

## Supplementary Data

### **Cytotoxicity and RNA-sequencing analysis of macrophages after exposure to vanadium dioxide nanoparticles**

Wen-Song Xi,<sup>a,b</sup> Jia-Bei Li,<sup>b</sup> Xue-Rui Tang,<sup>b</sup> Shi-Ying Tan,<sup>b</sup> Aoneng Cao,<sup>b</sup> Yuanfang Liu,<sup>b,c</sup> and Haifang Wang<sup>b\*</sup>

<sup>a</sup> School of Biomedical Engineering, Sun Yat-Sen University, Guangzhou 510006, China

<sup>b</sup> Institute of Nanochemistry and Nanobiology, Shanghai University, Shanghai 200444, China

<sup>c</sup> Beijing National Laboratory for Molecular Sciences, College of Chemistry and Molecular Engineering, Peking University, Beijing 100871, China

\*Corresponding author: H. Wang. Email: hwang@shu.edu.cn

**Table S1.** The sequences of qPCR primer pairs.

Gene	Forward sequence (5'-3')	Reverse sequence (5'-3')
GAPDH	TGTGTCCGTCGTGGATCTGA	TTGCTGTTGAAGTCGCAGGAG
Bcl-2	TTCAGGGATGGGGTGAAC TG	CACAGGGCGATGTTGT
BAX	CCCGAGAGGTCTTCTTCC	GCCTTGAGCACCAGTTTG
CHOP	CCACCACACCTGAAAGCAGAA	GGTGCCCCCAATTTTCATCT
EIF2 $\alpha$	CAACGTGGCAGCCTTACA	TTTCATGTCATAAAGTTGTAGGTTAGG
ATF4	AGCCCCACAACATGAC	CCACCTCCAGATAGTCAT
ATF6	GATGCAGCACATGAGGCTTA	CAGGAACGTGCTGAGTTGAA
IRE1	CTGTGGTCAAGATGGACTGG	GAAGCGGGAAGTGAAGTAGC
BIP	CTATTCCTGCGTCGGTGTGT	GCAAGAACTTGATGTCCTGCT
PERK	CACGCAGATCACAGTCAGGT	GGGCTGAGGATGGAAAAGCC
XBP1s	GAGTCCGCAGCAGGTG	GTGTCAGAGTCCATGGGA

**Table S2.** Quality control data statistics.

Sample	Clean reads	Clean bases	Error rate (%)	Q20 (%)
Cont-1	46075704	6894831489	0.0237	98.54
Cont-2	57989170	8680540290	0.0237	98.55
Cont-3	57388948	8589625041	0.0234	98.69
M-VO <sub>2</sub> -1	62125294	9270075833	0.0236	98.61
M-VO <sub>2</sub> -2	61014432	9115593597	0.0236	98.61
M-VO <sub>2</sub> -3	64202988	9604101155	0.0234	98.70
S-VO <sub>2</sub> -1	47887696	7161906395	0.0250	98.05
S-VO <sub>2</sub> -2	53271004	7971421478	0.0235	98.63
S-VO <sub>2</sub> -3	58900546	8803743066	0.0235	98.65

**Table S3.** The differentially expressed up-regulated genes between the control and S-VO<sub>2</sub> in RAW264.7 macrophages.

Gene_id	Gene_name	Log <sub>2</sub> FC (S-VO <sub>2</sub> /Cont)
ENSMUSG00000085586	Gm11613	1.148
ENSMUSG00000028865	Cd16412	1.110
ENSMUSG00000107944	Gm44280	1.665
ENSMUSG00000039239	Tgfb2	1.619
ENSMUSG00000103464	Gm38246	1.055
ENSMUSG00000053646	Plxnb1	1.686
ENSMUSG00000024958	Gpr137	1.111
ENSMUSG00000036560	Lgi4	1.381
ENSMUSG00000024347	Psd2	1.669
ENSMUSG00000041757	Plekha6	1.222
ENSMUSG00000094724	Rnaset2b	1.103
ENSMUSG00000092444	Gm18733	1.406
ENSMUSG00000055494	Gm14168	1.798
ENSMUSG00000021403	Serpib9b	1.240
ENSMUSG00000025473	Adam8	1.296
ENSMUSG00000048617	Rtbdn	1.030

ENSMUSG00000020484	XBP-1S	1.041
ENSMUSG00000040276	Pacsin1	1.195
ENSMUSG00000034990	Otoa	1.558
ENSMUSG00000074671	Tspyl3	1.246
ENSMUSG00000087408	Cers1	1.576
ENSMUSG00000025408	CHOP	1.658
ENSMUSG00000108596	Itgam	1.172
ENSMUSG00000030340	Scnn1a	1.101
ENSMUSG00000103588	Gm18445	1.420
ENSMUSG00000030098	Grip2	1.044
ENSMUSG00000049719	Prss46	1.106
ENSMUSG00000078486	Perm1	1.405
ENSMUSG00000021983	Atp8a2	1.592
ENSMUSG00000004105	Angptl2	1.659
ENSMUSG00000053693	Mast1	1.347
ENSMUSG00000022074	Tnfrsf10b	1.026
ENSMUSG00000021265	Slc25a29	1.078
ENSMUSG00000050357	Carmil2	1.303
ENSMUSG00000071192	Wfikkn1	1.334
ENSMUSG00000030882	Dnhd1	1.692
ENSMUSG00000049721	Gal3st1	2.032
ENSMUSG00000086598	Btbd18	1.054
ENSMUSG00000025269	Apex2	1.084
ENSMUSG00000074259	Gramd2	1.052
ENSMUSG00000091102	5830462I19Rik	1.103
ENSMUSG00000031022	BC051019	1.473
ENSMUSG00000045114	Prrt2	1.305
ENSMUSG00000082791	Gm4875	1.012
ENSMUSG00000046854	Pip5kl1	1.275
ENSMUSG00000022018	Rgcc	1.145
ENSMUSG00000038751	Ptk6	2.020
ENSMUSG00000068740	Celsr2	1.511
ENSMUSG00000013419	Zfp651	1.242
ENSMUSG00000024661	Fth1	1.086
ENSMUSG00000027257	Pacsin3	1.132
ENSMUSG00000085957	Syna	1.270
ENSMUSG00000079243	Xirp1	1.242
ENSMUSG00000015627	Gata5	1.081
ENSMUSG00000022044	Stmn4	1.010
ENSMUSG00000039021	Ttc16	1.215
ENSMUSG00000020327	Fgf22	1.270
ENSMUSG00000052819	Best2	1.213
ENSMUSG00000020592	Sdc1	1.068
ENSMUSG00000105628	Gm43350	1.921
ENSMUSG00000023905	Tnfrsf12a	1.328
ENSMUSG00000028158	Mttp	1.423

ENSMUSG00000029710	Ephb4	1.498
ENSMUSG00000072825	Cep170b	1.057
ENSMUSG00000037428	Vgf	1.034
ENSMUSG00000022483	Col2a1	1.723
ENSMUSG00000043085	Tmem82	2.179
ENSMUSG00000106350	Gm4869	1.855
ENSMUSG00000101166	Gm28496	1.408
ENSMUSG00000001020	S100a4	1.008
ENSMUSG00000020135	Apc2	1.502
ENSMUSG00000031302	Nlgn3	1.578
ENSMUSG00000030683	Sez6l2	1.211
ENSMUSG00000028040	Efna4	1.223
ENSMUSG00000040866	Rsph6a	1.191
ENSMUSG00000031668	PERK	1.362
ENSMUSG00000001739	Cldn15	1.867
ENSMUSG00000040205	Cuzd1	1.090
ENSMUSG00000090236	Car15	1.135
ENSMUSG00000030409	Dmpk	1.236
ENSMUSG00000097080	1700086O06Rik	1.000
ENSMUSG00000041073	Nacad	1.759
ENSMUSG00000037411	Serpine1	1.177
ENSMUSG00000089669	Tnfsf13	1.157
ENSMUSG00000086075	Gm15728	2.377
ENSMUSG00000015143	Actn1	1.009
ENSMUSG00000034156	Tspoap1	3.618
ENSMUSG00000044716	Dok7	1.131
ENSMUSG00000002233	Rhoc	1.014
ENSMUSG00000006711	D130043K22Rik	1.410
ENSMUSG00000043099	Hic1	1.970
ENSMUSG00000001300	Efnb2	2.226
ENSMUSG00000044433	Camsap3	1.272
ENSMUSG00000079652	Fam71f2	1.395
ENSMUSG00000001930	Vwf	1.553
ENSMUSG00000096740	Lbhd1	1.885
ENSMUSG00000033368	Trim69	1.389
ENSMUSG00000021822	Plau	1.284
ENSMUSG00000037833	Sh2d4b	1.055
ENSMUSG00000004098	Col5a3	2.020
ENSMUSG00000020844	Nxn	1.107
ENSMUSG00000026308	Klhl30	1.393
ENSMUSG00000001946	Esam	1.172
ENSMUSG00000035033	Tbr1	1.220
ENSMUSG00000016995	Matn4	1.432
ENSMUSG00000046613	Vwa5b2	1.482
ENSMUSG00000073633	Fbxo36	1.939
ENSMUSG00000028661	Epha8	1.413

ENSMUSG00000032131	Abcg4	1.857
ENSMUSG00000026604	Ptpn14	2.274
ENSMUSG00000028541	B4galt2	1.632
ENSMUSG00000062762	Ei24	1.023
ENSMUSG00000057967	Fgf18	2.607
ENSMUSG00000026932	Nacc2	1.159
ENSMUSG00000091017	Fam71a	1.151
ENSMUSG00000108236	0610033M10Rik	1.550
ENSMUSG00000081094	Rpl19-ps11	1.560
ENSMUSG00000073274	Gm14636	1.210
ENSMUSG00000032193	Ldlr	1.087
ENSMUSG00000025804	Ccr1	1.026
ENSMUSG00000028785	Hpca	1.545
ENSMUSG00000033327	Tnxb	1.945
ENSMUSG00000020793	Galr2	1.414
ENSMUSG00000007039	Ddah2	1.166
ENSMUSG00000040797	Iqsec3	1.513
ENSMUSG00000103149	AA914427	1.025
ENSMUSG00000038167	Plekhg6	1.632
ENSMUSG00000045763	Basp1	1.050
ENSMUSG00000048856	Slc25a47	1.074
ENSMUSG00000067941	Gm7168	1.034
ENSMUSG00000027355	Tmco5	1.043
ENSMUSG00000106928	Gm43860	1.526
ENSMUSG00000110010	Gm45629	1.302
ENSMUSG00000053293	Pom121	1.000
ENSMUSG00000044006	Cilp2	2.138
ENSMUSG00000040563	Plppr2	1.135
ENSMUSG00000056656	Apol8	1.035
ENSMUSG00000037649	H2-DMa	2.483
ENSMUSG00000039556	Ppp1r3f	1.173
ENSMUSG00000027456	Sdcbp2	1.638
ENSMUSG00000027939	Nup210l	3.050
ENSMUSG00000083907	Plk-ps1	1.182
ENSMUSG00000102543	Pcdhgc5	1.513
ENSMUSG00000110218	Gm20219	1.478
ENSMUSG00000095369	Gm21859	1.588
ENSMUSG00000041801	Phlda3	1.640
ENSMUSG00000027470	Mylk2	1.748
ENSMUSG00000031486	Adgra2	1.848
ENSMUSG00000034762	Glis1	1.186
ENSMUSG00000039714	Cplx3	1.297
ENSMUSG00000036091	Hyal3	1.315
ENSMUSG00000022245	Skor1	1.006
ENSMUSG00000041842	Fhdc1	1.672
ENSMUSG00000058743	Kcnj14	2.324

ENSMUSG00000054008	Ndst1	1.255
ENSMUSG00000038486	Sv2a	1.384
ENSMUSG00000050503	Fbxl22	1.079
ENSMUSG00000071103	1700029J07Rik	1.097
ENSMUSG00000041445	Mmrn2	1.545
ENSMUSG00000016356	Col20a1	1.866
ENSMUSG00000021116	eif2 $\alpha$	2.180
ENSMUSG00000042828	Trim72	1.942
ENSMUSG00000027015	Cybrd1	1.230
ENSMUSG00000025013	Tll2	1.220
ENSMUSG00000051747	Ttn	1.027
ENSMUSG00000006356	Crip2	1.439
ENSMUSG00000042978	Sbk1	1.001
ENSMUSG00000023473	Celsr3	1.325
ENSMUSG00000026475	Rgs16	1.717
ENSMUSG00000039062	Anpep	1.417
ENSMUSG00000020902	Ntn1	2.051
ENSMUSG00000073599	Ecsr	1.090
ENSMUSG00000056569	Mpz	1.404
ENSMUSG00000041120	Nbl1	2.139
ENSMUSG00000047143	Dmrta2	1.601
ENSMUSG00000017767	Spata25	1.040
ENSMUSG00000024873	Cnih2	1.909
ENSMUSG00000039653	Baat	1.001
ENSMUSG00000038803	Ost4	1.237
ENSMUSG00000055865	Fam19a3	1.729
ENSMUSG00000031765	Mt1	1.009
ENSMUSG00000104158	Gm38100	1.145
ENSMUSG00000041351	Rap1gap	1.328
ENSMUSG00000086924	Gm11766	1.539
ENSMUSG00000107092	Gm7993	2.126
ENSMUSG00000050147	F2rl3	1.153
ENSMUSG00000042821	Snai1	1.695
ENSMUSG00000035745	Grin3b	2.473
ENSMUSG00000020695	Mrc2	1.315
ENSMUSG00000049928	Glp2r	1.842
ENSMUSG00000080717	B230307C23Rik	1.076
ENSMUSG00000069020	Urm1	1.042
ENSMUSG00000026697	Myoc	1.064
ENSMUSG00000031028	Tub	1.336
ENSMUSG00000070385	Ampd1	2.430
ENSMUSG00000029135	Fosl2	1.317
ENSMUSG00000030609	Aen	1.041
ENSMUSG00000041881	Ndufa7	1.006
ENSMUSG00000082016	Pgam1-ps2	1.200
ENSMUSG00000032648	Pygm	1.681

ENSMUSG00000105692	Gm43737	1.114
ENSMUSG00000037577	Ephx3	1.459
ENSMUSG00000022838	Eaf2	1.055
ENSMUSG00000042189	Tekt3	1.385
ENSMUSG00000086756	Gm14051	1.034
ENSMUSG00000027579	Srms	2.585
ENSMUSG00000043889	Gm8399	1.228
ENSMUSG00000032332	Col12a1	1.365
ENSMUSG00000040938	Slc16a11	1.216
ENSMUSG00000074818	Pdzd7	1.482
ENSMUSG00000068957	4930589L23Rik	1.409
ENSMUSG00000042607	Asb4	2.850
ENSMUSG00000042788	Fam166b	1.548
ENSMUSG00000045349	Sh2d5	1.729
ENSMUSG00000053461	Hhip12	1.677
ENSMUSG00000049526	Tmem202	1.098
ENSMUSG00000034282	Evpl	2.917
ENSMUSG00000044177	Wfikkn2	1.557
ENSMUSG00000062760	1810041L15Rik	1.057
ENSMUSG00000097840	Gm26756	1.024
ENSMUSG00000102717	Gm37759	1.161
ENSMUSG00000071342	Lsmem1	1.147
ENSMUSG00000062382	Ftl1-ps1	1.071
ENSMUSG00000043770	Gm12481	1.077
ENSMUSG00000027329	Spef1	1.694
ENSMUSG00000031078	Ctnn	1.180
ENSMUSG00000027950	Chrn2	1.344
ENSMUSG00000042428	Mgat3	1.590
ENSMUSG00000040740	Slc25a34	1.306
ENSMUSG00000104159	Gm38099	1.119
ENSMUSG00000007891	Ctsd	1.142
ENSMUSG00000031861	Lpar2	1.788
ENSMUSG00000053963	Stum	1.424
ENSMUSG00000005514	Por	1.198
ENSMUSG00000011752	Pgam1	1.161
ENSMUSG00000032380	Dapk2	1.032
ENSMUSG00000003934	Efnb3	1.184
ENSMUSG00000025161	Slc16a3	1.081
ENSMUSG00000075585	6330403L08Rik	2.225
ENSMUSG00000003279	Dlgap1	1.221
ENSMUSG00000031779	Ccl22	1.055
ENSMUSG00000018930	Ccl4	1.532
ENSMUSG00000055271	9330161L09Rik	1.644
ENSMUSG00000062591	Tubb4a	1.499
ENSMUSG00000026354	Lct	1.517
ENSMUSG00000046668	Cxxc5	1.618

ENSMUSG00000027368	Dusp2	1.464
ENSMUSG00000048458	Fam212b	1.549
ENSMUSG00000103966	Gm37120	2.273
ENSMUSG00000019301	Hsd17b1	1.148
ENSMUSG00000074340	Ovgp1	1.347
ENSMUSG00000033717	Adra2a	2.200
ENSMUSG00000002100	Mybpc3	3.325
ENSMUSG00000020475	Pgam2	1.179
ENSMUSG00000028909	Ptpru	1.104
ENSMUSG00000110702	Gm45767	1.553
ENSMUSG00000005320	Fgfr4	1.517
ENSMUSG00000052271	Bhlha15	1.189
ENSMUSG00000032946	Rasgrp2	1.876
ENSMUSG00000030124	Lag3	1.609
ENSMUSG00000003379	Cd79a	1.357
ENSMUSG00000113322	AC121504.1	1.136
ENSMUSG00000020447	Npc111	1.390
ENSMUSG00000028794	A3galt2	2.324
ENSMUSG00000093910	Zfp853	1.070
ENSMUSG00000031906	Smpd3	1.744
ENSMUSG00000054312	Mrps21	1.101
ENSMUSG00000004933	Matk	1.009
ENSMUSG00000086962	Gm12248	1.450
ENSMUSG00000035112	Wnk4	1.673
ENSMUSG00000031448	Adprh1	1.272
ENSMUSG00000043789	Vwce	1.806
ENSMUSG00000006342	Susd2	1.940
ENSMUSG00000027570	Col9a3	1.241
ENSMUSG00000049649	Gpr3	1.725
ENSMUSG00000108353	Gm45205	1.017
ENSMUSG00000036492	Rnf39	1.487
ENSMUSG00000038370	Pcp411	1.674
ENSMUSG00000044816	D630023F18Rik	1.215
ENSMUSG00000073774	Kcnk	1.325
ENSMUSG00000018752	Tnfsfm13	1.653
ENSMUSG00000052316	Lrrc15	1.234
ENSMUSG00000006445	Epha2	1.501
ENSMUSG00000035385	Ccl2	1.302
ENSMUSG00000047787	Flrt1	1.103
ENSMUSG00000026663	ATF6	1.181
ENSMUSG00000006575	Rundc3a	1.368
ENSMUSG00000038745	Nlrp6	1.036
ENSMUSG00000097855	A930007I19Rik	1.83
ENSMUSG00000025386	Pde6g	1.221
ENSMUSG00000021223	Papln	1.192
ENSMUSG00000019326	Aoc3	3.046



ENSMUSG00000050708	Ftl1	1.235
ENSMUSG00000026207	Speg	1.076
ENSMUSG00000006221	Hspb7	1.120
ENSMUSG00000060594	Layn	1.029
ENSMUSG00000029055	Plch2	1.232
ENSMUSG00000074899	Sptbn5	1.520
ENSMUSG00000007021	Syngn3	1.507
ENSMUSG00000073627	C130036L24Rik	1.602
ENSMUSG00000109953	5430430B14Rik	1.809
ENSMUSG00000044724	Gpr152	1.237
ENSMUSG00000056271	Lman11	1.339
ENSMUSG00000033597	Caskin1	1.292
ENSMUSG00000074001	Klhl40	1.665
ENSMUSG00000002565	Scin	2.198
ENSMUSG00000027223	Mapk8ip1	1.479
ENSMUSG00000023247	Guca2a	1.842
ENSMUSG00000022099	Dmtn	1.466
ENSMUSG00000063239	Grm4	1.276
ENSMUSG00000022504	Ciita	1.394
ENSMUSG00000097337	Gm26606	2.118
ENSMUSG00000006216	Clenkb	1.090
ENSMUSG00000036858	Ptcra	1.535
ENSMUSG00000070576	Mn1	1.638
ENSMUSG00000029408	Abcb9	2.325
ENSMUSG00000061462	Obscn	1.342
ENSMUSG00000027646	Src	1.217
ENSMUSG00000068699	Flnc	1.672
ENSMUSG00000002409	Dyrk1b	1.122
ENSMUSG00000020080	Hkdc1	1.534
ENSMUSG00000017943	Gdap111	2.134
ENSMUSG00000027568	Ntsr1	1.177
ENSMUSG00000035262	Amh	1.645
ENSMUSG00000038264	Sema7a	1.196
ENSMUSG00000106807	Gm10441	1.005
ENSMUSG00000110423	Gm45736	1.175
ENSMUSG00000001444	Tbx21	1.321
ENSMUSG00000051439	Cd14	1.051
ENSMUSG00000058297	Spock2	1.316
ENSMUSG00000024664	Fads3	1.333
ENSMUSG00000034818	Celf5	1.107
ENSMUSG00000040283	Btnl9	2.361
ENSMUSG00000019464	Ptger1	1.767
ENSMUSG00000009350	Mpo	2.854
ENSMUSG00000042377	Fam83g	1.484
ENSMUSG00000109198	D7Bwg0826e	1.378
ENSMUSG00000103845	Gm19026	1.551

ENSMUSG0000002006	Pdzd4	1.605
ENSMUSG00000039787	Cercam	1.123
ENSMUSG00000049515	Espnl	1.731
ENSMUSG00000085875	Gm12905	2.328
ENSMUSG00000033722	BC034090	1.027
ENSMUSG00000053846	Lipg	1.084
ENSMUSG00000109274	Gm45133	1.059
ENSMUSG00000034037	Fgd5	1.566
ENSMUSG00000034209	Rasl10a	1.210
ENSMUSG00000078137	Ankrd63	2.154
ENSMUSG00000074004	B3gnt6	1.020
ENSMUSG00000033763	Mtss11	1.115
ENSMUSG00000051107	Gm15440	1.958
ENSMUSG00000047507	Baiap3	1.859
ENSMUSG00000037989	Wnk2	1.223
ENSMUSG00000023993	Trem1	1.073
ENSMUSG00000042662	Dusp15	1.234
ENSMUSG00000034765	Dusp5	1.679
ENSMUSG00000032649	Colgalt2	1.575
ENSMUSG00000054206	Gzmm	2.308
ENSMUSG00000091952	Gm17709	1.216
ENSMUSG00000033615	Cplx1	2.049
ENSMUSG00000098488	Pla2g4b	1.507
ENSMUSG00000011179	Odc1	1.944
ENSMUSG00000054161	Fam83e	2.098
ENSMUSG00000058620	Adra2b	1.351
ENSMUSG00000032657	Fam189b	1.565
ENSMUSG00000010021	Kif19a	1.433
ENSMUSG00000084319	Tpt1-ps3	1.004
ENSMUSG00000043421	Hilpda	1.592
ENSMUSG00000060572	Mfap2	1.264
ENSMUSG00000022537	Tmem44	1.363
ENSMUSG00000087530	Gm15533	1.152
ENSMUSG00000003873	BAX	1.087
ENSMUSG00000105867	Gm42517	1.196
ENSMUSG00000033967	Rnf225	2.272
ENSMUSG00000094281	Gm8034	1.220
ENSMUSG00000039133	9330171B17Rik	1.126
ENSMUSG00000086228	Ubap11	1.238
ENSMUSG00000032482	Cspg5	1.908
ENSMUSG00000044390	Tigd3	1.277
ENSMUSG00000017817	Jph2	1.519
ENSMUSG00000038400	Pmepa1	1.080
ENSMUSG00000039376	Synpo21	1.302
ENSMUSG00000032595	Cdhr4	1.012
ENSMUSG00000097186	Gm26595	1.324

ENSMUSG00000112652	AC160411.2	1.103
ENSMUSG00000025380	Fscn2	1.182
ENSMUSG00000029072	Tas1r3	1.014
ENSMUSG00000037295	Ldlrap1	1.014
ENSMUSG00000112246	AC121871.1	1.142
ENSMUSG00000097328	Tnfsf12	1.451
ENSMUSG00000042406	ATF4	2.861
ENSMUSG00000113100	CT009754.2	1.601
ENSMUSG00000035576	L3mbtl1	1.289
ENSMUSG00000000982	Ccl3	1.014
ENSMUSG00000041117	Ccdc8	2.399
ENSMUSG00000090291	Lrrc10b	1.057
ENSMUSG00000025650	Col7a1	2.006
ENSMUSG00000112496	AC121569.2	1.568
ENSMUSG00000034706	Dnaic2	1.389
ENSMUSG00000090210	Itga10	1.101
ENSMUSG00000040258	Nxph4	1.181
ENSMUSG00000086462	Gm13990	1.383
ENSMUSG00000007591	Tsk4	1.082
ENSMUSG00000034117	Ptgdr2	2.688
ENSMUSG00000073758	Sh3d21	1.317
ENSMUSG00000076376	Mir674	1.549
ENSMUSG00000051236	Msrb3	1.159
ENSMUSG00000030739	Myh14	1.349
ENSMUSG00000036853	Mcoln3	1.007
ENSMUSG00000036687	Tmem184a	1.132
ENSMUSG00000034664	Itga2b	1.311
ENSMUSG00000097974	Gm10605	1.39
ENSMUSG00000045777	Ifitm10	2.178
ENSMUSG00000051243	Islr2	1.019
ENSMUSG00000085295	4930430E12Rik	1.173
ENSMUSG00000022768	Ccdc116	1.054
ENSMUSG00000108555	Gm18310	1.195
ENSMUSG00000024922	Ovol1	1.197
ENSMUSG00000009075	Cabp7	1.052
ENSMUSG00000031791	Tmem38a	1.078
ENSMUSG00000038011	Dnah10	3.013
ENSMUSG00000003545	Fosb	1.555
ENSMUSG00000034881	Tbxa2r	1.937
ENSMUSG00000022237	Ankrd33b	1.409
ENSMUSG00000055945	Prr18	1.632
ENSMUSG00000024330	Col11a2	2.206
ENSMUSG00000026864	BIP	1.070
ENSMUSG00000037705	Tecta	1.433
ENSMUSG00000098235	Gm7497	1.089
ENSMUSG00000002763	Pex6	1.040

ENSMUSG0000004885	Crabp2	1.775
ENSMUSG00000110350	Gm10252	1.713
ENSMUSG00000079710	Gm3448	1.876
ENSMUSG00000030708	Dnajb13	1.348
ENSMUSG00000059674	Cdh24	1.452
ENSMUSG00000041566	Tssk1	1.290
ENSMUSG00000087434	Rab11fip4os1	1.797

**Table S4.** The differentially expressed down-regulated genes between the control and S-VO<sub>2</sub> in RAW264.7 macrophages.

Gene_id	Gene_name	Log <sub>2</sub> FC (S-VO <sub>2</sub> /Cont)
ENSMUSG00000021287	Xrcc3	-1.092
ENSMUSG00000044066	Cep68	-1.062
ENSMUSG00000062753	AI413582	-1.359
ENSMUSG00000085873	Ttc39aos1	-1.079
ENSMUSG00000065601	Mir146	-1.490
ENSMUSG00000028028	Alpk1	-1.135
ENSMUSG00000032398	Snape5	-1.141
ENSMUSG00000022372	Sla	-1.717
ENSMUSG00000021886	Gpr65	-1.258
ENSMUSG00000071796	6820431F20Rik	-1.005
ENSMUSG00000027737	Slc7a11	-1.024
ENSMUSG00000097347	Gm17275	-1.131
ENSMUSG00000021895	Arhgef3	-1.211
ENSMUSG00000018425	Dhx40	-1.094
ENSMUSG00000111375	Btbd8	-1.105
ENSMUSG00000021699	Pde4d	-1.163
ENSMUSG00000055782	Abcd2	-1.277
ENSMUSG00000031641	Cbr4	-1.008
ENSMUSG00000020303	Stc2	-1.018
ENSMUSG00000104348	Gm37691	-1.012
ENSMUSG00000068457	Uty	-1.022
ENSMUSG00000087153	Gm6483	-1.375
ENSMUSG00000102602	A930004J17Rik	-1.120
ENSMUSG00000029178	Klf3	-1.055
ENSMUSG00000035164	Zc3h12c	-1.164
ENSMUSG00000041225	Arhgap12	-1.268
ENSMUSG00000046546	Fam43a	-1.008
ENSMUSG00000030717	Nupr1	-1.160
ENSMUSG00000027615	Hps3	-1.018
ENSMUSG00000028525	Pde4b	-1.034
ENSMUSG00000021876	Rnase4	-1.091
ENSMUSG00000029419	Gm996	-1.073
ENSMUSG00000061852	Gm7582	-1.323
ENSMUSG00000022960	Donson	-1.050

ENSMUSG00000093622	Gm20703	-1.059
ENSMUSG00000103527	Gm37261	-1.005
ENSMUSG00000029650	Slc46a3	-1.494
ENSMUSG00000032690	Oas2	-1.141
ENSMUSG00000021127	Zfp3611	-1.077
ENSMUSG00000040093	Bmf	-1.283
ENSMUSG00000108732	2310043P16Rik	-1.176
ENSMUSG00000024778	Fas	-1.314
ENSMUSG00000025154	Arhgap19	-1.060
ENSMUSG00000073478	D730003I15Rik	-1.262
ENSMUSG00000041695	Kcnj2	-1.668
ENSMUSG00000022091	Sorbs3	-1.106
ENSMUSG00000032010	Usp2	-1.068
ENSMUSG00000031004	Mki67	-1.130
ENSMUSG00000021990	Spata13	-1.174
ENSMUSG00000103651	Gm37206	-1.182
ENSMUSG00000029490	Mfsd7a	-1.037
ENSMUSG00000021470	Ercc6l2	-1.025
ENSMUSG00000108845	Gm45090	-1.009
ENSMUSG00000043629	1700019D03Rik	-1.286
ENSMUSG00000046111	Cep295	-1.205
ENSMUSG00000073647	Gm10557	-1.055
ENSMUSG00000045193	Cirbp	-1.069
ENSMUSG00000038910	Plcl2	-1.018
ENSMUSG00000096221	1500002C15Rik	-1.469
ENSMUSG00000048216	Gpr85	-1.107
ENSMUSG00000019763	Rmnd1	-1.109
ENSMUSG00000062901	Klhl24	-1.180
ENSMUSG00000078606	Gm4070	-1.017
ENSMUSG00000027901	Dennd2d	-1.607
ENSMUSG00000005501	Usp40	-1.102
ENSMUSG00000096210	H1f0	-1.304
ENSMUSG00000026548	Slamf9	-1.191
ENSMUSG00000044966	Fbxo48	-1.331
ENSMUSG00000028497	Hacd4	-1.261
ENSMUSG00000026779	Mastl	-1.275
ENSMUSG00000062980	Cped1	-1.206
ENSMUSG00000037608	Bclaf1	-1.032
ENSMUSG00000105272	Gm43071	-1.173
ENSMUSG00000020399	Havcr2	-1.605
ENSMUSG00000097042	Gm17491	-1.260
ENSMUSG00000092274	Neat1	-1.819
ENSMUSG00000027122	Arl14ep	-1.178
ENSMUSG00000033952	Aspm	-1.073
ENSMUSG00000095123	Gm21781	-1.347
ENSMUSG00000053062	Jam2	-1.051

ENSMUSG00000042851	Zc3h6	-1.052
ENSMUSG00000026928	Card9	-1.260
ENSMUSG00000095403	Gm21092	-1.033
ENSMUSG00000031502	Col4a1	-1.105
ENSMUSG00000058515	Olfr933	-1.597
ENSMUSG00000037926	Ssh2	-1.078
ENSMUSG00000054409	Tmem74	-1.070
ENSMUSG00000023940	Sgol1	-1.108
ENSMUSG00000069892	9930111J21Rik2	-1.165
ENSMUSG00000044583	Tlr7	-1.173
ENSMUSG00000049164	Zfp518a	-1.273
ENSMUSG00000026315	Serpinb8	-1.414
ENSMUSG00000053641	Dennd4a	-1.106
ENSMUSG00000085287	4833418N02Rik	-1.109
ENSMUSG00000090799	Klhl33	-1.527
ENSMUSG00000050103	Agmo	-1.170
ENSMUSG00000107017	Gm43196	-1.319
ENSMUSG00000057894	Zfp329	-1.126
ENSMUSG00000022364	Tbc1d31	-1.042
ENSMUSG00000051169	Rpusd3	-1.204
ENSMUSG00000104548	Gm43857	-1.150
ENSMUSG00000091575	2010016I18Rik	-1.775
ENSMUSG00000057110	Cntrl	-1.256
ENSMUSG00000047735	Samd9l	-1.297
ENSMUSG00000097572	Gm26797	-1.130
ENSMUSG00000078671	Chd2	-1.111
ENSMUSG00000038564	Ift172	-1.021
ENSMUSG00000041642	Kif21b	-1.148
ENSMUSG00000094915	AC168977.2	-1.098
ENSMUSG00000042129	Rassf4	-1.040
ENSMUSG00000048424	Ranbp31	-1.792
ENSMUSG00000106415	Gm42893	-1.101
ENSMUSG00000108738	Gm44777	-1.201
ENSMUSG00000043336	Filip1l	-1.923
ENSMUSG00000107215	Gm43197	-1.840
ENSMUSG00000036890	Gtdc1	-1.086
ENSMUSG00000020256	Aldh1l2	-1.273
ENSMUSG00000041132	N4bp2l1	-1.244
ENSMUSG00000097195	Snhg5	-1.087
ENSMUSG00000078942	Naip6	-1.067
ENSMUSG00000022357	Klhl38	-1.017
ENSMUSG00000110849	CT025680.2	-1.192
ENSMUSG00000024883	Rin1	-1.448
ENSMUSG00000037646	Vps13b	-1.043
ENSMUSG00000045092	S1pr1	-1.030
ENSMUSG00000079293	Clec7a	-1.056

ENSMUSG00000008496	Pou2f2	-1.058
ENSMUSG00000105078	Gm35911	-1.286
ENSMUSG00000010461	Eya4	-1.271
ENSMUSG000000089756	Zfp966	-1.057
ENSMUSG000000025014	Dntt	-1.331
ENSMUSG000000056673	Kdm5d	-1.143
ENSMUSG000000099041	Gm28035	-1.674
ENSMUSG000000030745	Il21r	-1.072
ENSMUSG000000058291	Zfp68	-1.042
ENSMUSG000000054855	Rnd1	-1.041
ENSMUSG000000072915	Gm12258	-1.052
ENSMUSG000000072889	Nfxl1	-1.142
ENSMUSG000000058402	Zfp420	-1.139
ENSMUSG000000096802	Gm15433	-1.461
ENSMUSG000000071656	Lrrn4cl	-1.527
ENSMUSG00000100017	2410022M11Rik	-1.236
ENSMUSG000000042579	4632404H12Rik	-1.088
ENSMUSG000000056215	Lrguk	-1.399
ENSMUSG000000028542	Slc6a9	-1.232
ENSMUSG000000090186	Gm7592	-1.412
ENSMUSG000000037913	Tmem156	-1.053
ENSMUSG000000040165	Cd209c	-1.070
ENSMUSG000000040943	Tet2	-1.042
ENSMUSG000000047153	Khyn	-1.127
ENSMUSG000000060301	2610008E11Rik	-1.305
ENSMUSG000000056130	Ticam2	-1.449
ENSMUSG000000051166	Eml5	-1.064
ENSMUSG000000032712	2810474O19Rik	-1.356
ENSMUSG000000069893	9930111J21Rik1	-1.021
ENSMUSG000000011831	Evi5	-1.007
ENSMUSG000000046027	Stard5	-1.228
ENSMUSG000000028838	Extl1	-1.352
ENSMUSG000000059540	Tcea2	-1.032
ENSMUSG000000028179	Cth	-1.013
ENSMUSG000000029165	Agbl5	-1.326
ENSMUSG000000020142	Slc1a4	-1.348
ENSMUSG000000039158	Akna	-1.012
ENSMUSG000000023952	Gtpbp2	-1.042
ENSMUSG00000104350	Gm38244	-1.908
ENSMUSG000000092341	Malat1	-1.541
ENSMUSG000000020381	Mrnip	-1.168
ENSMUSG000000037533	Rapgef6	-1.081
ENSMUSG00000107577	Gm44103	-1.089
ENSMUSG000000004698	Hdac9	-1.453
ENSMUSG000000035967	Ints6l	-1.527
ENSMUSG000000034959	Rubcnl	-1.396

ENSMUSG00000029544	Cabp1	-1.460
ENSMUSG00000027438	Napb	-1.061
ENSMUSG00000007872	Id3	-1.215
ENSMUSG00000062310	Glrp1	-1.136
ENSMUSG00000032607	Amt	-1.019
ENSMUSG00000056919	Cep162	-1.384
ENSMUSG00000074342	I830077J02Rik	-1.134
ENSMUSG00000025323	Sp4	-1.065
ENSMUSG00000034160	Ogt	-1.017
ENSMUSG00000020826	Nos2	-1.336
ENSMUSG00000020275	Rel	-1.030
ENSMUSG00000022667	Cd200r1	-1.021
ENSMUSG00000041147	Brca2	-1.220
ENSMUSG00000056749	Nfil3	-1.157
ENSMUSG00000082082	Gm13230	-1.110
ENSMUSG00000003032	Klf4	-1.170
ENSMUSG00000066510	Ankdd1a	-1.294
ENSMUSG00000057329	Bcl2	-1.302
ENSMUSG00000054293	A630033H20Rik	-1.080
ENSMUSG00000046688	Tifa	-1.283
ENSMUSG00000050555	Hyls1	-1.004

**Table S5.** The differentially expressed up-regulated genes between the control and M-VO<sub>2</sub> in RAW264.7 macrophages.

Gene_id	Gene_name	Log <sub>2</sub> FC(M-VO <sub>2</sub> /Cont)
ENSMUSG00000051747	Ttn	1.389
ENSMUSG00000026475	Rgs16	1.285
ENSMUSG00000024873	Cnih2	1.819
ENSMUSG00000055865	Fam19a3	1.243
ENSMUSG00000053964	Lgals4	1.052
ENSMUSG00000107092	Gm7993	1.445
ENSMUSG00000035745	Grin3b	1.637
ENSMUSG00000049928	Glp2r	1.334
ENSMUSG00000091685	Gm17359	1.662
ENSMUSG00000070385	Ampd1	1.388
ENSMUSG00000029135	Fosl2	1.037
ENSMUSG00000031898	Dpep3	1.183
ENSMUSG00000027579	Srms	1.307
ENSMUSG00000068957	4930589L23Rik	1.133
ENSMUSG00000045349	Sh2d5	1.161
ENSMUSG00000027329	Spef1	1.440
ENSMUSG00000027950	Chrb2	1.085
ENSMUSG00000031861	Lpar2	1.544
ENSMUSG00000075585	6330403L08Rik	1.657
ENSMUSG00000062591	Tubb4a	1.242



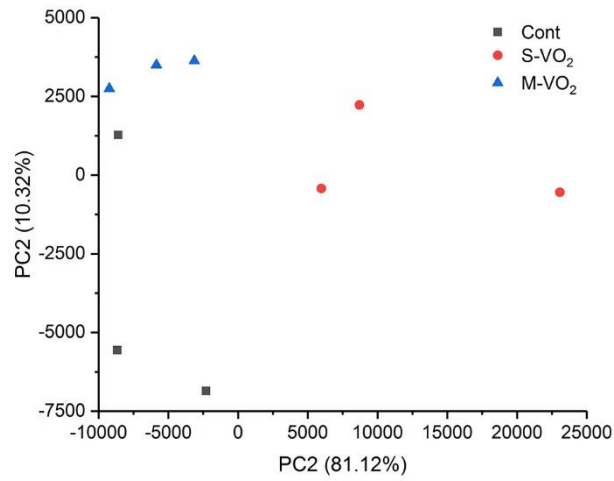
ENSMUSG00000048458	Fam212b	1.183
ENSMUSG00000034416	Pkd112	1.090
ENSMUSG00000103966	Gm37120	2.046
ENSMUSG00000074340	Ovgp1	1.153
ENSMUSG00000033717	Adra2a	1.173
ENSMUSG00000002100	Mybpc3	2.229
ENSMUSG00000030124	Lag3	1.001
ENSMUSG00000028794	A3galt2	1.318
ENSMUSG00000086962	Gm12248	1.021
ENSMUSG00000035112	Wnk4	1.108
ENSMUSG00000043243	Fam129c	1.055
ENSMUSG00000027570	Col9a3	1.144
ENSMUSG00000030680	Pagr1a	1.035
ENSMUSG00000018752	Tnfsfm13	1.074
ENSMUSG00000025986	Slc39a10	1.004
ENSMUSG00000097855	A930007I19Rik	1.338
ENSMUSG00000019326	Aoc3	2.253
ENSMUSG00000073627	C130036L24Rik	1.288
ENSMUSG00000109953	5430430B14Rik	1.684
ENSMUSG00000002565	Scin	1.851
ENSMUSG00000023247	Guca2a	1.256
ENSMUSG00000097337	Gm26606	1.569
ENSMUSG00000068699	Flnc	1.030
ENSMUSG00000040283	Btnl9	1.183
ENSMUSG00000019464	Ptger1	1.790
ENSMUSG00000109198	D7Bwg0826e	1.069
ENSMUSG00000103845	Gm19026	1.174
ENSMUSG00000002006	Pdzd4	1.257
ENSMUSG00000049515	Espnl	1.205
ENSMUSG00000085875	Gm12905	1.289
ENSMUSG00000051107	Gm15440	1.057
ENSMUSG00000023993	Trem1l	1.193
ENSMUSG00000054206	Gzmm	1.324
ENSMUSG00000091952	Gm17709	1.008
ENSMUSG00000033615	Cplx1	1.042
ENSMUSG00000032657	Fam189b	1.296
ENSMUSG00000043421	Hilpda	1.015
ENSMUSG00000033967	Rnf225	1.820
ENSMUSG00000044390	Tigd3	1.066
ENSMUSG00000001027	Scn4a	1.512
ENSMUSG00000113100	CT009754.2	1.627
ENSMUSG00000025650	Col7a1	1.577
ENSMUSG00000112496	AC121569.2	1.112
ENSMUSG00000090210	Itga10	1.163
ENSMUSG00000034117	Ptgdr2	1.660
ENSMUSG00000034664	Itga2b	1.147

ENSMUSG00000045777	Ifitm10	1.006
ENSMUSG00000022237	Ankrd33b	1.035
ENSMUSG00000055945	Prr18	1.106
ENSMUSG00000024330	Col11a2	2.113
ENSMUSG00000110350	Gm10252	1.163
ENSMUSG00000079710	Gm3448	1.193
ENSMUSG00000030708	Dnajb13	1.112
ENSMUSG00000087434	Rab11fip4os1	1.336
ENSMUSG00000085586	Gm11613	1.234
ENSMUSG00000107944	Gm44280	1.316
ENSMUSG00000050675	Gp1ba	1.242
ENSMUSG00000024347	Psd2	1.776
ENSMUSG00000055494	Gm14168	1.174
ENSMUSG00000021403	Serpinb9b	1.126
ENSMUSG00000009145	Dqx1	1.606
ENSMUSG00000103588	Gm18445	1.069
ENSMUSG00000078486	Perm1	1.341
ENSMUSG00000004105	Angptl2	1.443
ENSMUSG00000053693	Mast1	1.578
ENSMUSG00000078816	Prkcg	1.043
ENSMUSG00000030882	Dnhd1	1.796
ENSMUSG00000038751	Ptk6	1.193
ENSMUSG00000105628	Gm43350	1.006
ENSMUSG00000028158	Mttp	1.192
ENSMUSG00000031302	Nlgn3	1.166
ENSMUSG00000001739	Cldn15	1.176
ENSMUSG00000086075	Gm15728	1.211
ENSMUSG00000043099	Hic1	1.050
ENSMUSG00000079652	Fam71f2	1.071
ENSMUSG00000001930	Vwf	1.089
ENSMUSG00000096740	Lbhd1	1.296
ENSMUSG00000004098	Col5a3	1.036
ENSMUSG00000073633	Fbxo36	1.185
ENSMUSG00000032131	Abcg4	1.556
ENSMUSG00000026604	Ptpn14	1.426
ENSMUSG00000020793	Galr2	1.094
ENSMUSG00000040797	Iqsec3	1.023
ENSMUSG00000105852	Gm42890	1.167
ENSMUSG00000110218	Gm20219	1.373
ENSMUSG00000031486	Adgra2	1.130
ENSMUSG00000036091	Hyal3	1.005
ENSMUSG00000041842	Fhdc1	1.333
ENSMUSG00000058743	Kcnj14	1.062
ENSMUSG00000038486	Sv2a	1.100
ENSMUSG00000016356	Col20a1	1.647

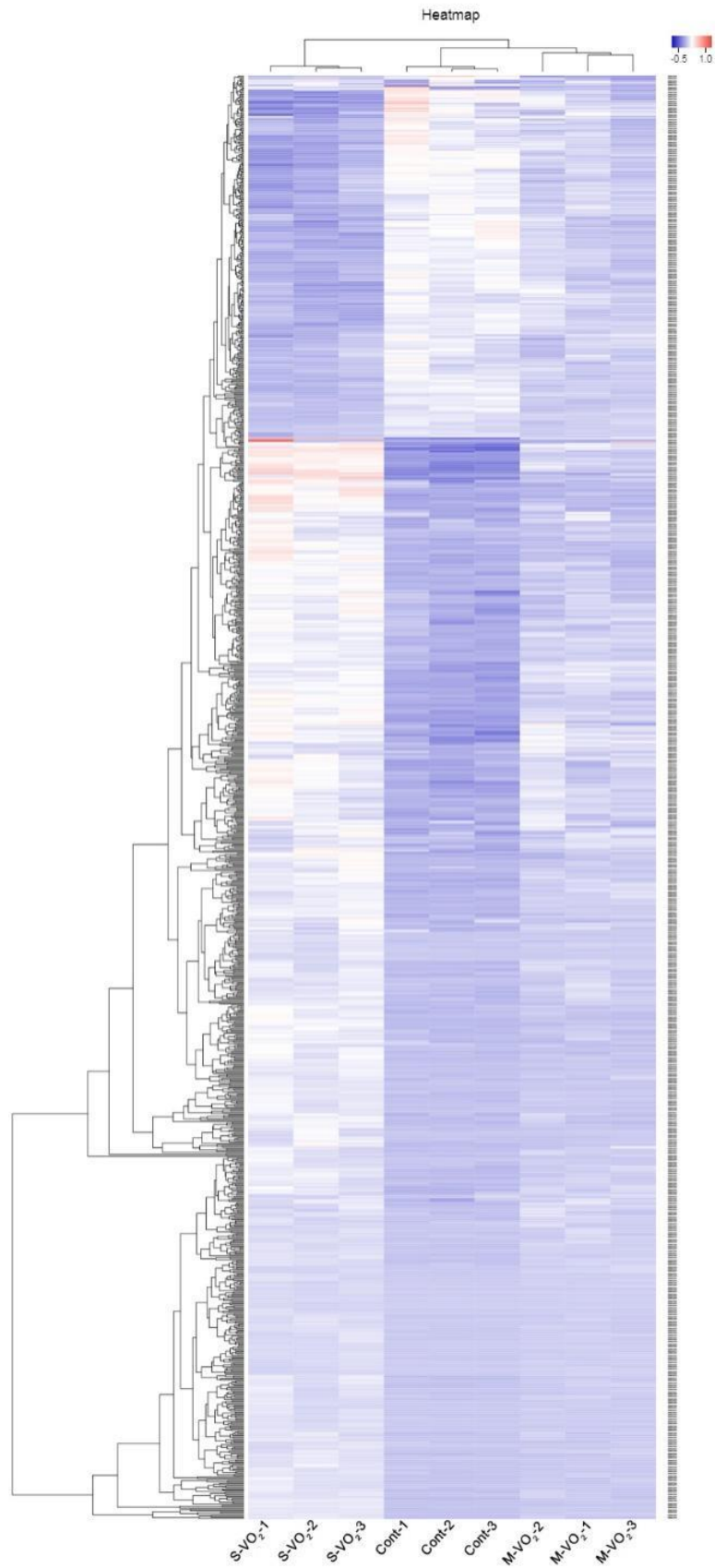
---

**Table S6.** The differentially expressed down-regulated genes between the control and M-VO<sub>2</sub> in RAW264.7 macrophages.

Gene_id	Gene_name	Log <sub>2</sub> FC(M-VO <sub>2</sub> /Cont)
ENSMUSG00000091780	Sco2	-1.122
ENSMUSG00000024011	Pi16	-1.182
ENSMUSG00000040618	Pck2	-1.091
ENSMUSG00000048424	Ranbp31	-1.728
ENSMUSG00000036390	Gadd45a	-1.066
ENSMUSG00000020256	Aldh112	-1.089
ENSMUSG00000036820	Amdhd2	-1.011
ENSMUSG00000024883	Rin1	-1.069
ENSMUSG00000028542	Slc6a9	-1.477
ENSMUSG00000046027	Stard5	-1.132
ENSMUSG00000028838	Extl1	-1.174
ENSMUSG00000034959	Rubcnl	-1.075
ENSMUSG00000007872	Id3	-1.424
ENSMUSG00000020826	Nos2	-1.048
ENSMUSG00000006638	Abhd1	-1.09
ENSMUSG00000056749	Nfil3	-1.078
ENSMUSG00000057329	Bcl2	-1.054
ENSMUSG00000062753	AI413582	-1.344
ENSMUSG00000059412	Fxyd2	-1.095
ENSMUSG00000030785	Cox6a2	-1.020
ENSMUSG00000022372	Sla	-1.187
ENSMUSG00000020604	Arsg	-1.005
ENSMUSG00000032715	Trib3	-1.252
ENSMUSG00000061852	Gm7582	-1.073
ENSMUSG00000029650	Slc46a3	-1.100
ENSMUSG00000073478	D730003I15Rik	-1.059
ENSMUSG00000032010	Usp2	-1.350
ENSMUSG00000029815	Malsu1	-1.095
ENSMUSG00000096221	1500002C15Rik	-1.020



**Figure S1.** Principal component analysis (PCA) of RNA-seq results of the control, the S-VO<sub>2</sub> group, and the M-VO<sub>2</sub> group.



**Figure S2.** Hierarchical clustering image showing the differential gene expression profiles of Raw264.7 cells after exposure to S-VO<sub>2</sub> and M-VO<sub>2</sub>.

FcγR-MEDIATED PHAGOCYTOSIS

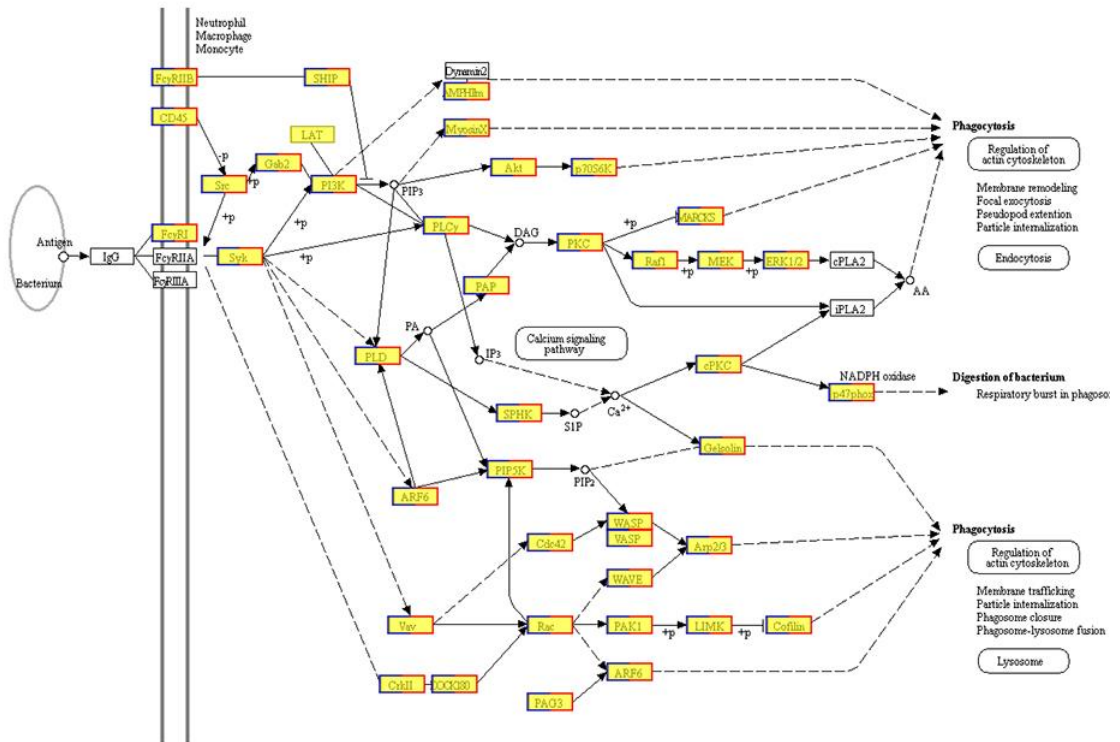


Figure S3. KEGG pathway of Fc gamma R-mediated phagocytosis.

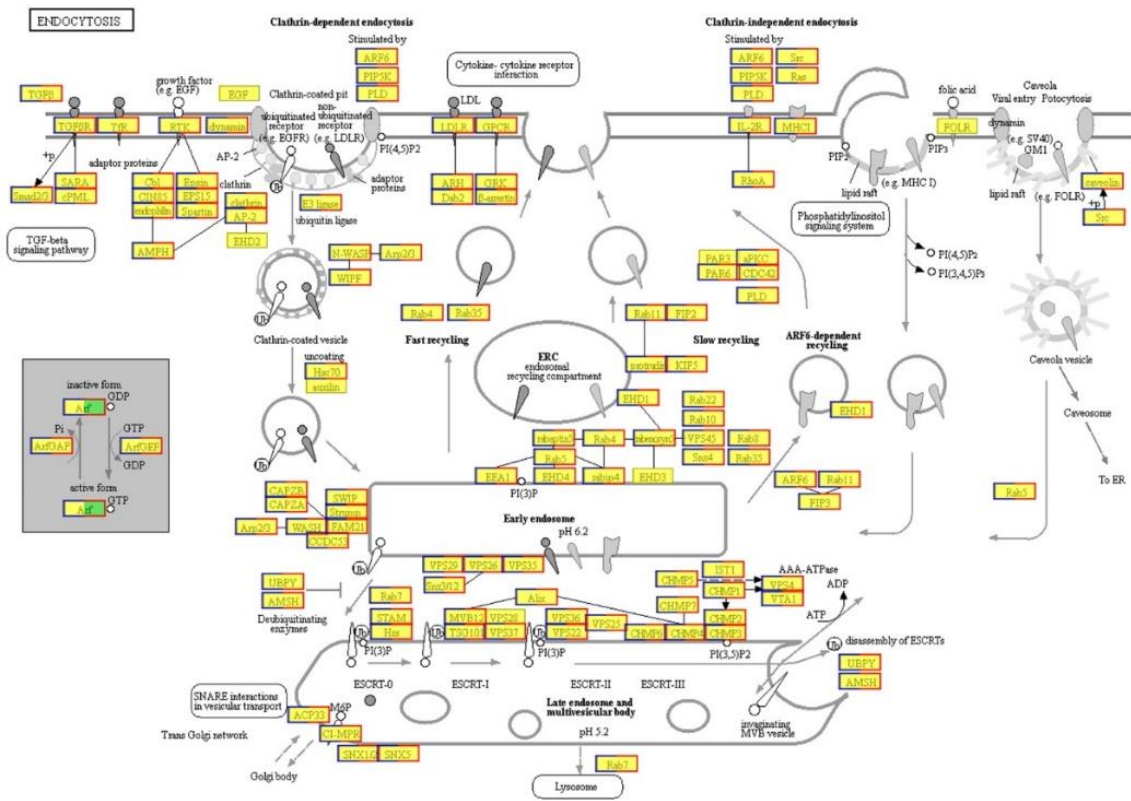


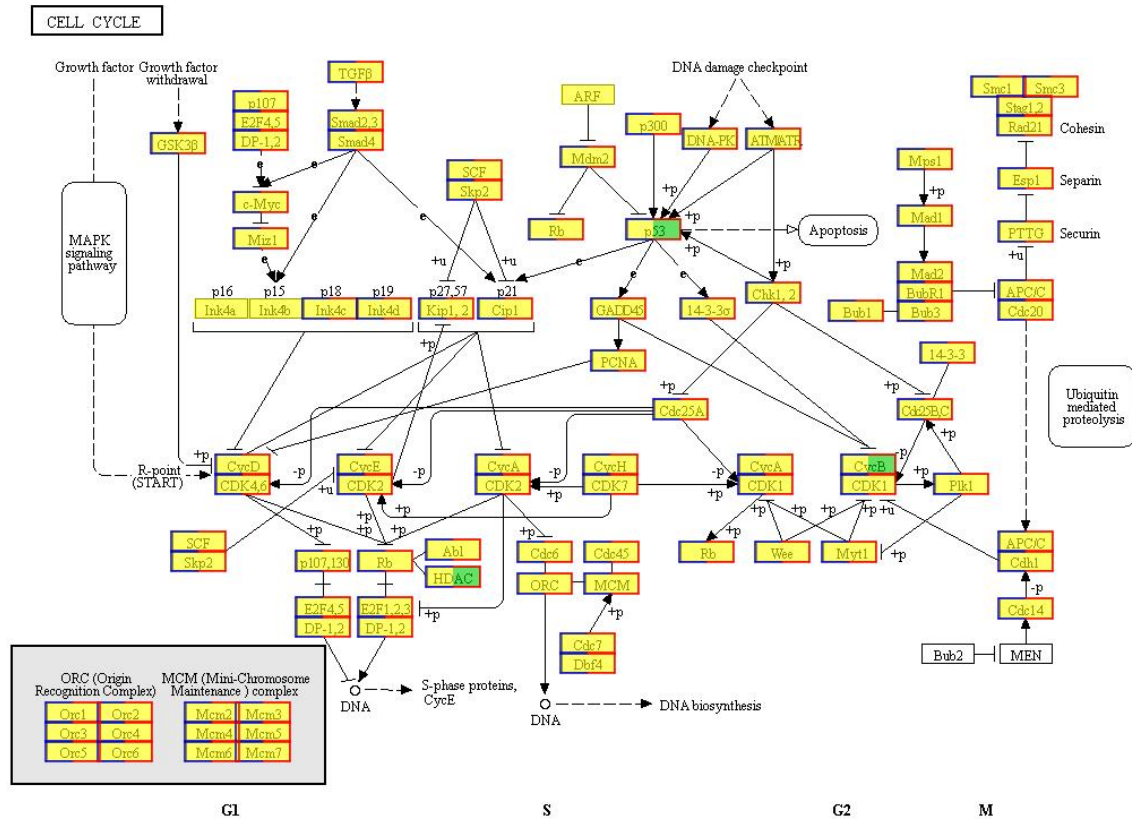
Figure S4. KEGG pathway of endocytosis.







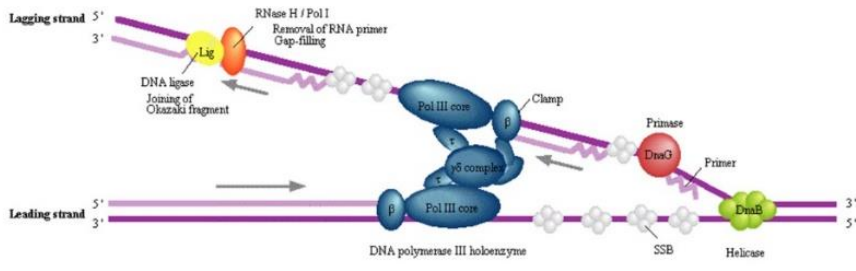




**Figure S9. KEGG pathway of cell cycle.**

DNA REPLICATION

Replication complex (Bacteria)



DNA polymerase III holoenzyme

		β	
		ε	
		α	
		γ & τ	
Clamp	ψ	δ'	
	β	δ	

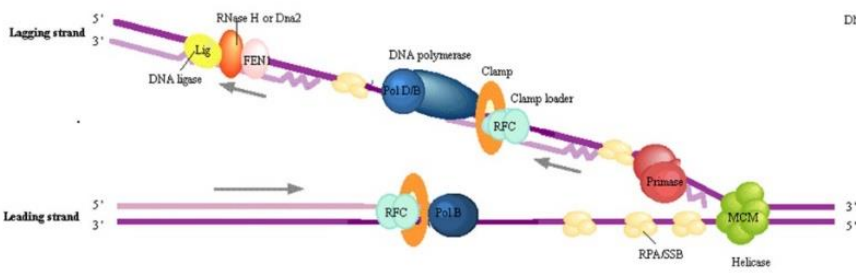
Pol III core

γδ complex

Helicase	Primase	
DnaB	DnaG	SSB

RNaseH	DNA polymerase I	DNA ligase
RNaseHI	Dpol	Lig
RNaseHII		
RNaseHIII		

Replication complex (Archaea)



DNA polymerase B DNA polymerase D

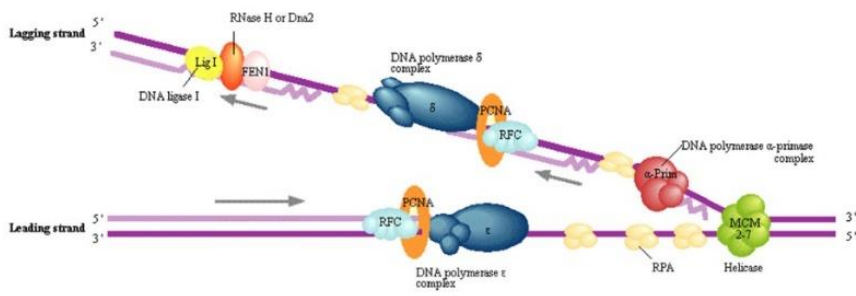
PolB	PolD1	
	PolD2	

Helicase	Primase	RFA/SSB
MCM	Pri1	SPA
	Pri2	

Clamp	Clamp loader	RNaseH
PCNA	RFS	RNaseHI
	RfL	RNaseHII

Helicase	DNA ligase	
Dna2	Lig	

Replication complex (Eukaryotes)



DNA polymerase α-primase complex

α1	α2	Pri1	Pri2
----	----	------	------

DNA polymerase δ complex

δ1	δ2	δ3	δ4
----	----	----	----

DNA polymerase ε complex

ε1	ε2	ε3	ε4
----	----	----	----

MCM complex (helicase)

Mcm2	Mcm3	
Mcm4	Mcm5	
Mcm6	Mcm7	

RFA

RFA1
RFA2/4
RFA3

Clamp	Clamp loader	
PCNA	RFC1	RFC2/4
		RFC3/5

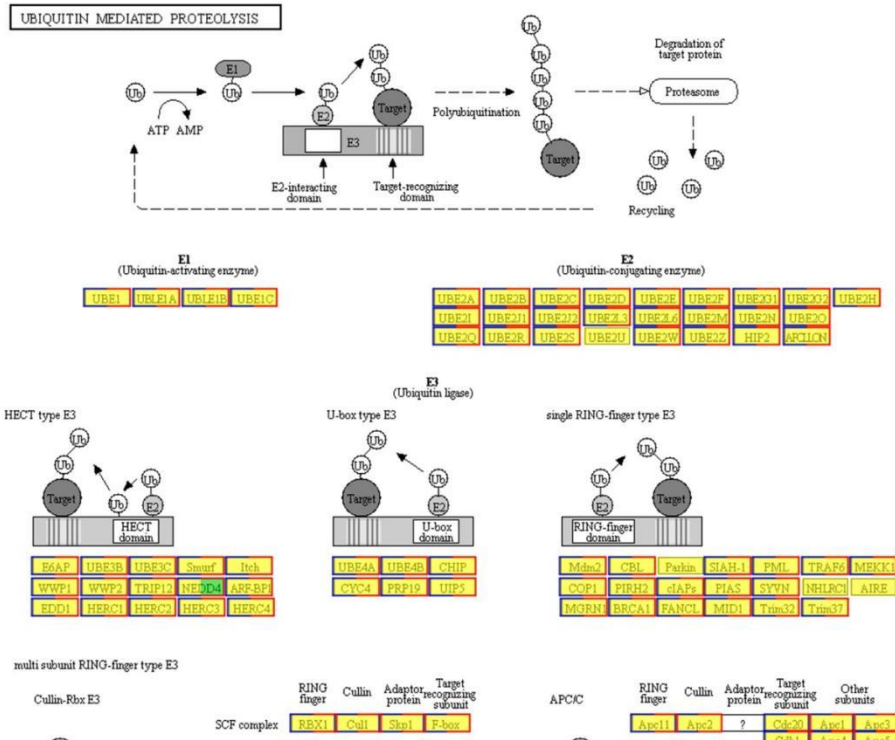
RNaseHI	RNaseHII	
RNaseHI	RNaseG	RNaseH
	RNaseG	RNaseH

Helicase	DNA ligase	
Dna2	Lig1	

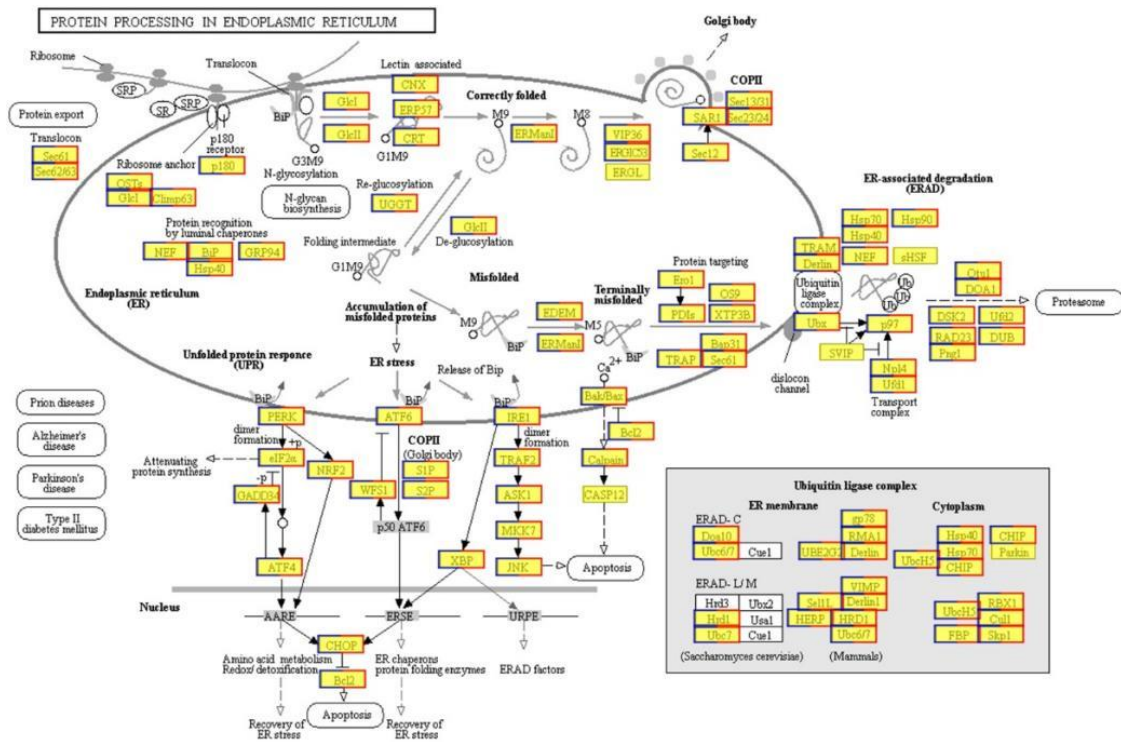
Figure S10. KEGG pathway of DNA replication.







**Figure S14.** KEGG pathway of ubiquitin mediated proteolysis.



**Figure S15.** KEGG pathway of protein processing in endoplasmic reticulum.



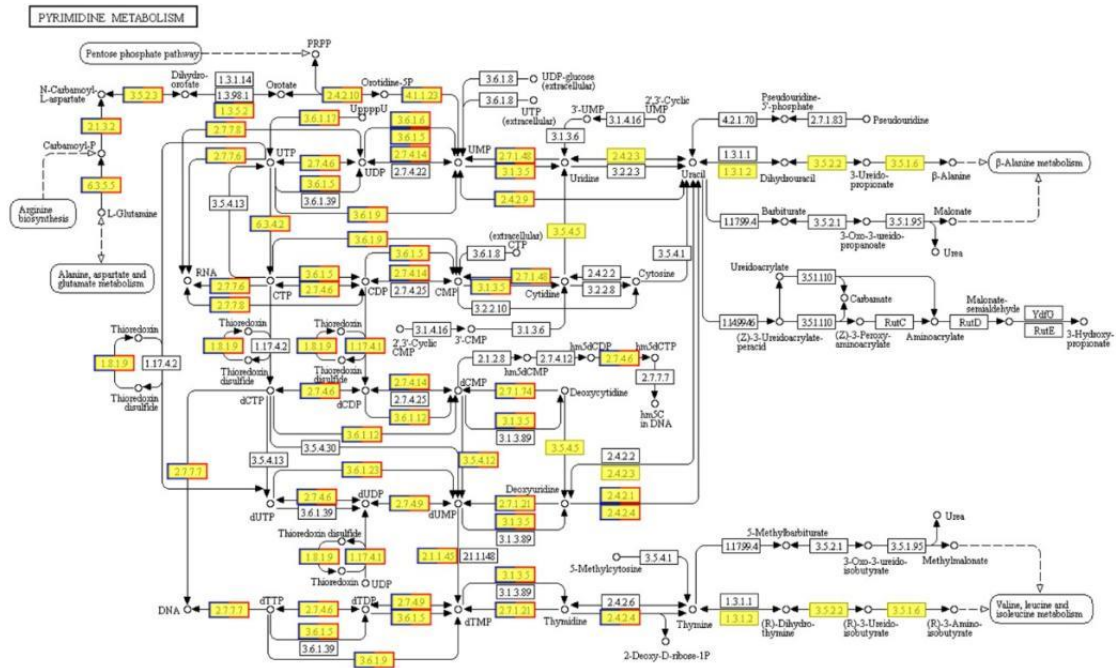


Figure S16. KEGG pathway of pyrimidine metabolism.

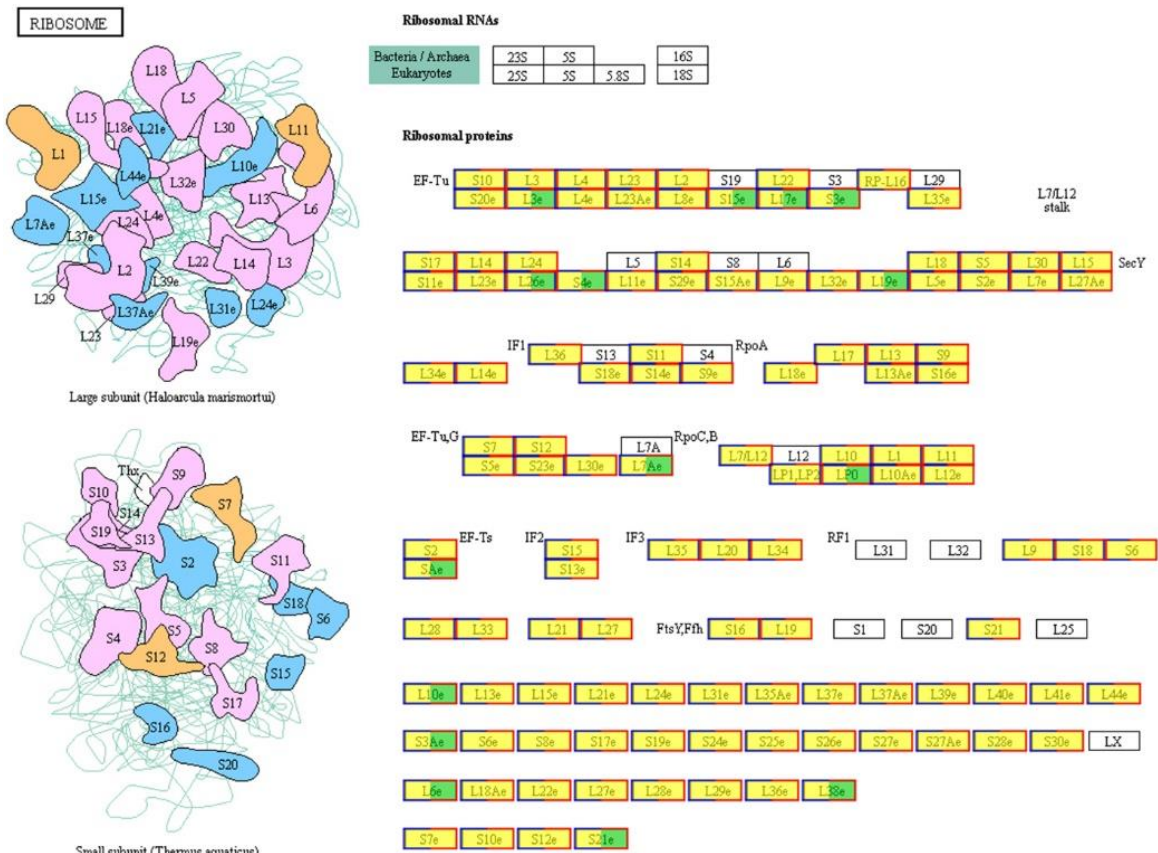
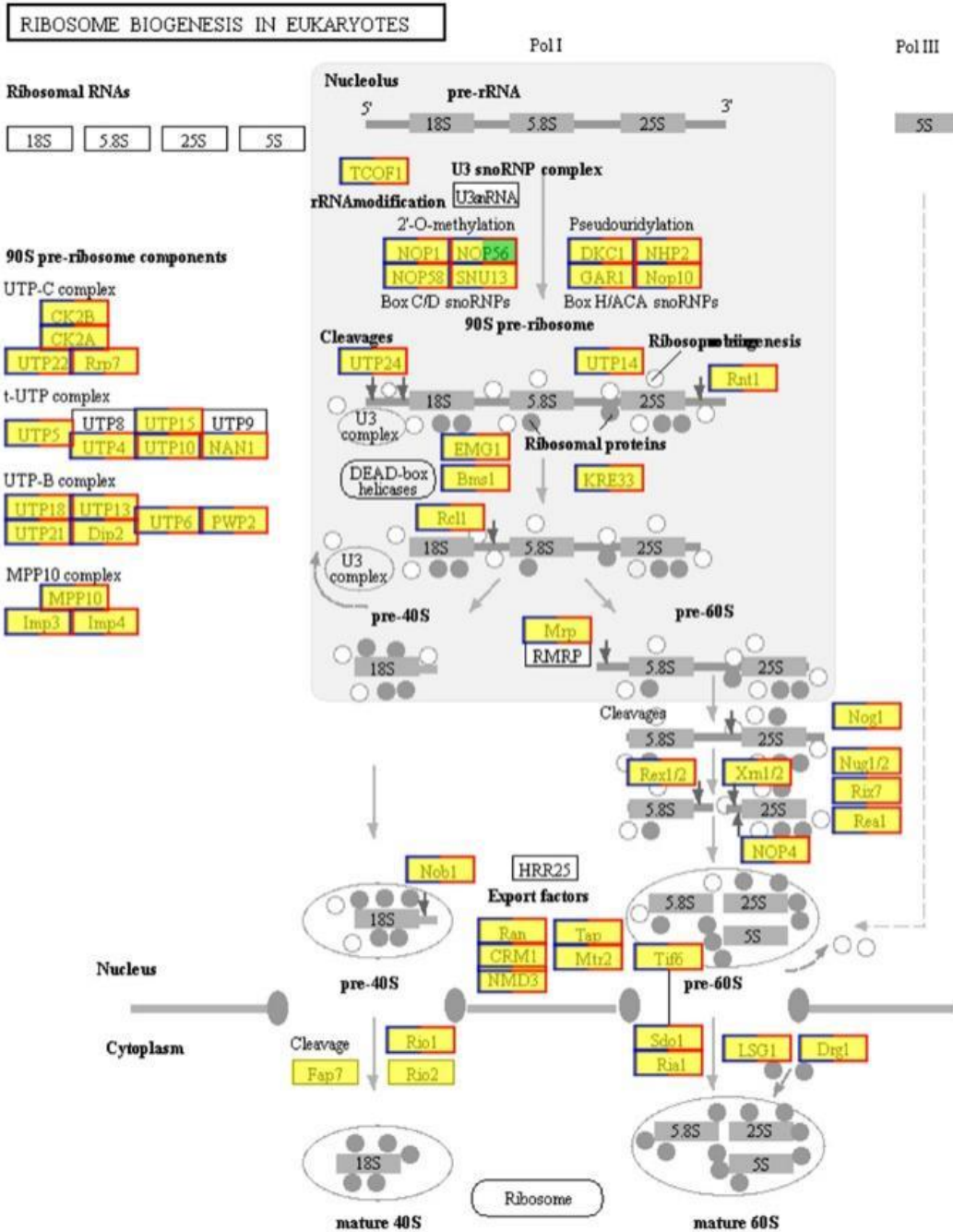


Figure S17. KEGG pathway of ribosome.



**Figure S18.** KEGG pathway of ribosome biogenesis in eukaryotes.

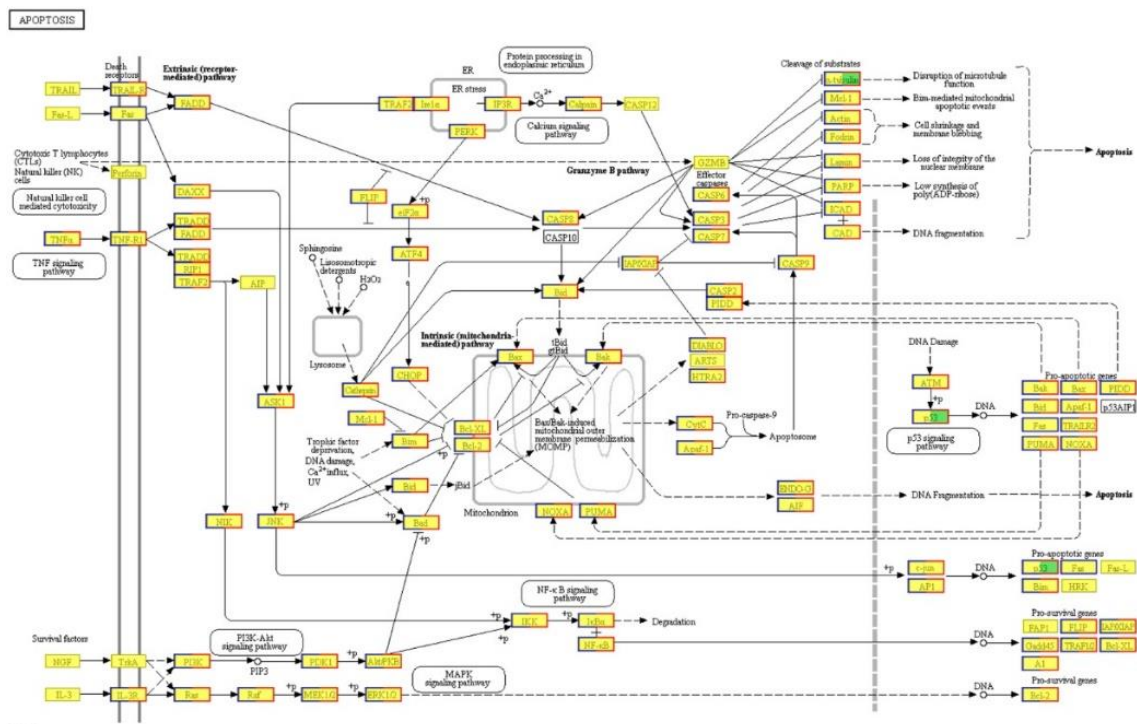


Figure S19. KEGG pathway of apoptosis.

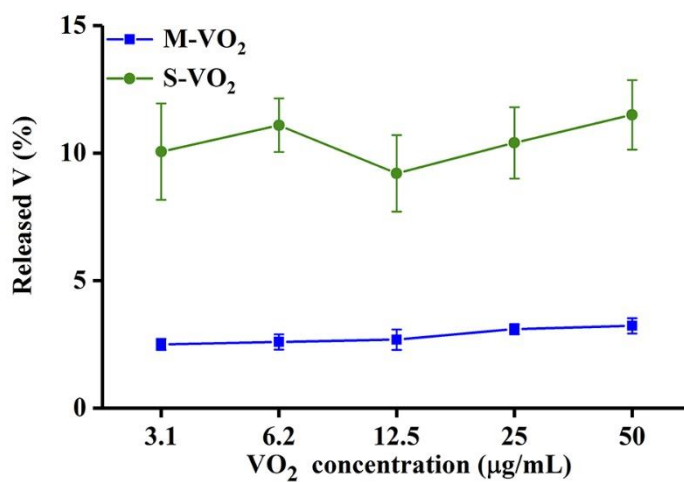


Figure S20. Dissolutions of VO<sub>2</sub> in different concentration in culture medium under the cell culture condition.