

Supplementary Figure 1 The workflow of the study design.

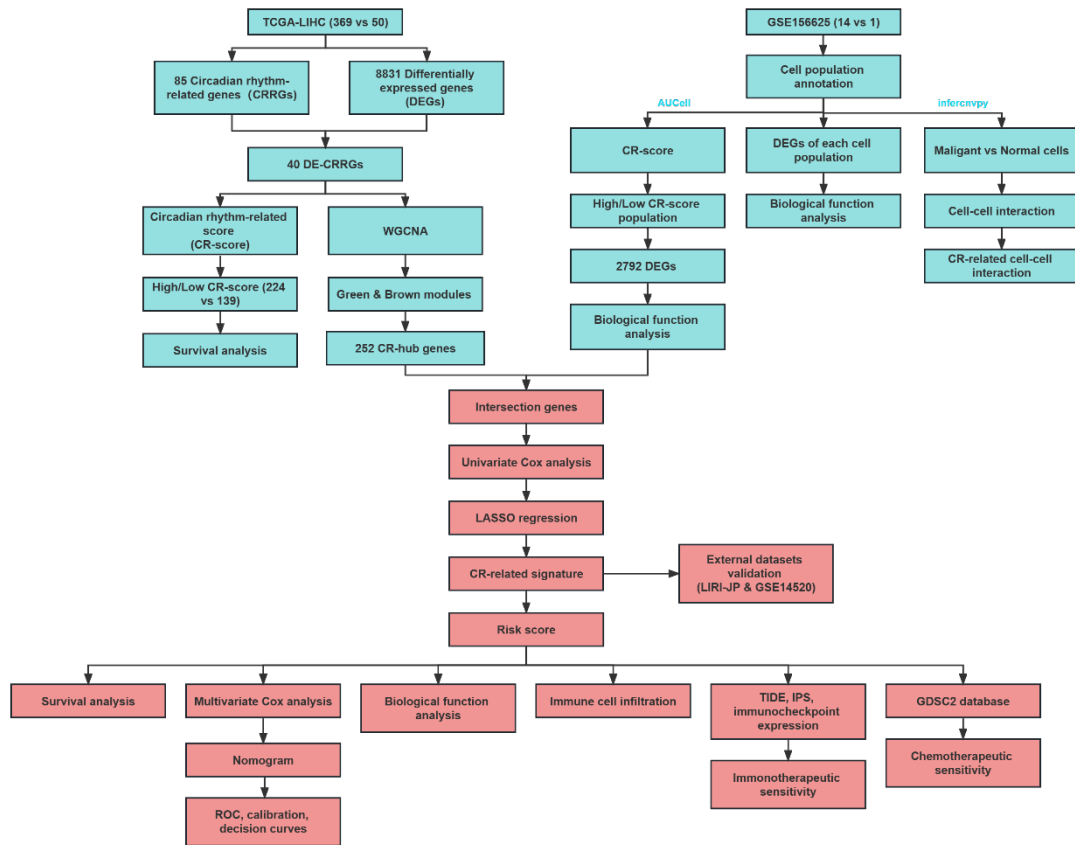


Table S1 Circadian rhythm-related genes (CRRGs) from the GeneCards.

Sources	Gene symbol
GeneCards	BMAL1
	CLOCK
	NR1D1
	RORA
	CARM1
	NCOA2
	CREBBP
	NCOA6
	PPARA
	MED1
	RXRA
	SMARCD3
	TBL1X
	TBL1XR1
	CHD9
	HELZ2
	NCOA1
	TGS1
	BHLHE40
	BHLHE41
	NPAS2
	EP300
	HDAC3
	NCOR1
	CRY1
	CRY2
	CSNK1E
	PER1
	PER2
	NAMPT
	DBP
	F7
	NOCT
	KLF15
	SERPINE1
	AVP
	BMAL2
	RAI1
	PPARGC1A
	CPT1A
CREB1	
ATF2	

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CRTC2  
CRTC1  
SIRT1  
MEF2C  
MEF2D  
CRTC3  
SREBF1  
NRIP1  
PER3  
LOC102724428  
TPTEP2-CSNK1E  
CREM  
CSNK1D  
SIK1  
FBXL3  
NR3C1  
HIF1A  
NFIL3  
PPP1CA  
PPP1CB  
PPP1CC  
RBM4  
RPS27A  
SKP1  
UBA52  
UBB  
UBC  
CUL1  
BTRC  
SLC46A1  
LY96  
HBA1  
HBA2  
HBB  
HMOX1  
APOA1  
APOB  
NFE2L2  
CLEC1B  
BACH1  
TLR4  
XPO1  
MAFK

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Table S2 DEGs between HCCs and normal samples in TCGA-LIHC cohort ( $|\log_2 \text{FC}| > 0.585$  &  $P < 0.05$ ).

Total	Up	Down
8831	7793	1038

Table S3 Venn analysis of the 40 intersected CRRCs between CRRGs from GeneCards and DEGs from TCGA-LIHC cohort.

Intersected CRRGs	Gene symbol
	CLEC1B
	CRTC2
	SKP1
	CSNK1D
	PPP1CA
	PPP1CC
	MEF2D
	XPO1
	CSNK1E
	SLC46A1
	HDAC3
	UBA52
	RPS27A
	CRTC1
	NCOA6
	HBB
	RBM4
	DBP
	HBA2
	TGS1
	TBL1XR1
	ATF2
	MED1
	PPP1CB
	SERPINE1
	NPAS2
	NOCT
	NCOA2
	CARM1
	TLR4
	SMARCD3
	NFIL3
	RAI1
	HMOX1
	NAMPT
	APOA1
	BHLHE40
	BMAL2
	PPARGC1A
	LY96

Table S4 Identification of the hub genes based on WGCNA.

Hub genes	Gene symbol
	ABI3BP
	ABR
	AC006062.1
	ACTA2
	ADAMTS1
	ADAMTS2
	ADAMTS4
	ADCY3
	ADGRA2
	ADGRF5
	AEBP1
	AKT3
	ANTXR1
	AOC3
	AP001189.1
	AP001189.3
	ARAP3
	ARHGAP23
	ARHGAP31
	ARHGAP6
	ASPN
	BGN
	BX322234.1
	C7
	CACNA1C
	CALCRL
	CALHM2
	CCDC80
	CD248
	CD93
	CDH11
	CDH5
	CDR2L
	COL12A1
	COL14A1
	COL15A1
	COL16A1
	COL1A1
	COL1A2
	COL3A1
	COL4A1
	COL4A2

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COL5A1  
COL6A1  
COL6A2  
COL6A3  
COL8A1  
CPXM2  
CRISPLD2  
CTTNBP2NL  
CXCL12  
CYTH3  
DACT3  
DCN  
DENND3  
DHH  
DKK2  
DSE  
ECM1  
EDNRA  
EFEMP1  
ELK3  
EMILIN1  
EMP1  
ENDOD1  
ENG  
EPHA3  
ERG  
ETS1  
F2R  
F3  
FAP  
FBLN2  
FBLN5  
FBN1  
FIBIN  
FILIP1L  
FLNA  
FLT4  
FMOD  
FNDC1  
FOXF1  
FSTL1  
GAS1  
GEM  
GFPT2

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GGT5  
GIMAP6  
GPR4  
GUCY1A1  
GUCY1A2  
GUCY1B1  
HAND2  
HAND2-AS1  
HCG11  
HDGFL3  
HECW2  
HEG1  
HEPH  
HEYL  
HSPG2  
ID4  
IGFBP5  
IGFBP7  
IQGAP1  
IRAG1  
ISLR  
ITGA11  
ITGA3  
ITGA9  
JAM3  
KCNE4  
KCTD12  
KIF26A  
KIRREL1  
LAMA2  
LBH  
LDB2  
LHFPL6  
LINC00924  
LINC01197  
LINC01679  
LRRC32  
LTBP2  
LTBP4  
LUM  
LXN  
LZTS1  
MAP3K6  
MEDAG

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MFAP4  
MMP2  
MOXD1  
MRC2  
MSRB3  
MXRA5  
MYCT1  
MYH11  
MYOF  
NAV1  
NEXN  
NFASC  
NOS3  
NOTCH3  
NOTCH4  
OMD  
OSBPL5  
P4HA3  
PCDH17  
PCDHGB7  
PCDHGC3  
PDE1A  
PDGFRA  
PEAR1  
PFKFB3  
PHLDB1  
PLAT  
PLEKHG1  
PLEKHG5  
PLN  
PLXDC2  
PMEPA1  
PODN  
PODXL  
POSTN  
PPP1R12B  
PPP1R18  
PRELP  
PREX1  
PRKG1  
PRSS23  
PTGIR  
PTGIS  
PTPRB

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PTPRE  
PXDN  
RAB31  
RBMS2  
RCAN2  
SCARF1  
SLC6A6  
SLIT2  
SLIT3  
SMOC2  
SNAI1  
SPARC  
SPON1  
SPRY1  
SRPX  
SSC5D  
ST8SIA6  
STING1  
SULF1  
SVEP1  
SYNPO2  
SYT11  
TAGLN  
TANC1  
TBXA2R  
TCF21  
TCF4  
TEK  
TGFB3  
THBD  
THBS2  
TIMP2  
TMEM255B  
TNC  
TNXB  
TPM4  
TSHZ3  
UNC5B  
VCAN  
VCL  
VEGFC  
ZEB2  
ZFPM2  
ZSWIM4

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AC000089.1  
AC004453.1  
AC034236.1  
AC091153.1  
AC125807.1  
AL009174.1  
EEF1B2P6  
FBL  
RPL10AP6  
RPL11  
RPL13  
RPL14  
RPL14P1  
RPL24  
RPL24P2  
RPL27  
RPL27A  
RPL29  
RPL32  
RPL34  
RPL37  
RPL37A  
RPL37P6  
RPL38  
RPL7AP50  
RPLP2  
RPS14  
RPS15A  
RPS21  
RPS24  
RPS24P8  
RPS25  
RPS29  
RPS7

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Table S5 DEGs between high CR-score and low CR-score groups in GSE156625 dataset ( $|\log_2 FC| > 0.585$  &  $P < 0.05$ ).

Total	Up	Down
2792	2649	143

Table S6 Venn analysis of the 44 intersected CRRCs between CRRGs from WGCNA and scRNA-seq data analysis.

Intersected CRRGs	Gene symbol
	RPS29
	IQGAP1
	RPS25
	TAGLN
	RPLP2
	RPL27A
	PTPRE
	CALHM2
	PLXDC2
	ETS1
	PFKFB3
	ACTA2
	VCL
	RPS24
	TPM4
	ZSWIM4
	PMEPA1
	PREX1
	RPS21
	RPL13
	CRISPLD2
	MYH11
	RPS15A
	RAB31
	RPL27
	RPL38
	RPL37A
	RPL32
	SLC6A6
	RPL14
	ZEB2
	RPL34
	RPL24
	RPL29
	RPL11
	RPS7

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LBH  
SYT11  
FLNA  
GEM  
RPS14  
RPL37  
DSE  
PPP1R18

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