

Supplementary Materials: Novel Ferrocene Derivatives Induce Apoptosis through Mitochondria-Dependent and Cell Cycle Arrest via PI3K/Akt/mTOR Signaling Pathway in T Cell Acute Lymphoblastic Leukemia

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Table S1. The IC₅₀ of compound F1, F3, and Daunorubicin in three T-ALL cell lines (Jurkat, CEM-T4, Molt-4) and normal cell lines (Normal human T and HEK293).

Compounds/ IC ₅₀ (μM)	Jurkat	CEM-T4	Molt-4	Normal Human T	HEK293
F1	18.17 ± 1.23	30.77 ± 2.80	28.22 ± 1.17	190.03 ± 5.78	127.25 ± 2.60
F3	27.73 ± 0.97	44.43 ± 1.50	43.56 ± 1.21	242.59 ± 3.34	135.60 ± 1.70
Daunorubicin	0.08 ± 0.01	0.06 ± 0.01	0.05 ± 0.01	0.12 ± 0.01	0.02 ± 0.01

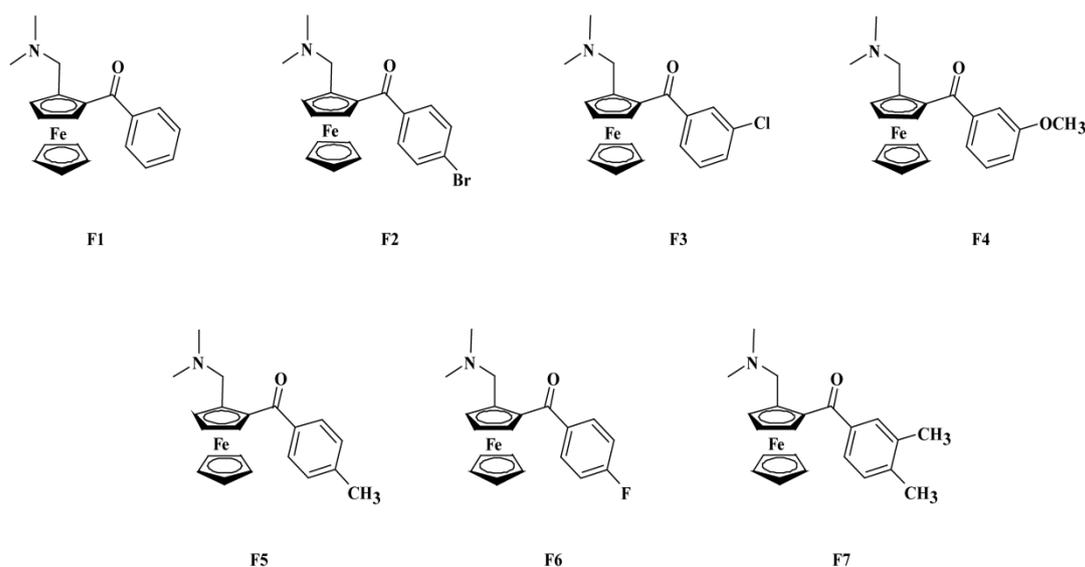


Figure S1. Chemical structures of the seven novel ferrocene derivatives (compounds F1–F7).

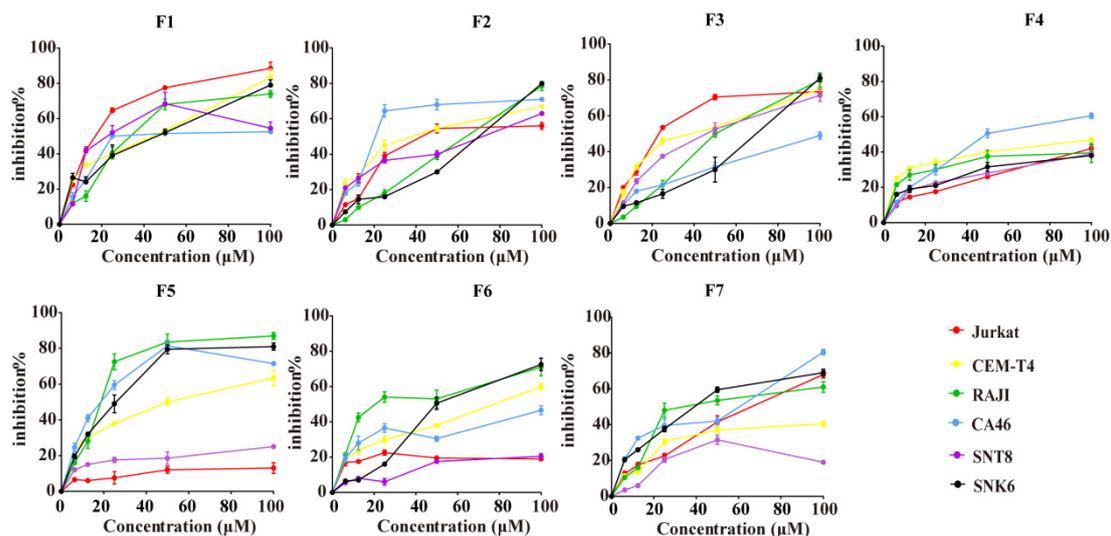
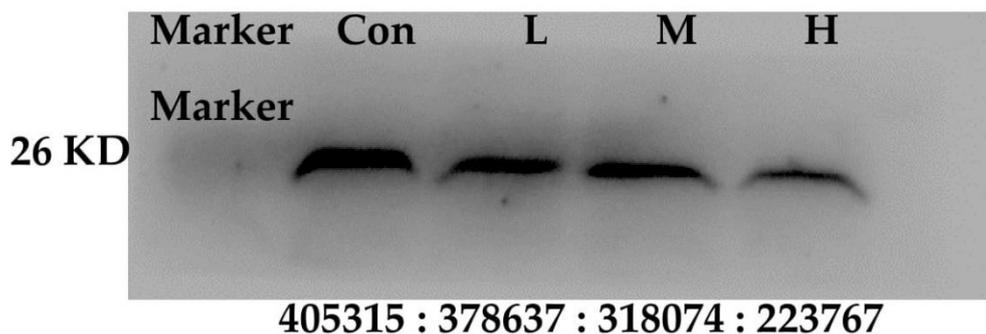


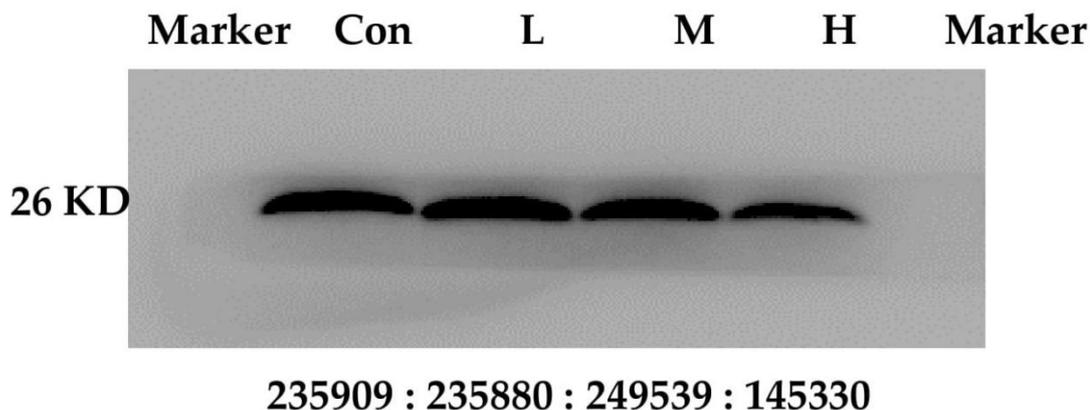
Figure S2. The inhibition rate (%) of ferrocene derivatives F1–F7 in Jurkat, CEM-T4, RAJI, CA46, SNT8, and SNK6 cells. F1–F7 at different concentrations (6.25, 12.5, 25, 50 and 100 μM) for 48 h. The data were expressed as the mean ± SEM of three independent experiments.

F1-Bcl-2

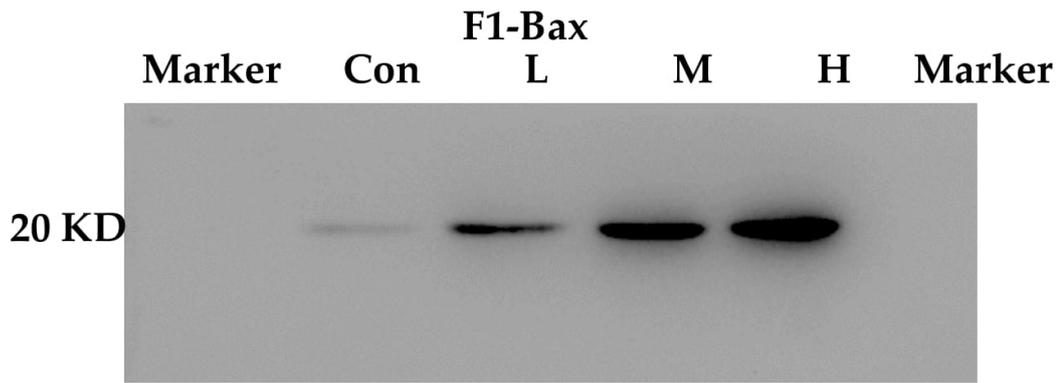


(correspondence to Figure 4A in the manuscript)

F3-Bcl-2

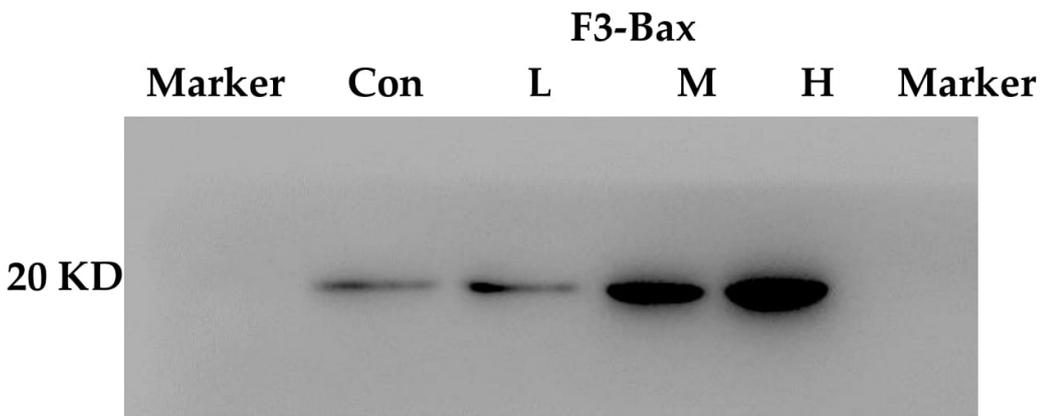


(correspondence to Figure 4A in the manuscript)



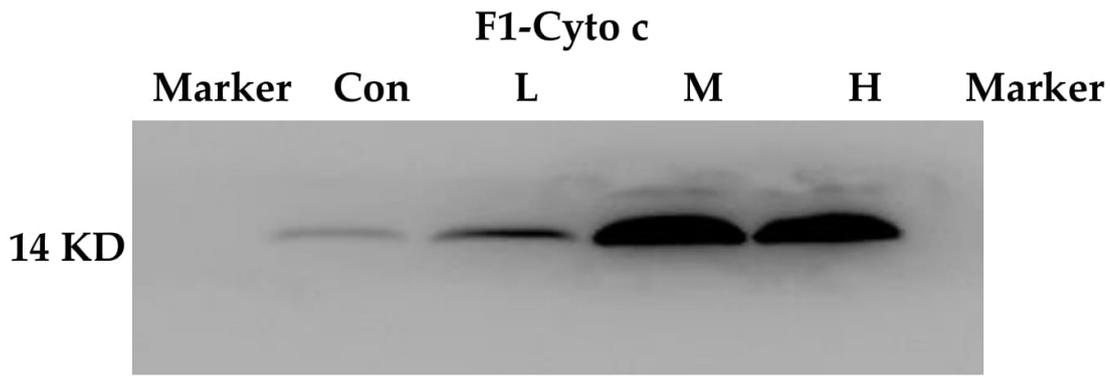
27991 : 168598 : 310678 : 416468

(correspondence to Figure 4A in the manuscript)

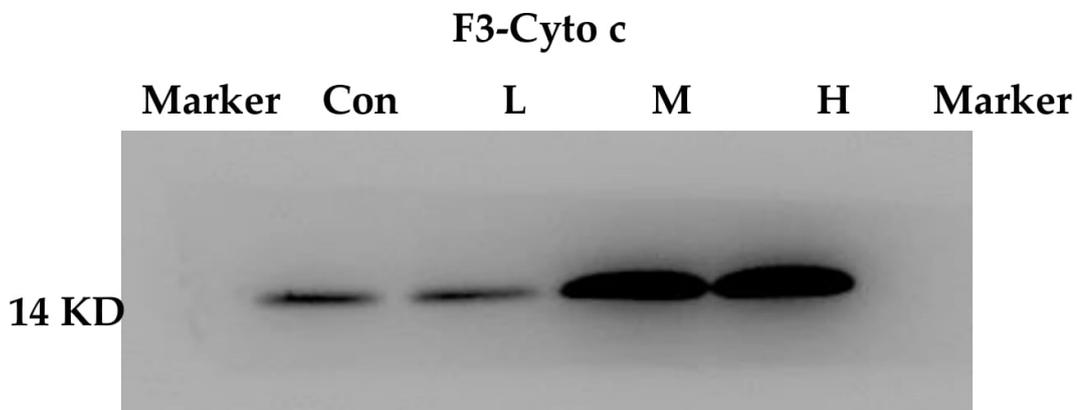


134375 : 169679 : 343267 : 470405

(correspondence to Figure 4A in the manuscript)



45832 : 130562 : 342213 : 309247
(correspondence to Figure 4A in the manuscript)



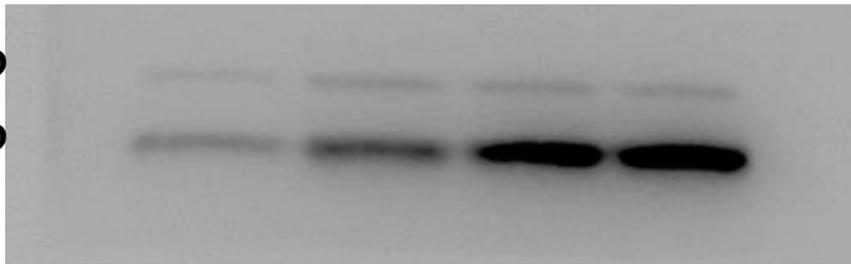
89660 : 92724 : 269171 : 309731
(correspondence to Figure 4A in the manuscript)

F1-Cleaved Caspase-9

Marker Con L M H Marker

37 KD

35 KD



9252: 21170: 28051: 25617

48694: 125568: 185202: 20586

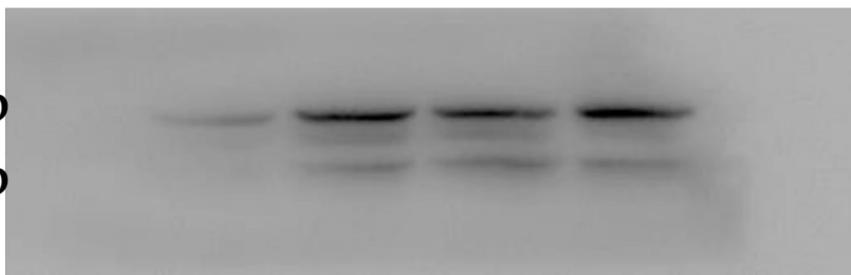
(correspondence to Figure 4A in the manuscript)

F3-Cleaved Caspase-9

Marker Con L M H Marker

37 KD

35 KD

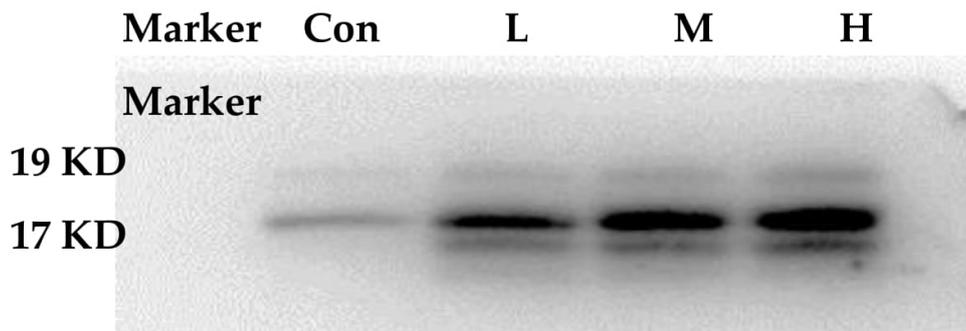


32852: 120505: 137657: 129479

8712 : 40651: 61516: 58122

(correspondence to Figure 4A in the manuscript)

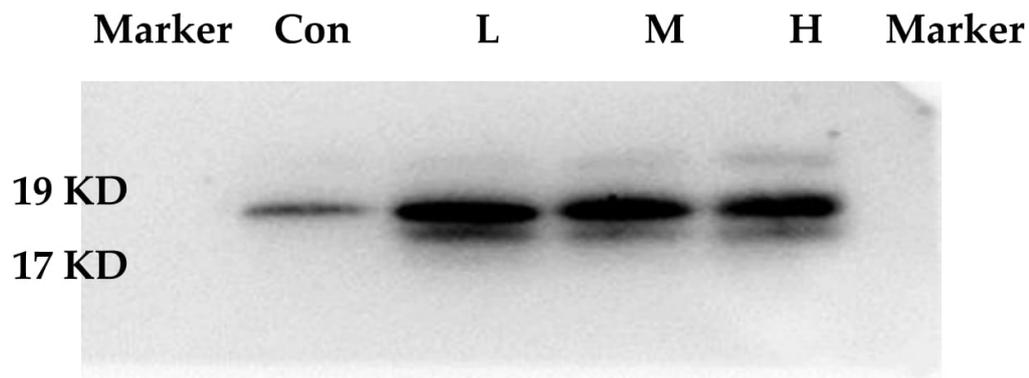
F1-Cleaved Caspase-3



36374: 140296: 163125: 161751
 5336: 56754: 72791: 98672

(correspondence to Figure 4A in the manuscript)

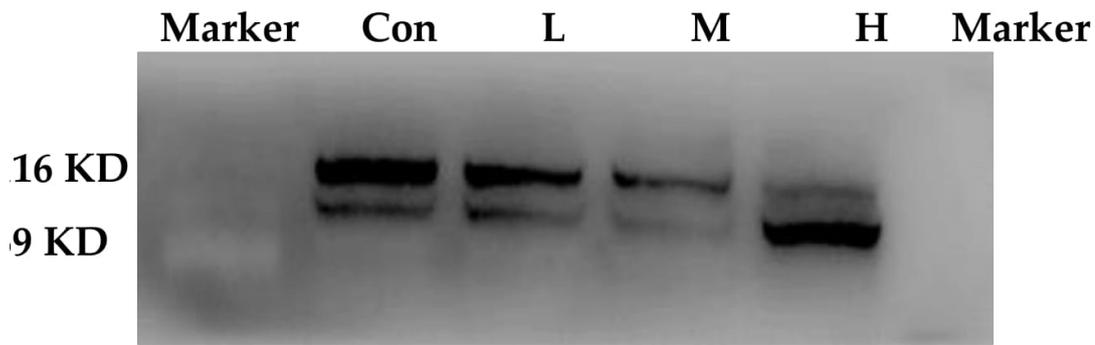
F3-Cleaved Caspase-3



55347: 150005: 153878: 124664
 12456: 65943: 52121: 56948

(correspondence to Figure 4A in the manuscript)

F1-PARP

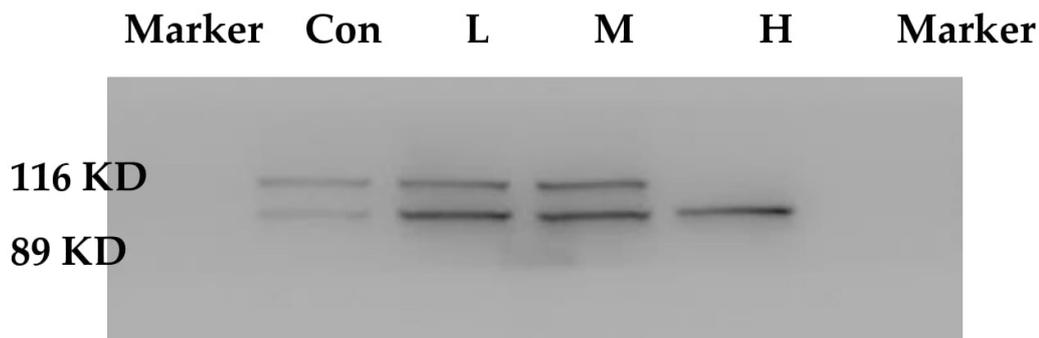


205394: 192457: 163305: 127396

160426: 166331: 127465: 237972

(correspondence to Figure 4A in the manuscript)

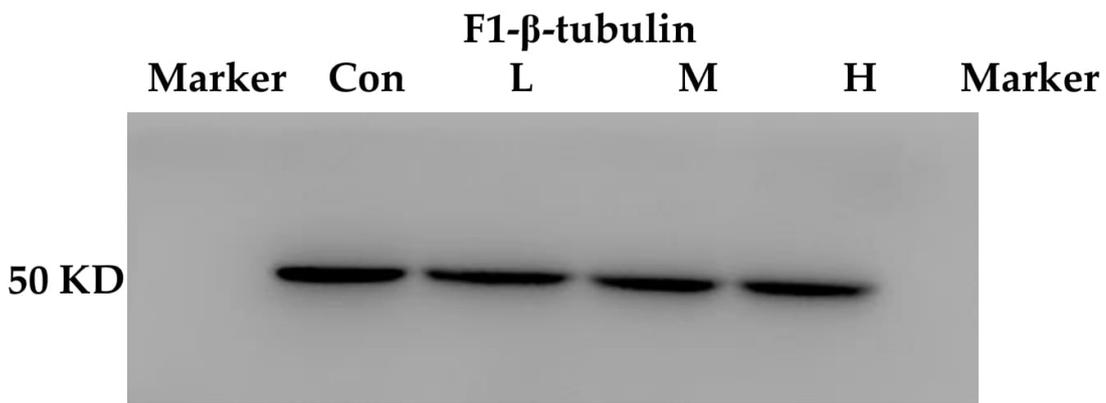
F3-PARP



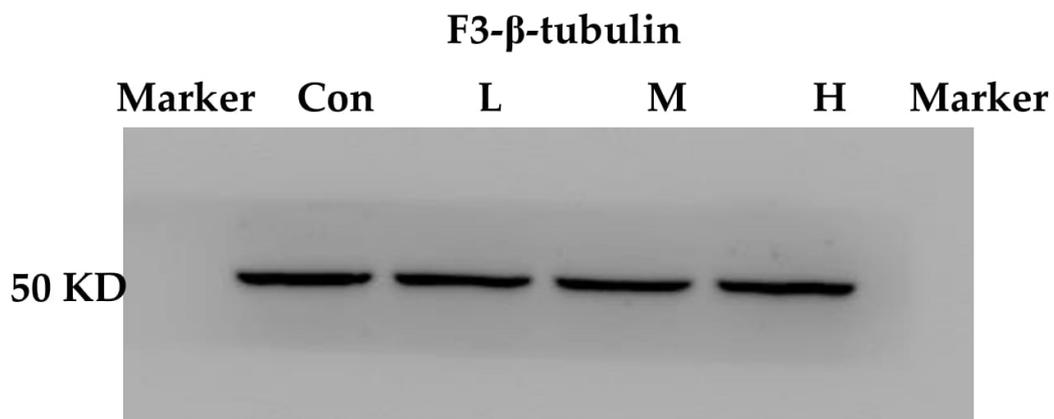
120789:126129:116658: 53144

68970: 65600: 94679: 90541

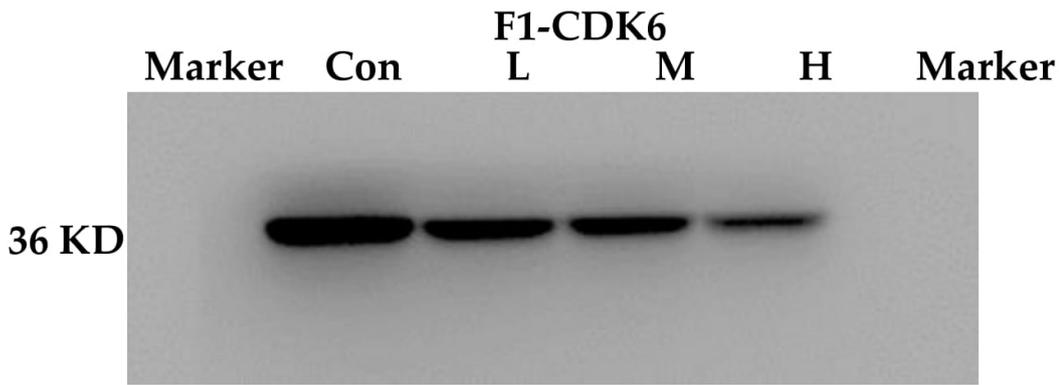
(correspondence to Figure 4A in the manuscript)



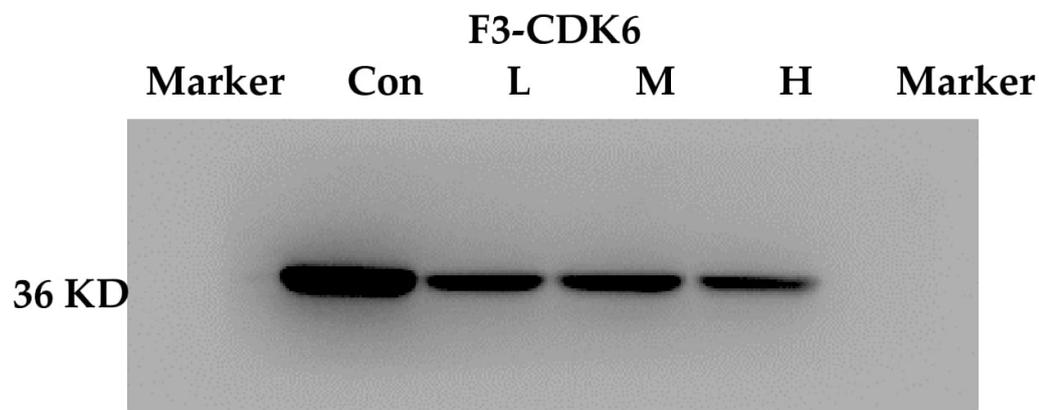
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(correspondence to Figure 4A in the manuscript)



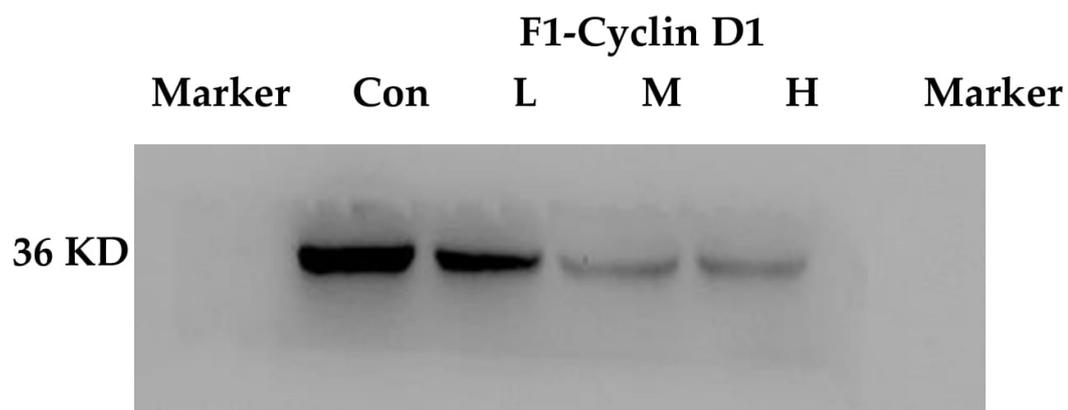
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(correspondence to Figure 4A in the manuscript)



257572 : 198515 : 140945 : 85799
(correspondence to Figure 5A in the manuscript)

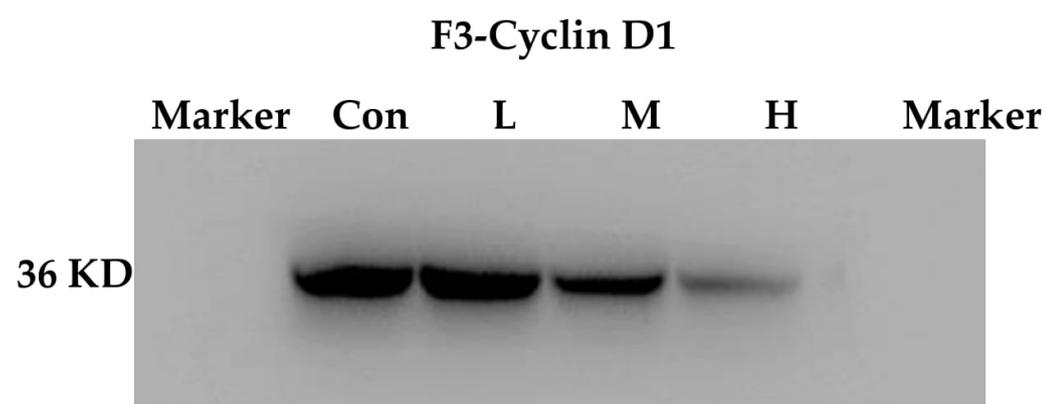


332098 : 163091 : 194267 : 149327
(correspondence to Figure 5A in the manuscript)



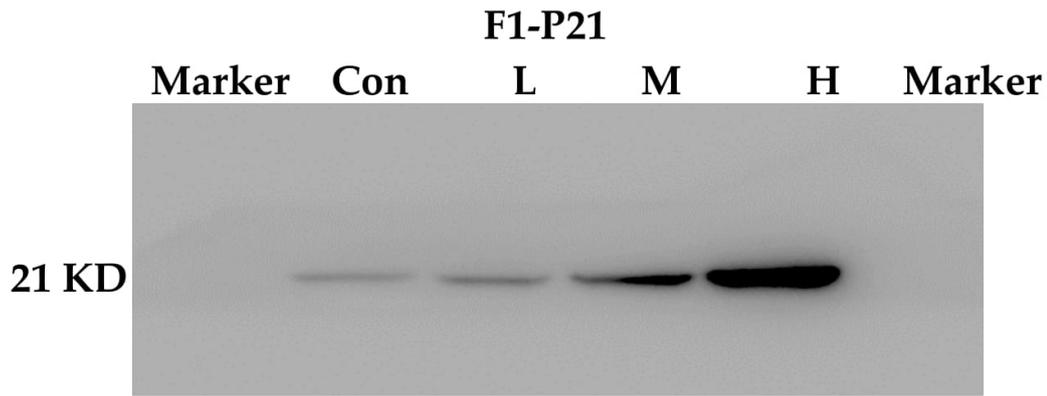
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(correspondence to Figure 5A in the manuscript)

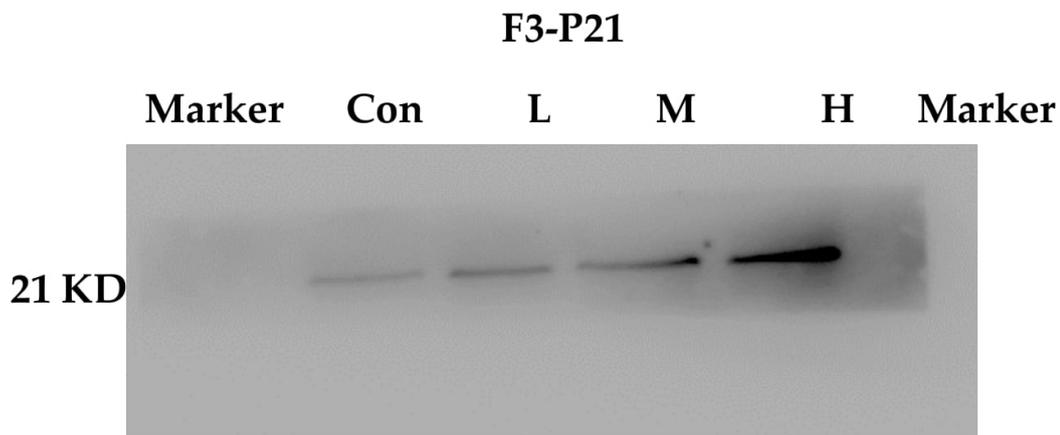


381371:368293:268948:159010

(correspondence to Figure 5A in the manuscript)



71009 : 86217 : 219540 : 525780
(correspondence to Figure 5A in the manuscript)

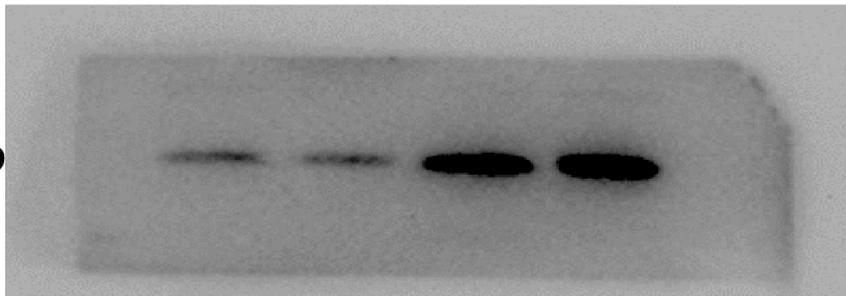


93175 : 101590 : 166586 : 370573
(correspondence to Figure 5A in the manuscript)

F1-P27

Marker Con L M H Marker

27 KD



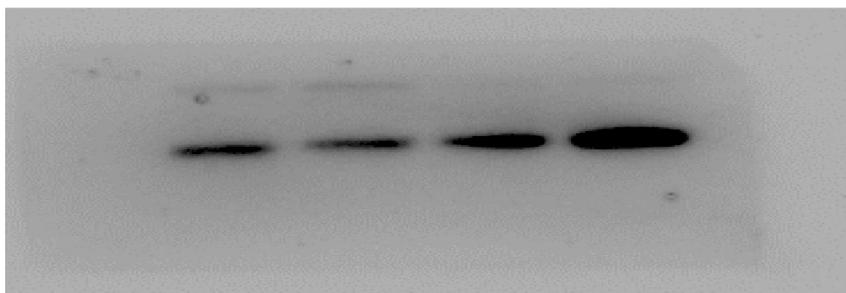
41815 : 46107 : 142581 : 191935

(correspondence to Figure 5A in the manuscript)

F3-P27

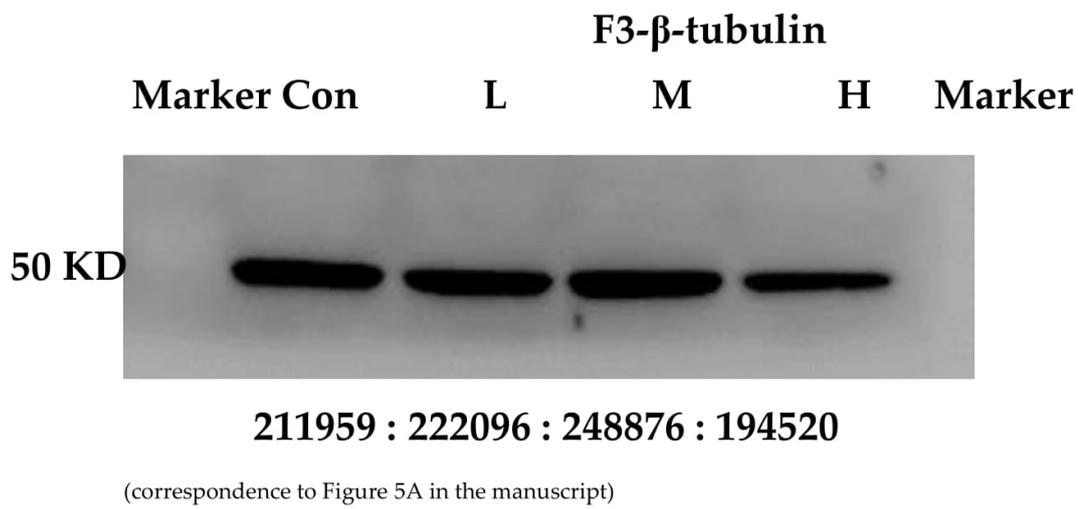
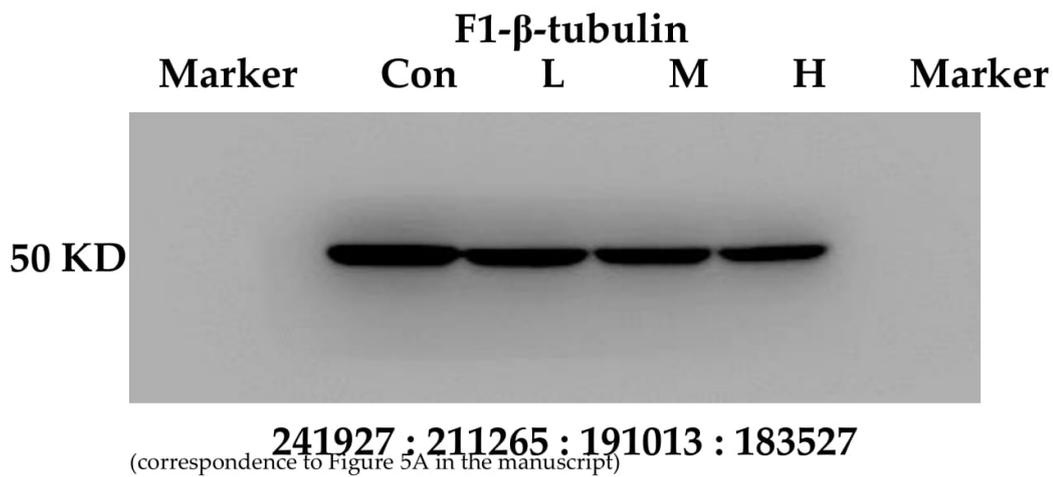
Marker Con L M H Marker

27 KD



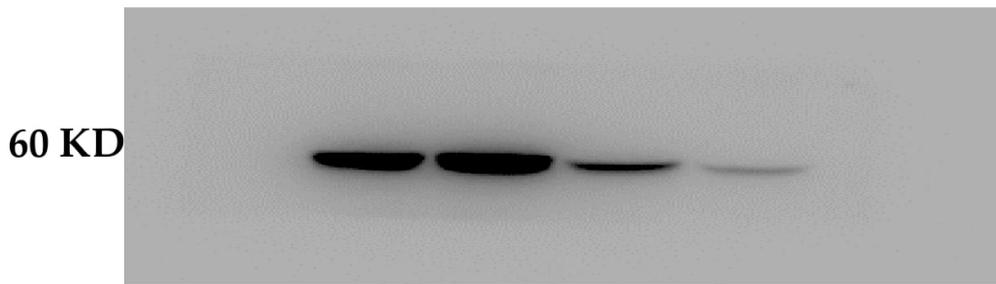
124354 : 121587 : 178561 : 286274

(correspondence to Figure 5A in the manuscript)



F1-p-Akt (Thr308)

Marker Con L M H Marker

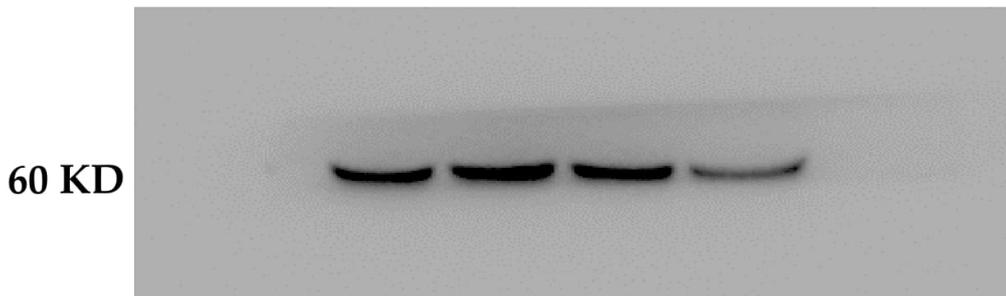


267411 : 298654 : 135245 : 33643

(correspondence to Figure 6A in the manuscript)

F3-p-Akt (Thr308)

Marker Con L M H Marker

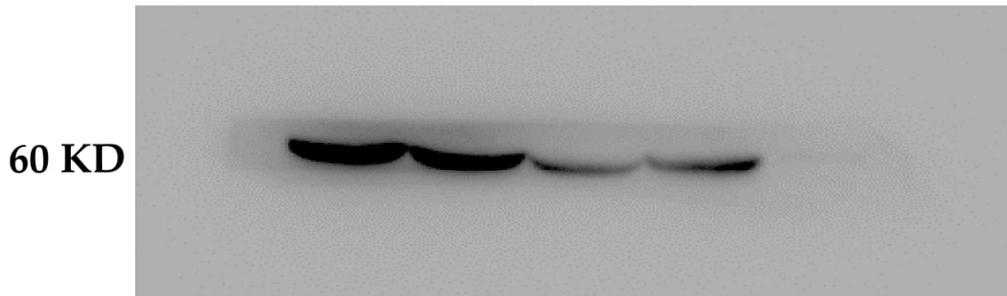


156848 : 167713 : 133136 : 96563

(correspondence to Figure 6A in the manuscript)

F1-p-Akt (Ser473)

Marker Con L M H Marker

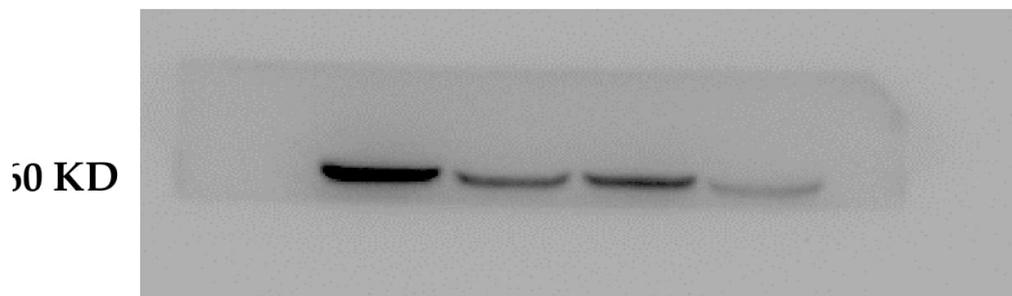


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(correspondence to Figure 6A in the manuscript)

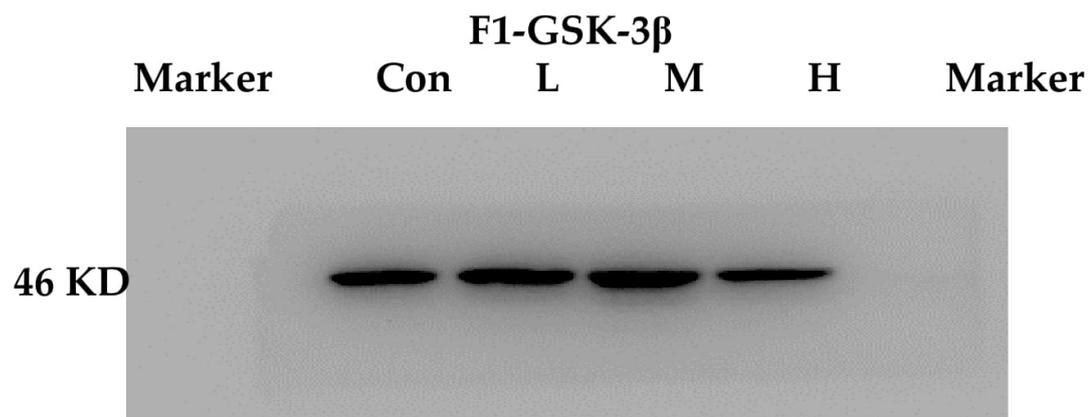
F3-p-Akt (Ser473)

Marker Con L M H Marker



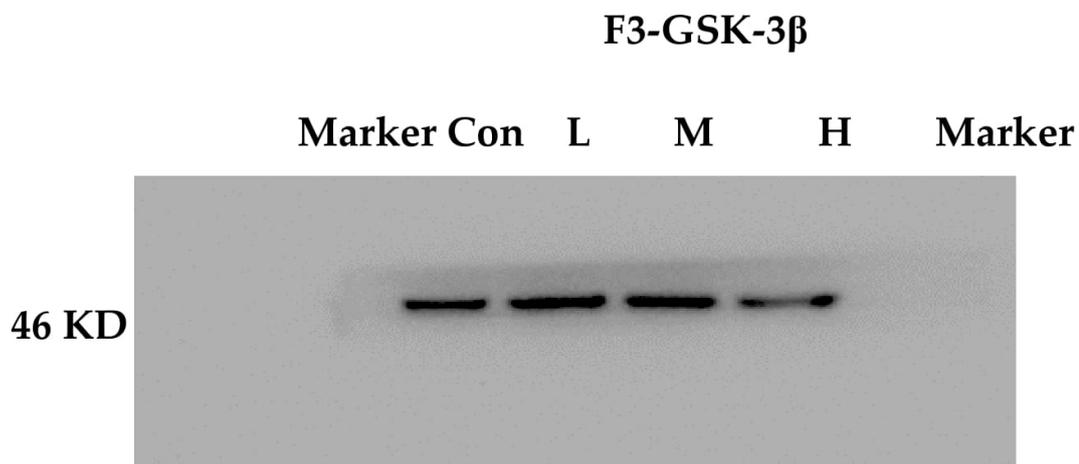
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(correspondence to Figure 6A in the manuscript)



179543 : 157973 : 190961: 157262

(correspondence to Figure 6A in the manuscript)

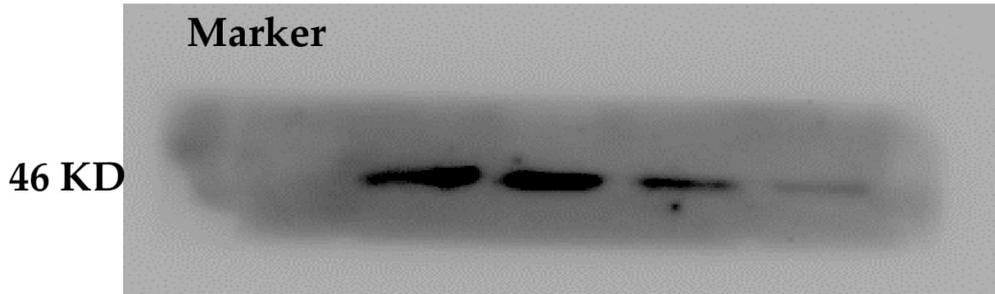


145560 : 165985 : 160288 : 134006

(correspondence to Figure 6A in the manuscript)

F1-p-GSK-3 β (Ser9)

Marker Con L M H

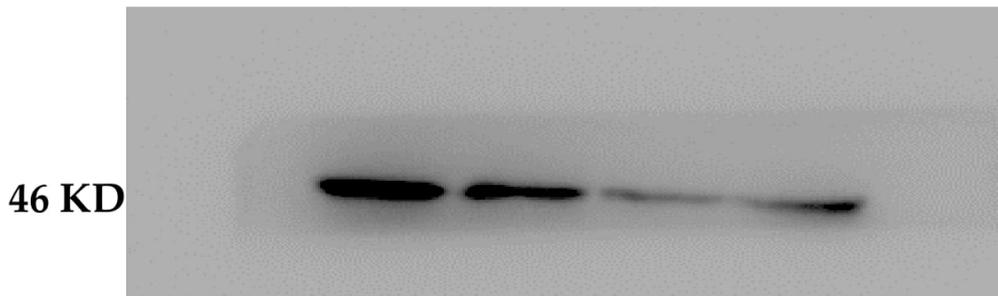


206798 : 122201 : 76942 : 58313

(correspondence to Figure 6A in the manuscript)

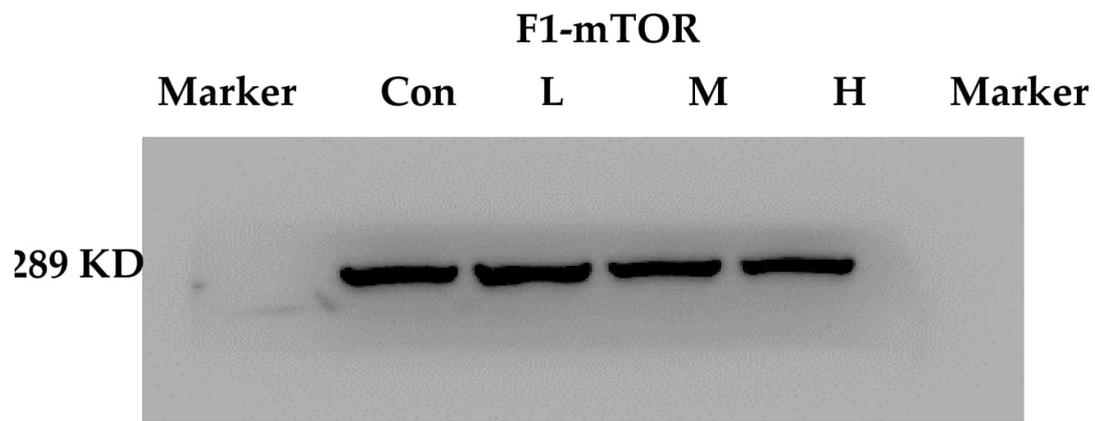
F3-p-GSK-3 β (Ser9)

Marker Con L M H Marker

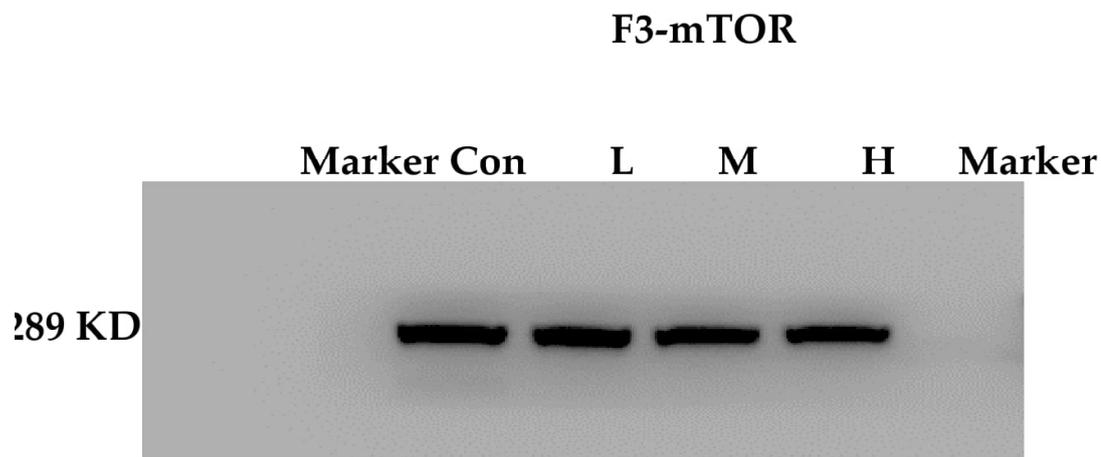


268496 : 192005 : 75913 : 100175

(correspondence to Figure 6A in the manuscript)

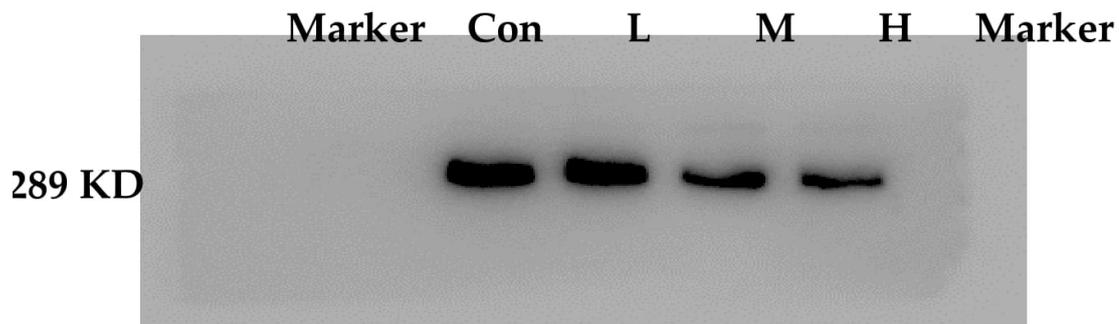


201674 : 210486 : 181499 : 173692
(correspondence to Figure 6A in the manuscript)



203392 : 181078 : 186718 : 174102
(correspondence to Figure 6A in the manuscript)

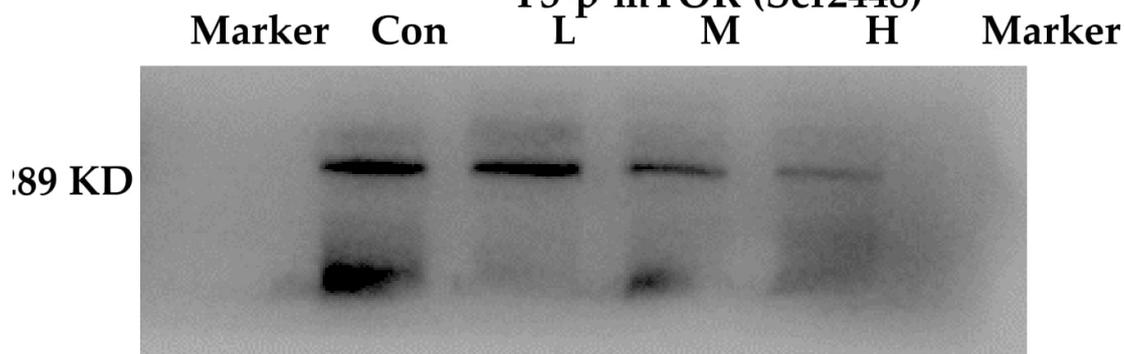
F1-p-mTOR (Ser2448)



245940 : 235718 : 163981 : 138698

(correspondence to Figure 6A in the manuscript)

F3-p-mTOR (Ser2448)

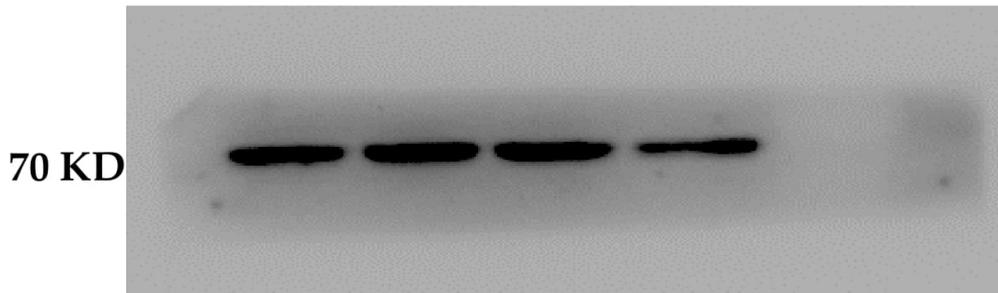


102890 : 73647 : 60219 : 44887

(correspondence to Figure 6A in the manuscript)

F1-p70 S6K

Marker Con L M H Marker

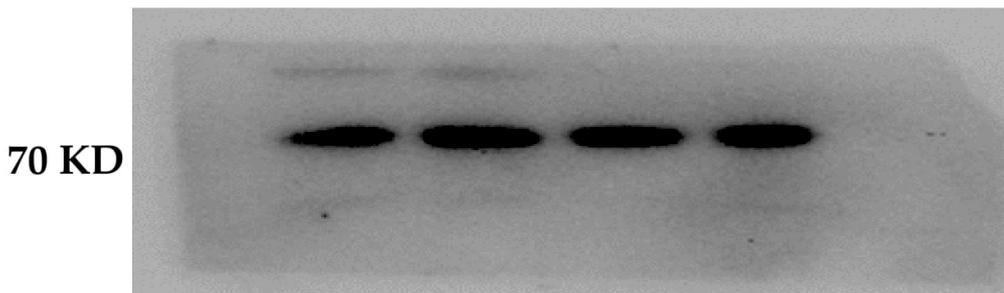


206628 : 192554 : 191760 : 176193

(correspondence to Figure 6A in the manuscript)

F3-p70 S6K

Marker Con L M H Marker



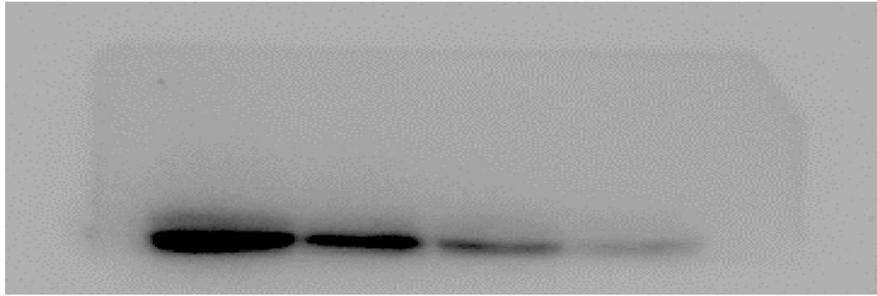
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(correspondence to Figure 6A in the manuscript)

F1-p-p70 S6K (Ser389)

Marker Con L M H Marker

70



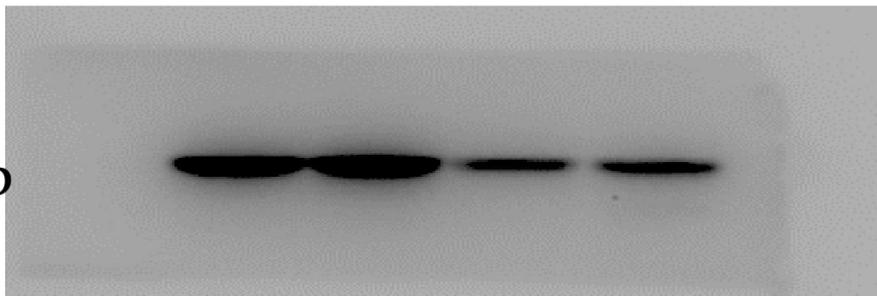
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(correspondence to Figure 6A in the manuscript)

F3-p-p70 S6K (Ser389)

Marker Con L M H Marker

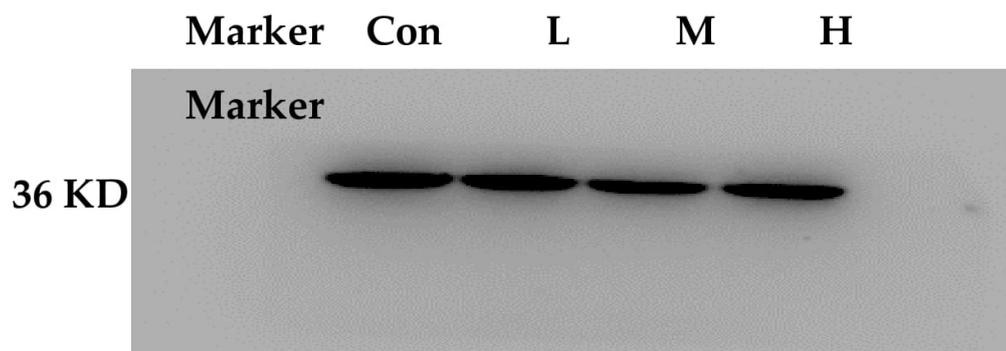
70 KD



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(correspondence to Figure 6A in the manuscript)

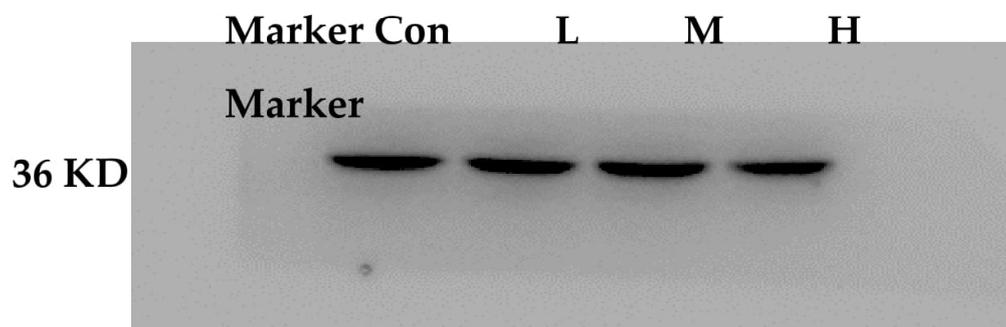
F1-GAPDH



227084 : 208304 : 185087 : 210380

(correspondence to Figure 6A in the manuscript)

F3-GAPDH



171067 : 166928 : 156244 : 121406

(correspondence to Figure 6A in the manuscript)

Figure S3. Detailed information of protein expression analysis by Western blot.