

Supplementary 3. The overlapping genes of the KNSTRN-related genes and DEGs

Only DEGs      Only KNSTRN DEGs AND KNSTRN-related genes

TNMD	ABCC5	E2F2
CYP26B1	ABHD3	NCAPD2
SLC4A1	ACIN1	ANLN
CALCR	ACOT11	GABRA3
PRSS22	ACTL6A	BRCA1
HOXA11	ACYP1	DEPDC1
ITGA3	ADAMTS6	DEPDC1B
ASB4	ADAT2	C6
TMEM132A	ADPGK	DSG2
TAC1	ALS2CR4	RAD51
DLX6	AMIGO3	POLQ
CCL26	ANAPC7	CBLN4
LGALS14	ANKLE1	MCM10
SCIN	ANKLE2	ASPM
PRSS21	ANKRD23	PRR11
PROM1	ANKRD32	TRIP13
SLC13A2	ANKRD36	HMMR
CEACAM7	ANP32E	MCM2
TKTL1	AP4E1	GTSE1
SELE	APAF1	WDR62
TFAP2B	ARHGAP19	SPAG5
MASP2	ARHGAP33	SMC1B
GIPR	ARID3B	RBL1
SLC6A13	ARL6IP6	NDC80
FMO1	ATAD2	RAD54L
ISL1	ATPBD4	DNMT3B
IL20RA	ATXN2L	TPX2
CLCA1	AURKAPS1	BIRC5
CYP24A1	AURKA	KIF4A
PLEKHB1	AZI1	WDR76
NLRP2	BAGE	CLSPN
IBSP	BRD9	CDC45
MYOC	BRI3BP	CDC6
CDH10	BRIP1	CDC7
RAB27B	BRIX1	MAGEB2
TG	BRPF1	CENPM
BARX2	BUB3	DMC1
ADRB1	C10orf78	CDKN3
ANO2	C11orf82	GIN51
COL9A2	C11orf84	MYBL2
EPN3	C12orf24	SALL4
DKK3	C12orf32	E2F1
COL23A1	C12orf48	CENPI
METTL24	C12orf65	OIP5
MCF2L2	C13orf23	RNASEH2A
KCNH2	C13orf34	ASF1B
MCOLN3	C13orf37	CCNE1
ITIH4	C14orf106	ZNF85

PHF21B	C14orf143	EZH2
SERPINB3	C14orf145	MPP2
LAMC2	C14orf80	NEIL3
RASGRF1	C15orf21	NCAPG
STYK1	C15orf23	FOXM1
RIMBP2	C15orf42	RAD51AP1
COL11A1	C16orf59	CDCA3
SEZ6	C16orf75	FBXO5
ATP2C2	C17orf53	PACRG
SNAP91	C17orf80	TTK
CTNNA2	C18orf10	MEP1A
CLDN18	C18orf45	C7
PKM	C19orf40	KIF20A
STON1-GTF2I	C19orf47	LMNB1
PAGE1	C1orf106	SMC4
PITX1	C1orf135	ECT2
TRPC7	C1orf84	CENPA
TRPM5	C1orf96	OTX1
SLC6A15	C20orf72	CDC20
SPEG	C21orf45	NEK2
TRHDE	C2orf48	CENPF
CYP2W1	C3orf26	KIF14
SLC12A1	C3orf34	MYB
SEMA3A	C4orf21	ELOVL3
FGF4	C4orf46	HELLS
ATP12A	C5orf22	CENPL
CAPN6	C5orf34	NCAPH
SPAG6	C5orf54	KIF18A
ACTN2	C5orf58	GPSM2
NEBL	C6orf147	RAMP3
RBFOX1	C6orf167	ZWINT
TP73	C6orf182	CIT
CDH17	C7orf36	CENPK
EPHA6	C9orf100	STIL
SCTR	C9orf140	HJURP
C1QTNF3	C9orf53	C4BPA
KCNK2	CABLES2	SSX1
TRPM3	CASC5	DLGAP5
GRHL2	CASP2	CTAG2
EPYC	CBFA2T2	PKMYT1
SLC27A5	CBX1	RIBC2
KIF3C	CCDC138	E2F8
ORC1	CCDC14	SULT4A1
AQP6	CCDC150	CYP2E1
CEACAM6	CCDC163P	POLN
CETP	CCDC18	PSMC3IP
PTHLH	CCDC21	TOP2A
SULT2B1	CCDC34	SLC14A2
NOS1	CCDC41	CCNB1
FXD3	CCDC43	CFHR4

SI	CCDC45	CDCA8
DLL3	CCDC66	ACRV1
ORC6	CCDC77	KHDC1
CPA1	CCDC84	TROAP
ESR1	CCDC88A	ESPL1
CMA1	CCDC99	HTR2B
SEMA6A	CCT5	IGF2BP3
TDRD1	CDAN1	TCF19
CRTAC1	CDC14A	KIF23
IL11	CDC25B	SLC44A5
MYO3A	CDCA4	KIF11
ITPR3	CDK16	CEP55
MISP	CDK2	KIF20B
SEC14L2	CDK4	TET1
SEZ6L	CDKN2A	BARD1
PNPLA5	CDKN2BAS	MNS1
CACNA1I	CDKN2C	CENPE
UPK3A	CDKN2D	GAS2L3
KCNK10	CDT1	BRCA2
CTSG	CELSR3	PIF1
GSTZ1	CENPH	FANCI
CHGA	CENPJ	PLK4
CPNE6	CENPO	KIF2C
BMP7	CENPQ	IGSF3
CHRNA4	CENPW	NUF2
EEF1A2	CEP135	DTL
ANGPT4	CEP152	FANCD2
PDYN	CEP250	CCNA2
PAK5	CEP72	CDH18
CST4	CEP78	CRHBP
SPINT3	CHAF1A	ZNF300
CELF4	CHEK2	CDCA5
VSIG1	CHML	NCAPG2
PAGE4	CHORDC1	IGSF1
F9	CHTF18	GIN54
PLP2	CIDECF	MKI67
LUZP4	CKAP2	INCENP
PHEX	CKAP5	CHEK1
PCYT1B	CKS2	CDH22
DRP2	CLCN2	SPC25
KLF5	CLN6	SPARCL1
SGCG	CNGB3	CDH12
OLFM4	CNOT10	PGM5
DHODH	CNOT3	SKA1
FA2H	CNTNAP4	EME1
ZP2	COIL	NAA11
SLC6A2	COMMD2	FBXO43
AQP9	COX7B2	BUB1B
IGDCC4	CPSF6	CCNB2
OCA2	CRLF3	SLC13A3

SCG3	CSAG2	CDC25C
RHOV	CSAG3	CHAF1B
MYEF2	CSE1L	ISL2
EYA1	CSMD1	C21orf58
ESRP1	CSTF2	ZNF714
NEFM	CTAG1B	CYP3A4
FGL1	CUZD1	RACGAP1
KLC3	CWC27	CCNF
AMH	CXorf48	PAQR4
CLEC4M	CXorf61	LMX1A
TNNT1	DAZAP1	DNASE1L3
SLC1A5	DBF4B	KIF15
APLP1	DBF4	CLEC3B
ETFB	DCLRE1B	CDC25A
CEACAM5	DCLRE1C	MAD2L1
ATP4A	DDX11	RANBP3L
HAMP	DDX12	TERT
ITGB8	DDX39	CDCA7L
DLX5	DDX55	MELK
STEAP1B	DEK	CLDN2
ATP6V0A4	DEM1	HEPACAM
ADAP1	DHDH	SKA3
HOXA6	DIAPH3	RPL10L
ANKRD7	DLEU2L	SSX5
EPHB6	DLEU2	E2F7
HYAL4	DNA2	TMEM100
AGR2	DNAJC9	LDHD
OGN	DNMT1	C18orf54
RLN2	DONSON	PLK1
CA9	DPF2	TMEM88
LHX3	DR1	PBK
DNTT	DSCC1	FAM178B
CDH23	DSCR4	FSTL5
DKK1	DSN1	ATOH8
SORCS1	DTYMK	VCX3A
CSF3	DVL3	KCNK9
SEPTIN4	DYNC1LI1	CKAP2L
ALDH3A1	E2F6	BUB1
MYH3	EDC3	ADRA1B
FOXP1	EPB41L2	CDK1
ODAM	EPPK1	SHCBP1
SMR3A	EPR1	ESCO2
NMU	EWSR1	COL24A1
UCP1	EXOG	RRM2
NKX3-2	EXOSC2	ZNF738
GLRB	EXOSC3	SLCO4C1
HGFAC	FADS1	EXO1
NRXN2	FAM111A	UBE2C
CCKBR	FAM119A	CCNE2
HPX	FAM133A	ATAD5

FOLR1	FAM24B	ACBD7
APOA4	FAM40B	KBTBD11
KIAA1549L	FAM54A	TYMS
SLC35F2	FAM57B	AURKB
CALCA	FAM5C	GPC5
ADGRD1	FAM64A	MKRN3
SLCO1B3	FAM71D	APOBEC3B
APOBEC1	FAM83D	DDN
RFX4	FANCA	FANCB
UST	FANCE	RTKN2
TULP1	FANCG	VCX
IL17F	FANCM	NEB
PRDM13	FBXO45	COLEC10
HDGFL1	FEN1	KNTC1
EYA4	FIGNL1	ZNF93
ENPP5	FLJ46321	CDCA2
PRSS16	FOXD2	MAGEA11
TBX18	FO XK2	C12orf56
CDH9	FSD1L	KIF18B
PCDHB6	FUS	KIF24
HAVCR1	G2E3	ERCC6L
CDH6	GABPB1	TCL6
AGXT2	GEN1	LIN28B
C9	GIN52	LCTL
RBP2	GIN53	FAM72B
RBP1	GLB1L3	FAM111B
C3orf52	GMPS	FAM180A
VIPR1	GPD2	ZNF681
POMC	GPN3	ZNF107
ITGB6	GPR120	FAM72A
TLX2	GPR137C	XRCC2
REG1A	GPR19	ADH1B
SLC9A2	GPRC5D	ZNF257
DLX2	GRK6	BLM
NPHS2	GSG2	ZNF98
CTH	GTF3C2	ZNF695
CFHR3	GTSF1	TUBA3C
ST6GALNAC5	H1FX	DSCR8
MFAP2	H2AFX	WDHD1
ACTL8	H2AFY	ARHGAP11A
TNFSF4	H2AFZ	PRC1
HSD11B1	HAT1	RHOXF2B
PLPPR5	HAUS1	SLCO6A1
A4GNT	HAUS2	CFI
TNNT2	HAUS3	TRIM59
ELOVL4	HAUS5	MAGEB1
CNR1	HAUS6	UBE2QL1
SPACA1	HAUS8	FAM72D
ADGB	HERC2P2	RAET1K
GHRH	HIC2	ELFN1

BSPRY	HIST1H1B	DCAF8L1
CSF3R	HIST1H1E	KIF4B
BCL11A	HIST1H2BO	ZNF492
EPCAM	HIST1H3C	CLEC2L
PYROXD2	HIST1H4E	CT47B1
SFRP5	HMGB2	KIFC1
INSL6	HMG2	SSX2
INSL4	HNRNPA2B1	INMT
GRIA2	HNRNPA3P1	CARD18
PCDHB8	HNRNPA3	RNASE4
TEX11	HNRNPD	UHRF1
SOHLH2	HNRNPH1	ARHGAP11B
DUSP4	HNRNPL	
PRAMEF2	HNRNPR	
AL139327.1	HNRNPU	
RGSL1	HSF2	
ADGRB2	HSPA14	
HPCA	HYLS1	
PTGFR	IFT80	
SPINK4	IKBIP	
SFTPA1	IL12A	
BICC1	IL1F7	
GUCY1B2	ILF3	
ITIH5	INTS4	
HOXC13	IP6K2	
TNFAIP6	IQCB1	
ARHGAP40	IQCC	
RBPJL	IQGAP3	
MAGEA10	ITGB3BP	
POF1B	KATNA1	
CEACAM8	KCNMB3	
NDP	KCTD6	
PACSIN1	KHDC1L	
ZNF391	KHDRBS1	
SPDEF	KIAA0101	
KCNK17	KIAA0406	
EREG	KIAA0907	
SCGB2A1	KIAA1009	
MT1G	KIAA1239	
MT2A	KIAA1524	
SOX21	KIAA1731	
HROB	KIAA1841	
MYH2	KIN	
IL37	KLHL17	
NKX2-2	KPNA2	
OVOL2	KPNA7	
LAMP5	L3MBTL	
GRPR	LEO1	
KIRREL2	LEPRE1	
IFI6	LIG1	

TMEM35A	LIN9
NXF5	LMNB2
BEST3	LOC100128191
TRPV5	LOC100133469
AUNIP	LOC100286793
SYNGR3	LOC127841
STEAP4	LOC145783
GAL3ST1	LOC146880
STRIP2	LOC256880
FEZF1	LOC339535
HOXD1	LOC339674
GAD1	LOC374443
HOXD11	LOC388152
HOXD13	LOC399815
MYOD1	LOC401052
TPH1	LOC440173
PIMREG	LOC440944
AIPL1	LOC441666
EGLN3	LOC642846
FOXJ1	LOC647121
SGO1	LOC647946
CDH15	LOC729082
APOC1	LOC81691
FCHO1	LRDD
UNC13A	LRP11
MNX1	LRR1
RBBP8NL	LRR137B
FIBCD1	LRR157
SMPDL3B	LRR159
PNCK	LSM14B
DUSP9	LY6G5B
SLC7A10	MAGEA2
EPS8L1	MAGEA3
CCL25	MAGEA6
RHOXF2	MAGEA9B
PPP1R1B	MAPKAPK5
FTHL17	MAPKBP1
REEP2	MAST2
SNAP25	MASTL
RHBG	MCM3
CRP	MCM4
RAB25	MCM5
APCS	MCM6
ALDH3B2	MCM7
RNF17	MCM8
CHI3L1	MDC1
LGR6	MESDC1
BEX1	MESP2
ZDHHC8P1	METTL4
NTS	METTL6

LRRIQ1	MGC12982
TEX15	MICB
GSC	MITD1
PEBP4	MKRN2
ADAMDEC1	MLF1IP
REG4	MND1
VTCN1	MRE11A
SAA2	MSH2
ERN2	MSH5
FOLH1B	MSH6
PIWIL4	MST4
MTNR1B	MTBP
DSG1	MTF2
DSC3	MTMR7
FHOD3	MUS81
TCN1	MXD3
CCNJL	MYBL1
CSN2	MYO19
UGT2B28	NAA40
EHF	NAP1L6
KCNH3	NASP
CHST5	NCAPD3
ZNF670-ZNF6	NCAPH2
GLUL	NCRNA00164
CHRND	NCRNA00183
PAX3	NCRNA00189
STAB2	NDE1
USP44	NEDD1
BORA	NFKBIL2
RPL13AP25	NPC1
NKX2-8	NPFFR2
TBR1	NRAS
GALNT5	NRM
GAD2	NUDT1
WDR38	NUP107
GABBR2	NUP155
CTSV	NUP188
DMRT1	NUP205
ARHGEF39	NUP210
TFAP2A	NUP35
CLPS	NUP37
TMPRSS4	NUP43
FXD2	NUP85
MMP13	NUPL2
TMPRSS13	NUSAP1
CASP5	OBFC2B
PAK6	OR56A3
DUOX1	ORC1L
STRA6	ORC3L
CYP19A1	ORC6L



BRDT	OTUD3
SIX3	PA2G4P4
CYP2C9	PA2G4
ZNF365	PABPC1L
AOX1	PALB2
HCN4	PARP2
NDST4	PASK
FGF5	PCNA
IL21	PDCD7
FRAS1	PDE7A
ANXA3	PDIA3P
EGF	PDK3
COL2A1	PDSS1
PTPRQ	PFKFB4
FOXN4	PGS1
PDX1	PHF19
RDH16	PHF5A
GPR84	PI4KAP1
SMIM2	PKN3
ZIC5	PLAGL2
SYT16	PLCB1
KCNH5	PLOD2
SLC25A47	PM20D2
DUOXA1	POC1A
DUOXA2	POC5
DUOX2	POLA1
GCNT3	POLA2
CYP1A1	POLD1
CCDC33	POLD3
CYP1A2	POLE2
RHCG	POLE3
TICRR	POLE
SH3GL3	POLR2D
PRELID3A	PPHLN1
TNFRSF11A	PPIL5
PMAIP1	PPP1CC
FKBP10	PRELID2
HUNK	PRIM1
C1orf94	PRIM2
FCN3	PRKCD
TMEM61	PRKCI
DMRTB1	PRPF38A
PROK1	PRRT2
RXRG	PSIP1
MAEL	PSRC1
DPT	PTBP1
NECTIN4	PTPN23
HORMAD1	PTTG1
AQP10	PTTG2
REN	PTTG3P

PPFIA4	QSER1
ABHD1	RAB42
DQX1	RACGAP1P
NT5DC4	RAD18
NXPH2	RAD1
CDCA7	RAD21
DLX1	RAD51C
GULP1	RAD54B
CPO	RAD9A
ABCA12	RAD9B
GADL1	RAF1
TAGLN3	RAN
NCEH1	RBBP7
SPATA16	RBBP8
AC062028.1	RBM12B
ILDR1	RBM14
EPHA5	RBM15B
ADAMTS16	RBM17
SHISAL2B	RBM19
LIX1	RCAN3
CXCL14	RCC1
TENM2	RCC2
GFRA3	RDM1
CYP39A1	RECQL4
MMS22L	REEP4
FAXC	RFC2
GABRR1	RFC3
CLVS2	RFC4
MTFR2	RFC5
VWDE	RFWD3
ZC3HAV1L	RHEBL1
RAB19	RMI1
ZNF711	RNASEN
RIPPLY1	RNF26
RADX	RNF34
HTR2C	RNF8
ARHGAP36	RNFT2
GPR119	RPSAP9
MAGEA4	RQCD1
CHRN3	RRM1
STAR	RSRC1
SNTG1	RUSC1
ADHFE1	S100BPB
RSPO2	SAAL1
FAM83A	SAE1
ANKRD30A	SAP30
VAX1	SART3
PLEKHS1	SASS6
NKX6-2	SCARNA12
SLC5A12	SCLT1

SCGB1A1	SCMH1
SYT8	SCML2
GLYAT	SENP1
GLB1L2	SENP5
SLC22A8	SETD8
ZP1	SET
TLCD3B	SF3B4
DOC2A	SFPQ
HMGA2	SFRS13A
CNTN5	SFRS13B
PCDH15	SFRS1
LYPD6B	SFRS2
GPM6A	SFRS7
C11orf53	SFRS8
C2orf50	SFRS9
TKTL2	SGK494
LYZL2	SGOL1
ATP6V1G3	SGOL2
CENPU	SIP1
ZNF385D	SKA2
GABRA2	SKP2
TMEM132D	SLBP
CCDC74B	SLC25A19
TUBA3E	SLC26A6
GRID2	SLC36A1
BOLL	SLMO2
PLEKHH2	SMARCD1
IGSF10	SMC2
ANKRD22	SMPD4
PART1	SNHG1
CLGN	SNRPA1
ADGRF4	SNRPA
FRMD1	SNRPB
PLEKHG4B	SNRPD1
TGIF2LX	SNRPF
ANKFN1	SNRPG
PANX3	SPATS2L
UCHL1	SPATS2
CNTNAP3B	SPC24
CHODL	SR140
TMPRSS15	SRRT
SLFN13	SSRP1
SEPTIN14	SSX4
CNTNAP5	SSX6
PROM2	STIP1
TRIM74	STMN1
XAGE2	STX16
SPAG17	SUV39H1
FMN2	SUV39H2
ADCY8	SUV420H2

RAET1L	SUZ12P
KIF5A	SUZ12
NAT2	SYCE2
MAGEA8	SYT1
ALX3	TACC3
SORCS3	TAF1B
TDRD9	TAF4
PPP2R2B	TAF5
UNC5D	TCERG1
GLYATL2	TCF7L1
MAPK13	TCOF1
SST	TDG
C8A	TDRKH
LRP8	THOC1
C1orf158	THOC4
HYDIN	TIGD7
FAM81A	TIMELESS
PWWP3B	TIPIN
KCNJ6	TK1
SVOPL	TMEM106C
SLC34A2	TMEM189
GAREM2	TMEM194A
DPYSL5	TMEM194B
SLC30A2	TMEM201
TRIM63	TMEM48
HPD	TMEM97
DZIP1L	TMPO
CPA2	TMPPE
DYNC1I1	TOPBP1
PAGE5	TPRKB
SV2A	TRA2B
HOXB13	TRAF2
PLA2G4D	TRAIP
TFF2	TRIM31
TFF1	TRIM45
TMPRSS3	TRIP4
ZNF66	TTF2
FTCD	TUBA1B
ZNF208	TUBA1C
FCN2	TUBB
TMEM190	TUBG1
NLRP4	U2AF1
LY6K	UBA2
PTGER1	UBE2CBP
SCGB3A1	UBE2E1
KASH5	UBE2N
CD300LG	UBE2S
BICDL2	UBE2T
ZG16B	UBXN2A
CYP4A22	UCK2

BSND	UNK
RAVER2	USP1
AKR7A3	USP39
LHX8	UTP18
B3GALT2	UTP6
BRINP3	VPS29
VANGL2	VRK1
LRRC52	WASF1
TDRD5	WDR53
MT2P1	WDR67
KLHDC8A	WHSC1
C1orf147	XAGE1D
TRIM17	XPO1
LINC01931	XRCC1
CAPN13	XRCC3
FBXO41	YEATS2
SGPP2	ZBTB12
XIRP2	ZCCHC3
SPRR2D	ZCCHC8
BMP10	ZMYM1
PGLYRP4	ZMYND10
TGFA	ZMYND19
INAVA	ZNF138
IGFN1	ZNF195
ADORA1	ZNF207
CIP2A	ZNF215
FBLN2	ZNF248
SGO2	ZNF26
CADPS	ZNF273
NKX6-1	ZNF335
CXCL3	ZNF341
CXCL5	ZNF367
PPBP	ZNF37B
CXCL1	ZNF384
CDCP1	ZNF431
LIPH	ZNF48
CLDN19	ZNF519
MST1R	ZNF589
PITX2	ZNF620
PRSS12	ZNF639
NDST3	ZNF643
TMEM155	ZNF682
ADAD1	ZNF765
ELOVL7	ZNF792
ANKRD33B	ZNF826
SCGB3A2	ZNF883
ENPP6	ZSCAN20
LINC01600	ZSCAN29
ADGRF2	ZWILCH
GJB7	ABCA8

GRIK2	ABHD14B
BMPER	ACADVL
SP8	ACAT1
SUN3	ACYP2
SLC30A8	ADI1
KCNV1	ALDH2
CSMD3	ALDH4A1
DEFA5	ATP6V0A1
BAALC	ATP6V0E2
FREM1	BCKDHA
NKX6-3	BLCAP
TRPV6	BOK
LLCFC1	C10orf72
SHOC1	C17orf103
ASB11	C20orf160
VEGFD	C4orf3
WNK2	CABC1
SLITRK5	CBFA2T3
ARMC3	CCDC48
DEUP1	CCL14
MBL2	CDADC1
DDIAS	CDC14B
MAGEC3	CDC37L1
NGB	CDNF
CDX2	CHURC1
CLEC1B	CLEC14A
STOX1	CLYBL
VWA2	COQ4
SALL2	CPT2
PRAP1	CUX1
LARGE2	CYB5D2
IFI27	CYGB
PDZRN4	CYYR1
SLC6A5	DHRS12
NELL1	DISP1
PASD1	DLC1
SPINT1	DNAJC30
GABRB3	ECM2
RAG1	EFCAB6
MOGAT2	EMCN
SERPINB7	ENG
TMEM130	ERMAP
SLC38A8	ETFDH
MMP10	EXOC3L2
HTR3A	FAM167B
NNMT	FAM43A
GLYATL1	FBXO31
GPR182	FHL2
TAC3	FXN
CHP2	FXYD6

MIR202HG	GABARAPL1
C15orf48	GALNTL2
EPB42	GNA14
MS4A8	GNG7
MS4A15	GPR155
TCP10L2	GRHPR
TERB2	HERPUD1
B4GALNT2	HGD
ANKRD40CL	HIBADH
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