

## Supplementary Table

Table S1 HPV breakpoints in the cervical intraepithelial cells

Sample Number	Chr	Position	Element	Gene
180003190_OC053 _CapNGS	chrX	12709243	intronic	FRMPD4
180003190_OC053 _CapNGS	chr3	95067171	intergenic	LINC00879;MTHFD2P1
180003140_OC053 _CapNGS	chr6	21813214	ncRNA_intronic	CASC15
180003140_OC053 _CapNGS	chr6	21804583	ncRNA_intronic	CASC15
180003140_OC053 _CapNGS	chr6	21804579	ncRNA_intronic	CASC15
180003122_OC053 _CapNGS	chr8	128934054	ncRNA_intronic	PVT1
180003122_OC053 _CapNGS	chr8	128924573	ncRNA_intronic	PVT1
180003122_OC053 _CapNGS	chr8	128923660	ncRNA_intronic	PVT1
180003122_OC053 _CapNGS	chr8	128920730	ncRNA_intronic	PVT1
180003105_OC053 _CapNGS	chr13	97840226	intergenic	LINC00456;MBNL2
180003049_OC053 _CapNGS	chr16	26066012	intronic	HS3ST4
180003049_OC053 _CapNGS	chr10	4972497	intergenic	AKR1C6P;AKR1C1
180003049_OC053 _CapNGS	chr10	5085051	intergenic	AKR1C2;AKR1C3
180002647_OC053 _CapNGS	chr10	27282093	intergenic	FAM238C;ANKRD26
180002646_OC053 _CapNGS	chr19	38585678	intronic	SIPA1L3
180002646_OC053 _CapNGS	chr9	5090149	intronic	JAK2
180002646_OC053 _CapNGS	chr7	110688995	intronic	IMMP2L
180002646_OC053 _CapNGS	chr7	110657492	intronic	IMMP2L
180002646_OC053 _CapNGS	chr7	110629633	intronic	IMMP2L
180002646_OC053 _CapNGS	chr7	110520106	intronic	IMMP2L
180002646_OC053 _CapNGS	chr3	60458039	intronic	FHIT
180002646_OC053 _CapNGS	chr3	60450874	intronic	FHIT

180002646_OC053_CapNGS	chrX	96733527	intronic	DIAPH2
180002646_OC053_CapNGS	chrX	96723560	intronic	DIAPH2
180002645_OC053_CapNGS	chr2	42454188	intronic	EML4
180002645_OC053_CapNGS	chr13	74087557	intergenic	KLF5;LINC00392
180002606_OC053_CapNGS	chr6	124250180	intronic	NKAIN2
180002591_OC053_CapNGS	chr4	70616896	intronic	SULT1B1
180002587_OC053_CapNGS	chr17	29901935	upstream	MIR365B;MIR4725
180002585_OC053_CapNGS	chr12	57292061	intergenic	HSD17B6;SDR9C7
180002585_OC053_CapNGS	chr12	57292053	intergenic	HSD17B6;SDR9C7
180002463_OC053_CapNGS	chr3	189625657	intergenic	TP63;P3H2
180002463_OC053_CapNGS	chr3	189625652	intergenic	TP63;P3H2
180002463_OC053_CapNGS	chr3	189625120	intergenic	TP63;P3H2
180002431_OC053_CapNGS	chr9	131252274	ncRNA_intronic	MIR1268A
180002431_OC053_CapNGS	chr9	131249018	ncRNA_intronic	MIR1268A
180002431_OC053_CapNGS	chr2	146411850	intergenic	TEX41;PABPC1P2
180002387_OC053_CapNGS	chr5	160653448	intergenic	LINC02159;GABRB2
180002386_OC053_CapNGS	chr9	28147143	intronic	LINGO2
180002386_OC053_CapNGS	chr9	28147108	intronic	LINGO2
180002327_OC053_CapNGS	chr1	71327371	intronic	PTGER3
180002327_OC053_CapNGS	chrX	38978743	intergenic	MID1IP1;LINC01281
180002327_OC053_CapNGS	chr1	71272105	intergenic	LINC01788;PTGER3
180002245_OC053_CapNGS	chr2	142150724	intronic	LRP1B
180002245_OC053_CapNGS	chr2	141862382	intronic	LRP1B
180002244_OC053_CapNGS	chr21	22859848	intronic	NCAM2

180002244_OC053_CapNGS	chr3	196773950	intronic	DLG1
180002186_OC053_CapNGS	chr9	93812640	intergenic	SYK;LOC100129316
180002186_OC053_CapNGS	chr5	74356497	intergenic	LINC01336;ANKRD31
180002174_OC053_CapNGS	chr1	27929435	intronic	AHDC1
180002174_OC053_CapNGS	chr1	27980139	intergenic	FGR;IFI6
180002174_OC053_CapNGS	chr1	27977931	intergenic	FGR;IFI6
180001816_OC053_CapNGS	chr2	214516172	intronic	SPAG16
180001816_OC053_CapNGS	chr2	214516171	intronic	SPAG16
180001816_OC053_CapNGS	chr2	214516169	intronic	SPAG16
180001816_OC053_CapNGS	chr2	214055740	intergenic	LINC01953;LOC100130451
180001804_OC053_CapNGS	chr2	133012785	ncRNA_intronic	ANKRD30BL
180001804_OC053_CapNGS	chr5	134372585	intronic	C5orf66
180000720_OC053_CapNGS	chr2	183273384	intronic	PDE1A
180000687_OC053_CapNGS	chr3	96685606	intronic	EPHA6
180000687_OC053_CapNGS	chr3	96685601	intronic	EPHA6
180000687_OC053_CapNGS	chr10	37554874	intergenic	ANKRD30A;LINC00993
180000683_OC053_CapNGS	chrX	49755402	intronic	CLCN5
180000664_OC053_CapNGS	chr12	80180	ncRNA_intronic	LOC100288778
180000664_OC053_CapNGS	chr2	114341255	ncRNA_exonic	WASH2P
180000664_OC053_CapNGS	chr3	188839421	intergenic	TPRG1-AS1;TPRG1
180000664_OC053_CapNGS	chr19	39540562	intergenic	FBX027;ACP7
180000595_OC053_CapNGS	chr2	141719734	intronic	LRP1B
180000595_OC053_CapNGS	chr6	30405337	intergenic	TRIM39-RPP21;HLA-E
180000595_OC053_CapNGS	chr2	192064246	intergenic	STAT4;MYO1B

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180000574_OC053_CapNGS	chr3	138884153	intergenic	BPESC1;PISRT1
180000559_OC053_CapNGS	chr8	62160883	intergenic	LOC100130298;CLVS1
180000559_OC053_CapNGS	chr8	62137702	intergenic	LOC100130298;CLVS1
180000559_OC053_CapNGS	chr8	62137699	intergenic	LOC100130298;CLVS1
180000559_OC053_CapNGS	chr2	180965327	intergenic	CWC22;SCHLAP1
180000494_OC053_CapNGS	chr5	147485766	intronic	SPINK5
180000494_OC053_CapNGS	chr7	34185663	intronic	BMPER
180000480_OC053_CapNGS	chr9	88873831	intronic	C9orf153
180000480_OC053_CapNGS	chrX	11887810	intergenic	MSL3;FRMPD4
180000480_OC053_CapNGS	chr4	17244871	intergenic	LINC02493;SNORA75B
180000467_OC053_CapNGS	chrX	152119166	intronic	ZNF185
180000467_OC053_CapNGS	chr3	158529525	intronic	MFSD1
180000467_OC053_CapNGS	chrX	152042006	intergenic	NSDHL;ZNF185
180000418_OC053_CapNGS	chr7	1280995	intergenic	UNCX;MICALL2
180000412_OC053_CapNGS	chr10	44600364	intergenic	LINC00841;C10orf142
180000408_OC053_CapNGS	chr5	102166734	intronic	PAM
180000404_OC053_CapNGS	chr3	67606170	intronic	SUCLG2
180000404_OC053_CapNGS	chr8	129242878	intergenic	MIR1208;LINC00824
180000404_OC053_CapNGS	chr2	64030360	intergenic	MDH1;UGP2
180000360_OC053_CapNGS	chr10	105720651	intergenic	STN1;SLK
180000337_OC053_CapNGS	chr4	87566760	intronic	PTPN13
180000336_OC053_CapNGS	chr2	50913806	intronic	NRXN1
180000336_OC053_CapNGS	chr2	50911964	intronic	NRXN1
180000336_OC053_CapNGS	chr2	50839189	intronic	NRXN1

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180000336_OC053_CapNGS	chr2	50834533	intronic	NRXN1
180000257_OC053_CapNGS	chr13	83400904	intergenic	LINC00564;SLITRK1
180000210_OC053_CapNGS	chr16	1363414	intronic	UBE2I
180000210_OC053_CapNGS	chr2	146505150	intergenic	TEX41;PABPC1P2
180000210_OC053_CapNGS	chr2	146375770	intergenic	TEX41;PABPC1P2
180000209_OC053_CapNGS	chr22	28423456	intronic	TTC28
180000209_OC053_CapNGS	chr17	28749622	intronic	CPD
180000209_OC053_CapNGS	chr1	195092056	intergenic	LINC01031;LINC01724
180000198_OC053_CapNGS	chr17	39738664	UTR3	KRT14
180000197_OC053_CapNGS	chr4	142965708	intronic	INPP4B
180000197_OC053_CapNGS	chr4	142961049	intronic	INPP4B
180000045_OC053_CapNGS	chr9	139743600	UTR5	PHPT1
180000045_OC053_CapNGS	chr6	20915150	intronic	CDKAL1
180000045_OC053_CapNGS	chr14	99287089	intergenic	C14orf177;BCL11B
180000045_OC053_CapNGS	chr9	139743883	exonic	PHPT1
170011808_OC053_CapNGS	chr4	151085095	intronic	DCLK2
170011808_OC053_CapNGS	chr1	142934469	intergenic	ANKRD20A12P;LOC102723769
170011808_OC053_CapNGS	chr1	142934159	intergenic	ANKRD20A12P;LOC102723769
170011795_OC053_CapNGS	chr5	52636606	intergenic	LOC257396;FST
170011795_OC053_CapNGS	chr5	52619266	intergenic	LOC257396;FST
170011720_OC053_CapNGS	chr15	59794826	intronic	FAM81A
170011720_OC053_CapNGS	chr15	59960896	intronic	BNIP2
170011720_OC053_CapNGS	chr15	59960893	intronic	BNIP2
170011719_OC053_CapNGS	chr18	44867004	ncRNA_intronic	MIR4527HG

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170011684_OC053_CapNGS	chr6	135498935	intergenic	HBS1L;MYB
170011684_OC053_CapNGS	chr6	135498904	intergenic	HBS1L;MYB
170011637_OC053_CapNGS	chr9	23112702	intergenic	LINC01239;LOC10192956 3
170011636_OC053_CapNGS	chr5	35865694	intronic	IL7R
170011577_OC053_CapNGS	chr3	122308537	intronic	PARP15
170011577_OC053_CapNGS	chr8	127623005	intergenic	FAM84B;PCAT1
170011576_OC053_CapNGS	chr20	19938991	intronic	RIN2
170011576_OC053_CapNGS	chr20	19988082	intergenic	RIN2;NAA20
170011575_OC053_CapNGS	chrX	66538204	intergenic	EDA2R;AR
170011575_OC053_CapNGS	chrX	66538197	intergenic	EDA2R;AR
170011573_OC053_CapNGS	chr12	11544572	UTR3	PRB2
170011573_OC053_CapNGS	chr2	22856719	intergenic	LINC01884;KLHL29
170011572_OC053_CapNGS	chr20	61840316	intronic	YTHDF1
170011571_OC053_CapNGS	chr20	61840317	intronic	YTHDF1
170011559_OC053_CapNGS	chr3	128079337	intronic	EEFSEC
170011559_OC053_CapNGS	chr3	128079336	intronic	EEFSEC
170011559_OC053_CapNGS	chr3	128059984	intronic	EEFSEC
170011559_OC053_CapNGS	chr3	128051529	intronic	EEFSEC
170011556_OC053_CapNGS	chr8	141528265	intergenic	CHRAC1;AGO2
170011556_OC053_CapNGS	chr8	141528242	downstream	CHRAC1
170011555_OC053_CapNGS	chr3	37904951	intronic	CTDSPL
170011555_OC053_CapNGS	chr18	57794431	intergenic	PMAIP1;MC4R
170011555_OC053_CapNGS	chr12	75245572	intergenic	ATXN7L3B;KCNC2
170011540_OC053_CapNGS	chr17	37849833	intronic	ERBB2

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170011540_OC053_CapNGS	chr17	37849831	intronic	ERBB2
170011540_OC053_CapNGS	chr1	243967416	intronic	AKT3
170011515_OC053_CapNGS	chr16	33959885	intergenic	ENPP7P13;LINC00273
170011515_OC053_CapNGS	chr2	133022750	intergenic	ANKRD30BL;ZNF806
170011478_OC053_CapNGS	chr10	135333161	intergenic	SCART1;CYP2E1
170011478_OC053_CapNGS	chr10	134612044	intergenic	NKX6-2;CFAP46
170011426_OC053_CapNGS	chr9	112176212	intronic	PTPN3
170011426_OC053_CapNGS	chr11	93672443	intergenic	VSTM5;HEPHL1
170011426_OC053_CapNGS	chr3	194200246	intergenic	ATP13A3;LINC00884
170011426_OC053_CapNGS	chr15	45814280	exonic	SLC30A4
170011230_OC053_CapNGS	chr11	102703832	ncRNA_intronic	WTAPP1
170011230_OC053_CapNGS	chr11	102739914	intronic	MMP12
170011228_OC053_CapNGS	chr4	172351833	intergenic	MIR6082;LINC02174
170011155_OC053_CapNGS	chrX	96201108	intronic	DIAPH2
170011154_OC053_CapNGS	chr15	71965928	intronic	THSD4
170011153_OC053_CapNGS	chrX	111377331	intronic	RTL4
170011153_OC053_CapNGS	chrX	138636032	intronic	F9
170011153_OC053_CapNGS	chrX	138636027	intronic	F9
170011153_OC053_CapNGS	chrX	138661710	intergenic	F9;MCF2
170011153_OC053_CapNGS	chrX	138661705	intergenic	F9;MCF2
170011151_OC053_CapNGS	chr14	26036012	intergenic	STXBP6;NOVA1
170011151_OC053_CapNGS	chr17	46833787	intergenic	HOXB13;TTLL6
170011137_OC053_CapNGS	chr20	36780798	intronic	TGM2
170011137_OC053_CapNGS	chr20	36780785	intronic	TGM2

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170011137_OC053_CapNGS	chr20	36780784	intronic	TGM2
170011105_OC053_CapNGS	chr17	66691396	intergenic	LINC01482;ABCA8
170011102_OC053_CapNGS	chr2	191462814	intergenic	NEMP2;NAB1
170011102_OC053_CapNGS	chr2	191452577	intergenic	NEMP2;NAB1
170011102_OC053_CapNGS	chr2	191437654	intergenic	NEMP2;NAB1
170011102_OC053_CapNGS	chr18	73533689	intergenic	LINC01898;LOC339298
170010971_OC053_CapNGS	chr2	109387815	intronic	RANBP2
170010971_OC053_CapNGS	chr21	16369512	intronic	NRIP1
170010971_OC053_CapNGS	chr2	155661855	intronic	KCNJ3
170010971_OC053_CapNGS	chr16	65303923	intergenic	LINC02126;LINC00922
170010969_OC053_CapNGS	chr19	45461468	intronic	CLPTM1
170010969_OC053_CapNGS	chr19	45248164	intergenic	CEACAM16;BCL3
170010969_OC053_CapNGS	chr19	45245817	intergenic	CEACAM16;BCL3
170010969_OC053_CapNGS	chr19	45452947	downstream	APOC2;APOC4-APOC2
170010945_OC053_CapNGS	chr3	116290632	intergenic	LINC00903;TUSC7
170010903_OC053_CapNGS	chr11	69042647	intergenic	LOC338694;MYEOV
170010903_OC053_CapNGS	chr15	33502979	intergenic	FMN1;TMC05B
170010355_OC053_CapNGS	chr8	119582719	intronic	SAMD12
170010289_OC053_CapNGS	chr2	228222208	UTR3	MFF
170010289_OC053_CapNGS	chr2	228220599	intronic	MFF
170010289_OC053_CapNGS	chr10	42599832	intergenic	NONE;LOC441666
170010289_OC053_CapNGS	chr10	42599827	intergenic	NONE;LOC441666
170010288_OC053_CapNGS	chr6	114994918	intergenic	HDAC2- AS2;LOC105377962
170010150_OC053_CapNGS	chr1	244632838	intronic	CATSPERE

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170010150_OC053_CapNGS	chr1	244632823	intronic	CATSPERE
170010150_OC053_CapNGS	chr1	244632819	intronic	CATSPERE
170010148_OC053_CapNGS	chr6	144661706	intronic	UTRN
170010141_OC053_CapNGS	chr4	94500527	intronic	GRID2
170010136_OC053_CapNGS	chr2	178091891	intergenic	HNRNPA3;NFE2L2
170010136_OC053_CapNGS	chr2	178091890	intergenic	HNRNPA3;NFE2L2
170010136_OC053_CapNGS	chr2	178094767	downstream	NFE2L2
170010116_OC053_CapNGS	chr1	55463866	upstream	BSND
170010116_OC053_CapNGS	chr1	55463862	upstream	BSND
170010116_OC053_CapNGS	chr1	247147995	ncRNA_intronic	ZNF670-ZNF695
170010116_OC053_CapNGS	chr1	55470534	intronic	BSND
170010116_OC053_CapNGS	chr4	149889425	intergenic	LOC105377480;LINC02355
170010116_OC053_CapNGS	chr4	149889423	intergenic	LOC105377480;LINC02355
170010116_OC053_CapNGS	chr4	149888852	intergenic	LOC105377480;LINC02355
170010116_OC053_CapNGS	chr4	149888848	intergenic	LOC105377480;LINC02355
170010116_OC053_CapNGS	chr1	55484461	intergenic	BSND;PCSK9
170010116_OC053_CapNGS	chr1	55484458	intergenic	BSND;PCSK9
170010116_OC053_CapNGS	chr1	55481274	intergenic	BSND;PCSK9
170010116_OC053_CapNGS	chr1	55481273	intergenic	BSND;PCSK9
170010076_OC053_CapNGS	chr2	48733104	intronic	PPP1R21
170010076_OC053_CapNGS	chr2	48733071	intronic	PPP1R21
170004089_OC053_CapNGS	chr1	209556772	intergenic	LINC01698;MIR205HG
170004089_OC053_CapNGS	chr1	209556771	intergenic	LINC01698;MIR205HG
170004089_OC053_CapNGS	chr1	209556770	intergenic	LINC01698;MIR205HG

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170004089_OC053_CapNGS	chr1	209556763	intergenic	LINC01698;MIR205HG
170004089_OC053_CapNGS	chr1	209556759	intergenic	LINC01698;MIR205HG
170003975_OC053_CapNGS	chr3	160505662	intronic	PPM1L
170003975_OC053_CapNGS	chr10	14189084	intronic	FRMD4A
170003947_OC053_CapNGS	chr11	18015042	intronic	SERGEF
170003946_OC053_CapNGS	chr2	159762187	intergenic	DAPL1;TANC1
170003943_OC053_CapNGS	chr13	78893537	ncRNA_intronic	RNF219-AS1
170003942_OC053_CapNGS	chr6	7109779	intronic	RREB1
170003942_OC053_CapNGS	chr6	7108893	intronic	RREB1
170003942_OC053_CapNGS	chr10	121512527	intronic	INPP5F
170003942_OC053_CapNGS	chr10	121512526	intronic	INPP5F
170003942_OC053_CapNGS	chr2	79409756	intergenic	REG3A;LOC101927987
170003942_OC053_CapNGS	chr10	121243601	intergenic	GRK5;RGS10
170003940_OC053_CapNGS	chr4	74719426	intronic	PF4V1
170003940_OC053_CapNGS	chr17	55987808	intronic	CUEDC1
170003940_OC053_CapNGS	chr17	55987802	intronic	CUEDC1
170003940_OC053_CapNGS	chr17	55987801	intronic	CUEDC1
170003940_OC053_CapNGS	chr17	55976292	intronic	CUEDC1
170003940_OC053_CapNGS	chr16	74142703	intergenic	LINC01568;LOC101928035
170003940_OC053_CapNGS	chr16	73958435	intergenic	LINC01568;LOC101928035
170003775_OC053_CapNGS	chrX	129473674	upstream	SLC25A14
170003694_OC053_CapNGS	chr2	83219955	intergenic	DHFRP3
170003682_OC053_CapNGS	chr3	169037256	intronic	MECOM
170003682_OC053_CapNGS	chr3	169037254	intronic	MECOM

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170003678_OC053_CapNGS	chr9	102526297	ncRNA_intronic	LOC101928438
170003678_OC053_CapNGS	chr9	102720177	intronic	STX17
170003678_OC053_CapNGS	chr9	102720173	intronic	STX17
170003678_OC053_CapNGS	chr9	102606231	intronic	NR4A3
170003678_OC053_CapNGS	chr9	102604485	intronic	NR4A3
170003678_OC053_CapNGS	chr9	102586671	intronic	NR4A3
170003675_OC053_CapNGS	chr1	209492679	intergenic	PLXNA2
170003675_OC053_CapNGS	chr1	209514220	intergenic	LINC01696
170003646_OC053_CapNGS	chr8	54140249	UTR3	OPRK1
170003646_OC053_CapNGS	chr8	54140247	UTR3	OPRK1
170003646_OC053_CapNGS	chr19	41353770	intronic	CYP2A6
170003646_OC053_CapNGS	chr4	100261545	intronic	ADH1C
170003646_OC053_CapNGS	chr8	54136836	intergenic	NPBWR1
170003646_OC053_CapNGS	chr19	41347849	intergenic	CYP2T1P
170003646_OC053_CapNGS	chr2	62492040	intergenic	B3GNT2
170003646_OC053_CapNGS	chr2	62492035	intergenic	B3GNT2
170003646_OC053_CapNGS	chr4	100256222	intergenic	ADH1B
170003645_OC053_CapNGS	chr8	11556107	intronic	GATA4
170003645_OC053_CapNGS	chr18	58909497	intergenic	MC4R
170003557_OC053_CapNGS	chr9	14392011	intronic	NFIB
170003557_OC053_CapNGS	chr9	14392008	intronic	NFIB

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170003557_OC053_CapNGS	chr9	14392007	intronic	NFIB
170003557_OC053_CapNGS	chr9	14301328	intronic	NFIB
170003557_OC053_CapNGS	chr9	14301200	intronic	NFIB
170003557_OC053_CapNGS	chr9	14300990	intronic	NFIB
170003557_OC053_CapNGS	chr9	14300758	intronic	NFIB
170003557_OC053_CapNGS	chr9	14300747	intronic	NFIB
170003557_OC053_CapNGS	chr9	14300631	intronic	NFIB
170003557_OC053_CapNGS	chr9	14299710	intronic	NFIB
170003557_OC053_CapNGS	chr9	14299242	intronic	NFIB
170003557_OC053_CapNGS	chr9	14298348	intronic	NFIB
170003557_OC053_CapNGS	chr9	14287508	intronic	NFIB
170003557_OC053_CapNGS	chr19	15630073	intronic	CYP4F22
170003557_OC053_CapNGS	chr19	15625131	intronic	CYP4F22
170003557_OC053_CapNGS	chr19	15617067	intergenic	PGLYRP2
170003557_OC053_CapNGS	chr9	14444237	intergenic	NFIB
170003557_OC053_CapNGS	chr9	14425226	intergenic	NFIB
170003557_OC053_CapNGS	chr2	178138311	intergenic	NFE2L2
170003557_OC053_CapNGS	chr19	15750544	intergenic	CYP4F8
170003555_OC053_CapNGS	chr7	17485590	ncRNA_intronic	KCCAT333
170003555_OC053_CapNGS	chr7	17393615	intergenic	AHR
170003555_OC053_CapNGS	chr7	17393612	intergenic	AHR
170003511_OC053_CapNGS	chr3	189576796	intronic	TP63
170003511_OC053_CapNGS	chr3	189576794	intronic	TP63
170003511_OC053_CapNGS	chr3	189710101	intronic	P3H2

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170002698_OC053_CapNGS	chr19	56161395	intronic	CCDC106
170002698_OC053_CapNGS	chr13	73788866	intergenic	KLF5
170000585_OC053_CapNGS	chr3	96077123	intergenic	MTHFD2P1
170000583_OC053_CapNGS	chr10	75386316	intergenic	USP54
170000583_OC053_CapNGS	chr10	4083087	intergenic	MIR6078
170000582_OC053_CapNGS	chr1	38467812	intronic	FHL3
170000582_OC053_CapNGS	chr1	38467810	intronic	FHL3
170000582_OC053_CapNGS	chr1	38467808	intronic	FHL3
170000582_OC053_CapNGS	chr1	38467807	intronic	FHL3
170000582_OC053_CapNGS	chr1	38467763	intronic	FHL3
170000579_OC053_CapNGS	chr7	5316359	intergenic	WIPI2
170000579_OC053_CapNGS	chr7	5316320	intergenic	WIPI2
170000579_OC053_CapNGS	chr3	195552510	intergenic	MUC4
170000577_OC053_CapNGS	chr9	102604487	intronic	NR4A3
170000577_OC053_CapNGS	chr3	169017428	intronic	MECOM

Table S2 Table of gene frequency

Gene	Frequency
P3H2	2
MC4R	2
KLF5	2

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FRMPD4	2
NR4A3	2
PABPC1P2	2
TEX41	2
DIAPH2	2
LRP1B	2
ANKRD30BL	2
TP63	2
MTHFD2P1	2
YTHDF1	2
NFE2L2	2
MECOM	2
ATXN7L3B	1
KCCAT333	1
C5orf66	1
SYK	1
HDAC2-AS2	1
PTGER3	1
IL7R	1
AKR1C3	1
NAB1	1
RIN2	1
WTAPP1	1
DLG1	1
CLVS1	1
MCF2	1
PISRT1	1
EDA2R	1
LINC01482	1
INPP5F	1
CYP2A6	1
LINC01239	1
ZNF185	1
ABCA8	1
FMN1	1
LINC00273	1
MYO1B	1
PCAT1	1
PGLYRP2	1
SUCLG2	1
AHDC1	1
NKAIN2	1
FAM238C	1
TchrD4	1

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LINGO2	1
ATP13A3	1
PAM	1
LINC01788	1
LINC00884	1
EML4	1
KRT14	1
MBNL2	1
DHFRP3	1
PARP15	1
EPHA6	1
ACP7	1
MIR6078	1
CLPTM1	1
LOC100288778	1
PHPT1	1
CEACAM16	1
LOC101929563	1
LOC338694	1
NEMP2	1
SDR9C7	1
MIR205HG	1
SCHLAP1	1
PVT1	1
MIR1208	1
LINC00903	1
SERGEF	1
STN1	1
CYP2T1P	1
NAA20	1
LINC01281	1
LOC100130298	1
MID1IP1	1
NPBWR1	1
UNCX	1
SLITRK1	1
FGR	1
ANKRD26	1
FHL3	1
chr3ST4	1
F9	1
FST	1
ADH1B	1
IMMP2L	1

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AKR1C1	1
NRXN1	1
AGO2	1
LINC01698	1
SCART1	1
RANBP2	1
FRMD4A	1
STAT4	1
MIR1268A	1
PLXNA2	1
BCL11B	1
REG3A	1
TPRG1	1
HBS1L	1
MUC4	1
LINC02355	1
LINC01724	1
LINC02174	1
WASH2P	1
ANKRD20A12P	1
LINC02159	1
LINC00841	1
LOC339298	1
SULT1B1	1
CPD	1
FAM81A	1
TPRG1-AS1	1
NRIP1	1
SLC25A14	1
AR	1
BNIP2	1
ZNF806	1
MIR4725	1
MFS1	1
CWC22	1
EEFSEC	1
GRID2	1
CATSPERE	1
CYP4F22	1
LINC00456	1
HNRNPA3	1
DCLK2	1
BPESC1	1
STX17	1

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PCSK9	1
PMAIP1	1
LINC00564	1
INPP4B	1
MIR365B	1
RGS10	1
PPM1L	1
KCNJ3	1
GABRB2	1
C9orf153	1
FHIT	1
TGM2	1
LINC01031	1
SLK	1
OPRK1	1
ZNF670-ZNF695	1
JAK2	1
PTPN3	1
HOXB13	1
NKX6-2	1
IFI6	1
UGP2	1
PRB2	1
PTPN13	1
MSL3	1
UTRN	1
LOC102723769	1
AKT3	1
TRIM39-RPP21	1
CDKAL1	1
TANC1	1
DAPL1	1
BMPER	1
AKR1C6P	1
TMC05B	1
ANKRD30A	1
CYP4F8	1
CUEDC1	1
SPAG16	1
chrD17B6	1
LOC101928438	1
LINC00922	1
SAMD12	1
ANKRD31	1

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CCDC106	1
LINC00824	1
GRK5	1
NOVA1	1
LINC00879	1
AKR1C2	1
ENPP7P13	1
KCNC2	1
FBX027	1
C10orf142	1
LINC00993	1
PDE1A	1
LINC01336	1
WIPI2	1
HEPHL1	1
MIR4527HG	1
APOC4-APOC2	1
CFAP46	1
LOC257396	1
LINC01568	1
RTL4	1
LINC02493	1
MMP12	1
NFIB	1
APOC2	1
C14orf177	1
MIR6082	1
SIPA1L3	1
GATA4	1
TTL6	1
LOC105377480	1
LINC01953	1
NSDHL	1
RREB1	1
MFF	1
ADH1C	1
MICALL2	1
MDH1	1
CASC15	1
BCL3	1
PF4V1	1
LINC01696	1
MYEOV	1
STXBP6	1

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PPP1R21	1
LOC100130451	1
CHRAC1	1
UBE2I	1
AHR	1
B3GNT2	1
NCAM2	1
LOC101928035	1
FAM84B	1
LINC00392	1
CLCN5	1
RNF219-AS1	1
CYP2E1	1
LINC01898	1
TTC28	1
LINC01884	1
LOC101927987	1
CTDSPL	1
BSND	1
SNORA75B	1
LOC105377962	1
LOC100129316	1
LINC02126	1
USP54	1
SPINK5	1
HLA-E	1
KLHL29	1
SLC30A4	1
TUSC7	1
VSTM5	1
MYB	1
ERBB2	1

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Table S3 Analysis of Pathway

KEGG PATHWAY	Input gene number	Background gene number	Corrected P-Value	Genes
Metabolism of xenobiotics by cytochrome P450	5	73	***	AKR1C1   CYP2E1   ADH1C   ADH1B   CYP2A6
Chemical carcinogenesis	5	82	***	CYP2E1   AKR1C2   ADH1C   ADH1B   CYP2A6
Steroid hormone biosynthesis	4	58	**	AKR1C1   AKR1C3   AKR1C2   CYP2E1
Drug metabolism - cytochrome P450	4	69	**	CYP2E1   ADH1C   ADH1B   CYP2A6
Morphine addiction	4	91	**	KCNJ3   PDE1A   GABRB2   GRK5
Neuroactive ligand-receptor interaction	6	278	**	MC4R   GABRB2   GRID2   PTGER3   OPRK1   NPBWR1
Chemokine signaling pathway	5	187	**	GRK5   FGR   JAK2   AKT3   PF4V1
Non-small cell lung cancer	3	56	*	EML4   AKT3   ERBB2
Arachidonic acid metabolism	3	62	*	AKR1C3   CYP2E1   CYP4F8
Retinol metabolism	3	65	*	ADH1C   ADH1B   CYP2A6
Metabolic pathways	12	1243	*	B3GNT2   CYP4F8   UGP2   CYP2A6   MDH1   INPP4B   SUCLG2   ADH1C   AKR1C3   NSDHL   CYP2E1   ADH1B
Platinum drug resistance	3	75	*	PMAIP1   AKT3   ERBB2

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Jak-STAT signaling pathway	4	158	*	IL7R STAT4 JAK2 AKT3
EGFR tyrosine kinase inhibitor resistance	3	81	*	ERBB2 JAK2 AKT3

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\* P<0.05;\*\* P<0.01;\*\*\* P<0.001