

SUPPLEMENTARY TABLES

Comprehensive functional enrichment analysis of male infertility

Seyed Morteza Razavi¹, Marjan Sabbaghian^{2*}, Mahdi Jalili³, Adeleh Divsalar¹, Olaf Wolkenhauer⁴, Ali Salehzadeh-Yazdi^{4*}

¹Department of Cell and Molecular Biology, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran

²Department of Andrology, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran.

³Hematology, Oncology and SCT Research Center, Tehran University of Medical Sciences, Tehran, Iran.

⁴Department of Systems Biology and Bioinformatics, University of Rostock, 18051 Rostock, Germany

Correspondences:

Ali Salehzadeh-Yazdi

University of Rostock

Department of Systems Biology and Bioinformatics

Rostock, Germany

ali.salehzadeh-yazdi@uni-rostock.de

Marjan Sabbaghian

Department of Andrology, Reproductive Biomedicine Research Center

Royan Institute for Reproductive Biomedicine, ACECR,

Tehran, Iran

marjan.sabbaghian@gmail.com

Supplementary Table S1. Differentially expressed genes of azoo-oligo-terato-spermia

Supplementary Table S2. Up- and Down- regulated Biological Process, Cellular Component, Molecular Function and KEGG Pathways in Maturation Arrest Azoospermia, Oligospermia and Teratospermia.

Supplementary Table S3. Differentially expressed genes of Post Meiotic Arrest, Meiotic Arrest, Pre Meiotic Arrest and Sertoly Cell Only Syndrome

Supplementary Table S4. Up- and Down- regulated Biological Process, Cellular Component, Molecular Function and KEGG Pathways in Post MA, MA, Pre MA and SCOS

Supplementary Table S1. Differentially expressed genes of azoo-oligo-terato-spermia

Up-Regulated Genes				Down-Regulated Genes							
Maturation Arrest		oligospermia		teratospermia		Maturation Arrest		oligospermia		teratospermia	
AAMDC	HIGD1A	PLCZ1	A2M	A1CF	RAPGEF2	AADAC	FSCB	SPACA4	ABHD2	ABHD16B	RDH8
ABCA10	HIST1H2AC	PLDN	ABCB10	ABCC13	RAPSN	ABHD1	FSCN3	SPACA7	ACSBG2	ACADAM	RIMBP3C
ABCA6	HIST1H2B	PLEK2	ABIC3BP	ABCC9	RLB1	ABIB3P	FTMT	SPAG6	ACTL7B	ACOT11	RNF20
ABCA8	HIST2H2AB	PLEKHG4	ABRA	ACKR4	RBMS3	ACADSB	GADD45GIP1	SPANXA1	ACTRT2	ADAM32	RPL10A
ABCA9	HIVEP2	PLPP3	ACYP2	ACSM2A	REL	ACR	GALNTL5	SPANXB1	ALS2CR11	ADAP2	RPL12
ABHD7	HLA-DMB	PMP22	ANK3	ACVR1B	RNF144B	ACRBP	GAPDHS	SPANXC	ANKRD7	ALDH1A2	RPL13A
ABIB3P	HLA-DPA1	PNPLA8	APOBEC2	ADAM18	ROR1	ACRV1	GEMIN4	SPATA16	APH1B	ALDOA	RPL15
ACAT2	HLA-DPB1	PNRC2	ARHGAP1	ADAMT53	RORA	ACRSBG2	GFR2A	SPATA17	ARL4A	ALOX15B	RPL22
ACSBG2	HLA-DQA1	POMK	ATP7B	ADAMT55	RPL37A	ACSL6	GGN	SPATA18	ARMC12	ALOX5AP	RPL3
ACSM3	HLA-DRA	PP12719	C10ORF71	ADH1B	RPL6	ACTG2	GGTL2C	SPATA19	ASXL1	AMFR	RPL35A
ACSS2	HMGB1	PRKAA2	C11ORF21	ADH4	RSAD2	ACTL7A	GIMAP5	SPATA20	APP	RPL4	
ACSS3	HMGCCL1	PRKACB	CACNA1S	ADH4L	RTP5	ACTL7B	GINS1	SPATA22	ATP5G1	APPBP2	RPL8
ACTL7A	HMGR	PRKRIR	CCDC102A	AK5	RUNDCC3B	ACTRT2	GK2	SPATA3	BRD7	AQP11	RPLP2
ACTL7B	HMGS3	PROK1	CKK	AKR7A2	RUNX1T1	ADAD1	GKAP1	SPATA31A7	C11ORF71	AQP2	RPS11
ADAMTS12	HNF4G	PRPS2	CD48	ALPP	SCD5	ADAM2	GLP1R	SPATA31C1	C12ORF56	ARFGAP1	RPS15
ADAMTS5	HNRNPJ	PSMA2	CHL1	AMY2B	SCGB1D1	ADAM29	GLT1D1	SPATA4	C15ORF48	ARHGAP19	RPS16
ADIRF	HOOK1	PSMA3	CLEC10A	ANKFN1	SCN11A	ADAM32	GLT6D1	SPATA6	C1R	ARHGAP4	RPS24
AK3L1	HRASLS	PSMC6	CLEC14A	APCDD1L	SEMA6D	ADAM5	GPR135	SPATA9	C22ORF23	ARID4B	RPS3
AKAP13	HS3ST1	PTK2	CPNE6	ARG2	SERF1A	ADAM7	GPR64	SPATA5	C2ORF31	ARMC2-AS1	RPS5
AKR1C3	HS3ST3B1	PTPRA	CSR3P	ASTN2	SH3TC1	AIPL1	GPRASP1	SPERT	C2ORF32	ARPC5L	RSL24D1
ALDH1A3	HSD11B1	PTPRD	CUX1	ATP8B3	SHOX	AKAP1	GPX5	SPIN4	CCDC54	ATP5O	RSPH14
ANAPC10	HSD17B11	PWAR6	CYLD	B3GALT2	SLC22A7	AKAP4	GRIK5	SPINK2	CCDC71L	AURKA	SEC31B
ANPPTL1	HSD17B3	RAB41	CYP2C18	B4GALT2	SLC26A3	ALS2CR11	GGG1	SPTBN2	CCDK3	BAG2	SELENOF
ANKRD20A9P	HSD17B6	RALGAPA1	CYP8B1	BACH2	SLC39A8	AMOTL2	GSTM1	STG6GALNAC2	CENPL	BCKDHB	SEMG1
ANKRD7	HSD3B1	RARRS2	DHRS7	BBS4	SMCO1	ANKEF1	GSTTP2	STAM	CENPU	BCL9	SEMG2
ANP32A	HSD3B2	RBMS3	DMPK	BCL11A	SMG6	ANKRD13B	GTSF1A	STATA4	CEP76	BEX3	SEPP1
ANP32B	HSPA4L	RBMV2EP	DNAH1	BCL7A	SNAPC1	ANKRD5	GUCA1A	STK31	CFAP45	BEX4	SEPTIN10
ANTXR1	HSPA8	RBP1	DNAJC19	BCORL1	SNTG1	ANKRD53	HAAO	STON1-GTF2A1L	CFAP70	BLOC1S5	SEPTIN12
ANXA1	HSPB3	RBX1	DTNA	BICD1	SOC54	ANKRD55	HEATR9	SUN3	CFAP74	BTBD6	SEPTIN5
APOL3	IER2	RDX	EDN2	BNC2	SORBS1	ANKRD7	HEMGN	SUN5	CKS2	C2ORF197	SF3B6
ARHGAP12	IER3	RFPL4A	FABP4	BRWD1	SOX11	ANO1	HIPK4	SYK	CLGN	C4ORF19	SGSH
ARHGFEF6	IFI4L4	RHBDGF1	FBXW11	BZW2	SOX5	APBB3	HIST1H2BA	SYTL3	CRISP2	CACNA11	SLI1
ARL4A	IFI1T1	ROBO1	GAD1	C11ORF1	SQSTM1	APBEC4	HLA-DPB1	TBATA	DAZ1	CAMSA19	SIAH1
ASAP2	IGF1	RPA4	GIMAP6	C11ORF74	SRGAP2C	AQP5	HMGB4	TBC1D21	DHX2	CARD16	SLC25A43
ASB13	IGF2	RPL15	GPM6A	C14ORF37	SRGAP2C	ARMC12	HOOK1	TBC1D3G	DRHS9	CBARP	SLC35A1
AT2G2A	IGFBP4	RPL21P28	HEBP2	C16ORF87	SSX2	ARMC3	HOXB5	TBL3	DMRTB1	CBLN1	SLC38A9
ATM	IGFBP5	RPL23P8	IL12A	C19ORF57	STOX2	ARRB1	HSFY1	TCAIM	DNAI1	CBX1	SLC6A2
ATP1B3	IGFBP6	RPL31	ITPKC	C2ORF15	STRN	ASB17	HYD1N	TDRD3	DPY19L2	CBX3	SMCP
ATP5L2	IGFB6	RPL6	KAT6B	C5AR2	SYCE1L	ASPHD2	IGSF10	TEK73	DZ1P1	CCDC65	SNORA70
ATPV6V01P2	IL16	RPS3A	KCNJ1	C5ORF24	SYNGR1	ATP1A2	IL13	TESMIN	EGR4	CCNI	SNORD139
AZ12	IL1A	RPS6KA3	KIAA1524	C5ORF51	SYNJ1	ATP1A4	INPP1	TEX26	EGM71E1	CCN4	SNORD68
B2M	IL1RAP	RRS1	LINC01108	CA13	SYTL3	ATP8B3	IQCF5	TEX29	FKBP6	CD38	SPRCS1
BCCIP	ING4	SAMD9L	LINC01136	CACNA1E	SYTL4	BNF2	IRGC	TEX38	FNDC11	CD48	SPINK2
BCCORL1	INGA	SC5D	LMOD2	CADPS	TAFB4	BAP1	ISG20L2	THB51	FUSC	CD74	SPML2C
BET1	INHBA	SCARNA7	LOC145783	CCDC9	TAS2R9	BB55	ITGA9	THEG	FUCA2	CDC42EP3	SRGN
BHMT2	IPO7	SCARNA9	LOH12CR2	GCLL16	TBPL2	BCL2L14	ITGA9	THYN1	GCA	CDK3	SRP9
BPI	ITGC	SDCBP	LPL	CCNG1	TC2N	BP1FA3	IZUMO4	TIMD4	GGH	CDR2	STK38
C11ORF63	ITM2A	SDHD	MAIP1	CCR1	TCF15	C10ORF62	JAKMIP1	TIMP4	GK2	CETN3	STRN3
C12ORF56	JAM3	SEPP1	MDP1	CDO1	TDG	C11ORF21	KCTD19	TMC7	GKAP1	CFAP221	SYCE3
C14ORF105	KCNK17	SFR1	MGAT2	CCLF4	TEAD3	C11ORF52	KDM3A	TMCO5A	GMCL1P1	CHRNA5	SYNGR1
C15ORF48	KCNK4	SFRP1	MLLT1	CHRM3	TEFM	C11ORF75	KIAA1324	TMEM144	GTF2A2	CLDN11	TAF7L
C1D	KCNQ1	SFRP4	MSLN	CLDN6	TEP1	C12ORF25	KIAA1683	TMEM190	GTSF1	CLGN	TCEAL4
C1ORF115	KCN3S	SGOL1	MTNR1A	CLDN9	TERF1	C12ORF54	KIF2B	TMEM31	HELLS	COX6A1	TCEB2
C1ORF21	KIAA0484	SH3PXD2A	MYH6	CNKR2	TMEM241	C14ORF119	KIR2DS2	TMEM64	HIP1	COX7B	TGFB1
C1QA	KIAA1199	SIX3	MYLK2	CNOT9	TMEM74	C16ORF78	KLFB-AS1	TNC	HMGB3	CSAD	TIMD4
C1QB	KIF1C	SIX6	MYOT	COL11A1	TNS2	C16ORF82	KLHL10	TNFAIP6	HRASLS	CSNK2B	TLR1
C1R	KLR2DL4	SKA2	NAP1L2	COL4A3	TRMU	C17ORF105	KLK5	TNFAIP8L1	HNSP4L	CTST11	TM6SF1
C1S	KLHL9	SLC10A5	NOL6	CREB1	TRFM3	C17ORF53	KLRB1	TNP1	INPP4A	CTSD	TMCO2
C22ORF23	KMT2C	SLC16A2	NRP2	CTB3	TTCS	C17ORF64	KNG1	TOR1A	IRGC	CUBN	TMEM17
C3ORF35	KRR1	SLC16A9	NTS	CUX2	TWISTNB	C17ORF74	KRT23	TPP2	ITCH	CUTC	TMEM43
C6	KRT23	SLC25A2	NUS1	CYP19A1	UGT2A1	C19ORF45	KSR1	TRIM2	JKAMP	CXCR4	TNFRSF14
C6ORF166	KRT6A	SLC25A51	PHKG1	CYP20A1	UPF1	C10KF108	LACRT	TRIM36	KCNK4	CYP7B1	TN2P
C6ORF203	KRTAP19-8	SLC37A3	PLN	DLK1	VPS4A	C10RF111	LAMP3	TRIM42	KIF15	DNX52	TOMM7
C8ORF49	KYAT3	SLC38A1	PLOD2	DCN	WBP1L	C10RF158	LATS2	TSACC	KLHL1	DDR	TRAM1
C9ORF78	LAG3	SLC40A1	PLP2	DICER1	WDR82	C10RF192	LCA5L	TSKS	KPNA2	DGCR6L	TSACC
CA2	LAMA4	SLFN5	PMP22	DLD	WIF1	C10RF194	LECT2	TSNAX1P	KRT23	DHRS13	TSLP
CALB2	LAMTOR3	SLIRP	POU2F3	DLEU7	WISP3	C10RF94	LLEP1	TSPAN1	LDHAL6B	DHX15	TTC25
CASK	LDHC	SLITRK4	PRF1	DNAJB6	XKR4	C2ORF10	LILRA5	TSPAN16	LDHC	DKC1	TUBB4B
CAV2	LECT2	SMAD2	PRMT2	DNMT3A	ZAK	C2ORF141	LINC00238	TSSK2	LIMS3-LOC440895	DNMT1	TXNDC9
CBF6	LEPREL1	SMEK3P	PRRG4	EDARADD	ZC3H13	C2ORF173	LINC00301	TSSK3	LINC00467	DYNLRB2	UQCRCFS1
CBR3	LHGR	SMN1	QDPR	ELOVL4	ZNF234	C2ORF195	LINC00467	TSSK6	LINC00479	DYRK1A	VAV2
CBR4	LIMD1-AS1	SMPD1	RAB5B	EMD	ZNF302	C2ORF85	LINC00521	TTBK2	LINC01016	EEF1A1	VIMP
CBWD2	LIMS3-LOC440895	SNCA	RFTN1	ERC1	ZNF408	C22ORF23	LINC00938	TTC25	LOC100134040	EEF2	WASF1
CCCL2	LINC00328	SNHG1	RPS6KA3	FAM7	ZNF454	C2ORF57	LOC100132147	TTC29	LRAT	EEFBAB5	WEE1
CCNG1	LINC00643	SNORD113-3	RPS9	FAM172A	ZNF552	C3ORF22	LOC102725072	TTL2	LSM14B	EHPBP1	WHSC1L1
CD14	LINC00670	SNORD113-4	SELENOO	FAM212A	ZNF585	C3ORF30	LOC136242	TTL3	LYAR	EI24	WRN
CD1E	LIPH	SNORD114-2	SLC25A6	FAM98B	ZNF596	C4ORF35	LOC157740	TULP2	MAEL	EID1	ZCCHC10
CD53	LIP1T	SNORD114-26	SLCO2A1	FBXL22	ZNF596	C5ORF60	LOC440149	TXNDC15	MAGEB2	EML4	ZFAND5
CDC37L1	LITAF	SNORD114-3	SLF1	FBXO38	ZNF596	C6ORF10	LOC440896	TXNDC2	MAN1A1	ENOPH1	ZFP2
CDKN3	LOC100130428	SNORD114-6	SNX13	FGF12	ZNF596	C6ORF106	LOC645961	UBAL2	MAPK8	EPB41L4A-AS1	ZFP36
CDR2	LOC100131541	SNORD13P2	SOD2	FKBP1	ZNF596	C6ORF204	LOC727924	UBAL4B	MBTD1	ITFDH	ZFP91
CD2S2	LOC100131943	SNORD55B	SPARCL1	FLRT1	ZNF596	C7ORF34	LOC728450	UBQLN3	MRPL42	EXOSC3	ZNF1
CELA2B	LOC100132099	SNORD58A	SRPK3	FOXJ1	ZNF596	C7ORF62	LRR7C7A4	UBQLNL	MS4A5	FAM162A	ZMI2
CENPC	LOC100132686	SNORD73A	SSH2	FRG1BP	ZNF596	C8ORF74	LRKK1	UNQ9391	MS4A6E	FAM175B	ZPBP
CENPI	LOC100287869	SNORD75	SSH3	FRG1JP	ZNF596	C9ORF131	LY6G5B	USP38	MTRF1L	FAM188A	ZRAN2
CEP76	LOC283481	SNORD78	TERF1	FSP2	ZNF596	C9ORF173	LYPLA1	VCX2	MYBL1	FAM83F	ZW10
CFAP45	LOC389834	SNX2	TGFB1	FUS	ZNF596	C9ORF9	LYRM2	VCX3A	NKX3-1	FKBP14	
CFH	LOC63920	SPACA9	THPO	GABRB1	ZNF596	CA2	LYZL1	VCX3B	NUP62	FLVCR2	
CFHR1	LOC731157	SPAG6	TMOD2	GABRB3	ZNF596	CABLES2	LYZL2	VRBP	OIP5	FN1	
CFHR3	LR1F1	SPARCL1	TMPRSS2	GDPD1	ZNF596	CABS1	LYZL4	VRK3	OLAH	FOPNL	
CFI	LRRN3	SPATA22	TMPRSS4	GJC2	ZNF596	CABYR	LYZL6	VRNA1-1	OTX1	FTL	
CHST11	LRR2TM3	SPATA7	TPO	GJD2	ZNF596	CAMKK2	MAP1A	VVA5B1	PAAF1	GAGE6	
CHST7	LRWD1	SPDYE1	TRHDE	GLIDR	ZNF596	CAPN11	MARCH_11	WBSR28	PCSK4	GBP5	
CILP	LSM14B	SPINK2	TRIM2	GLYATL1	ZNF596	CAPZ3	MCL1P	WDR38	PCYT2	GIMAP6	
CKS2	LSM5	SPTLC3	UBE2QL1	GNAO1	ZNF596	CATSPER1	MC4R	WDR39	PDE1B	GLIPR1L1	
CLEC2B	LSP1	SSMEM1	USP38	GPC2	ZNF596	CATSPER4	METRN	WSCD1	PDK1	GMFB	
CLGN	LTV1	STAG1	WRAP53	GPD1	ZNF596	CATSPERG	MFSD6L	YPCL1	PIF4K2B	GNF10	
CLMP	LUM	STEAP1B	ZNF426	GPM6B	ZNF596	CAV2	MGAT4C	ZBTB32	PKP2	GNPNAT1	
CLN5	LYSMD3	STRADB	ZNF560	GRK5	ZNF596	CCDC114	MGC13057	ZC2HC1B	PLAZR1	GOLGA8N	
CMYA5	MAD2L1	STX10	ZNF738	GRM3	ZNF596	CCDC110	MMEL1	ZDHHC19	PLC21	GPR137B	
CNOT7	MAGEB16	SYCP3	ADCY1	GY52	ZNF596	CCDC116	MORN3	ZDHHC20	PMS1	GPR183	
CNTNAP2	MAGEB2	TAF1D	ARHGEF7	HAND1	ZNF596	CCDC126	MRO	ZFAND1	POM121L9P	GPRIN2	
COL12A1	MAGEB6	TAPT1-AS1	ARGL1	HBS1L	ZNF596	CCDC136	MROH2B	ZMAT3	PPP13F3	GTF2A1L	
COMM6	MAGOHB	TAS2R10	C19ORF60	HECW2	ZNF596	CCDC159	MROH5	ZMYND10	PRSS50	H2BFWT	
COPS2	MALAT1	TAS2R14	C5	HIF3A	ZNF596	CCDC185	MROH7-TTC4	ZNF110	RAB39B	HECA	
COX16	MAMLT2	TAS2R19	C8ORF33	HNRNPA0	ZNF596	CCDC54	MS4A6E	ZNF141	RFPL3S	HEXB	
CPM	MAP1B	TAS2R20	CACNA2D3	HNRNPR	ZNF596	CCDC7	MTRN1A	ZNF222	RGS22	HLA-DPA1	
CREB5	MAPKAPK5-AS1	TAS2R33	CCDC138	HNRNPJ	ZNF596	CCER1	MTR	ZNF474	RIMBP3	HRASLS	
CRHR1	MARS	TAS2R31	CIDEA	HS3ST3A1	ZNF596	CCIN	MUC1	ZNF560	ROCK1	HSD17B7	
CRISP2	MCM4	TAS2R45	CISH	HYMAI	ZNF596	CCT8L2	MYL12B	ZNF683	SERPINA5	HSPBAP1	
CRYAB	MEF2C	TAS2R50	CLCN7	IAPP	ZNF596	CDK14A	MYO22	ZNF814	SHK494	HSPH1	
CRYGS	MEGF8	TBC1D3F	CORO2B	IBA57	ZNF596	CDK5R2	NAT2	ZNRF4	SG3RF2	ICAM1	
CRYZ	METTL15	TBX2	CS	IDNK	ZNF596	CEL	NCAN	ZXDC	SHPK	IFI30	
CSRNP3											

Supplementary Table S3. Differentially expressed genes of Post Meiotic Arrest, Meiotic Arrest, Pre Meiotic Arrest and Sertoli Cell Only Syndrome

Post MA	Up-Regulated Genes				Post MA	Down-Regulated Genes							
	MA	Pre MA	SCOS	SCOS		MA	Pre MA	SCOS					
AAMDC	ACAT2	STAG1	ABCA9	PSME1	ABHD4	PHKG1	ABHD1	ACSBG2	ABHD1	SMARCE1	ABHD1	PRM1	
ABCA10	ACSS2	STEAP1B	ADAM28	PTPRD	ABRA	phyhpb	ACTG2	ACTL7A	ACE	SMCP	ACSBG2	PRM2	
ABCA6	ACSS3	STRADB	ADAMTS12	PTPRE	ACKR4	PIK3C3	ADAM29	ACTRT2	ACR	SPACA3	ACTL7A	PRR30	
ABCA8	AK3L1	STX10	ADAMTS5	PTPRM	ACOT2	PIN4P1	ADAM7	ADAM29	ACRBP	SPACA4	ACTL7B	Prss21	
ABCA9	ANAPFC10	SYCP3	AKT3	RAB41	ACSS1	PLA2G4A	AKAP1	AKAP1	ACRV1	SPANXB1	ADAD1	PSMG1	
ACSM3	ANP32A	TAF1D	AMFR	RBMS3	ADAMTS10	PLA2G7	ANKRD13B	ANKRD13B	ANKRD53	SPATA16	ADAM18	PWP1	
ADAMTSS	ANP32B	TAS2R3	AMTN	RBMY2EP	ADAMTS5	PLCB4	ANKRD53	ANKRD53	ARMC12	SPATA9	ADAM29	RACGAP1	
ANKRD20A9P	ANXA1	TAS2R45	ANAPCS	RBP1	ADCY1	PLEK2	ANO1	ANO1	ATP1A4	SPATS1	ADORA3	RBM26-AS1	
ANTXR1	ARHGAP12	TAS2R50	ANTXR2	RECK	AFG3L2	PLP1	APBB3	APBB3	BANF2	ADAM29	ALDH1A2	RFC3	
ATP5L2	ARHGGEF6	TEN2	ANXA1	RFPL4A	AGER	plma1	ARMC12	ARMC12	BANF2	ADAM29	ALDH1A2	RFC3	
C3orf35	ASB13	TET2	AP1G1	RG1	AKT1	PLXNA3	ATP1A4	ATP1A4	BPIFA3	ADAM3A	ALS2CR11	RG1	
C6orf203	ATG2A	TEX11	APCDD1	ROBO1	ANGPTL1	PLXNC1	BATP1	BATP1	C10orf62	ADAM5	ANKRD13A	RIMBP3C	
C8orf49	ATM	TMEM106B	ARHGGEF6	ROBO2	ANKRD33B	POLR2F	ATP1A4	ATP1A4	C10orf82	ADAMTS3	ANKRD7	RIMS1	
CAV2	ATP1B3	TMTC3	ARMXC1	RPA4	ANXA1	PP12719	C16orf82	C16orf82	C17orf105	ADRA1D	TACR3	ARP5	
CBWD2	AZ12	TMX1	ARMXC3	RPS27L	AP1S2	PP14571	C19orf45	C19orf45	C17orf74	AHCYL1	TAF4	ARMC12	ROPN1B
CLN5	BCCIP	TncRNA	ASPHD2	RPS4Y1	APOBEC2	PPF1BP2	C10orf192	C10orf192	C19orf45	AKAP4	TEKT2	ARMC4	ROPN1L
COMMD6	BCORL1	TOP2B	AYTL1	RPS6KA3	APOL3	PPP1R1A	C20orf173	C20orf173	C10orf111	ALOX15	TEKT3	ART3	RSHL1
COX16	BET1	TRAF3	B2M	RRS1	ARHGFE6	PRAGMIN	C2orf57	C2orf57	C2orf57	ANKRD5	TES	ASAP2	RUBCNL
CSRYG5	C1D	TRNT1	BARHL1	RTP4	ATR8B4	PRKACB	C5orf60	C5orf60	C3orf30	ANKRD55	TEX38	ASRGL1	SAP30
CSRNRP3	C6orf166	TUBB2A	BCL6B	SAMD9L	ATR	PRLR	C7orf34	C7orf34	C5orf60	APOBEC4	TFAP2A	ASTN2-AS1	SEC23B
CTS	C9orf78	TUBB2B	BHLHB2	SAMHD1	B2M	PROK1	C8orf74	C8orf74	C7orf34	AQP5	TMC5	ATP1A3	sec24a
DKFZP779L18	CASK	UBLCP1	BIVM	SCRG1	BRCC3	PRPS2	C9orf131	C9orf131	C8orf74	BANF2	TMC7	ATP23	SEPTIN10
DNM3OS	CAV2	UIMC1	BNIP3	SDCBP	BTN3A3	PRR4	CABLES2	CABLES2	C9orf131	BCAT1	TMCO5A	BAG6	SEPTIN12
DOCK10	CBFB	UTSP1	C10orf116	SERPINI1	C10orf71	PRRG4	C10orf71	C10orf71	C9orf173	BCL2L14	TMEM144	BAlAP2L1	SESN3
DPM1	CBR4	UTP11L	C12orf29	SHE	C15orf52	PTPN11	C15orf52	C15orf52	CCIN	BPIFA3	TMEM189	BANF2	SLC26A8
DRAM2	CBWD2	VAMP4	C12orf41	SIN3B	c19orf60	PSTN11	c19orf60	c19orf60	CLPB	BRIP1	TMEM190	BCL2L14	SLC5A6
ERAP2	CCNG1	VAMP7	C1orf21	SLC16A14	C21orf62	PWAR6	CCDC114	CCDC114	CPA5	C10orf62	TMEM31	BIRC5	SLC6A16
ESCO2	CDC37L1	VNN2	C1orf57	SLC25A4	C5	QDPR	CCDC116	CCDC116	CXCL16	C13orf28	TMPRSS6	BOLL	SMCP
FAM103A1	CDS2	WDR75	C6	SLC37A3	C7	rab22a	CCDC159	CCDC159	DNAH17	C14orf129	TNFAIP6	BPIFA3	SNHG11
FLJ38894	CENPC	WNT11	C6orf203	SLC38A1	CACNA1S	RAB5B	CCER1	CCER1	EIF4E	C16orf78	TNP1	BRD7	SOX30
FLRT2	CNOT7	XIST	C9orf170	SLC8A3	CALB2	RARBES2	CEP	CEP	FAM166A	C17orf74	TNP2	BTG4	SPACA4
FRG1	COP2	ZEB2	C9orf138	SLCO4C1	CALCLRL	RRMS3	CFAP74	CFAP74	FAM187B	C10orf108	TOX3	C10orf62	SPAG5
FZD4	COX16	ZFAND1	CAPN13	SLFN5	CAMK2N1	RGS14	CHD5	CHD5	FAM205A	C10orf111	TPPP2	C10orf68	SPAG6
GLO1	CPM	ZNF141	CASP4	SMC5	CAPN2	RNF152	CHRM4	CHRM4	FAM71A	C10orf158	TREML2	c11orf70	SPANXB1
GPR21	CRYAB	ZNF189	CAV2	SNHG1	CAPN5	RNMT	CLPB	CLPB	FAM71B	C10orf194	TRPM5	C12orf25	SPATA3
GPR52	CTPS2	ZNF22	CBR3	SNORD113-3	cas9a	ROBO2	CNN1	CNN1	FAM71F1	C10orf94	TSACC	C16orf71	SPATA8
GPR75	CXYorf2	ZNF260	CCDC93	SNORD113-4	CCDC102A	RP13-347D8.3	CNTN2	CNTN2	FANCD2OS	C10orf98	TSKS	C16orf78	SPC25
GSTA1	DCUN1D5	ZNF37A	CCL2	SNORD114-2	CCDC138	RPS9	COX6B2	COX6B2	JARID1A	C20orf10	TSPAN1	C17orf105	SPC53
GSTA3	DDF1	ZNF430	CD14	SNORD114-26	CCNG1	RTN2	CPA5	CPA5	FER1L5	C20orf141	TSSK2	C17orf39	SPINK2
GTFA2	DDIAS	ZNF486	CDH19	SNORD114-3	CD14	SAMD9	CPNE2	CPNE2	FNDC8	C20orf195	TTBK2	C17orf51	SPRNT
HFXA-AS1	DICER1	ZNF502	CENP1	SNORD114-6	CD36	SAMD9L	CPTP	CPTP	FSCB	C20orf85	TUBA8	C17orf74	STAG3
HMGCB1	DLEU2	ZNF503	CFI	SNORD56B	CD48	SAPS2	CSNK1G2	CSNK1G2	FSCN3	C22orf23	TULP2	C10orf105	STK31
HMGCR	DMKN	ZNF525	CF2	SNORD73A	CD99	SDS	DCST1	DCST1	FTMT	C3orf22	UBQLN3	C10orf158	SYCP1
HMGCS1	DNAJB11	ZNF641	CHI3L1	SNORD78	CDK5	SEPP1	DCST2	DCST2	GAPDHS	C4orf35	UNQ1A1	C10rf194	SYT6
HNRNPU	DNAJC12	ZNF649	CHRNA1	SNX22	CEBPA-AS1	SFTPD	DEFB126	DEFB126	GGN	C5AR1	UNQ9391	C10QTNF3	TARDBP
HSD17B3	DDP1	ZNF682	CHST11	SPTLC3	CFH	SGCE	DNAH1	DNAH1	GGG1	C5orf60	UPK3A	C1R	TCAM1P
HSD17B6	DPPA3P2	ZNF737	CLCN5	SS18L1	CFI	SH2B1	DNAH17	DNAH17	GUCA1A	C6orf10	USF1	C20orf85	TC10L
IGSF6	EIF1AY	ZNF770	CLEC2B	STMN2	CFLAR	SH3TC1	DNAI2	DNAI2	KIF2B	C6orf204	USP2	C22orf23	TCP11
IPO7	ENTPD1	ZNF845	CMYA5	TACSTD1	CHL1	SHD	DOC2A	DOC2A	KLHL10	C7orf34	WBSCR28	C5orf60	TCTE1
KLHL9	ENTY2	ZNF845	CNKSR3	TBC1D13	CIDEC	SLC15A2	DOT1L	DOT1L	LLELP1	C7orf62	ZC2HC1B	C6orf10	TDRG1
KRT6A	EPB41L4A	ZNF845	COL27A1	TBC1D9	CKMT2	SLC25A14	DPEP3	DPEP3	LINC00521	C9orf131	ZDHC19	C7orf31	TEKT3
LAMA4	ESCOC2	ZNF845	CPA3	TBL1XR1	CLEC10A	SLC30A3	DUS1L	DUS1L	LYZL6	CA13	CABS1	C9orf72	TEX30
LHCGR	ETFDH	ZNF845	CREB5	TET2	CLEC4M	SLC38A1	COBL1	COBL1	LYZL6	CAMKK2	DUSP1	CALR3	TEX38
LIMD1-AS1	EXOC6	ZNF845	CRYZ	TEX11	COL27A1	SLC44A1	DXO	DXO	MROH7-TTC4	CAPN11	CAPN11	CAPN11	TKFD1
LINC00328	FAM103A1	ZNF845	CSNK1E	TLOC1	CTHRC1	TMEM158	CPA3	CPA3	MSA46E	CAPS	CAPZA3	CAPZA3	TKTL2
LINC00643	FAM69A	ZNF845	CTHRC1	TMEM43	CTNNA3	TMEM43	CPED1	CPED1	NT5C1B	CAPZA3	CAPZB	CASC5	TKTL2
LIP1	FLJ38894	ZNF845	CTSA	TncRNA	CTSA	TncRNA	CRK	CRK	OAZ3	CCDC126	CCDC126	CCDC136	TMEM99
LOC100130428	FLJ44451	ZNF845	CTSG	TRAF3	CTSG	TRAF3	CRK	CRK	ODF1	CCIN	CCIN	CCDC65	TMUB2
LOC100131541	FNBP1	ZNF845	CTSK	TRF3	CTSK	TRF3	CRYAB	CRYAB	ODF31	CCR9	CCT8L2	CCIN	TNFAIP6
LOC100132099	FPR1	ZNF845	CTSK	TRF3	CTSK	TRF3	CRYZ	CRYZ	ODF31	CCR9	CCT8L2	CCIN	TNFAIP6
LOC100287868	FRG1	ZNF845	CUL5	TSPO	CTSD2	SOX11	CSDC2	CSDC2	ODF31	CCR9	CCT8L2	CCIN	TNFAIP6
LOC731157	FUSIP1	ZNF845	CXorf39	UBE2A	CTBS	SP100	CTSD2	CTSD2	PHOSPHO1	CCR9	CCT8L2	CCIN	TNFAIP6
MALAT1	FXC1	ZNF845	CXorf48	USP31	CTNB1	SPARCL1	CTNNB1	CTNNB1	PPP1R32	CCR9	CCT8L2	CCIN	TNFAIP6
MAMML2	GAK	ZNF845	CYP7B1	USP9Y	CTSC	ST3GAL4	CTSC	CTSC	PRM1	CCR9	CCT8L2	CCIN	TNFAIP6
METTL15	GAS5	ZNF845	DAZ1	VCX	CTSD	STAG2	CTSD	CTSD	PRM2	CCR9	CCT8L2	CCIN	TNFAIP6
METTL21EP	GDAP1	ZNF845	DKC	VCY	CTSK	STEAP4	CUX1	CUX1	PROCA1	CCR9	CCT8L2	CCIN	TNFAIP6
MGARP	GF11	ZNF845	DDX3Y	VIPR1	CUX1	TAS2R14	CYBB	CYBB	PRSS54	CCR9	CCT8L2	CCIN	TNFAIP6
MGC24103	GGA2	ZNF845	DDX58	VTN	CYBB	TAS2R4	CYBD	CYBD	RNF151	CCR9	CCT8L2	CCIN	TNFAIP6
MIR107	GNDPA2	ZNF845	DNAJB11	WDR41	CYLD	TAX1BP3	CYP8B1	CYP8B1	FOXM1	CCR9	CCT8L2	CCIN	TNFAIP6
MIR128-1	GPR21	ZNF845	DNASE1L3	WNT8B	CYP8B1	TCF3	DSCR3	DSCR3	FSCB	CCR9	CCT8L2	CCIN	TNFAIP6
MIR145	GSTA1	ZNF845	DSCR3	WTAP	D4S234E	TCL1A	DAB2	DAB2	GAPDHS	CCR9	CCT8L2	CCIN	TNFAIP6
MIR154	GSTA3	ZNF845	DSEL	ZEB2	DAB2	TERF1	DAO	DAO	GEMIN4	CCR9	CCT8L2	CCIN	TNFAIP6
MIR15A	GTPBP10	ZNF845	DTNA	ZNF226	DAO	TET2	EDN1	EDN1	SMCP	CCR9	CCT8L2	CCIN	TNFAIP6
MIR18A	HAT1	ZNF845	EDN1	ZNF277	EDN1	ZNF277	ELAVL3	ELAVL3	SPACA4	CCR9	CCT8L2	CCIN	TNFAIP6
MIR197	HERC4	ZNF845	ELAVL3	ZNF641	DDR2	THOC2	ENPP2	ENPP2	SPATA18	CCR9	CCT8L2	CCIN	TNFAIP6
MIR199A2	HIGD1A	ZNF845	ENPP2	ZNF770	DEF8	THPO	HIGD1A	HIGD1A	SPATA20	CCR9	CCT8L2	CCIN	TNFAIP6
MIR21	HIST1H2AC	ZNF845	FAM114A1	ZNF805	DIFRAS3	THY1	MIR21	MIR21	SPATA3	CCR9	CCT8L2	CCIN	TNFAIP6
MIR214	HIST1H2BH	ZNF845	FAM129A	ZNF805	DNAH1	TM4SF18	MIR214	MIR214	SPATA31A7	CCR9	CCT8L2	CCIN	TNFAIP6
MIR218-1	HIST2H2AB	ZNF845	FAM20C	ZNF805	DPT	TMEM53	MIR218-1	MIR218-1	SPATA31C1	CCR9	CCT8L2	CCIN	TNFAIP6
MIR23B	HLA-DPA1	ZNF845	FARP1	ZNF805	DTNA	TMPRSS4	MIR23B	MIR23B	SPERT	CCR9	CCT8L2	CCIN	TNFAIP6
MIR27B	HLA-DQA1	ZNF845	FAT1	ZNF805	DUSP26	TNFSF10	MIR27B	MIR27B	STGALNAC2	CCR9	CCT8L2	CCIN	TNFAIP6
MIR29C	HSD11B1	ZNF845	FEM1B	ZNF805	EDDM3A	TPO	MIR29C	MIR29C	IL13	CCR9	CCT8L2	CCIN	TNFAIP6
MIR30E	HSD17B11	ZNF845	FHOD3	ZNF805	EDEM2	TRBV19	MIR30E	MIR30E	INPP1	CCR9	CCT8L2	CCIN	TNFAIP6
MIR31	HSPA8	ZNF845	FLJ38894	ZNF805	EIF2AK2	TREM1	MIR31	MIR31	KCTD19	CCR9	CCT8L2	CCIN	TNFAIP6
MIR32	HSPB3	ZNF845	EMCN	ZNF805	EMCN	TRIM16	MIR32	MIR32	KIAA1683	CCR9	CCT8L2	CCIN	TNFAIP6
MIR503	IER2	ZNF845	FLJ39632	ZNF805	ENDOU	TRIM2	MIR503	MIR503	KIF2B	CCR9	CCT8L2	CCIN	TNFAIP6
MIR509	IER3	ZNF845	FLRT2	ZNF805	EPX	TRIM38	MIR509	MIR509	KIR2DS2	CCR9	CCT8L2	CCIN	TNFAIP6
MIR99A	IFIT1	ZNF845	GABRG1	ZNF805	ERAP2	TRIM63	MIR99A	MIR99A	KLHL10	CCR9	CCT8L2	CCIN	TNFAIP6
MIR99AHG	IL16	ZNF845	GABRP	ZNF805	F2R	TC37	MIR99AHG	MIR99AHG	KSR1	CCR9	CCT8L2	CCIN	TNFAIP6
MIRLET7A2	IL1A	ZNF845	GABK	ZNF805	FAM13A	TUBA1C	MIRLET7A2	MIRLET7A2	LOC102725072	CCR9	CCT8L2	CCIN	TNFAIP6
MIRLET7C	IL1RAP	ZNF845	GATA2	ZNF805	FAM167B	UBE2D3	MIRLET7C	MIRLET7C	LRC74A	CCR9	CCT8L2	CCIN	TNFAIP6
MIRLET7F1	JNG4	ZNF845	GBP1	ZNF805	FAM46A	UGDH	MIRLET7F1	MIRLET7F1	LY6G5B	CCR9	CCT8L2	CCIN	TNFAIP6
MIRLET7G	IPO7	ZNF845	GCLC	ZNF805	FBLN5	USP38	MIRLET7G	MIRLET7G	LYZL1	CCR9	CCT8L2	CCIN	TNFAIP6
MPLKIP	JAM3	ZNF845	GLO1	ZNF805	fgl22	VNN2	MPLKIP	MPLKIP	LYZL6	CCR9	CCT8L2	CCIN	TNFAIP6
MSPMO1	KCNK17	ZNF845	GPR128	ZNF805	FLG2	WNSP2	MSPMO1	MSPMO1	MME1	CCR9	CCT8L2	CCIN	TNFAIP6
NKAPP1	KCN3	ZNF845	GRIK2	ZNF805	FLJ36840	ZEB2	NKAPP1	NKAPP1	MROH5	CCR9	CCT8L2	CCIN	TNFAIP6
NRK	KIAA0484	ZNF845	HERC4	ZNF805	FMO1	ZEB1	NRK	NRK	MROH7-TTC4	CCR9	CCT8L2	CCIN	TNFAIP6
OCLM	KIAA1199	ZNF845	HIPK3	ZNF805	FRS1	ZKSCAN1	OCLM	OCLM	MUC1	CCR9	CCT8L2	CCIN	TNFAIP6
OCML	KIF1C	ZNF845	HIST1H4H	ZNF805	FXYD6	ZNF189	OCML	OCML	NEFM				

