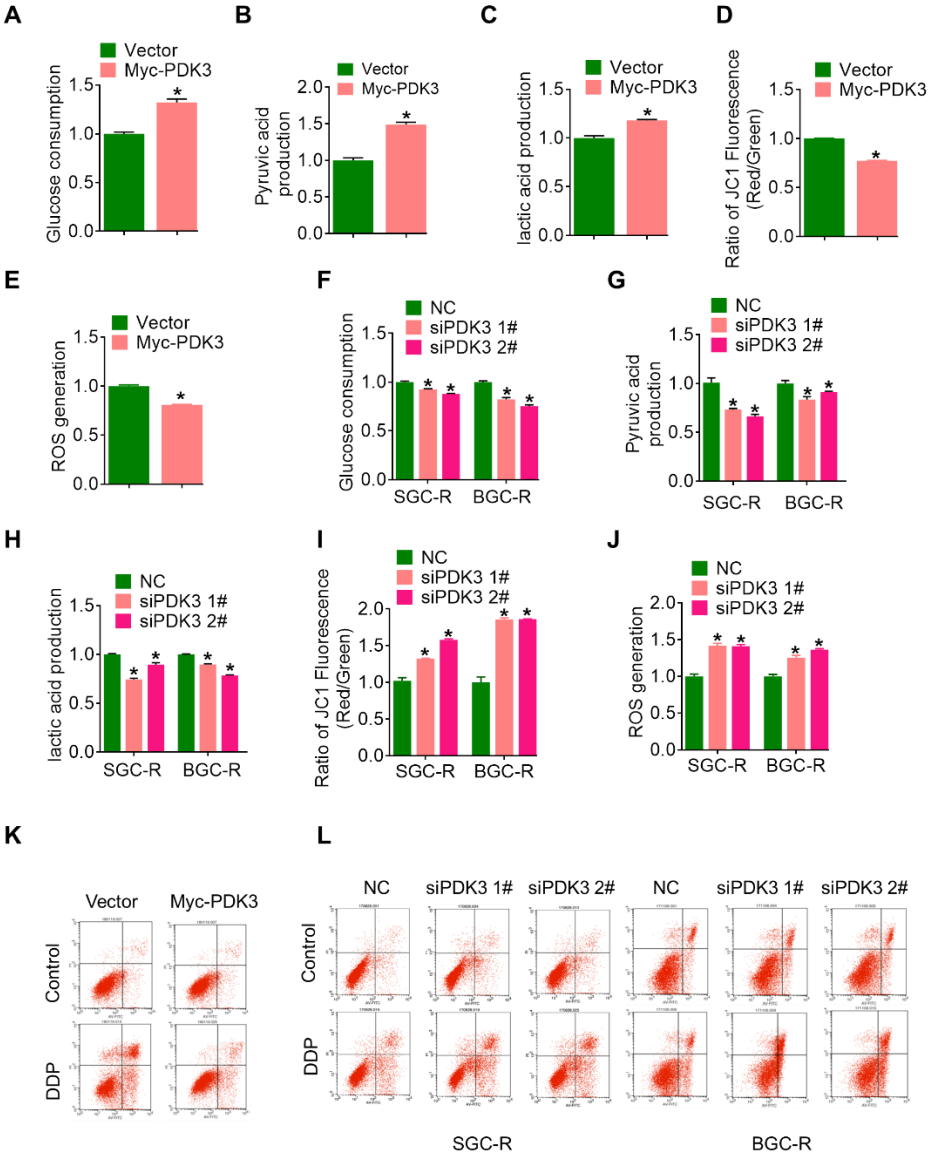
Supplementary Figures and Figure Legends



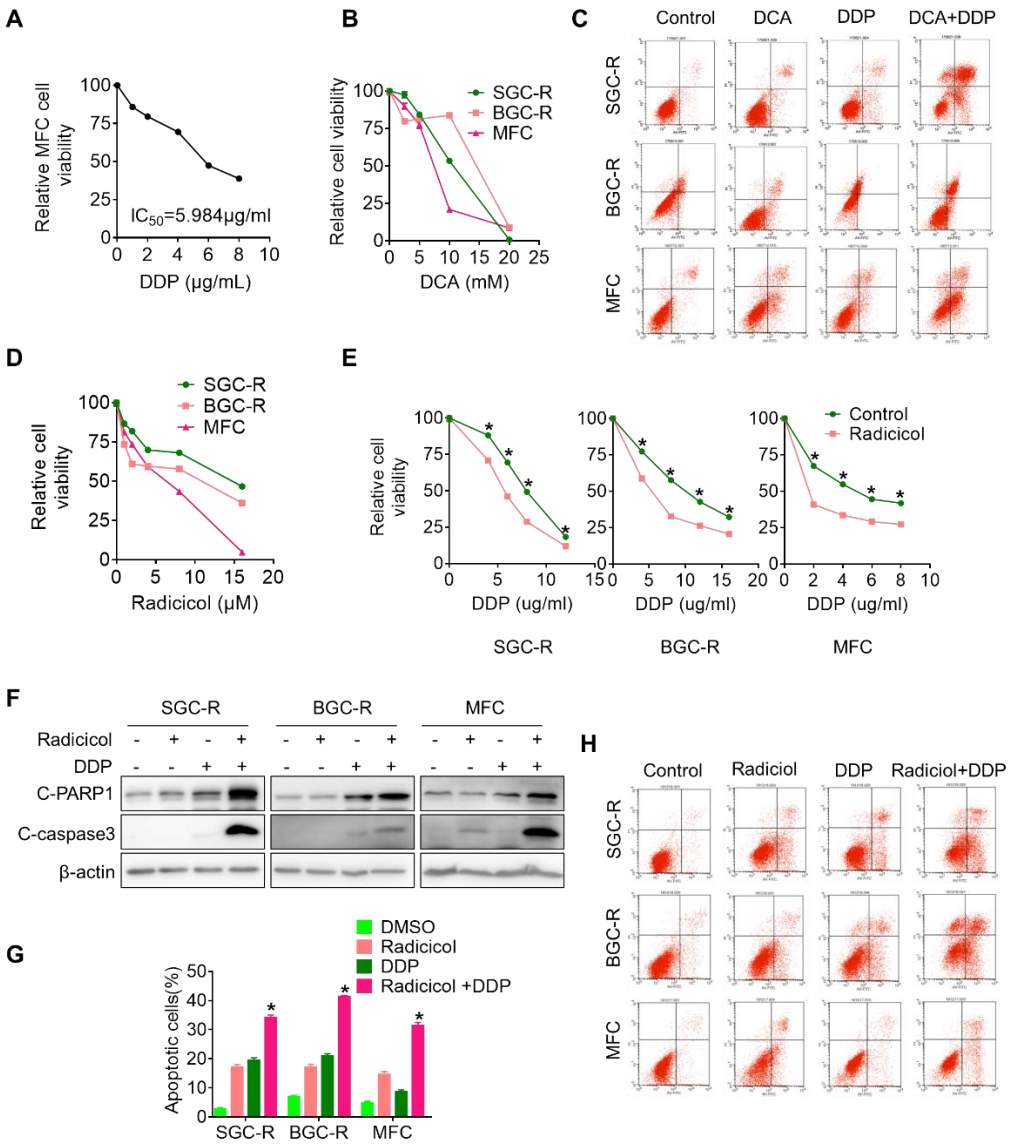
Supplementary Figure 1. PDK3 promotes glucose metabolism and chemoresistance in GC Cells.

A-E: Alternations in glucose consumption (A) production of pyruvic acid (B), lactic acid (C), mitochondrial membrane potential (D) and ROS generation (E) were determined in SGC7901 cells with or without stable PDK3 overexpression.

F-J: Alternations in glucose consumption (F) production of pyruvic acid (G), lactic acid (H), mitochondrial membrane potential (I) and ROS generation (J) were determined in SGC-R and BGC-R cells with or without PDK3 depletion.

K: DDP-induced apoptosis in SGC7901 cells with or without stable PDK3 overexpression were evaluated by Annexin V and PI double staining.

L: DDP-induced apoptosis in SGC-R and BGC-R cells with or without PDK3 depletion were evaluated by Annexin V and PI double staining.



Supplementary Figure 2. Chemical inhibition of PDK3 impairs glycolysis to reverse chemoresistance

A: Cell viability was evaluated by MTS assay after exposure to indicated concentrations of DDP for 24 h in MFC cells.

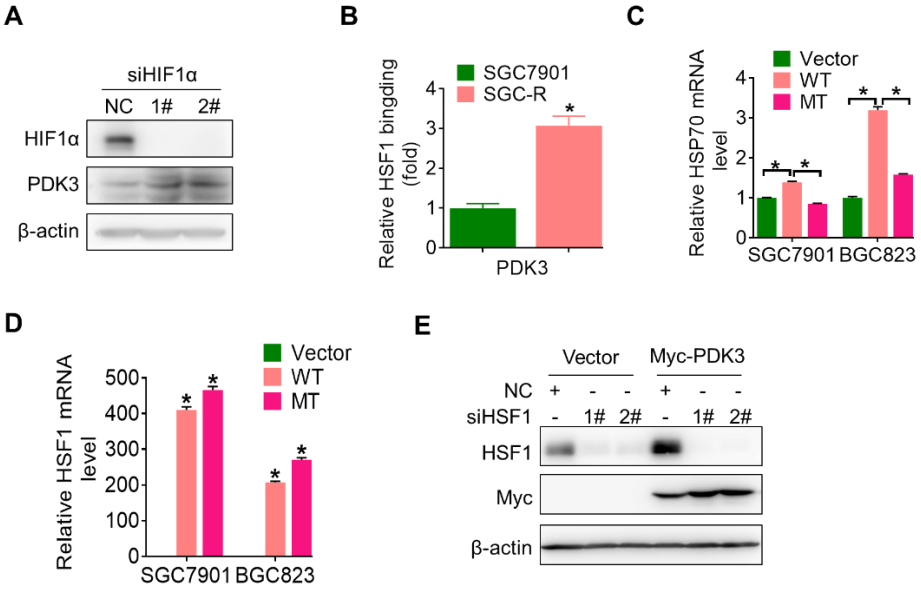
B: Cell Viability was evaluated by MTS assay after exposure to indicated concentrations of DCA for 72 h in MFC cells.

C: DDP-induced apoptosis in SGC-R, BGC-R and MFC cells treated as indicated were evaluated by Annexin V and PI double staining.

D: Cell Viability was evaluated by MTS assay after exposure to indicated concentrations of Radicicol for 48h in MFC cells.

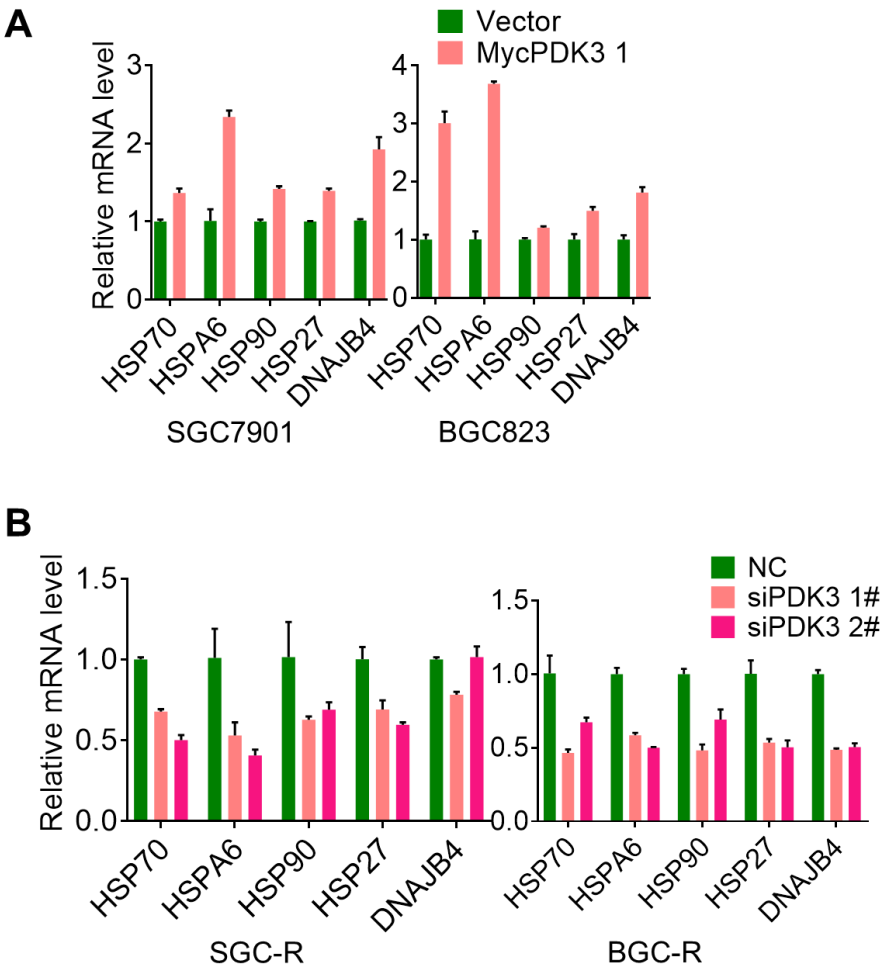
E, Viability of various cells treated with various doses of DDP and Radicicol were evaluated by MTS assay.

F-H, Apoptosis of SGC-R, BGC-R and MFC cells after treatment with Radicicol and/or DDP were analyzed by immunoblot (F) and flowcytometry analysis (G and H).



Supplementary Figure 3. HSF1 upregulates PDK3 expression at transcription level.

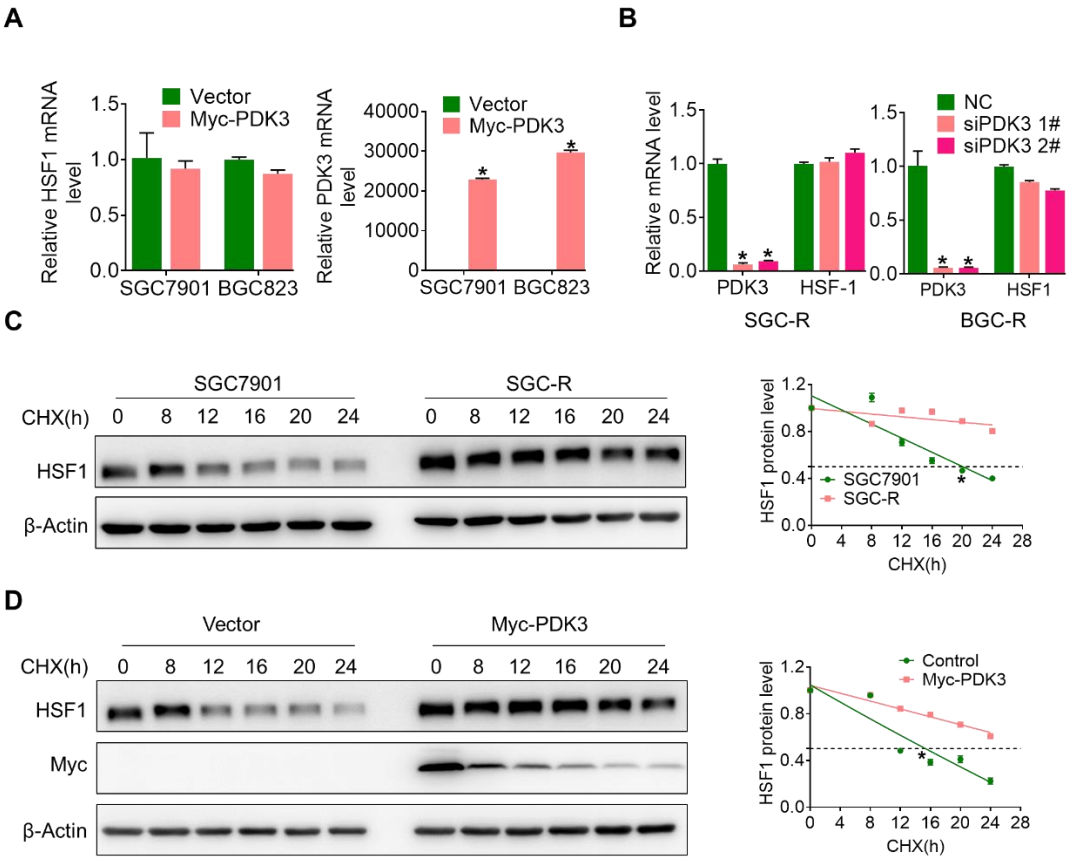
A: Immunoblot analysis of endogenous PDK3 expression in SGC-R cells before and after HIF1α depletion.
B: ChIP assay assessing HSF1 binding at the putative HSE site in the PDK3 promoter in SGC7901 and SGC-R cells. The results were normalized with 1% of input.
C: RT-PCR analysis of HSP70 mRNA levels in gastric cancer cells transfected with (WT) or MT (mutated) HSF1.
D: RT-PCR analysis of a HSF1 mRNA levels in gastric cancer cells transfected with WT or MT HSF1.
E: Immunoblot analysis of ectopic PDK3 expression in SGC7901 cells before and after HSF1 depletion.



Supplementary Figure 4. PDK3 alternations changes the expression of HSF1 downstream targets

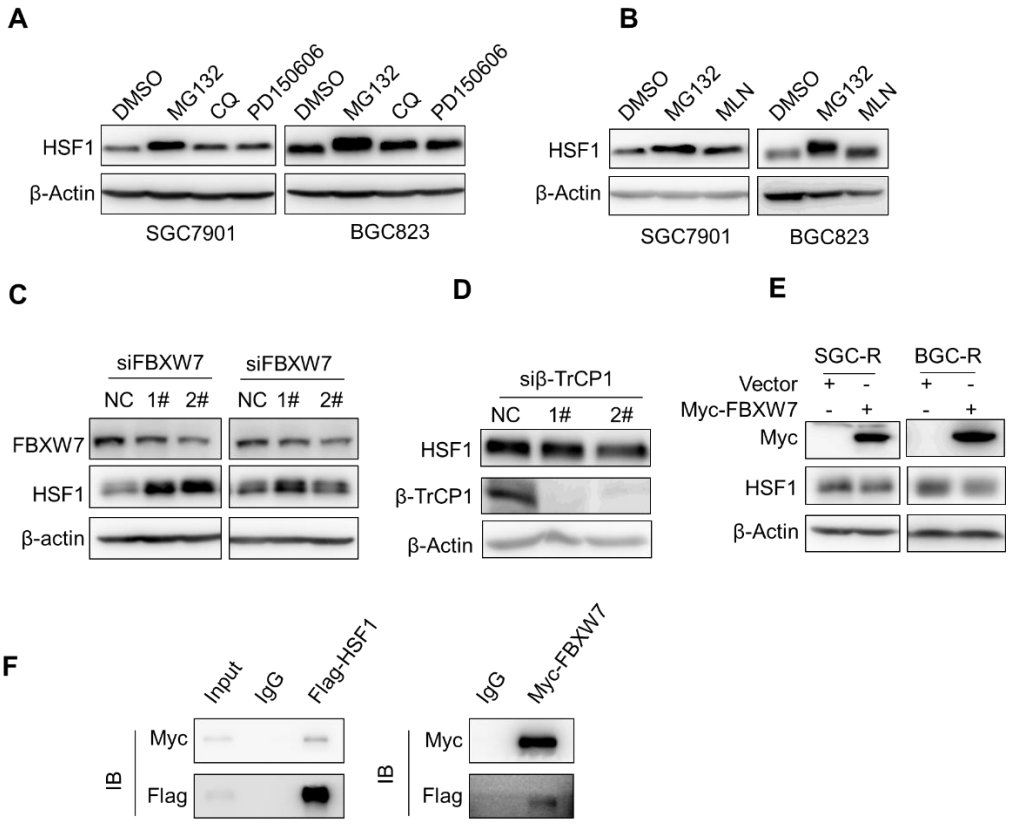
A: RT-PCR analysis of HSF1 downstream targets after transfected with PDK3 plasmid in GC chemosensitive cells

B: RT-PCR analysis of alternation of HSF1 downstream targets induced by PDK3 knocking down in GC chemoresistant cells.



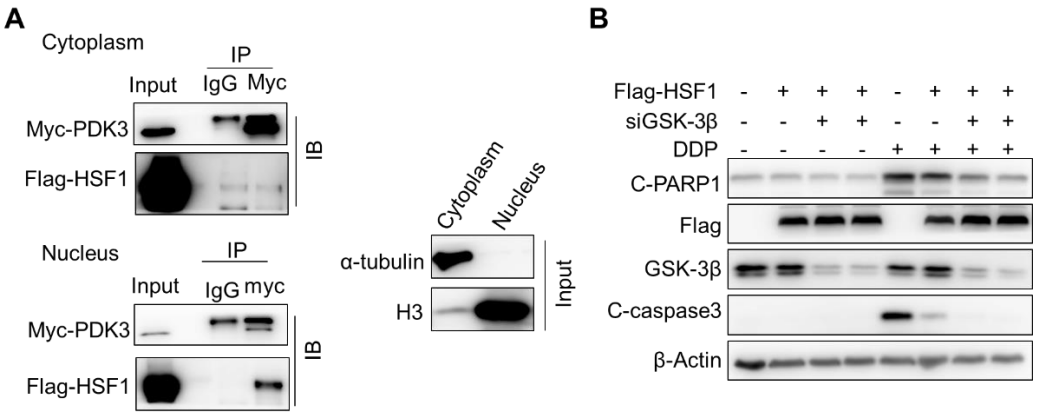
Supplementary Figure 5. PDK3 upregulates HSF1 protein expression.

A: RT-PCR analysis of HSF1 expression in SGC7901 cells before and after PDK3 overexpression.
B: RT-PCR analysis of HSF1 expression in SGC-R cells before and after PDK3 depletion.
C: Immunoblot analysis of HSF1 protein levels in SGC7901 and SGC-R cells treated with cycloheximide (50 μg/mL).
D: Immunoblot analysis of HSF1 protein levels in cycloheximide-treated SGC7901 cells before and after PDK3 overexpression.



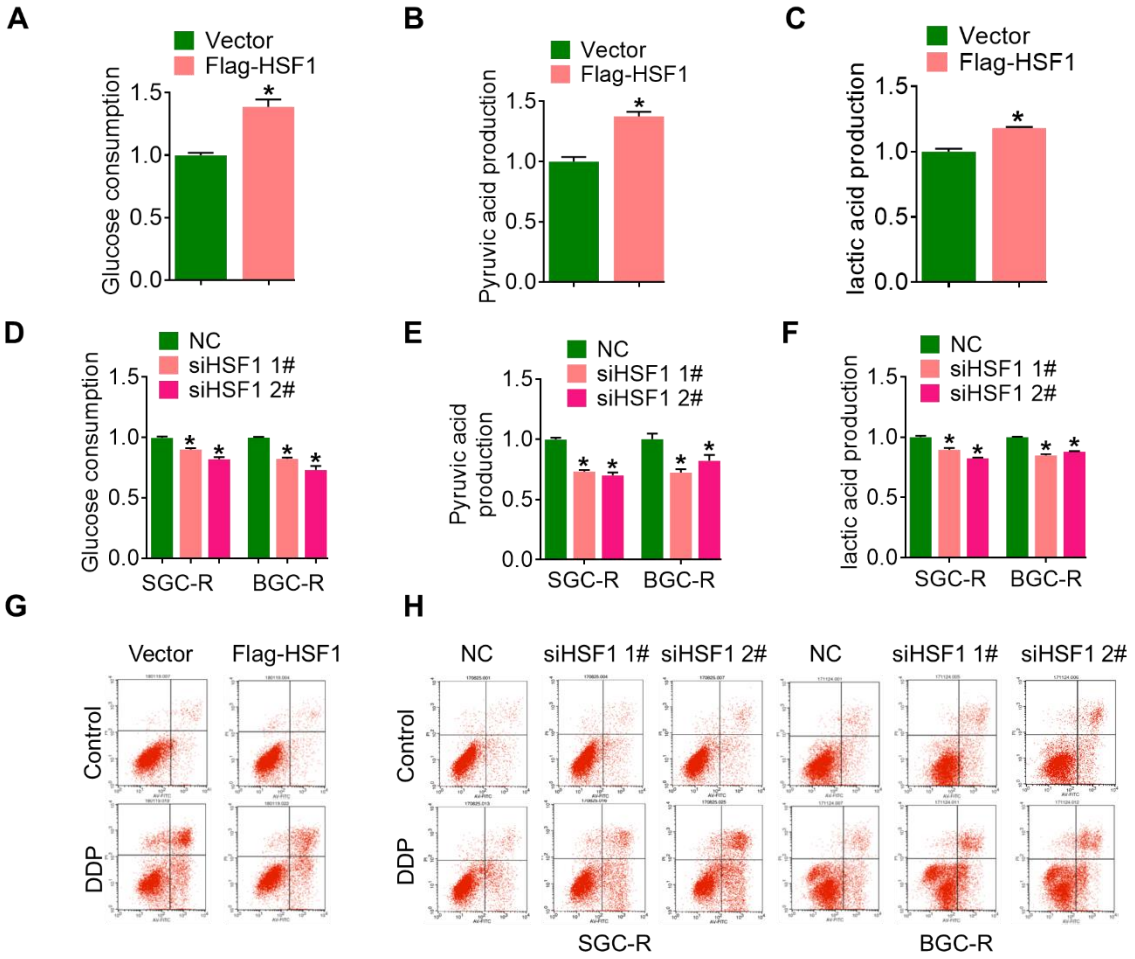
Supplementary Figure 6. FBXW7 inhibits the expression of HSF1.

A: Immunoblot analysis of HSF1 protein levels in gastric cancer cells treated with proteasome inhibitor MG132 (50 μg/mL) for 6 h, lysosomotropic agent chloroquine (CQ, 20 μM) for 24 h or calpain inhibitors PD150606 (400 μM)) for 24h, respectively
B: Immunoblot analysis of HSF1 protein levels in gastric cancer cells treated with either MG132 (50 μg/mL) for 6 h or MLN4924 (100 nM) for 24 h.
C: Immunoblot analysis of HSF1 protein levels in gastric cancer cells before and after FBXW7 depletion.
D: Immunoblot analysis of HSF1 protein levels in SGC7901 cells before and after β-TrCP1 depletion.
E: Immunoblot analysis of the effect of FBXW7 on HSF1 protein levels.
F: The interaction of HSF1 with FBXW7 was explored with Co-immunoprecipitation (Co-IP).



Supplementary Figure 7. PDK3 interacts with HSF1 to disrupt its phoshorylation by GSK3β.

A: Cytoplasmic and nuclear fractionated from HEK293 cells expressing Myc-PDK3 and Flag-HSF1 were immunoprecipitated by anti-Myc antibody.
B: Effect of GSK-3β knock-down on DDP-induced cleavage of PARP1 and caspase3 were determined in HSF1 high expressing SGC7901 cells by immunoblot analysis.



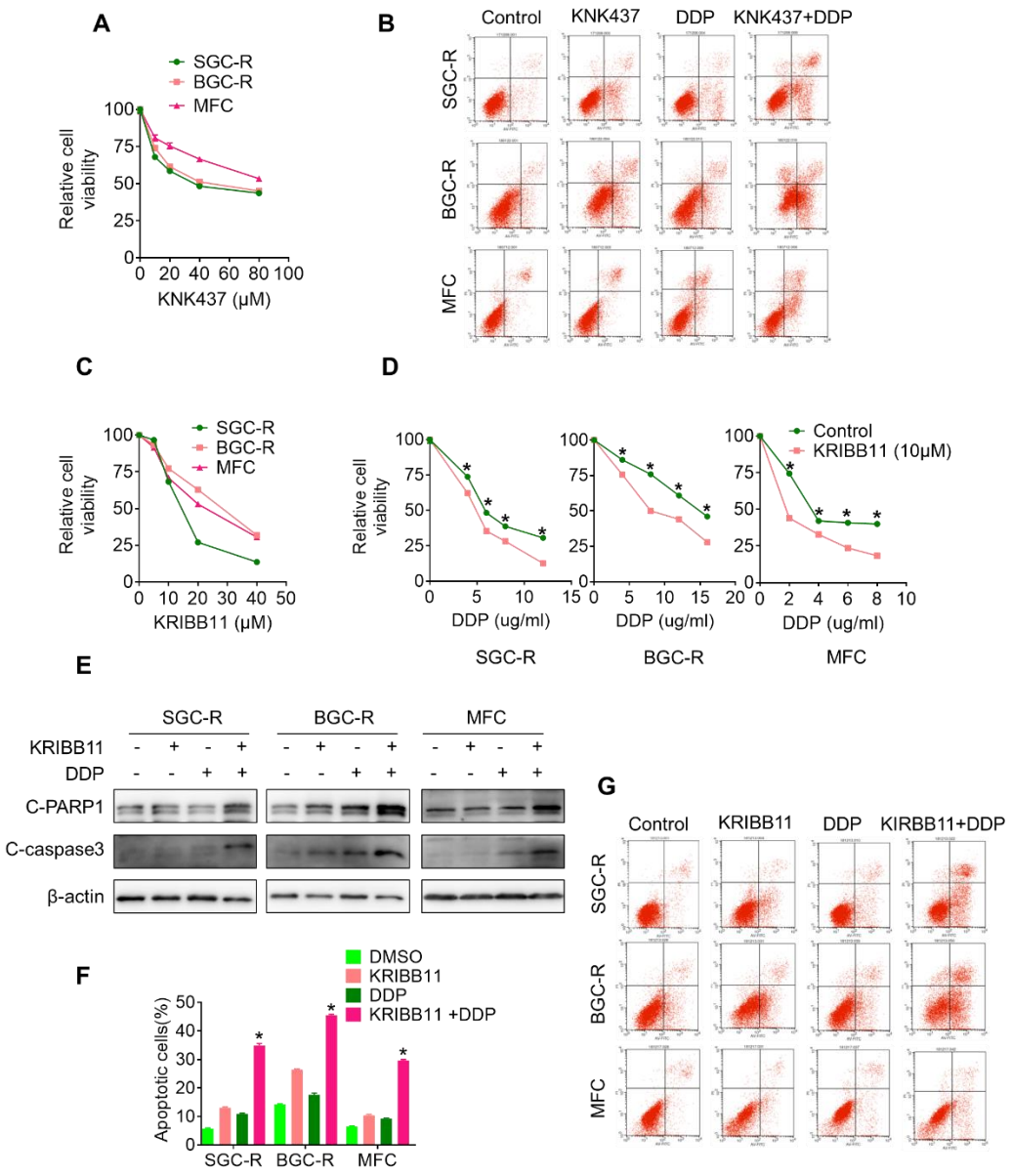
Supplementary Figure 8. HSF1 regulates the glucose metabolism and chemoresistance.

A-C: Alternations in glucose consumption (A) production of pyruvic acid (B), lactic acid (C) were determined in SGC7901 cells with or without stable HSF1 overexpression.

D-F: Alternations in glucose consumption (D) production of pyruvic acid (E), lactic acid (F) were determined in SGC-R and BGC-R cells with or without HSF1 depletion.

G: DDP-induced apoptosis in SGC7901 cells with or without stable HSF1 overexpression were evaluated by Annexin V and PI double staining.

H: DDP-induced apoptosis in SGC-R and BGC-R cells with or without HSF1 depletion were evaluated by Annexin V and PI double staining.



Supplementary Figure 9. Chemical inhibition of HSF1 reverses chemoresistance.

A: Cell Viability was evaluated by MTS assay after exposure to indicated concentrations of KNK437 for 72 h.

B: DDP-induced apoptosis in gastric cancer cells treated with or without KNK437 were evaluated by Annexin V and PI staining.

C: Cell Viability was evaluated by MTS assay after exposure to indicated concentrations of KRIBB11 for 48h in MFC cells.

D, Viability of various cells treated with various doses of DDP and KRIBB11were evaluated by MTS assay.

E-G, Apoptosis of SGC-R, BGC-R and MFC cells after treatment with KRIBB11 and/or DDP were analyzed by immunoblot (E) and flow cytometry analysis (F and G).

Supplementary Table1 siRNAs used in this study

siRNA	Sequence
HSF1-1#	S: CCUGAAGAGUGAAGACAUATT
	AS: UAUGUCUUCACUCUUCAGGTT
HSF1-2#	S: GGACAAGAAUGAGCUCAGUTT
	AS: ACUGAGCUCAUUCUUGUCCTT
PDK3-1#	S: GCCGCUCUCCAUCAAACAATT
	AS: UUGUUUGAUGGAGAGCGGCTT
PDK3-2#	S: GGUUCCUACAAUGGCACAATT
	AS: UUGUGCCAUUGUAGGAACCTT
FBXW7-1#	S: GCACACUGCAAGGAAUGGUTT
	AS: ACCAUUCCUUGCAGUGUGCTT
FBXW7-2#	S: GGAGUAUGGUCAUCACAAATT
	AS: UUUGUGAUGACCAUACUCCTT
Beta-TRCP1-1#	S: GUGGAAUUUGUGGAACAUCTT
	AS: GAUGUUCCACAAAUUCCACTT
Beta-TRCP12#	S: CACAUAAACUCGUAUCUUATT
	AS: UAAGAUACGAGUUUAUGUGTT
HIF-1α 1#	S: GCCGAGGAAGAACUAUGAATT
	AS: UUCAUAGUUCUUCCUCGGCTT
HIF-1α 2#	S: GCUGAUUUGUGAACCCAUUTT
	AS: AAUGGGUUCACAAAUCAGCTT

Supplementary Table 2 Primers used in this study

Primers	Sequence
HSF1	F: ACGGAGTTCCAGCACCCA
	R: CGCCACAGAGCCTCATTCT
PDK1	F: CTCAATCAGCACTCTTTATTGTTTG
	R: CCTGGTGATTTTGCATTTAGTTC
PDK2	F: GTGGTCAAAGATGCCTACGAC
	R: CATGGCATTCTTGAAGAGCTC
PDK3	F: CTGGACTTCGGGAGAGATAATG
	R: GTTATCCAAGACCTGTGGATCC
PDK4	F: CTTTGAACTATTTAAGAATGCAATGC
	R: CAAAACCAGCCAAAGGAGC
FBXW7	F: GGTCAGGACATTTGGTAGGGG
	R: TGAGGGAATGAGTGACGGC
HSP70	F: ACCAAGCAGACGCAGATCTTC
	R: CGCCCTCGTACACCTGGAT
HSP27	F: GGCATTTCTGGATGTGAGCC
	R: AGCAGGCAGGACATAGGTGC
HSP90	F: TGCGGTCACTTAGCCAAGATG
	R: GAAAGGCGAACGTCTCAACCT
HSPA6	F: ACAGGAGCACAGGTAAGGCT
	R: TTCATGAACCATCCTCTCCA
DNAJB4	F: GGAGGAAGGGTTGAAAGGA
	R: ATGAAAGGTGTACCGGAAGG
β-actin	F: CACCAACTGGGACGACAT
	R: ACAGCCTGGATAGCAACG
HSFK80Q	F: CTCGATGTGGACCACTTGCCGGAAGCCATACAT
MT	R: ATGTATGGCTTCCGGCAAGTGGTCCACATCGAG

PDK3 (CHIP)	F: GCCGAGGTCTTTTACTGTGTATG
	R: CAGCTTACTTTAGCCATTTCCAC
PDK3(Luciferase)+28--1200	F: GCAGGTACCGCTACCCACCAATAATCTCATTCAG
	R: GCAAAGCTTGAGTCGGTTGCTGCACGTAC
GST-HSF11-529	F:GGAGAATTCGATCTGCCCGTGGGCCCCGG
	R: GCGCTCGAGGGAGACAGTGGGGTCCTTGG
GST-HSF11-385	F:GGAGAATTCGATCTGCCCGTGGGCCCCGG
	R: GCGCTCGAGACTGAGCTCATTCTTGTCCA
GST-HSF11-123	F:GGAGAATTCGATCTGCCCGTGGGCCCCGG
	R: GCGCTCGAGCTTTATGTCTTCACTCTTCA
GST-HSF1123-387	F: GGAGAATTCTCCACCCTGAAGAGTGAAGAC
	R: GCACTCGAGGTGGTCACTGAGCTCATTCTTG
GST-HSF1123-315	F: GGAGAATTCTCCACCCTGAAGAGTGAAGAC
	R: GCACTCGAGGGGACTCGCCTCCTCTACC
GST-HSF1129-226	F: GGAGAATTCTCCACCCTGAAGAGTGAAGAC
	R: GCACTCGAGGCTATACTTGGGCATGGAATG
GST-HSF1220-315	F: GGAGAATTCCATTCCATGCCCAAGTATAGC
	R: GCACTCGAGGGGACTCGCCTCCTCTACC

Supplementary Table3 Antibodies used in this study

Antibody	Identifier, Source	Dilution for WB
anti-GSK3	9832S, CST	1:1000
anti-ERK1/2	4695S, CST	1:1000
anti-Cleaved-PARP	9541S, CST	1:1000
anti-Cleaved-Caspase3	9661S, CST	1:1000
anti-β-actin	4970L, CST	1:1000
anti-beta-TRCP1	4394S, CST	1:1000
anti-Myc	2776s, CST	1:1000
anti-HSF1	ab2757, Abcam	1:1000
anti-HSF1 (p-S303/S307)	ab81281, Abcam	1:5000
anti-Histone3	Ab1791, Abcam	1:2000
anti-PDK3	sc-365378, SCBT	1:500
anti-UB	sc-8017, SCBT	1:200
HIF-1α	sc-53546, SCBT	1:500
anti-flag (M2)	F1804-1, Sigma-Aldrich	1:2000
anti-α-tubulin	F5168, Sigma-Aldrich	1:5000

Supplementary Table 4 The VIP and FC values metabolites involved in glycolysis.

	SGCR-SGC7901		MYCPDK3-SGC7901		Flag-HSF1-SGC7901	
Name	FC	VIP	FC	VIP	FC	VIP
1,5-Anhydrosorbitol	1.1	0.4	1	0.7	0.7	1.2
2-Hydroxy-3-methylbutyric acid	0.6	1.7	0.8	1.5	0.8	1.8
3-Methyl-2-oxovaleric acid	1.8	1.7	2.5	1.7	1.4	1.8
4-Hydroxybenzoic acid	0.8	1.3	0.9	0.7	0.9	1.1
Allose	1.1	0.4	2	1.3	1.4	0.7
Alpha-Lactose	1.1	0.5	0.9	0.1	1.1	0.2
Benzoic acid	1.3	1.6	1.2	0.8	0.9	0.6
Citric acid	1	0.1	1	0.6	0.8	0.5
D-Fructose	1	0.8	1	0.1	1.2	0.1
D-Galactose	1.1	0.2	0.4	1.7	1.1	1.2
D-Glucose	0.8	0.5	0.2	1.5	0.6	1.3
D-Mannose	1.5	0.7	1.8	1.4	1.1	0.3
D-Ribose	2.5	1.2	2.6	1.2	1.6	1.6
D-Tagatose	1	0	1.1	0.3	0.9	1.1
D-Threitol	0.8	1	1	0.5	0.7	1.1
Fructose 6-phosphate	0.6	1.2	0.6	1.3	0.8	0.7
Fumaric acid	0.5	1.5	0.8	0.6	0.6	1.1
Galactonic acid	4.9	1.7	4.7	1.7	1.6	0.8
Gluconic acid	0.7	0.2	1	0.1	0.9	0.4
Gluconolactone	0.1	1.2	0.1	1.2	0.1	1.2
Glyceric acid	1.2	0.3	1.3	0.1	1.1	0.7
Glycolic acid	1	0.2	1	0.1	0.9	0.8
L-3-Cyanoalanine	1	0.1	1.1	0	1.1	0.2
L-Arabinose	0.6	1	0.4	1.7	0.8	1.9
L-Arabitol	0.9	0.3	0.6	1.6	0.8	1.5
L-Lactic acid	1.6	1.1	1.8	0.9	1.3	0.7
L-Pipecolic acid	1.1	0.5	1.6	0.1	1.5	0.5
L-Sorbose	0.4	1.7	0.5	1.7	0.6	1.8
Maleic acid	0.4	0.9	1.3	1	1.5	1
Malic acid	0.6	1.5	1.1	0.8	0.6	1.3
Mannitol	0.6	1.6	0.5	1.6	0.7	1.5
Oxalic acid	0.4	1	0.5	1.3	0.7	0.9
Oxoglutaric acid	1.9	1.1	0.8	0.4	1.6	1
p-Aminobenzoic acid	1.1	0.5	0.9	0.4	1.1	0.5
Petroselinic acid	0.8	0.5	0.9	0.1	1.1	0.3
Pyruvic acid	9.1	1.7	4.9	1.5	3.5	1.9
Ribonolactone	2.4	1.2	2.4	1.2	1.6	1.8
Sorbitol	0.2	1.6	0.5	1.6	0.7	1.5
Succinic acid	0.4	0.4	1.1	0.8	0.7	1

Sucrose	0.9	1.4	0.6	1.7	0.8	1.7
Threonic acid	1.1	0.4	1.2	1.2	1.1	0.5
Uric acid	1.1	1.1	1.1	0.6	1	0.6