

**Supplementary table 3.** Gene modules correlated with each gross subtype of HCC and their hub genes.

Type	Module	Correlation & P value	Threshold	Hub genes
I	greenyellow	cor=0.44 P=0.092	GS >0.2 &  MM >0.8	MT1G MT1M MT1X MT1HL1 MT1B MT1E MT1A SULT1B1 MT2A
II	turquoise	cor=0.35 P=5.5e-29	GS >0.3 &  MM >0.8	ALOX5AP IL4I1 RGS1 AIM2 COTL1 CD52 C1QA TLR8 MNDA LTB LSP1 FAM26F RAB31 AIF1 FMNL1 C1QB MYO1G S100A4 CTSC SASH3 CYTH4 FCGR3A CD48 IL21R CSF1R VAV1 TAGAP CORO1A SLC15A3 GMFG
III	brown	cor=0.42 P=2e-29	GS >0.3 &  MM >0.8	LUM EFEMP1 FNDC1 MGP AEBP1 MFAP4 LAMA2 LOXL1 KAL1 MOXD1 COL3A1 FBLN2 ANTXR1 CNN1 COL8A1 MSRB3 GEM LXN F2R ARAP3 KIF26A PCDH18 ISLR COL6A2 DACT1 PODN VCAN THBD ACTA2 PEAR1 LHFP COL12A1 MXRA8 EPHA3 PLAT LRRC32 CPZ TAGLN BGN EFS PMP22 VEGFC TUBB6 AOC3 MYL9 C11orf96 TSHZ3 COL6A3 LINC01197 CALHM2 JAM3 JAM2 EMP1 MRV11 HEG1 FILIP1L HIC1 TMEM119 THY1 SOX17 FXVD6 SYTL2 TMEM204 PCDH7 COL13A1
	blue	cor=0.3 P=1.1e-16	GS >0.2 &  MM >0.8	BRMS1L PNO1 RNASEH1 NDRG3 C1orf216 TMEM185A TYSND1 TPD52L2 LANCL1 B3GNT2 ZNF282 SPATA2 USP46 BTBD3 POLR3F CRT3 C2orf76 KBTBD2 NIF3L1 UBE2N INPP5A ANKIB1 KDM3A TRIM32 EIF2S2 UBXLN2A CUL2 QSOX2 ADAT1 SAMD8 NCKAP1
	green	cor=0.36 P=1.6e-11	GS >0.2 &  MM >0.8	RHOBTB1 NKD1 RHBG VSTM4 CDK6 AXIN2 TCF7 SP5 HLF CACNB4 AMER1 ODAM LGR5 ZNR3 PPAP2A GLUL LOC101928628 TSC22D1 HABP4 ATP2B2
	red	cor=0.3 P=1.1e-16	GS >0.2 &  MM >0.8	CYP2A7 FETUB SLC10A1 XDH SLC6A1 AGXT FBP1 ALDOB
	greenyellow	cor=0.56 P=0.00057	GS >0.2 &  MM >0.8	MT1G MT1X MT1HL1 MT1A MT2A
IV	brown	cor=0.64 P=7.1e-77	GS >0.5 &  MM >0.8	FNDC1 MGP LAMA2 KAL1 MOXD1 COL3A1 ANTXR1 CNN1 MSRB3 HAND2 GEM LXN MMP23B DACT1 PODN VCAN THBD ACTA2 LHFP MXRA8 EPHA3 MMP2 TUBB6 KIF26A PLAT CPZ HSPB2 FRZB BGN EFS PMP22 VEGFC PRSS23 MYL9 COL6A3 CALHM2 PRELP DACT3 HEG1 FILIP1L TMEM119 THY1 HEYL VIM PCDH7 ATL1

				PCDH18 FOXS1
	pink	cor=0.66 $P=1.2e-25$	$ GS >0.2$ & $ MM >0.8$	PTGS1 ADORA3 TLR7 TREM2 TMEM158 PTPRO GAL3ST4 FCGR2C GPR34 AGTRAP GNPDA1
	turquoise	cor=0.31 $P=8.7e-23$	$ GS >0.5$ & $ MM >0.8$	ALOX5AP HK1 PTPLAD2 MNDA S100A11 RAB31 TMC6 CTSC LAPTM5 MILR1