

Supplement table 1. Composition of rat diets

	Standard diet (%)	LP diet (%)
Protein	22.2	7
Fat	4.8	6.9
Carbohydrates	61.2	74.7
Ca	1.62	0.53
P	0.92	0.3
Calories	399 kcal/100 g	395 kcal/100 g

LP, low protein

Supplement table 2. Antibodies for western blotting, IHC and IF

Target protein	Source	Company	Ref.	Dilution
Bip	Rabbit	CST	3177	1:1000
Atf6	Rabbit	Proteintech	24169-1	1:500
Hspa1l	Rabbit	Proteintech	13970-1	1:2000
Herpud1	Rabbit	Abcam	ab150424	1:1000
Creb3l3	Rabbit	Immunoway	YN1809	1:1000
Atf4	Rabbit	Proteintech	10835-1	1:1000
Perk	Rabbit	Immunoway	YT6126	1:1000
eIF2 α	Rabbit	CST	5324	1:1000
p-eIF2 α	Rabbit	CST	3398	1:500
Xbp1	Rabbit	Enogene	E90127	1:500
Jnk1	Rabbit	CST	3708	1:500
Pdx1	Rabbit	Enogene	E2A7170	1:500
Beclin1	Rabbit	Proteintech	11306-1	1:500
LC3	Rabbit	CST	2775	1:1000
Ampk	Rabbit	Enogene	E1A6423	1:1000
p-Ampk	Rabbit	Enogene	E1A3423	1:1000
Cleavage-caspase3	Rabbit	Absin	abs132005	1:1000
Bax	Rabbit	SAB	40635	1:1000
Bcl-2	Rabbit	Enogene	E1A6139	1:3000
Cleavage-caspase8	Rabbit	Enogene	E1A5267	1:2000
Cleavage-caspase9	Rabbit	Wanlei	WL01838	1:1000
Caspase-12	Rabbit	Wanlei	WL03268	1:500
Insulin	mouse	Proteintech	66198-1	1:100
β -actin	mouse	Proteintech	66009-1	1:5000

Supplement table 3. Primers for qPCR

Gene name	Accession Number	Primer Sequences (5'-3')	Size (bp)	Annealing temp (°C)
Atf2	NM_031018.1	GACAAACCATGCCCGTTGCT GGACCGGTTGAGGAGAGGA	141	60
Atf4	NM_024403.2	CTTCTCCAGGTGTTCTCGTT GCTCAGCCCTCTTCTTCTG	162	60
Atf6	NM_001107196.1	GATTTGATGCCTTGGGAGTC GGACCGAGGAGAAGAGACAG	122	60
Bip1	NM_013083.2	CCCAGGTCAAACACGAGGA GCGGCAAGCAACCAAGGAT	137	60
Creb3l3	NM_001012115	ATAGCGGTCCTTCTGCTGTC CTGTGCACTTTGTTGGCAGT	77	60
Chop	NM_001109986.1	GGCTTTGGGAGGTGCTTGTG CTGCCTTTGCCTTTGAGAC	201	60
Dnajc1	XM_002728514.4	AGACAGTGACCTCAGAAGCC AGCTTCTCCTCTGGTTCCAC	88	60
Dnajc2	NM_053776	AGAGAAGTCAACCGGCAGAA CCCATCTGGAGTTTGTCCCA	113	60
Grp94	NM_001012197.2	AAGGTCATTGTCACGTGAAAA GTGTTTCCTCTTGGGTCAGC	97	60
Hspa1l	NM_212546.4	TCTCGTCCATGGTGTGACC GTGGCCTGTCTCTGGGAGTC	108	60
Herpud1	NM_053523	CGGACAACACTAGTCAGGCA GCTTCAGGCCTAGAGACGTT	118	60
Perk	NM_031599.2	GTGCTCCGCTTATTCCTTT CCTGTCTTGGTTGGGTCTG	158	60
Xbp1	NM_001004210.2	GATGAATGCCCTGGTTACTG AGATGTTCTGGGGAGGTGAC	152	60
β -actin	NM_031144	AGTCCCTCACCTCCAAAAG AAGCAATGCTGTACCTTCCC	95	60

Supplement table 4. Relative expression of the 84 UPR-related genes by PCR Arrays

Gene Symbol	AVG DeltaCt		2 ^{Δ(-DeltaCt)}		Fold Difference (F/C)	T-TEST (p value)	Up- or Down-Regulation (F/C)
	FGR	Control	FGR	Control			
Atf4	0.644444	1.89	0.639739	0.269807	2.3711	0.03574	2.3711
Atf6	4.527778	5.9	0.043351	0.016746	2.5887	0.02258	2.5887
Atxn3	6.067778	5.836667	0.014908	0.017498	0.852	0.49245	-1.1737
Bax	4.257778	4.14	0.052273	0.05672	0.9216	0.73868	-1.0851
Calr	-0.355556	-0.17	1.279478	1.125058	1.1373	0.64846	1.1373
Canx	1.227778	1.43	0.426975	0.371131	1.1505	0.64141	1.1505
Cct4	0.644444	0.65	0.639739	0.63728	1.0039	0.92961	1.0039
Cct7	0.904444	0.91	0.534238	0.532185	1.0039	0.90484	1.0039
Cebpb	9.411111	9.85	0.001469	0.001084	1.3556	0.46276	1.3556
Creb3	4.057778	3.823333	0.060046	0.070642	0.85	0.63122	-1.1765
Creb3l1	5.217778	5.52	0.026872	0.021793	1.233	0.44966	1.233
Creb3l2	5.464444	5.64	0.022648	0.020054	1.1294	0.55933	1.1294
Creb3l3	11.384444	8.776667	0.000374	0.00228	0.1641	0.02855	-6.0956
Creb3l4	7.134444	7.49	0.007117	0.005563	1.2795	0.44939	1.2795
Ddit3	5.041111	5.33	0.030372	0.024861	1.2217	0.35244	1.2217
Derl1	3.854444	4.466667	0.069135	0.045227	1.5286	0.17998	1.5286
Dnajb9	4.347778	4.913333	0.049112	0.033185	1.48	0.38759	1.48
Dnajc10	5.084444	5	0.029473	0.03125	0.9431	0.86299	-1.0603
Dnajc3	0.867778	1.503333	0.54799	0.352737	1.5535	0.20002	1.5535
Dnajc4	6.611111	6.71	0.01023	0.009552	1.0709	0.61378	1.0709
Tor1a	3.564444	4.14	0.084527	0.05672	1.4903	0.2162	1.4903
Edem1	2.354444	2.906667	0.195543	0.133354	1.4663	0.09532	1.4663
Edem2	2.984444	3.78	0.126355	0.072796	1.7357	0.24519	1.7357
Eif2a	4.447778	4.283333	0.045823	0.051356	0.8923	0.37229	-1.1207
Eif2ak2	6.337778	5.716667	0.012363	0.019016	0.6502	0.07429	-1.5381
Eif2ak3	3.141111	4.806667	0.113353	0.035731	3.1724	0.0135	3.1724
Eif2ak4	4.274444	4.513333	0.051673	0.043788	1.1801	0.40182	1.1801
Ern2	12.21777	12.79	0.00021	0.000141	1.4868	0.9304	1.4868
Ero1a	3.691111	3.696667	0.077422	0.077125	1.0039	0.96113	1.0039
Fbxo6	4.671111	4.666667	0.039251	0.039373	0.9969	0.93576	-1.0031
Ganab	2.544444	3.706667	0.171414	0.076592	2.238	0.0538	2.238
Herpud1	1.717778	3.33	0.304017	0.099442	3.0572	0.03835	3.0572
Herpud2	4.637778	4.603333	0.040169	0.041139	0.9764	0.95874	-1.0242
Hsp90b1	-0.758889	-0.41	1.692187	1.328686	1.2736	0.38418	1.2736
Hspa1l	10.481111	12.346667	0.0007	0.000192	3.6441	0.01559	3.6441
Hspa2	8.094444	8.233333	0.003659	0.003323	1.1011	0.63983	1.1011
Hspa4	3.107778	3.016667	0.116002	0.123564	0.9388	0.68541	-1.0652
Hspa4l	7.964444	8.063333	0.004004	0.003738	1.0709	0.97953	1.0709
Hspa5	-0.225556	0.383333	1.169227	0.766664	1.5251	0.37605	1.5251
Hspb9	12.671111	11.74	0.000153	0.000292	0.5245	0.13703	-1.9067
Hsph1	6.351111	6.196667	0.01225	0.013634	0.8985	0.72709	-1.113
Htra2	2.587778	3.066667	0.166342	0.119355	1.3937	0.06507	1.3937
Htra4	10.211111	9.546667	0.000844	0.001337	0.6309	0.21535	-1.585
Insig1	3.041111	3.166667	0.121488	0.111362	1.0909	0.78615	1.0909
Insig2	6.087778	6.043333	0.014703	0.015163	0.9697	0.93743	-1.0313
Manf	0.931111	1.476667	0.524454	0.359318	1.4596	0.2923	1.4596
Mapk10	9.374444	8.983333	0.001507	0.001976	0.7625	0.51065	-1.3114
Mapk8	5.441111	5.566667	0.023018	0.021099	1.0909	0.61933	1.0909

Mapk9	4.057778	4.2	0.060046	0.054409	1.1036	0.58014	1.1036
Mbtps1	3.627778	4.153333	0.080897	0.056198	1.4395	0.3491	1.4395
Mbtps2	5.567778	5.546667	0.021083	0.021394	0.9855	0.89622	-1.0147
Nploc4	4.091111	3.976667	0.058675	0.063519	0.9237	0.8021	-1.0826
Nucb1	3.287778	3.703333	0.102395	0.076769	1.3338	0.33322	1.3338
Os9	2.847778	3.47	0.13891	0.090246	1.5392	0.30407	1.5392
Pdia3	0.311111	0.583333	0.806021	0.66742	1.2077	0.56273	1.2077
Pfdn5	2.267778	2.256667	0.207649	0.209255	0.9923	0.8695	-1.0077
Pfdn6	2.941111	2.96	0.130208	0.128514	1.0132	0.82495	1.0132
Ppia	-2.508889	-2.623333	5.691815	6.161721	0.9237	0.54464	-1.0826
Ppib	-1.635556	-1.29	3.107072	2.445281	1.2706	0.29974	1.2706
Ppic	2.891111	2.963333	0.1348	0.128218	1.0513	0.61458	1.0513
Ppp1r15a	11.084444	11.403333	0.000461	0.000369	1.2474	0.25049	1.2474
Ppp1r15b	3.174444	3.736667	0.110764	0.075016	1.4765	0.3364	1.4765
PrkcsH	2.821111	3.206667	0.141501	0.108317	1.3064	0.31514	1.3064
Rnf139	3.464444	3.833333	0.090594	0.070154	1.2914	0.15107	1.2914
Rpn1	-0.592222	-0.193333	1.507567	1.143402	1.3185	0.32289	1.3185
Scap	2.271111	3.29	0.20717	0.102238	2.0264	0.29193	2.0264
Sec62	1.241111	1.41	0.423047	0.376312	1.1242	0.43421	1.1242
Sec63	3.044444	3.253333	0.121208	0.104869	1.1558	0.43616	1.1558
Sel1l	1.474444	2.87	0.359872	0.136787	2.6309	0.08426	2.6309
Vimp	2.161111	2.316667	0.223584	0.200731	1.1139	0.50979	1.1139
Serp1	-1.282222	-0.873333	2.432133	1.831891	1.3277	0.45539	1.3277
Sil1	5.341111	6.206667	0.02467	0.01354	1.822	0.07869	1.822
Srebf1	10.341111	10.51	0.000771	0.000686	1.1242	0.73574	1.1242
Srebf2	8.384444	9.073333	0.002992	0.001856	1.612	0.18618	1.612
Syvn1	3.894444	4.336667	0.067244	0.049492	1.3587	0.37585	1.3587
Tcp1	1.751111	1.703333	0.297073	0.307076	0.9674	0.92308	-1.0337
Ube2g2	5.804444	6.196667	0.017893	0.013634	1.3124	0.37226	1.3124
Ube2j2	4.667778	4.74	0.039342	0.037421	1.0513	0.6841	1.0513
Ubxn4	2.964444	3.493333	0.128119	0.088798	1.4428	0.03773	1.4428
Ufd1l	4.097778	4.423333	0.058404	0.046606	1.2531	0.17838	1.2531
Uggt1	3.954444	4.133333	0.064505	0.056983	1.132	0.71615	1.132
Usp14	3.154444	3.34	0.11231	0.098755	1.1373	0.30157	1.1373
Vcp	1.221111	1.533333	0.428952	0.345478	1.2416	0.30008	1.2416
Xbp1	1.317778	2.84	0.401152	0.139661	2.8723	0.09153	2.8723
Actb	-3.032222	-2.926667	8.180688	7.603516	1.0759	0.64805	1.0759
B2m	0.361111	0.353333	0.778565	0.782773	0.9946	0.97205	-1.0054
Hprt1	2.671111	2.573333	0.157006	0.168016	0.9345	0.36109	-1.0701
Ldha	1.571111	1.636667	0.336549	0.321599	1.0465	0.60043	1.0465
Rplp1	-3.375556	-2.89	10.378712	7.412704	1.4001	0.27865	1.4001

CT: threshold cycle; F/C: FGR/control relative expression.