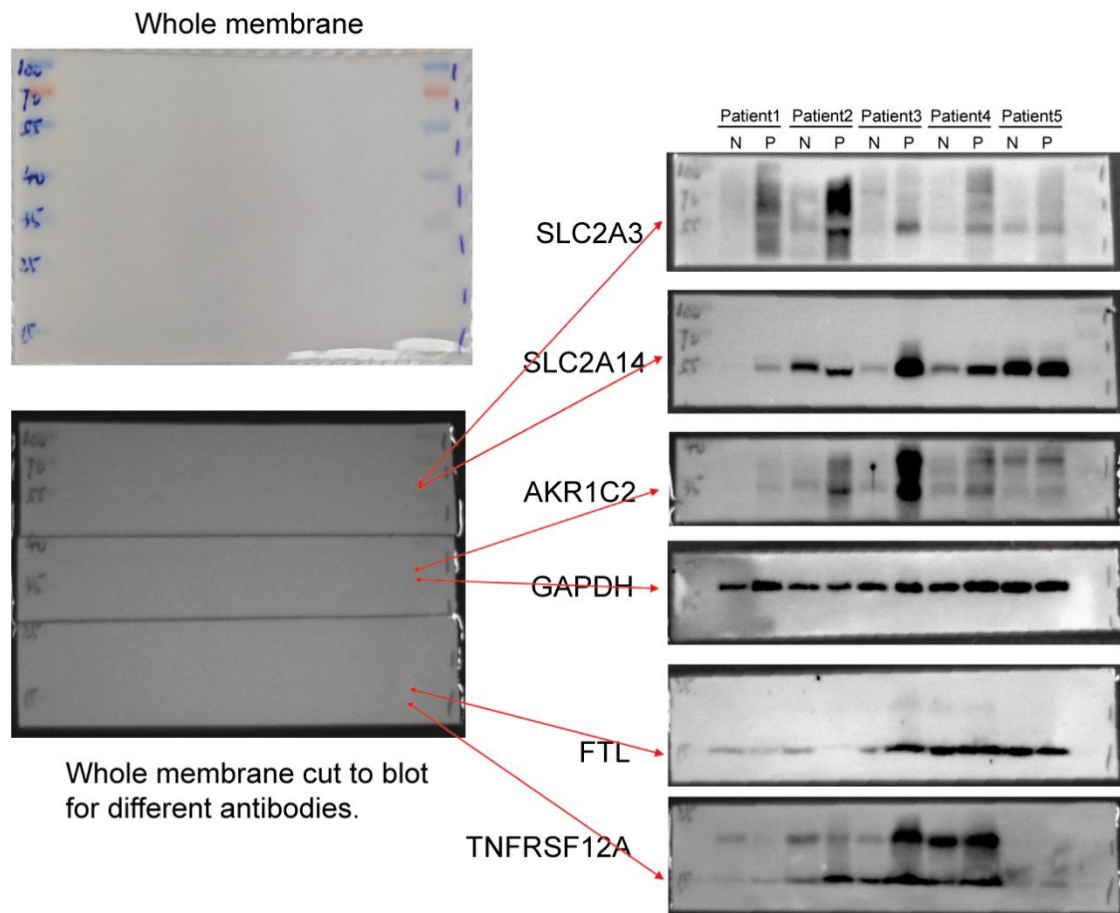


Supplementary Figure 1. The diagnostic performance of panptosis signature genes was exploratory validation in an independent rat transcriptome dataset (GSE149317). As SLC2A14 lacks a direct ortholog in the rat genome, analysis was conducted for the four conserved homologs. (A-D) Receiver operating characteristic (ROC) curves for AkR1c2 (AUC = 0.719), Ftl (AUC = 0.852), Slc2a3 (AUC = 0.828), and Tnfrsf12a (AUC = 0.797). (E) ROC curve of the four signature genes. AUC, area under the curve.



Supplementary Figure 2. Original western blot bands. Proteins with similar molecular weights were detected sequentially on the same membrane: SLC2A14 and SLC2A3, AKR1C2 and GAPDH, TWEAKR and FTL. For each pair, the membrane was first incubated with the primary antibody against the former protein, visualized, then stripped. The following day, it was re-probed with the primary antibody against the latter protein.

Supplementary Table 1. A total of 524 PANRGs, 577 FRGs and 62 CRGs comprised the 1163 PRGs set.

PANoptosis-related genes (PRGs) set								
524 PANRGs				577 FRGs				62 CRGs
H1-2	PPT1	CAMK2A	GNA15	DCAF7	MIR214	MIR539	FNDC5	NDUFA1
BAK1	F2	CAMK2D	MGMT	RPL8	DLD	KMT2D	CircIL4R	FDX1
TP63	IL6	CAMK2B	DBNL	IREB2	WWTR1	GPX4	CDH1	SLC31A1
CHMP2 B	SC5D	CAMK2G	NMT1	ATP5MC3	PRKCA	AKR1C1	NEDD4L	DLAT
BAX	IFITM3	SLC25A4	TLR4	CS	LGMN	AKR1C2	BRD2	CD274
GZMB	RNASEL	SLC25A5	PSMB7	EMC2	SMPD1	AKR1C3	BRD3	ARFGEF1-DT
CHMP4 B	EMP1	SLC25A6	UACA	ACSF2	MYCN	RB1	BRDT	SMAD3-AS1
GSDMD	CAV1	SLC25A31	PSMB6	NOX1	IFNA1	HSPB1	DECR1	LINC03085
GSDME	DNM1L	PPID	PSMA5	CYBB	IFNA2	HSF1	GLRX5	LIPT1
IL1A	ANXA1	VDAC1	TP53BP2	NOX3	IFNA4	GCLC	NCOA3	C6orf136
CHMP3	TOP2A	VDAC3	RPS27A	NOX4	IFNA5	NFE2L2	NR5A2	CDKN2A
IRF1	ISG20	GLUD2	CDKN2A	NOX5	IFNA6	SQSTM1	PANX2	H2BC6-AS1
IL1B	SLC20A1	GLUD1	GAS2	DUOX1	IFNA7	NQO1	RHEBP1	ATP7A
CHMP2 A	MADD	GLUL	APIP	DUOX2	IFNA8	FTH1	TFAP2A	H1-10-AS1
CASP1	PPP2R5B	PYGL	UBC	G6PD	IFNA10	MUC1	CP	SERPINE1
CASP5	BCAP31	PYGM	LY96	PGD	IFNA13	SLC3A2	ARF6	PDHB
TP53	ERBB3	PYGB	PSMA8	VDAC2	IFNA14	MT1G	GDF15	SLC27A5
CHMP7	NEDD9	MAPK10	APPL1	PIK3CA	IFNA16	SLC40A1	ABHD12	FOXD2-AS1
IL18	SAT1	MAPK9	PSMD4	FLT3	IFNA17	CISD1	PPP1R13L	LINC02154
CASP3	PDCD4	FTH1	PSMB4	SCP2	IFNA21	FANCD2	TFAM	LINC00853
CHMP4 C	BCL2L2	FTL	PSMC2	TP53	SMG9	FTMT	KDM3B	LASTR
IRF2	FEZ1	PLA2G4E	OMA1	ACSL4	PPARG	HSPA5	RNF113A	HSPD1
CYCS	ERBB2	PLA2G4A	PSMD6	LPCAT3	MIR335	HELLS	AHCY	PDHX
CHMP6	DNAJA1	JMJD7-PLA2G4B	PRKCD	NRAS	SNX5	SCD	circ-TTBK2	SNHG16
HMGB1	DAP3	PLA2G4B	YWHAZ	KRAS	PAQR3	SRC	MIR522	DLD
CASP4	DPYD	PLA2G4C	PSMC3	HRAS	MICU1	STAT3	IDH2	ARID1A
ELANE	NEFH	PLA2G4D	YWHAB	TF	TOR2A	PML	PPARA	SQSTM1
CHMP4 A	PAK1	PLA2G4F	PSMD2	TFRC	MIR375	MTOR	NOS2	HMGB1

CASP9	FDXR	ALOX15	SFN	TFR2	MAP3K14	NFS1	SIAH2	NLRP3
DFFA	GPX4	SMPD1	DAPK1	SLC38A1	CircKDM4C	TP63	RELA	GPX4
CASP7	ETF1	MLKL	YWHAE	SLC1A5	MIR324	CDKN1A	VDR	NLRP2
CFLAR	CCNA1	PGAM5	PSMD9	GLS2	QSOX1	MIR137	NEDD4	SLC25A3
BIRC3	GUCY2D	NLRP3	LMNB1	GOT1	MIB2	ENPP2	PRDX1	NLRP7
PMAIP1	AVPR1A	PYCARD	UNC5A	CARS1	CLTRN	FH	AR	CALCOCO2
CASP8	CASP10	RNF103-CHMP3	KPNA1	ALOX5	KLF2	CISD2	MTF1	TAX1BP1
JUN	CHUK	VPS4B	TFDP2	KEAP1	MIR5096	MIR9-1	COPZ1	ATP7B
BCL2L11	PRKAR2B	VPS4A	PSMD14	HMOX1	HOTAIR	MIR9-2	NUPR1	DPYD
MCL1	PPP3R2	CHMP1B	TJP2	ATG5	H19	MIR9-3	USP35	DBT
SPTAN1	PPP3CC	CHMP1A	H1-3	ATG7	FOXO4	CBS	NEAT1	DLST
DIABLO	MYD88	CHMP5	H1-1	NCOA4	YTHDC2	ISCU	PARP1	GCSH
BIK	FADD	TRPM7	PSMF1	ALOX12	DDR2	ACSL3	PARP2	GLRX5
BID	RIPK1	IL33	PSMB2	ALOX12B	SLC39A7	OTUB1	PARP3	GLS
CDKN1A	BAD	FAF1	TICAM1	ALOX15	TRIM46	CD44	PARP4	LIPA
GADD45A	IRAK4	IFNA1	SEM1	ALOX15B	ACSL1	LINC00336	PARP6	LIPT2
DDIT3	IKKBK	IFNA2	YWHAH	ALOXE3	KDM5A	BRD4	PARP8	MTF1
CDKN1B	AKT1	IFNA4	PSMA1	PHKG2	TRIM21	PRDX6	PARP9	NDUFB10
TNF	AKT2	IFNA5	PSME3	ACO1	DPEP1	MIR17	PARP10	NDUFB2
GSN	TNFRSF1A	IFNA6	YWHAQ	G6PDX	CYGB	SESN2	PARP11	NDUFB6
TNFSF10	AKT3	IFNA7	STK26	ULK1	IDO1	NF2	PARP12	NDUFC1
CASP6	CHP2	IFNA8	DSG3	ATG3	GSTZ1	ARNTL	PARP14	NDUFC2
SQSTM1	ATM	IFNA10	DSG1	ATG4D	GJA1	JUN	PARP15	NDUFV2
FASLG	ENDOGL	IFNA13	APC	BECN1	SLC7A11	CA9	PARP16	PLAT
EGR3	NFKB1	IFNA14	DAPK3	MAP1LC3A	PGRMC1	TMBIM4	PDSS2	PPAT
CD44	NFKBIA	IFNA16	H1-4	GABARAPL2	CIRBP	PLIN2	TXN	SDHB
FAS	CAPN2	IFNA17	FNTA	GABARAPL1	circPSE N1	MIR212	SENP1	ACO2
IGFBP6	PIK3R5	IFNA21	STAT3	ATG16L1	USP11	Fer1HCH	OIP5-AS1	LIPM
PRF1	IKBKG	IFNG	AVEN	WIPI1	YAP1	AIFM2	MIR190A	POLD1
DAP	CAPN1	IFNAR1	YWHAG	WIPI2	MIR135B	LAMP2	FGF21	LAIS
CCND1	IL3RA	IFNAR2	UBB	SNX4	TRIM26	ZFP36	CREB1	TIMMDC1
BTG3	IL3	IFNGR2	PSMD1	ATG13	NDRG1	PROM2	CREB3	PDHA1

F2R	ENDOD1	JAK1	VTRNA1-1	ULK2	MIR302A	CHMP5	CREB5	ISCA2
SATB1	APAF1	JAK2	NINJ1	SAT1	ASMTL-AS1	CHMP6	MIR130B	NDUFA8
BNIP3L	PRKX	JAK3	PSMD12	EGFR	FADS2	CAV1	BEX1	
TNFRSF12A	CSF2RB	TYK2	OCLN	MAPK3	PIEZO1	GCH1	ASAH2	
CREBBP	TNFRSF10A	STAT1	TFDP1	MAPK1	LIFR	DAZAP1	FABP4	
RHOB	TRAF2	STAT2	OPA1	BID	PTPN6	PIR	AKT1S1	
GPX3	TNFRSF10D	STAT4	PSMB8	ZEB1	MIR15A	FTL	MLST8	
PDGFRB	NGF	STAT5A	PSMB10	DPP4	EGR1	HCAR1	TYRO3	
TSPO	TNFRSF10B	STAT5B	UBA52	CDKN2A	ADAM23	SLC16A1	SIRT6	
CCND2	TNFRSF10C	STAT6	PSMB11	PEBP1	ARHGEF26-AS1	RRM2	TMSB4X	
XIAP	MAP3K14	IRF9	PSMB9	SOCS1	CPEB1	NR4A1	TMSB4Y	
TIMP1	IL1RAP	EIF2AK2	TICAM2	CDO1	COX4I2	RPTOR	KIF20A	
CTNNB1	IRAK2	TLR3	DYNLL2	MYB	lncRNA AABR07017145.1	SREBF1	ECH1	
HSPB1	IL1R1	ZBP1	PSMB3	MAPK8	TIMP1	SREBF2	circRHOT1	
ADD1	IRAK1	USP21	TRAF5	MAPK9	KDM6B	FZD7	ETV4	
TIMP2	TRADD	HSP90AA1	RBCK1	CHAC1	METTL14	P4HB	MEG8	
BTG2	PIK3R3	HSP90AB1	RNF31	MAPK14	MIB1	NT5DC2	VCP	
TIMP3	BCL2	TNFAIP3	SHARPN	LINC00472	KDM5C	BCAT2	circ_0007142	
LEF1	BIRC2	PARP2	SPATA2L	PRKAA2	MEG3	PLA2G6	RBMS1	
GPX1	IRAK3	PARP3	SPATA2	PRKAA1	CCDC6	MIR424	KDM4A	
BCL10	PRKACA	PARP4	RIPK3	ELAVL1	CFL1	PARK7	MGST1	
IGF2R	PRKACB	H2AX	CYBB	BAP1	DRD4	FXN	circKIF4A	
CDC25B	PRKACG	H2AC20	PLEC	ABCC1	MAP3K5	SUV39H1	miR-7-5p	
AIFM3	PPP3CB	H2AC12	MAGED1	MIR6852	SLC2A1	ATF2	circ_0067934	
CD38	PPP3CA	H2AC1	PAK2	ACVR1B	SLC2A3	ACOT1	MPC1	
PPP3R1	PIK3CA	H2AW	H1-5	TGFBR1	SLC2A6	ALDH3A2	CHMP1A	
HGF	PIK3CB	H2AB3	PSMD13	EPAS1	SLC2A8	STK11	CAMKK2	
CLU	DFFB	H2AC8	MAPT	HILPDA	SLC2A12	CEBPG	SOX2	
ATF3	PIK3CD	H2AC4	DCC	HIF1A	GLUT13	SNORA16A	SRSF9	
LGALS3	PRKAR1A	MACROH2A2		IFNG	SLC2A14	RGS4	PROK2	

LUM	PRKAR2A	MACROH2A1		ANO6	EIF2AK4	BLOC1S5-TXNDC5	MIR4443	
LMNA	PRKAR1B	H2AC19		LPIN1	TFAP2C	LOC390705	SIRT2	
GADD45B	EXOGEN	H2AJ		HMGB1	SP1	EIF2S1	circRNA1615	
CDK2	PIK3CG	H2AB1		TNFAIP3	HBA1	KIM-1	MIR27A	
IFNB1	AIFM1	H2AC17		TLR4	NNMT	CXCL2	MIR670	
RETSAT	NTRK1	H2AC18		ATF3	PLIN4	HSD17B11	MEF2C	
SMAD7	PIK3R1	H2AC11		ATM	HIC1	SETD1B	EZH2	
SOD1	PIK3R2	H2AC21		YY1AP1	STMN1	MAFG	PEDS1	
PTK2	CHP1	H2AZ2		EGLN2	CAPG	IL33	ADAMTS13	
ENO2	PSMB1	H2AC7		MIOX	HNF4A	HAMP	CDC25A	
HMOX1	PSMC4	H2AZ1		TAFAZZIN	NGB	STEAP3	CircFNDC3B	
IER3	VIM	H2AC15		MTDH	YWHAE	DRD5	PPARD	
BCL2L10	DAPK2	H2AC6		IDH1	GABPB1	SIRT3	ENO3	
CD2	CDH1	H2AC13		SIRT1	AURKA	CGAS	LCN2	
GCH1	PSMA4	H2AC14		FBXW7	MIR4715	STING1	MARCHF5	
MMP2	DSG2	H2AC16		PANX1	RIPK1	HDDC3	TRIB2	
VDAC2	PRKCQ	H2AB2		DNAJB6	MIR30B	MIR761	DHODH	
TAP1	PSME4	PPIA		BACH1	MMP13	MDM2	MIR545	
PLAT	ARHGAP10	MTOR		LONP1	LRRFIP1	MDM4	PDK4	
IFNGR1	TP73	ITGA5		CD82	CBR1	OXSRI	CircPVT1	
APP	PKP1	CRYBA1		IL1B	PTGS2	SELENO5	MIR9-3HG	
BRCA1	PSMC5	STK11		CTSB	IREB	ANGPTL7	ADIPOQ	
ROCK1	PPP1R13B	MAP3K7		POR	ATP5G3	DDIT4	circDTL	
PSEN1	DYNLL1	CEACAM6		CYB5R1	LncRNAH19	LOC284561	mmu_circRNA_0000309	
DCN	PSME1	ITGB1		ELOVL5	LOXs	ASNS	PTPN18	
PSEN2	CLSPN	TLE1		FADS1	GCL	TSC22D3	ABCC5	
SOD2	PSMD5	NTRK2		PTEN	GS	DDIT3	CISD3	
BMF	DSP	PTRH2		NR1D1	METTL3	JDP2	MS4A15	
EREG	PSMD8	BRMS1		NR1D2	HMGCR	SLC1A4	FURIN	
KRT18	MAPK1	ANKRD13C		TBK1	FSP1	PCK2	circRHBG	
TGFB2	PSMC6	CEACAM5		IL6	FPN	TXNIP	GALNT14	

RELA	PSMA3	TSC2		USP7	IRP2	VLDLR	KLHDC3	
WEE1	PSMC1	SNAI2		miR-182-5p	Nrf2	GPT2	LINC01833	
RARA	PSMB5	NOTCH1		miR-378a-3p	PPAR γ	PSAT1	circGFRA1	
CD14	ACIN1	SIK1		ATF4	MT3	LURAP1L	MAPKAP1	
CD69	PSMA6	CHEK2		AQP3	UBC	SLC7A5	PRR5	
PEA15	PSME2	PDK4		AQP5	ALB	HERPUD1	RICTOR	
DNAJC3	PSMA7	MYBBP1A		AQP8	TXNRD1	XBP1	GSTM1	
CASP2	E2F1	TLE5		LINC00618	SRXN1	ZNF419	TERT	
CTH	PSMD10	SRC		MT1DP	GPX2	KLHL24	circ0097009	
PLCB2	BMX	ZNF304		PEX10	BNIP3	TRIB3	TMEM161B-DT	
BMP2	STK24	MEFV		AGPAT3	ciARS	ZFP69B	circEPSTI1	
HMGB2	MAPK3	AIM2		PEX12	SLC39A14	ATP6V1G2	MIR18A	
PLPPR4	PSMD7	SOD2-OT1		CHP1	MAP3K11	VEGFA	RARRES2	
H1-0	TJP1	TUG1		GPAT4	GSK3B	TUBE1	DUSP1	
TGFBR3	BBC3	SNHG7		BRPF1	BRD7	ARRDC3	NCF2	
EBP	CARD8	SNHG1		OSBPL9	SLC25A28	LCE2C	AEBP2	
TXNIP	PSMA2	SNHG16		INTS2	MFN2	FAR1	AGPS	
ANKH	MAPK8	SNHG6		MMD	SLC11A2	PHF21A	CDCA3	
RHOT2	UNC5B	SFTA1P		CYP4F8	ZFAS1	SMAD7	PEX2	
CYLD	PSMD3	CDK1		MLLT1	TSC1	LYRM1	PEX6	
GSTM1	SEPTIN4	NFS1		TTPA	TGFB1	AMN	TIMM9	
GSR	KPNB1	SAMHD1		GRIA3	SNCA	PEX3		
BGN	C1QBP	STING1		EPT1	LIG3	MTCH1		
BCL2L1	PSMD11	CRMA		POM121L12	ACADSB	PVT1		

PANRGs, genes related to pyroptosis, apoptosis, and necroptosis; FRGs, ferroptosis-related genes; CRGs, cuproptosis-related genes; PRGs, PANoptosis-related genes.