP1	FACT	80 kD	0	0	0	1
Uncharacterized protein C17orf85 homolog	C17orf85		69 kD	0	0	0	1
Lamin-B1	Lamin B1		67 kD	0	0	0	1
Splicing factor 3B subunit 1	SF3B		146 kD	0	4	1	3
ATP-dependent RNA helicase DDX15	DDX15		88 kD	1	2	0	3
			Total	2	14	1	75

Figure S1. Immunoprecipitation of AID from chromatin of DT40 and complex analysis. (a) Schematic of complex isolation and analysis. DT40 cells expressing tagged AID-3FM (red) and untagged AID (blue, control) were fractionated into cytoplasm, nucleoplasm, and chromatin. Each fraction was then subjected to FLAG bead IP and Mass Spec analysis. A total of 1,319 peptides (391 proteins) were identified from all AID-3FM fractions, with 151 peptides (52 proteins) from the chromatin fraction only. The equivalent Mass Spec dataset from control cells was used as a filter to remove false positives (yellow lines/boxes), leaving 75 peptides (25 proteins). (b) Table of the peptide ids from Mass Spec analysis of AID-3FM - chromatin fraction after filtering. NC, nucleoplasm control; NA, nucleoplasm AID-3FM; CC, chromatin control; CA, chromatin AID-3FM. RNA pol II B1 was included because it usually associates with RNA pol II B2, and this complex has 11 peptides with AID and 1 without. SF3B was included because it associates with SF3A, and this complex has 19 peptides with AID and 1 without. DDX15 was included because it has five peptides with AID and one without.

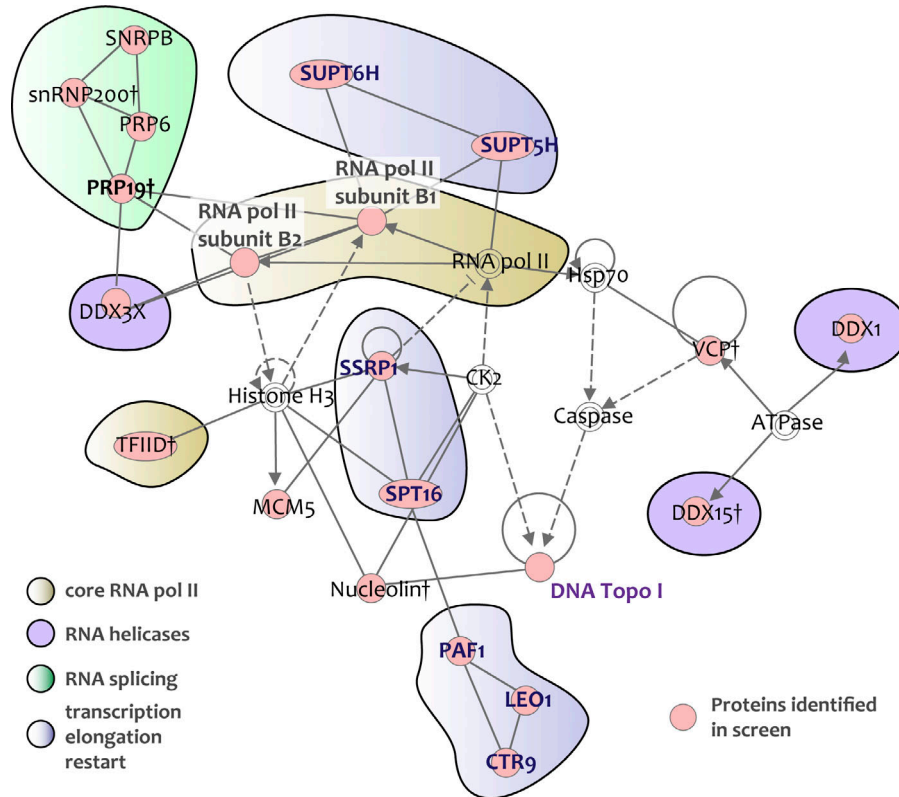


Figure S2. Filtered AID chromatin mass spec ID data were submitted to the Ingenuity Systems Pathway Analysis gene network software and allowed to generate a Network tree, receiving a tree score of 75. A second tree was also generated, and it obtained a score of 22. Those proteins that were also detected in the control dataset were removed from the tree. Proteins marked with a † were specific (0 peptides in control) or highly enriched (<15% in control) in the chromatin AID fraction, but less or nonspecific in the nucleoplasm. Identified proteins are in light red, solid lines represent direct interactions, dashed lines represent functional interactions. Color schemes as indicated.

Table S1. Primer sequences

Gene	Primer 1 – sequence	Primer 2 – sequence	Reference / Name	Purpose
<i>CD79b</i>	5'-CCACACTGGTGTCTCTCC-3'	5'-GGGCTTCCTGGAAATTCAG-3'		qRT-PCR
<i>HPRT</i>	5'-GTTGGATACAGGCCAGACTTTGTTG-3'	5'-GATTCAACTGCGCTCATCTTAGGC-3'		qRT-PCR
<i>GLTα</i>	5'-CAAGAAGGAGAAGGTGATTGAG-3'	5'-GAGCTGGTGGGAGTGTGAGT-3'		qRT-PCR
<i>GLTμ</i>	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-TCTGAACCTTCAAGGATGCTCTTG-3'		qRT-PCR
<i>SPT5</i>	5'-TGCACCTGCAAGAAGCTGGTGG-3'	5'-GCTCATAGGAGTGAAGCCACCA-3'	OriGene (MP216410)	qRT-PCR
<i>PAF1</i>	5'-GGAGGAAGAGATGGAGGCTGAA-3'	5'-CACTGCCTCATCTCTGTACC-3'	OriGene (MP210531)	qRT-PCR
<i>LEO1</i>	5'-GAGGAGCAAGACCAGAAGTCA-3'	5'-TGTCGCTGTCTGCTCGGAATC-3'	OriGene (MP207353)	qRT-PCR
<i>CTR9</i>	5'-GTGACACCTACTCTATGCTGGC-3'	5'-TGGCAGCATACAGGTTCTTGGC-3'	OriGene (MP203022)	qRT-PCR
<i>CDC73</i>	5'-GAGAGAGTGTGGAGGACAAGAAC-3'	5'-GCACGACCTTCTCTCTGGCTT-3'	OriGene (MP202272)	qRT-PCR
<i>AID</i>	5'-GAAAGTCACGCTGGAGCCG-3'	5'-TCTCATGCCGTCCTTGG-3'		qRT-PCR
<i>MSH2</i>	5'-GGGATGTGACGAAGCCGAGCC-3'	5'-TGCTCTCCTCCGACATGGCAGT-3'		qRT-PCR
<i>MSH6</i>	5'-CTCGTCGCCGGAGGCAAAGG-3'	5'-TAGGCAAGGCCACCAGGGGT-3'		qRT-PCR
<i>UNG</i>	5'-GTCTATCCGCCCCCGGAGCA-3'	5'-AACTGGGCGGGGTGGAAGT-3'		qRT-PCR
<i>HeLa A</i>	5'-CTCCGAGCGGAGACTCTAGAG-3'	5'-CGTACGTGATGTTACCTCG-3'	KMS6703 / KMS6716	ChIP-qPCR
<i>HeLa B</i>	5'-GAAGCGAAGGTTGTGGATCTG-3'	5'-CTTGTAATCAAGGCGTTGGTC-3'	KMS6705 / KMS6706	ChIP-qPCR
<i>DT40 1</i>	5'-CCTTCACGATTCTCCGGTTC-3'	5'-CACCTAGGACGGTCAGGGTT-3'	DS4506 / DS4507	ChIP-qPCR
<i>DT40 2</i>	5'-CCTTCACGATTCTCCGGTTC-3'	5'-TTCCCCAATTGCTTTGTGTAC-3'	DS4506 / DS4516	ChIP-qPCR
<i>DT40 3</i>	5'-CATCCCATCACTTCTGACCC-3'	5'-CACCTAGGACGGTCAGGGTT-3'	DS4517 / DS4507	ChIP-qPCR
<i>DT40 4</i>	5'-CCTTGAAGAGGTGAGGAGG-3'	5'-GCAGAAACAGCCCAAGCAGC-3'	KMS6911 / KMS6912	ChIP-qPCR
<i>DT40 5</i>	5'-CAGAGGTGCATGTGTGTCTG-3'	5'-GTTGAGTCTCTCTTTGACG-3'	KMS6915 / KMS6916	ChIP-qPCR

Table S2. shRNA (single and sets)

Target	Vector	Sequence	Reference	Source
PAF1	RV-1	5'-GGTGACGGAGTTTACTACAATGAGCTGGA-3'	GI518753	OriGene
LEO1	RV-1	5'-GTGGCAGTGACAATCACTCTGAACGGTCA-3'	GI529047	OriGene
CTR9	RV-1	5'-GATGAGGATCCGACAGTGACCAGCCGTC-3'	GI528588	OriGene
CDC73	RV-1	5'-GACGTGCTCAGCGTCTGCGACAGTACAA-3'	GI561719	OriGene
SPT5	RV-1	5'-GCTTGGCTACTGGAACAGCAGATGGTGC-3'	GI336016	OriGene
non-target	RV-1	5'-GCACTACCAGAGCTAACTCAGATAGTACT-3'	TR30007	OriGene
AID	RV-2	5'-ACCAGTCGCCATTATAATGCAA-3'		Open BioSystems
PAF1	LV	5'-GAACCAGTTTGTGGCTTATTT-3'	TRCN0000197886	Sigma-Aldrich
LEO1	LV	5'-GACTTGGGCAATGACTTATAT-3'	TRCN0000243542	Sigma-Aldrich
AID	LV	5'-GCGAGATGCATTTCTGTATGTT-3'	TRCN0000112031	Sigma-Aldrich
non-target	LV	5'-CAACAAGATGAAGAGCACCAA-3'		Sigma-Aldrich

Vectors: RV-1, pGFP-V-RS (retrovirus); RV-2, pLMP (retrovirus); LV, pLKO.1-puro-CMV-TurboGFP⁺ (lentivirus).

Table S3. Antibodies

Antibody	Clone	Source	Usage
FLAG	M2	Sigma-Aldrich	IP, Western
PAF1	ab20662	Abcam	Western
PAF1	A300-172A	Bethyl Laboratories	Western, ChIP
PAF1	A300-173A	Bethyl Laboratories	ChIP
LEO1	A300-175A	Bethyl Laboratories	Western
LEO1	ab70630	Abcam	Western, ChIP
CTR9	A301-395A	Bethyl Laboratories	Western
CDC73	ab43256	Abcam	Western
SUPT5H	ab26259	Abcam	Western
SUPT5H	sc-28678	Santa Cruz	Western, IP
SUPT6H	NB100-2582	Novus Biologicals	IP
SUPT6H	A300-801A	Bethyl Laboratories	Western
RNA pol II	ab5408	Abcam	Western, IP
AID	Strasbg 9	(Jeevan-Raj et al., 2011)	Western
AID		(Pavri et al., 2010)	ChIP
AID	Ab59361	Abcam	Western
AID	h52-1	(Conticello et al., 2008)	IP
Myc peptide	9E10	CRUK	Western
CD40	HM40-3	eBioscience	CSR stimulation
GFP	Ab290	Abcam	IP
GFP	11814460001	Roche	Western
rabbit IgGs	Ab37415-5	Abcam	ChIP
rabbit IgGs	Ab27478	Santa Cruz	ChIP