

1 Supplemental Table 1: Genes increased upon ICI treatment

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Accession	Gene Symbol	Gene Title	fold change
M60510	Smarcd2	SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 2 (Smarcd2)	15.16
AV339477	Rmi1	RMI1, RecQ mediated genome instability 1, homolog	3.18
NM_011619	Tnnt2	troponin T2, cardiac	2.81
BB524685	Tmprss11a	transmembrane protease, serine 11a	2.64
AK010391	Esco2	establishment of cohesion 1 homolog 2	2.5
BC025084	Cenph	centromere protein H	2.43
NM_019976	Psrc1	proline/serine-rich coiled-coil 1	2.19
NM_026024	Ube2t	ubiquitin-conjugating enzyme E2T	2.04
AW553424	Kctd14	potassium channel tetramerisation domain containing 14	2.01
AK011162	Dscc1	defective in sister chromatid cohesion 1 homolog	1.97
AK014919	Cenpp	centromere protein P	1.94
AU018569	C330027C09Rik	RIKEN cDNA C330027C09 gene	1.93
BG069355	E2f7	E2F transcription factor 7	1.9
NM_010790	Melk	maternal embryonic leucine zipper kinase	1.9
AV333851	Snx22	sorting nexin 22	1.9
AF091432	Ccne2	cyclin E2	1.88
BC003738	Rad51ap1	RAD51 associated protein 1	1.87
AV270035	Dtl	denticleless homolog	1.86
AK003674	Cthrc1	collagen triple helix repeat containing 1	1.85
U31625	Brca1	breast cancer 1	1.83
BB702754	Uhrf1	ubiquitin-like, containing PHD and RING finger domains, 1	1.82
BE848253	Cenpf	centromere protein F	1.79
NM_023209	Pbk	PDZ binding kinase	1.79
NM_009004	Kif20a	kinesin family member 20A	1.78
BB543028	E2f2	E2F transcription factor 2	1.77
NM_025581	2810433K01Rik	RIKEN cDNA 2810433K01 gene	1.77
BC004617	Tcf19	transcription factor 19	1.77
NM_011369	Shcbp1	Shc SH2-domain binding protein 1	1.76
AK010351	Nuf2	NUF2, NDC80 kinetochore complex component, homolog	1.72

AK011345	6720460F02Rik	RIKEN cDNA 6720460F02 gene	1.72
BE629588	Zfp367	zinc finger protein 367	1.71
BC005799	Depdc1a	DEP domain containing 1a	1.68
NM_008087	Gas2	growth arrest specific 2	1.68
NM_009445	Ttk	Ttk protein kinase	1.68
NM_021790	Cenpk	centromere protein K	1.67
BC027121	Spc25	SPC25, NDC80 kinetochore complex component, homolog	1.67
BF577722	Spc24	SPC24, NDC80 kinetochore complex component, homolog	1.66
BC004037	Ung	uracil DNA glycosylase	1.66
BC027435	Zwilch	Zwilch, kinetochore associated, homolog	1.66
BC003261	Aurkb	aurora kinase B	1.65
NM_011799	Cdc6	cell division cycle 6 homolog	1.65
BM230253	Cenpn	centromere protein N	1.65
AK013312	Ccnb2	cyclin B2	1.64
BC005475	Prc1	protein regulator of cytokinesis 1	1.63
BM208103	Ckap2	cytoskeleton associated protein 2	1.62
BC004702	Birc5	baculoviral IAP repeat-containing 5	1.61
AF002823	Bub1	budding uninhibited by benzimidazoles 1 homolog	1.61
C85740	Chek1	checkpoint kinase 1 homolog	1.61
AK021126	Mtap7d2	MAP7 domain containing 2	1.61
AK002962	A030009H04Rik	RIKEN cDNA A030009H04 gene	1.61
BB787809	Tacc3	transforming, acidic coiled-coil containing protein 3	1.61
NM_009791	Aspm	asp (abnormal spindle)-like, microcephaly associated	1.6
NM_012025	Racgap1	Rac GTPase-activating protein 1	1.59
BB702347	Ncapg	non-SMC condensin I complex, subunit G	1.58
AU045529	Bub1b	budding uninhibited by benzimidazoles 1 homolog, beta	1.57
BI690018	Anln	anillin, actin binding protein	1.56
BM234447	Kif11	kinesin family member 11	1.56
BB200034	Kif20b	kinesin family member 20B	1.56
BC003427	Kif22	kinesin family member 22	1.56
AW488914	Gins2	GIN5 complex subunit 2 (Psf2 homolog)	1.55
BC010581	Stmn1	stathmin 1	1.55
AV316937	Sgol2	shugoshin-like 2 (S. pombe)	1.55

U80932	Aurka	aurora kinase A	1.54
BI081061	Cdca3	cell division cycle associated 3	1.54
BB770972	Gas2l3	growth arrest-specific 2 like 3	1.54
BF453953	2610036L11Rik	RIKEN cDNA 2610036L11 gene	1.54
NM_011325	Scnn1b	sodium channel, nonvoltage-gated 1 beta	1.54
X75483	Ccna2	cyclin A2	1.53
AI385771	Plk4	polo-like kinase 4 (Drosophila)	1.53
NM_011234	Rad51	RAD51 homolog (S. cerevisiae)	1.53
AK004655	Cep55	centrosomal protein 55	1.52
NM_008567	Mcm6	minichromosome maintenance deficient 6	1.52
BB426248	1500015O10Rik	RIKEN cDNA 1500015O10 gene	1.52
AV216351	Siva1	SIVA1, apoptosis-inducing factor	1.52
AI891882	Cenpq	centromere protein Q	1.51
NM_033075	D17H6S56E-5	DNA segment, Chr 17, human D6S56E 5	1.51
C77054	Nek2	NIMA-related expressed kinase 2	1.51
NM_009387	Tk1	thymidine kinase 1	1.51
BB706206	Ywhaz	tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, zeta polypeptide	1.51
BM206009	Atad2	ATPase family, AAA domain containing 2	1.5
BB751158	Mov10	Moloney leukemia virus 10	1.5
AF069051	Pttg1	pituitary tumor-transforming gene 1	1.5
BI647893	Slfn9	schlafen 9	1.5
NM_007659	Cdc2a	cell division cycle 2 homolog A	1.49
AY055122	Otoa	otoancorin	1.49
AV307110	Cdca8	cell division cycle associated 8	1.48
NM_011132	Pole	polymerase (DNA directed), epsilon	1.48
NM_023223	Cdc20	cell division cycle 20 homolog	1.46
NM_008922	Prim2	DNA primase, p58 subunit	1.46
BB821996	4930579G24Rik	RIKEN cDNA 4930579G24 gene	1.46
AK010336	Trip13	thyroid hormone receptor interactor 13	1.46
AV162459	Ube2c	ubiquitin-conjugating enzyme E2C	1.46
AF477481	Cdt1	chromatin licensing and DNA replication factor 1	1.45
AV259620	Skp2	S-phase kinase-associated protein 2 (p45)	1.45
NM_025863	Trim59	tripartite motif-containing 59	1.45
X82786	Mki67	antigen identified by monoclonal antibody Ki 67	1.44

BC003428	Asf1b	ASF1 anti-silencing function 1 homolog B	1.44
BC004801	Idi1	isopentenyl-diphosphate delta isomerase	1.44
NM_133762	Ncapg2	non-SMC condensin II complex, subunit G2	1.44
BG066984	Slc38a5	solute carrier family 38, member 5	1.44
AK010400	Bex4	brain expressed gene 4	1.43
NM_021891	Figl1	fidgetin-like 1	1.42
BB829749	Gm266	gene model 266	1.42
NM_008234	Hells	helicase, lymphoid specific	1.41
NM_010715	Lig1	ligase I, DNA, ATP-dependent	1.4
AV301324	Rrm2	ribonucleotide reductase M2	1.4
BC024598	Stxbp6	syntaxin binding protein 6 (amisyn)	1.4
BM942465	Dnajc9	DnaJ (Hsp40) homolog, subfamily C, member 9	1.39
C80350	Mcm3	minichromosome maintenance deficient 3	1.39
BI665568	Smc4	structural maintenance of chromosomes 4	1.39
NM_025415	Cks2	CDC28 protein kinase regulatory subunit 2	1.38
AV132173	Cenpa	centromere protein A	1.38
AK014587	Stard4	StAR-related lipid transfer (START) domain containing 4	1.38
BB431627	Atad5	ATPase family, AAA domain containing 5	1.37
AK011530	Rpa2	replication protein A2	1.37
AA198774	Alg14	asparagine-linked glycosylation 14 homolog	1.36
AU015121	Ccnb1	cyclin B1	1.36
NM_008566	Mcm5	minichromosome maintenance deficient 5	1.36
NM_008892	Pola1	polymerase (DNA directed), alpha 1	1.36
BC010581	Stmn1	stathmin 1	1.36
AW553784	Eif2c2	eukaryotic translation initiation factor 2C, 2	1.35
NM_138685	Wfdc15b	WAP four-disulfide core domain 15B	1.35
NM_016904	Cks1b	CDC28 protein kinase 1b	1.33
BB830191	Itgb3bp	integrin beta 3 binding protein	1.33
NM_007999	Fen1	flap structure specific endonuclease 1	1.32
AV158882	Nqo1	NAD(P)H dehydrogenase, quinone 1	1.32
J04620	Prim1	DNA primase, p49 subunit	1.31
AW045976	2310061C15Rik	RIKEN cDNA 2310061C15 gene	1.31
BB447978	Mcm4	minichromosome maintenance deficient 4	1.3
NM_008568	Mcm7	minichromosome maintenance deficient 7	1.3
NM_031374	Tex15	testis expressed gene 15	1.29

1 Supplemental Table 2: Genes decreased upon ICI treatment

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Accession	Gene Symbol	Gene Title	fold change
NM_009475	Prap1	proline-rich acidic protein 1	-49.28
NM_017474	Clca3	chloride channel calcium activated 3	-20.63
BC021880	Abp1	amiloride binding protein 1	-8.96
NM_007482	Arg1	arginase, liver	-4.91
NM_010373	Gzme	granzyme E	-4.33
X14607	Lcn2	lipocalin 2	-4.19
NM_008522	Lf	Lactoferrin	-3.1
NM_010374	Gzmf	granzyme F	-2.52
U25103	Igkv15-103	immunoglobulin kappa chain variable 15-103	-2.44
BC017646	Calb2	calbindin 2	-2.38
NM_009245	Serpina1c	serine (or cysteine) peptidase inhibitor, clade A, member 1C	-2.11
NM_011059	Padi1	peptidyl arginine deiminase, type I	-2
NM_053134	Pcdhb9	protocadherin beta 9	-2
BB009037	Cp	Ceruloplasmin	-1.92
BG064490	AA881470	EST AA881470	-1.89
NM_007686	Cfi	complement component factor i	-1.73
NM_008426	Kcnj3	potassium inwardly-rectifying channel, subfamily J, member 3	-1.67
BB391874	A630033E08Rik	RIKEN cDNA A630033E08 gene	-1.66
BE862546	Tacc1	transforming, acidic coiled-coil containing protein 1	-1.66
BB253137	Inhbb	inhibin beta-B	-1.64
AI606154	5730409N24Rik	RIKEN cDNA 5730409N24 gene	-1.62
AF146523	Malat1	metastasis associated lung adenocarcinoma transcript 1	-1.61
BB041915	Nrip1	nuclear receptor interacting protein 1	-1.6
BB534670	Cd36	CD36 antigen	-1.57
L34570	Alox15	arachidonate 15-lipoxygenase	-1.56
BM246687	4930523C07Rik	RIKEN cDNA 4930523C07 gene	-1.49
BM244995	Tlk1	tousled-like kinase 1	-1.47
AK020162	6720477C19Rik	RIKEN cDNA 6720477C19 gene	-1.43
BG068076	Wipi1	WD repeat domain, phosphoinositide interacting 1	-1.42

AV256368	Pfkfb2	6-phosphofructo-2-kinase/fructose-2,6-biphosphatase 2	-1.4
BQ033138	Oasl2	2'-5' oligoadenylate synthetase-like 2	-1.4
AK018053	5830474E16Rik	RIKEN cDNA 5830474E16 gene	-1.39
NM_009724	Atp4b	ATPase, H+/K+ exchanging, beta polypeptide	-1.38
BB667439	Phf21a	PHD finger protein 21A (Phf21a), transcript variant 1, mRNA	-1.37
BE951033	Tlcd1	TLC domain containing 1	-1.37
BM241296	5330406M23Rik	RIKEN cDNA 5330406M23 gene	-1.34
BC005613	Lpp	LIM domain containing preferred translocation partner in lipoma	-1.32
BC026387	Eppk1	epiplakin 1	-1.31
NM_007913	Egr1	early growth response 1	-1.3
AF237627	Lmod1	leiomodrin 1 (smooth muscle)	-1.29
BB150886	Dst	Dystonin	-1.28
AA023906	Cux1	cut-like homeobox 1	-1.26

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1 Supplemental Table 3: Pathways differentially regulated by ICI treatment

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Pathways	Molecules	p-value
Mitotic Roles of Polo-Like Kinase	KIF11, CCNB2, PRC1, CDC20, CCNB1, CDC2, PTTG1, PLK4	5.75E-08
Cell Cycle: G2/M DNA Damage Checkpoint Regulation	YWHAZ, CCNB2, SKP2, CCNB1, CHEK1, CDC2, BRCA1	1.00E-07
ATM Signaling	RAD51, CCNB2, CCNB1, CHEK1, CDC2, BRCA1, TLK1	6.92E-07
Role of CHK Proteins in Cell Cycle Checkpoint Control	CHEK1, CDC2, BRCA1, E2F2, TLK1	1.78E-05
Role of BRCA1 in DNA Damage Response	RAD51, SMARCD2, CHEK1, BRCA1, E2F2	1.38E-04
Pyrimidine Metabolism	RRM2, PRIM2, PRIM1, TK1, POLE, POLA1, UNG	3.72E-04
Aryl Hydrocarbon Receptor Signaling	MCM7, CCNE2, CHEK1, POLA1, NQO1, CCNA2, NRIP1	4.47E-04
Cell Cycle: G1/S Checkpoint Regulation	SKP2, CCNE2, E2F2	1.86E-02
Purine Metabolism	RAD51, RRM2, PRIM2, PRIM1, KIF20B, POLE, POLA1	2.24E-02
Biosynthesis of Steroids	IDI1, NQO1	2.75E-02
Small Cell Lung Cancer Signaling	SKP2, CCNE2, CKS1B	3.09E-02
Sonic Hedgehog Signaling	CCNB1, CDC2	3.16E-02
Cell Cycle Regulation by BTG Family Proteins	CCNE2, E2F2	4.57E-02
p53 Signaling	CHEK1, BIRC5, BRCA1	5.62E-02
Nicotinate and Nicotinamide Metabolism	NEK2, TTK, CDC2	6.46E-02
Protein Ubiquitination Pathway	SKP2, UBE2C, CDC20, BRCA1	6.92E-02
Pancreatic Adenocarcinoma Signaling	RAD51, BIRC5, E2F2	8.13E-02

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