

ARTICLE

Supplemental Table 1 Primers used for qRT-PCR¹

Genes	Primer sequence (5' - 3')	Product size, bp	GenBank No.
TESK1	F:TACCTGCGGACCCTGACTAC	128	XM_003121984.4
	R:CATACTGCAGCAATGGATGG		
CDA	F:CTGCAGGCAAGTCATGAGAG	87	NM_001244385.1
	R:TGGATGGTCTGACAACGTA		
RP2	F:AGGTCTGTCTTGGCTTTGG	120	XM_003360282.4
	R:GGTGCTGTCTCCTTGCTTTC		
TAF2	F:GGAGATTACGGTGTGGTGCT	147	XM_021090551.1
	R:TGGCCTCTGGAATTATGGTC		
RIOK2	F:AATTGTTCCCTGCAGTTTGG	109	XM_021085153.1
	R:AGTTCGCTCCCAAGCTATGA		

TESK1, Dual specificity testis-specific protein kinase 1 isoform 1; CDA, Cytidine deaminase; RP2, Protein XRP2; TAF2, Transcription initiation factor TFIID 150 kDa subunit; RIOK2, Non-specific serine/threonine protein kinase.

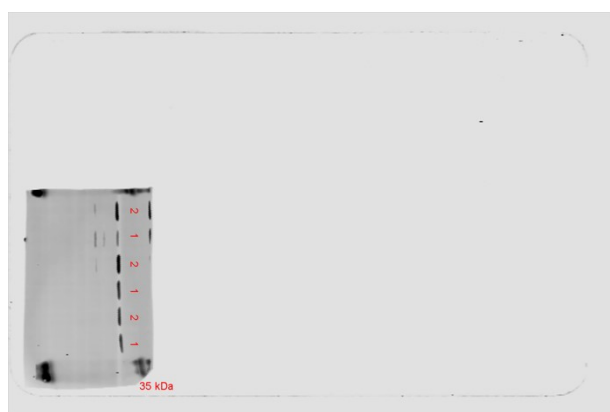
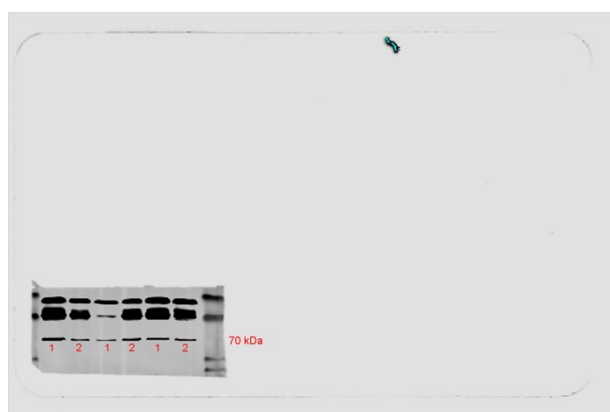
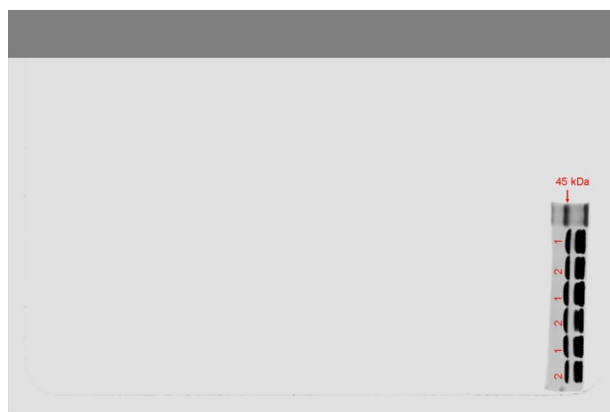
Supplemental Table 2 Primary antibodies for Western Blot

Primary antibodies	Company	Catalog number
Anti-GST antibody [EPR4236]	abcam	Ab111947
Beta Tubulin Rabbit Polyclonal antibody	proteintech	10094-1-AP
HSPA1L Rabbit Polyclonal antibody	proteintech	13970-1-AP
HLA Class I ABC Monoclonal Antibody	proteintech	66013-1-Ig
GLUT5 Polyclonal antibody	proteintech	27571-1-AP
HLA DR/DP antibody (HL-38) (MHC class II antigen DRA)	novus biologicals	NB500-406
Phospho-AMPK α (Thr172) (40H9) Rabbit mAb	Cell Signaling Technology	#2535
AMPK α 1 antibody	Cell Signaling Technology	#2795
GAPDH (14C10) Rabbit mAb	Cell Signaling Technology	#2118
β -Actin (13E5) Rabbit mAb	Cell Signaling Technology	#4970

Supplemental Table 3 Differential expressed proteins¹

Protein name	Gene name	Protein ID in uniprot	PQQ	CTRL	Log ₂ FC	Score	FDR
Up-regulated proteins (10)							
Dual specificity testis-specific protein kinase 1 isoform 1	TESK1	F15G05	1836334028.0	3688778.6	8.959	0.463	0.287
RING-type E3 ubiquitin transferase	MUL1	I3LH19	51522325029.0	642779034.7	6.325	1.000	0.000
Phosphatase tensin-type domain-containing protein	TNS1	K7GRG9	245488718.10	4564599.8	5.749	0.883	0.041
MHC class I antigen	SLA-2	A0A2S1PUH7	13121864987.0	292615970.8	5.487	0.672	0.136
Septin-5	SEPTIN5	A0A286ZRX1	4507778494.0	105256600.8	5.42	0.436	0.311
ADP ribosylation factor GTPase activating protein 1	ARFGAP1	A0A286ZJ05	261961332.4	6281263.1	5.382	0.794	0.073
Lipocalin 2	LCN2	F1RRX1	2238210083.0	120372094.7	4.217	0.978	0.007
Cytidine deaminase	CDA	I3LAH9	1729440564.0	145670444.5	3.57	0.713	0.118
Geranylgeranyl transferase type-2 subunit beta	MSH4	A0A287BJ15	453169555.4	39308629.0	3.527	0.965	0.013
GRIP and coiled-coil domain containing 1	GCC1	A0A287APX2	1641035917.0	146649838.6	3.484	0.998	0.001
Down-regulated proteins (10)							
Lysozyme C-3	N/A	P12069	58565652.3	1437499358.1	-4.617	0.587	0.195
Protein XRP2	RP2	I3L855	93768860.5	1223254842.8	-3.705	0.781	0.083
T-complex protein 1 subunit epsilon	CCT5	L7PBE6	112720354.8	1207915200.1	-3.422	0.968	0.010
Transcription initiation factor TFIID 150 kDa subunit	TAF2	K7GP24	48062265.2	497391020.0	-3.371	0.893	0.036
AHNAK nucleoprotein	AHNAK	A0A286ZPY1	234774768.8	2279716880.2	-3.28	0.967	0.011
DNA repair protein complementing XP-C cells isoform 5	XPC	F1SPI2	168155648.7	1553562655.6	-3.208	0.562	0.211
DNA topoisomerase II binding protein 1	TOPBP1	A0A287BSI9	557144557.1	5009732207.6	-3.169	0.992	0.002
Charged multivesicular body protein 2B	CHMP2B	F2Z5Q1	511645608.7	4445774113.1	-3.119	0.455	0.293
Non-specific serine/threonine protein kinase	RIOK2	A0A287B798	198680280.1	1580008420.4	-2.991	0.893	0.035
Nestin	NES	I3LNY6	359488520.8	2639655022.8	-2.876	0.388	0.345

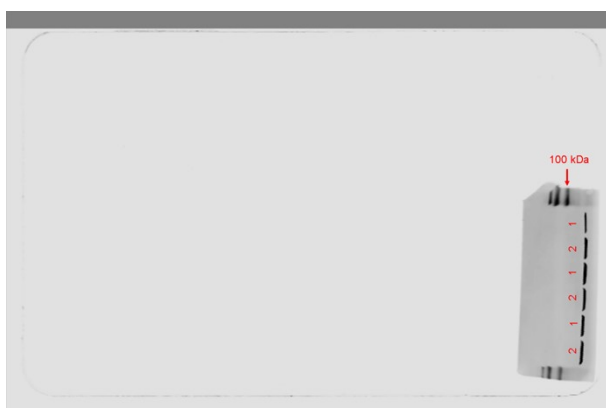
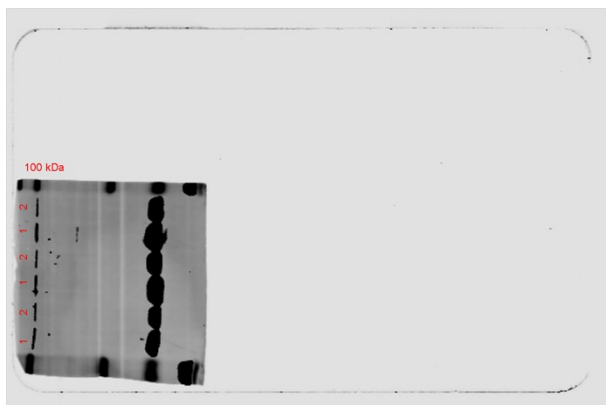
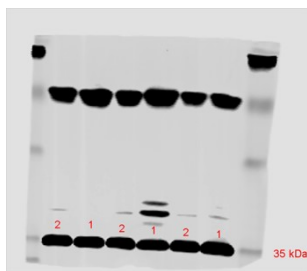
¹ PQQ and CTRL, the average relative abundance of proteins in two groups of samples after normalization. Log₂FC, log₂(PQQ/ CTRL) value of the multiple of the difference between the two groups. Scores, the posterior probability of the Bayesian model and the larger value means more significant difference of the protein. FDR, the false discovery rate and the smaller value means more significant difference of the protein.



Supplementary Figure 1. Gel membrane and protein band of β -actin (45kDa) as the loading control for Tublin and GST. 1 means CTRL group; 2 means PQQ group.

Supplementary Figure 2. Gel membrane and protein band of Tublin (55kDa). 1 means CTRL group; 2 means PQQ group.

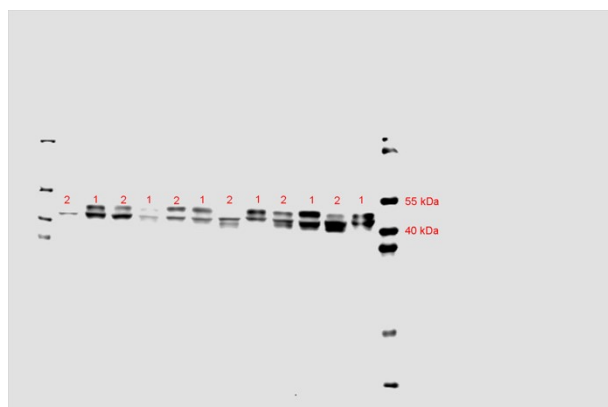
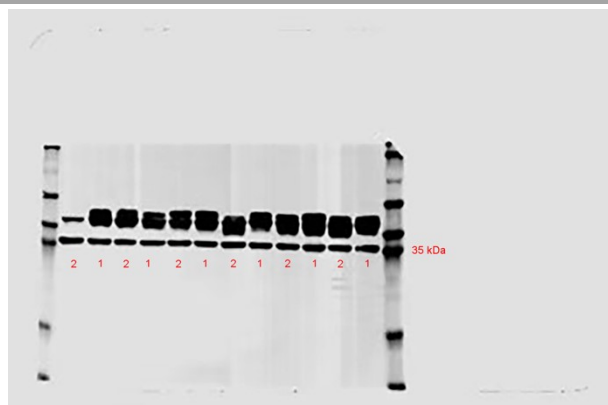
Supplementary Figure 3. Gel membrane and protein band of GST (26kDa). 1 means CTRL group; 2 means PQQ group.



Supplementary Figure 4. Gel membrane and protein band of GAPDH (35kDa) as the loading control for MHC II and HSP. 1 means CTRL group; 2 means PQQ group.

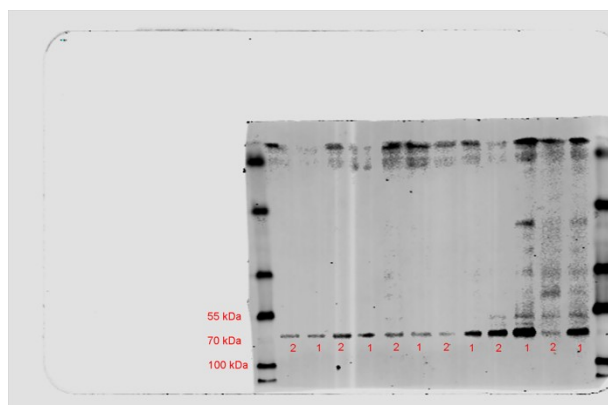
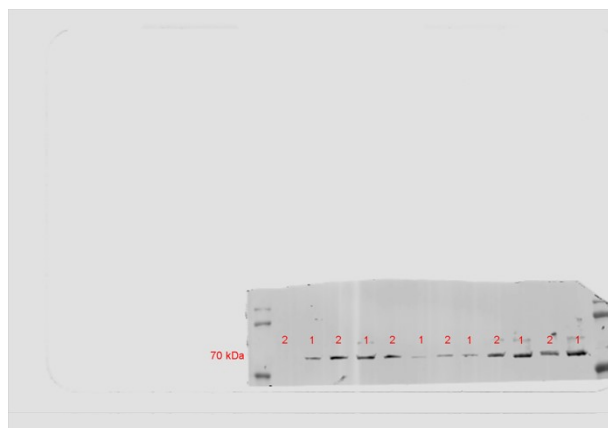
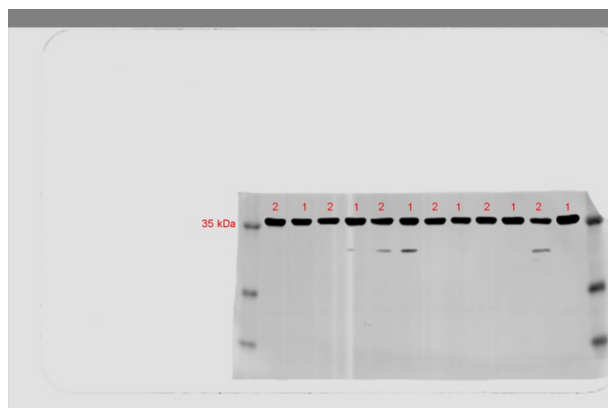
Supplementary Figure 5. Gel membrane and protein band of MHC II (100kDa). 1 means CTRL group; 2 means PQQ group.

Supplementary Figure 6. Gel membrane and protein band of HSP (70kDa). 1 means CTRL group; 2 means PQQ group.



Supplementary Figure 7. Gel membrane and protein band of GAPDH (35kDa) as the loading control for MHC I. 1 means CTRL group; 2 means PQQ group.

Supplementary Figure 8. Gel membrane and protein band of MHC I (41kDa). 1 means CTRL group; 2 means PQQ group.



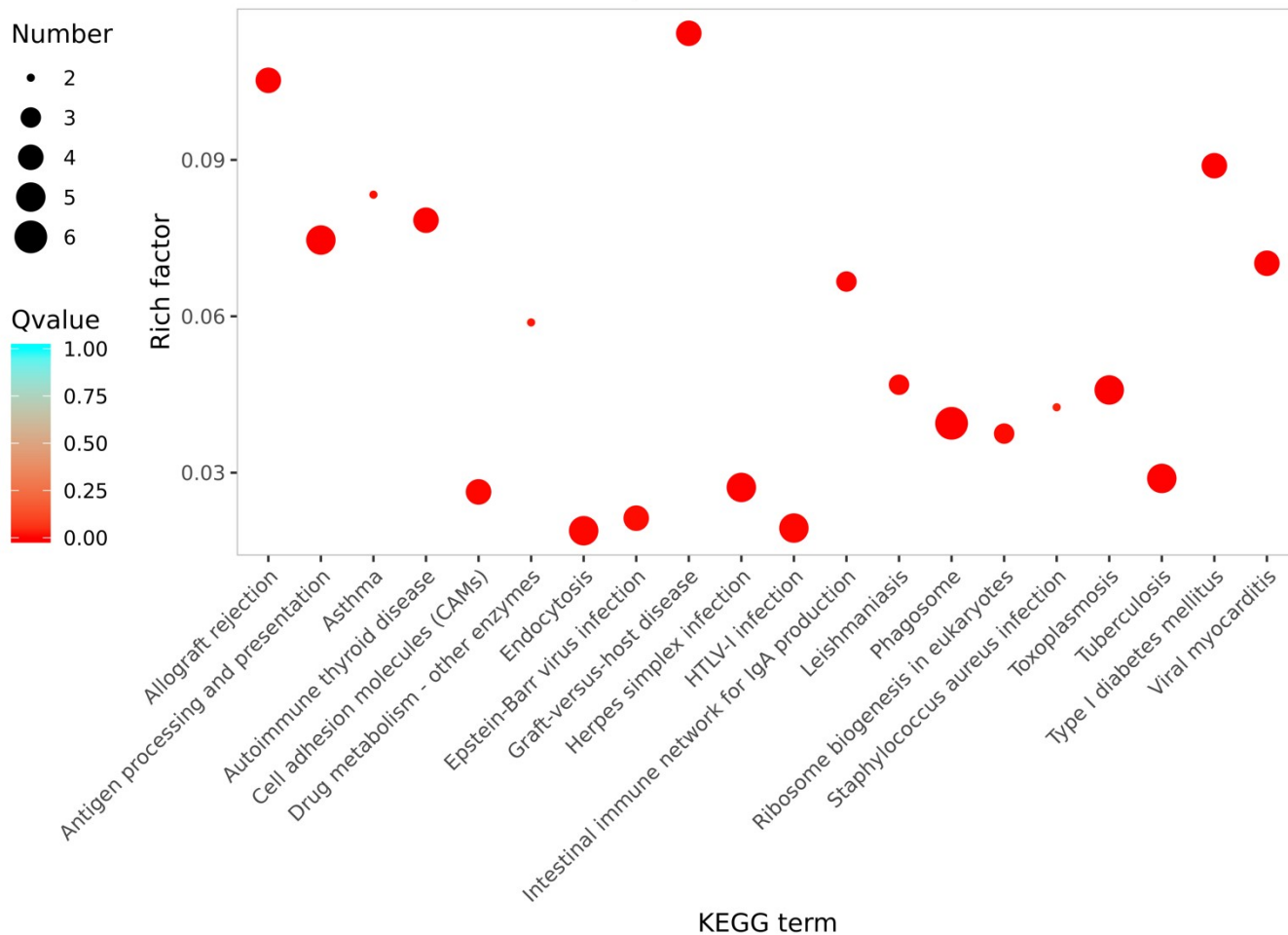
Supplementary Figure 9. Gel membrane and protein band of GAPDH (36kDa) as the loading control of GLUT5, p-AMPK and AMPK. 1 means CTRL group; 2 means PQQ group.

Supplementary Figure 10. Gel membrane and protein band of GLUT5 (70kDa). 1 means CTRL group; 2 means PQQ group.

Supplementary Figure 11. Gel membrane and protein band of p-AMPK (62kDa). 1 means CTRL group; 2 means PQQ group.

Supplementary Figure 12. Gel membrane and protein band of AMPK (62kDa). 1 means CTRL group; 2 means PQQ group

Statistics of KEGG Pathway Enrichment



Supplementary Figure 13. The statistics of KEGG pathway enrichment