

# Ferroptosis-Associated IncRNA Prognostic Signature Predicts Prognosis and Immune Response in Clear Cell Renal Cell Carcinoma

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## *Supplementary Material*

### 1 Supplementary Tables

#### 1.1 Supplementary Table S1. A list of ferroptosis-related genes

|         |
|---------|
| RPL8    |
| IREB2   |
| ATP5MC3 |
| CS      |
| EMC2    |
| ACSF2   |
| NOX1    |
| CYBB    |
| NOX3    |
| NOX4    |
| NOX5    |
| DUOX1   |
| DUOX2   |
| G6PD    |
| PGD     |
| VDAC2   |
| PIK3CA  |

|           |
|-----------|
| FLT3      |
| SCP2      |
| TP53      |
| ACSL4     |
| LPCAT3    |
| NRAS      |
| KRAS      |
| HRAS      |
| TF        |
| TFRC      |
| TFR2      |
| SLC38A1   |
| SLC1A5    |
| GLS2      |
| GOT1      |
| CARS1     |
| ALOX5     |
| KEAP1     |
| HMOX1     |
| ATG5      |
| ATG7      |
| NCOA4     |
| ALOX12    |
| ALOX12B   |
| ALOX15    |
| ALOX15B   |
| ALOXE3    |
| PHKG2     |
| ACO1      |
| G6PDX     |
| ULK1      |
| ATG3      |
| ATG4D     |
| BECN1     |
| MAP1LC3A  |
| GABARAPL2 |

|           |
|-----------|
| GABARAPL1 |
| ATG16L1   |
| WIP1      |
| WIP2      |
| SNX4      |
| ATG13     |
| ULK2      |
| SAT1      |
| EGFR      |
| MAPK3     |
| MAPK1     |
| BID       |
| ZEB1      |
| DPP4      |
| CDKN2A    |
| PEBP1     |
| SOCS1     |
| CDO1      |
| MYB       |
| MAPK8     |
| MAPK9     |
| CHAC1     |
| MAPK14    |
| LINC00472 |
| PRKAA2    |
| PRKAA1    |
| ELAVL1    |
| BAP1      |
| ABCC1     |
| MIR6852   |
| ACVR1B    |
| TGFBR1    |
| EPAS1     |
| HILPDA    |
| HIF1A     |
| IFNG      |
| ANO6      |

|             |
|-------------|
| LPIN1       |
| HMGB1       |
| TNFAIP3     |
| TLR4        |
| ATF3        |
| ATM         |
| YY1AP1      |
| EGLN2       |
| MIOX        |
| TAZ         |
| MTDH        |
| IDH1        |
| SIRT1       |
| FBXW7       |
| PANX1       |
| DNAJB6      |
| BACH1       |
| LONP1       |
| CD82        |
| IL1B        |
| CTSB        |
| POR         |
| CYB5R1      |
| ELOVL5      |
| FADS1       |
| FBW7        |
| PTEN        |
| NR1D1       |
| NR1D2       |
| TBK1        |
| IL6         |
| USP7        |
| miR-182-5p  |
| miR-378a-3p |
| ATF4        |
| AQP3        |

|           |
|-----------|
| AQP5      |
| AQP8      |
| LINC00618 |
| MT1DP     |
| PEX10     |
| AGPAT3    |
| PEX12     |
| CHP1      |
| GPAT4     |
| BRPF1     |
| OSBPL9    |
| INTS2     |
| MMD       |
| CYP4F8    |
| MLLT1     |
| TTPA      |
| GRIA3     |
| EPT1      |
| POM121L12 |
| LIG3      |
| AEBP2     |
| AGPS      |
| CDCA3     |
| PEX2      |
| PEX6      |
| TIMM9     |
| DCAF7     |
| LCE2C     |
| FAR1      |
| PHF21A    |
| SMAD7     |
| LYRM1     |
| AMN       |
| PEX3      |
| MTCH1     |
| ACADSB    |
| PVT1      |

|                  |
|------------------|
| hsa_circ_0008367 |
| SLC39A14         |
| MAP3K11          |
| GSK3B            |
| SLC7A11          |
| GPX4             |
| AKR1C1           |
| AKR1C2           |
| AKR1C3           |
| RB1              |
| HSPB1            |
| HSF1             |
| GCLC             |
| NFE2L2           |
| SQSTM1           |
| NQO1             |
| HMOX1            |
| FTH1             |
| MUC1             |
| SLC3A2           |
| MT1G             |
| SLC40A1          |
| CISD1            |
| FANCD2           |
| FTMT             |
| HSPA5            |
| ATF4             |
| TP53             |
| HELLS            |
| SCD              |
| FADS2            |
| SRC              |
| STAT3            |
| PML              |
| MTOR             |
| NFS1             |

|           |
|-----------|
| TP63      |
| CDKN1A    |
| MIR137    |
| ENPP2     |
| VDAC2     |
| FH        |
| CISD2     |
| MIR9-1    |
| MIR9-2    |
| MIR9-3    |
| CBS       |
| ISCU      |
| ACSL3     |
| OTUB1     |
| CD44      |
| LINC00336 |
| BRD4      |
| PRDX6     |
| MIR17     |
| SESN2     |
| NF2       |
| ARNTL     |
| HIF1A     |
| JUN       |
| CA9       |
| TMBIM4    |
| PLIN2     |
| MIR212    |
| Fer1HCH   |
| AIFM2     |
| LAMP2     |
| ZFP36     |
| PROM2     |
| CHMP5     |
| CHMP6     |
| CAV1      |
| GCH1      |

|          |
|----------|
| SIRT3    |
| DAZAP1   |
| PIR      |
| FTL      |
| HCAR1    |
| SLC16A1  |
| RRM2     |
| NR4A1    |
| PIK3CA   |
| RPTOR    |
| SREBF1   |
| SREBF2   |
| FZD7     |
| P4HB     |
| NT5DC2   |
| BCAT2    |
| PLA2G6   |
| MIR424   |
| PARK7    |
| FXN      |
| SUV39H1  |
| ATF2     |
| ACOT1    |
| ALDH3A2  |
| STK11    |
| FNDC5    |
| CircIL4R |
| CDH1     |
| MIR214   |
| NEDD4L   |
| TF       |
| BRD2     |
| BRD3     |
| BRDT     |
| DECR1    |
| PTGS2    |

|           |
|-----------|
| DUSP1     |
| NOS2      |
| NCF2      |
| MT3       |
| UBC       |
| ALB       |
| TXNRD1    |
| SRXN1     |
| GPX2      |
| BNIP3     |
| OXSRI     |
| SELENOS   |
| ANGPTL7   |
| CHAC1     |
| SLC7A11   |
| DDIT4     |
| LOC284561 |
| ASNS      |
| TSC22D3   |
| DDIT3     |
| JDP2      |
| SESN2     |
| SLC1A4    |
| PCK2      |
| TXNIP     |
| VLDLR     |
| GPT2      |
| PSAT1     |
| LURAP1L   |
| SLC7A5    |
| HERPUD1   |
| XBP1      |
| ATF3      |
| SLC3A2    |
| CBS       |
| ATF4      |
| ZNF419    |

|                    |
|--------------------|
| KLHL24             |
| TRIB3              |
| ZFP69B             |
| ATP6V1G2           |
| VEGFA              |
| GDF15              |
| TUBE1              |
| ARRDC3             |
| CEBPG              |
| SNORA16A           |
| RGS4               |
| BLOC1S5-<br>TXNDC5 |
| LOC390705          |
| EIF2S1             |
| KIM-1              |
| IL6                |
| CXCL2              |
| RELA               |
| HSD17B11           |
| AGPAT3             |
| SETD1B             |
| HMOX1              |
| TF                 |
| FTL                |
| RPL8               |
| ATP5MC3            |
| TFRC               |
| MAFG               |
| IL33               |
| FTH1               |
| SLC40A1            |
| GPX4               |
| HAMP               |
| HSPB1              |
| NFE2L2             |

|         |
|---------|
| STEAP3  |
| DRD5    |
| DRD4    |
| MAP3K5  |
| MAPK14  |
| SLC2A1  |
| SLC2A3  |
| SLC2A6  |
| SLC2A8  |
| SLC2A12 |
| GLUT13  |
| SLC2A14 |
| EIF2AK4 |
| ALOX5   |
| ALOX12  |
| ALOX15  |
| ACSF2   |
| IREB2   |
| HMGB1   |
| ELAVL1  |
| TFAP2C  |
| SP1     |
| HBA1    |
| NNMT    |
| PLIN4   |
| HIC1    |
| STMN1   |
| RRM2    |
| CAPG    |
| HNF4A   |
| NGB     |
| YWHAE   |
| GABPB1  |
| AURKA   |
| MIR4715 |
| RIPK1   |
| PRDX1   |

|         |
|---------|
| MIR30B  |
| MMP13   |
| LRRFIP1 |

## 1.2 Supplementary Table S2. Univariate Cox regression analysis identified 206 significant FR-DELS

| id          | HR       | HR.95L   | HR.95H   | pvalue   |
|-------------|----------|----------|----------|----------|
| AL161452.1  | 2.974066 | 1.37062  | 6.453334 | 0.005823 |
| AC008105.2  | 1.47242  | 1.097032 | 1.976259 | 0.009974 |
| AC244197.2  | 1.632917 | 1.189613 | 2.241416 | 0.00241  |
| AP005233.2  | 1.242314 | 1.092345 | 1.412872 | 0.000948 |
| Z99289.1    | 2.76151  | 1.514479 | 5.035356 | 0.000919 |
| AP000553.2  | 1.719081 | 1.169216 | 2.527539 | 0.005871 |
| AL513218.1  | 2.311876 | 1.525637 | 3.503305 | 7.76E-05 |
| AC005899.7  | 2.882625 | 1.60798  | 5.167681 | 0.000378 |
| AC073218.1  | 1.295682 | 1.103897 | 1.520786 | 0.001528 |
| AL596223.2  | 2.162316 | 1.254454 | 3.727208 | 0.005503 |
| AC093788.1  | 2.479539 | 1.658085 | 3.707961 | 9.74E-06 |
| MIAT        | 1.505182 | 1.224877 | 1.849633 | 0.000101 |
| LINC01705   | 1.461374 | 1.182328 | 1.806279 | 0.00045  |
| AC010973.2  | 1.999346 | 1.380503 | 2.895599 | 0.000246 |
| AC078906.1  | 2.245132 | 1.373913 | 3.668806 | 0.001248 |
| AC107081.1  | 1.888135 | 1.286411 | 2.771319 | 0.001169 |
| YEATS2-AS1  | 3.201574 | 1.839295 | 5.57283  | 3.87E-05 |
| AL139123.1  | 3.205642 | 1.762465 | 5.83055  | 0.000135 |
| N4BP2L2-IT2 | 1.968715 | 1.282592 | 3.021881 | 0.001946 |
| U47924.3    | 2.186345 | 1.407491 | 3.396187 | 0.000499 |
| NARF-IT1    | 2.491381 | 1.434598 | 4.326634 | 0.001189 |
| AC005785.1  | 2.813972 | 1.806207 | 4.384016 | 4.79E-06 |
| PTOV1-AS2   | 1.405998 | 1.116434 | 1.770666 | 0.003779 |
| AC008735.2  | 1.331724 | 1.083331 | 1.63707  | 0.00653  |
| AL645939.4  | 1.711409 | 1.17095  | 2.50132  | 0.00552  |
| KIF1C-AS1   | 2.715942 | 1.681635 | 4.386408 | 4.41E-05 |
| AC008875.1  | 2.631528 | 1.641386 | 4.218959 | 5.88E-05 |
| AC012615.6  | 1.75638  | 1.196044 | 2.579229 | 0.004064 |
| AL135999.1  | 1.706983 | 1.191813 | 2.444838 | 0.003531 |

|             |          |          |          |          |
|-------------|----------|----------|----------|----------|
| AC027796.4  | 1.72945  | 1.310946 | 2.281557 | 0.000106 |
| AC092119.2  | 1.944666 | 1.306797 | 2.893888 | 0.001041 |
| LINC00460   | 1.642665 | 1.36274  | 1.980089 | 1.92E-07 |
| AC005387.1  | 2.299164 | 1.463176 | 3.612795 | 0.000305 |
| MYG1-AS1    | 1.80892  | 1.37767  | 2.375164 | 1.99E-05 |
| AC124854.1  | 0.703454 | 0.594081 | 0.832963 | 4.51E-05 |
| AC004034.1  | 2.944876 | 1.614326 | 5.372084 | 0.000429 |
| AC008870.2  | 2.776636 | 1.743599 | 4.42172  | 1.69E-05 |
| AC084876.1  | 2.401392 | 1.689087 | 3.414083 | 1.06E-06 |
| AC011510.1  | 2.068788 | 1.286406 | 3.327008 | 0.002709 |
| ASMTL-AS1   | 1.312705 | 1.099061 | 1.567878 | 0.002681 |
| AC005840.2  | 1.999934 | 1.341171 | 2.982273 | 0.000674 |
| AC020907.4  | 1.771878 | 1.321579 | 2.375607 | 0.000131 |
| AL122125.1  | 1.922817 | 1.23311  | 2.998291 | 0.003921 |
| AL731567.1  | 1.741086 | 1.280901 | 2.3666   | 0.000399 |
| PVT1        | 1.632689 | 1.188641 | 2.242624 | 0.00247  |
| LINC01871   | 1.549969 | 1.186023 | 2.025596 | 0.00133  |
| AC025265.1  | 1.470627 | 1.152644 | 1.876333 | 0.001917 |
| LINC00894   | 2.193152 | 1.417276 | 3.393775 | 0.000423 |
| AL157392.4  | 2.099479 | 1.340465 | 3.28827  | 0.001195 |
| LINC01355   | 2.073305 | 1.481771 | 2.900985 | 2.10E-05 |
| AL021707.6  | 1.421102 | 1.114105 | 1.812693 | 0.004653 |
| LINC01943   | 1.901618 | 1.259442 | 2.871231 | 0.002234 |
| IGFL2-AS1   | 1.358858 | 1.130346 | 1.633567 | 0.001098 |
| SLC16A1-AS1 | 1.6461   | 1.134319 | 2.388786 | 0.008708 |
| AC006435.2  | 1.539163 | 1.11258  | 2.129306 | 0.009209 |
| LINC00551   | 0.076585 | 0.01089  | 0.53859  | 0.00983  |
| AC005387.2  | 1.985843 | 1.28332  | 3.072945 | 0.002071 |
| CD44-AS1    | 3.96614  | 2.007374 | 7.83624  | 7.32E-05 |
| NFE4        | 1.521668 | 1.235926 | 1.873473 | 7.62E-05 |
| AP001029.1  | 1.465924 | 1.108581 | 1.938455 | 0.007295 |
| AC027601.1  | 3.886211 | 1.885333 | 8.010592 | 0.000235 |
| AC083967.1  | 1.511646 | 1.159463 | 1.970804 | 0.002264 |
| AC026356.2  | 1.685565 | 1.139557 | 2.493188 | 0.008948 |
| AC132872.3  | 1.460141 | 1.186035 | 1.797596 | 0.000359 |
| SLBP-DT     | 2.225545 | 1.562558 | 3.169833 | 9.28E-06 |
| LINC00893   | 1.667884 | 1.170313 | 2.377001 | 0.004655 |

|            |          |          |          |          |
|------------|----------|----------|----------|----------|
| AC092809.4 | 2.471412 | 1.454353 | 4.199719 | 0.000824 |
| AC025171.4 | 1.567208 | 1.217218 | 2.017833 | 0.000493 |
| AL158151.4 | 2.718176 | 1.73488  | 4.258785 | 1.27E-05 |
| LINC00342  | 1.446305 | 1.142227 | 1.831333 | 0.002183 |
| AC040162.3 | 2.721964 | 1.520085 | 4.874127 | 0.000755 |
| AL353804.2 | 2.16918  | 1.214928 | 3.872937 | 0.008839 |
| AC110015.1 | 2.464795 | 1.383864 | 4.390037 | 0.002191 |
| MIR155HG   | 1.366897 | 1.117236 | 1.672347 | 0.002387 |
| AL391056.1 | 1.607691 | 1.195618 | 2.161787 | 0.001675 |
| AC011462.4 | 1.492713 | 1.169497 | 1.905256 | 0.001293 |
| UBE2Q1-AS1 | 2.636517 | 1.513232 | 4.593625 | 0.000621 |
| AL096865.1 | 2.158528 | 1.418372 | 3.284924 | 0.000329 |
| AC005104.1 | 1.630956 | 1.189693 | 2.235885 | 0.002373 |
| TCL6       | 0.343111 | 0.154298 | 0.762974 | 0.008705 |
| AC005306.1 | 2.525816 | 1.439517 | 4.431866 | 0.001238 |
| KLHDC7B-DT | 1.50855  | 1.147729 | 1.982807 | 0.0032   |
| AC012645.4 | 1.882288 | 1.172956 | 3.02058  | 0.008766 |
| AL158834.2 | 4.21369  | 2.119213 | 8.378196 | 4.10E-05 |
| AC018648.1 | 6.0751   | 3.157622 | 11.68817 | 6.52E-08 |
| AC245884.8 | 1.394151 | 1.083544 | 1.793795 | 0.009769 |
| LINC02154  | 1.758993 | 1.338109 | 2.312261 | 5.18E-05 |
| AC073487.1 | 2.365407 | 1.508848 | 3.708227 | 0.000175 |
| AC006272.1 | 3.096167 | 1.523361 | 6.292827 | 0.001789 |
| LINC00926  | 2.238774 | 1.427895 | 3.510139 | 0.000444 |
| AC044781.1 | 2.841004 | 1.333687 | 6.051874 | 0.006804 |
| AC105105.3 | 1.823502 | 1.17008  | 2.841822 | 0.007959 |
| AL023653.1 | 2.424227 | 1.365172 | 4.304863 | 0.002508 |
| LINC02446  | 1.762699 | 1.305482 | 2.380046 | 0.000216 |
| AC084117.1 | 1.301853 | 1.067342 | 1.587891 | 0.009239 |
| TMEM92-AS1 | 1.933177 | 1.374877 | 2.718187 | 0.00015  |

### 1.3 Supplementary Table S4. Correlation analysis between 8 FALs and 25 FAGs.

| ferrGene | lncRNA    | cor        | pvalue   | regulation |
|----------|-----------|------------|----------|------------|
| CDKN2A   | LINC00460 | 0.52895831 | 3.45E-40 | postive    |

|        |            |             |          |         |
|--------|------------|-------------|----------|---------|
| CDCA3  | LINC00460  | 0.564229432 | 1.24E-46 | postive |
| RRM2   | LINC00460  | 0.572292088 | 3.23E-48 | postive |
| STMN1  | LINC00460  | 0.520268565 | 1.03E-38 | postive |
| AURKA  | LINC00460  | 0.542306356 | 1.54E-42 | postive |
| PRKAA2 | AC124854.1 | 0.50757467  | 1.23E-36 | postive |
| PHKG2  | AC084876.1 | 0.510014502 | 4.98E-37 | postive |
| TAZ    | AC084876.1 | 0.629575722 | 7.49E-61 | postive |
| PVT1   | AC084876.1 | 0.563040824 | 2.11E-46 | postive |
| TUBE1  | AC084876.1 | 0.54044266  | 3.34E-42 | postive |
| IDH1   | IGFL2-AS1  | 0.518959048 | 1.70E-38 | postive |
| TFAP2C | LINC00551  | 0.532785702 | 7.50E-41 | postive |
| JDP2   | AC083967.1 | 0.518155329 | 2.31E-38 | postive |
| ALOX12 | AC073487.1 | 0.598650425 | 1.03E-53 | postive |
| ATM    | AC073487.1 | 0.663168673 | 1.40E-69 | postive |
| FBXW7  | AC073487.1 | 0.52151505  | 6.36E-39 | postive |
| FAR1   | AC073487.1 | 0.504926058 | 3.26E-36 | postive |
| HELLS  | AC073487.1 | 0.534353765 | 3.99E-41 | postive |
| ZNF419 | AC073487.1 | 0.506121796 | 2.10E-36 | postive |
| TUBE1  | AC073487.1 | 0.597180622 | 2.15E-53 | postive |
| GABPB1 | AC073487.1 | 0.582983593 | 2.19E-50 | postive |
| CDKN2A | LINC02446  | 0.507301079 | 1.36E-36 | postive |
| RRM2   | LINC02446  | 0.547962959 | 1.45E-43 | postive |

|       |           |             |          |         |
|-------|-----------|-------------|----------|---------|
| STMN1 | LINC02446 | 0.599655647 | 6.19E-54 | postive |
| AURKA | LINC02446 | 0.505422101 | 2.72E-36 | postive |

#### 1.4 Supplementary Table S3. GESA enrichment analysis of low-risk group

| GS<br> follow link to MSigDB                   | NES          | NOM p-val | FDR q-val |
|------------------------------------------------|--------------|-----------|-----------|
| KEGG_PROXIMAL_TUBULE_BICARBONATE_RECLAMATION   | -<br>2.30262 | 0         | 0.031591  |
| KEGG_PROPANOATE_METABOLISM                     | -<br>2.24592 | 0         | 0.02516   |
| KEGG_VASOPRESSIN_REGULATED_WATER_REABSORPTION  | -<br>2.22411 | 0         | 0.020912  |
| KEGG_VALINE_LEUCINE_AND_ISOLEUCINE_DEGRADATION | -<br>2.21725 | 0         | 0.017044  |
| KEGG_TRYPTOPHAN_METABOLISM                     | -2.2079      | 0         | 0.01542   |
| KEGG_PEROXISOME                                | -2.1817      | 0         | 0.01634   |
| KEGG_TIGHT_JUNCTION                            | -<br>2.18089 | 0         | 0.014006  |
| KEGG_PYRUVATE_METABOLISM                       | -<br>2.17093 | 0         | 0.013464  |
| KEGG_GLYCOLYSIS_GLUONEOGENESIS                 | -<br>2.15664 | 0.001957  | 0.013841  |
| KEGG_FATTY_ACID_METABOLISM                     | -<br>2.13667 | 0         | 0.015431  |
| KEGG_BUTANOATE_METABOLISM                      | -<br>2.12323 | 0         | 0.016271  |
| KEGG_RENIN_ANGIOTENSIN_SYSTEM                  | -2.1207      | 0         | 0.015545  |
| KEGG_CITRATE_CYCLE_TCA_CYCLE                   | -2.0693      | 0         | 0.024474  |
| KEGG_GLYCINE_SERINE_AND_THREONINE_METABOLISM   | -<br>2.02991 | 0.003891  | 0.030817  |
| KEGG_BETA_ALANINE_METABOLISM                   | -<br>1.98816 | 0.011696  | 0.040035  |
| KEGG_ADIPOCYTOKINE_SIGNALING_PATHWAY           | -<br>1.97945 | 0.004065  | 0.040569  |
| KEGG_TERPENOID_BACKBONE_BIOSYNTHESIS           | -<br>1.96563 | 0.005792  | 0.042471  |
| KEGG_SPHINGOLIPID_METABOLISM                   | -            | 0.004082  | 0.045782  |

|                                                           |              |          |          |
|-----------------------------------------------------------|--------------|----------|----------|
|                                                           | 1.95021      |          |          |
| KEGG_ADHERENS_JUNCTION                                    | -<br>1.94398 | 0.020121 | 0.045267 |
| KEGG_PROSTATE_CANCER                                      | -<br>1.93329 | 0.014141 | 0.045865 |
| KEGG_PPAR_SIGNALING_PATHWAY                               | -<br>1.91692 | 0.009615 | 0.048701 |
| KEGG_INSULIN_SIGNALING_PATHWAY                            | -<br>1.91522 | 0.00994  | 0.046881 |
| KEGG_ENDOMETRIAL_CANCER                                   | -<br>1.89299 | 0.015968 | 0.051521 |
| KEGG_BIOSYNTHESIS_OF_UNSATURATED_FATTY_ACIDS              | -<br>1.88942 | 0.013807 | 0.050919 |
| KEGG_RENAL_CELL_CARCINOMA                                 | -<br>1.86274 | 0.023857 | 0.057605 |
| KEGG_ENDOCYTOSIS                                          | -<br>1.85947 | 0.015779 | 0.056331 |
| KEGG_ERBB_SIGNALING_PATHWAY                               | -<br>1.85545 | 0.018145 | 0.055501 |
| KEGG_CYSTEINE_AND_METHIONINE_METABOLISM                   | -<br>1.85053 | 0.009363 | 0.055201 |
| KEGG_NEUROTROPHIN_SIGNALING_PATHWAY                       | -<br>1.84952 | 0.025845 | 0.053575 |
| KEGG_LYSINE_DEGRADATION                                   | -<br>1.83391 | 0.019646 | 0.057789 |
| KEGG_ONE_CARBON_POOL_BY_FOLATE                            | -1.8148      | 0.015534 | 0.063084 |
| KEGG_TYPE_II_DIABETES_MELLITUS                            | -<br>1.81283 | 0.001965 | 0.061854 |
| KEGG_ARGININE_AND_PROLINE_METABOLISM                      | -<br>1.80381 | 0.017143 | 0.063466 |
| KEGG_HISTIDINE_METABOLISM                                 | -<br>1.79733 | 0.021318 | 0.064003 |
| KEGG_GLYCOSYLPHOSPHATIDYLINOSITOL_GPI_ANCHOR_BIOSYNTHESIS | -<br>1.79056 | 0.014028 | 0.064847 |
| KEGG_MELANOMA                                             | -<br>1.77995 | 0.00432  | 0.067613 |
| KEGG_ALDOSTERONE_REGULATED_SODIUM_REABSORPTION            | -<br>1.76672 | 0.02008  | 0.071079 |
| KEGG_TGF_BETA_SIGNALING_PATHWAY                           | -1.7504      | 0.042596 | 0.076175 |
| KEGG_THYROID_CANCER                                       | -<br>1.73795 | 0.029126 | 0.079386 |
| KEGG_LONG_TERM_POTENTIATION                               | -<br>1.73666 | 0.024145 | 0.077838 |

## Supplementary Material

|                                                                     |              |          |          |
|---------------------------------------------------------------------|--------------|----------|----------|
| KEGG_GLYCEROLIPID_METABOLISM                                        | -<br>1.70727 | 0.015779 | 0.0888   |
| KEGG_LONG_TERM_DEPRESSION                                           | -<br>1.70623 | 0.025794 | 0.087264 |
| KEGG_SELENOAMINO_ACID_METABOLISM                                    | -<br>1.66222 | 0.036437 | 0.104484 |
| KEGG_ASCORBATE_AND_ALDARATE_METABOLISM                              | -<br>1.66143 | 0.033708 | 0.1026   |
| KEGG_EPITHELIAL_CELL_SIGNALING_IN_HELICOBACTER_PYLORI_INF<br>ECTION | -1.6531      | 0.047151 | 0.104157 |
| KEGG_PANTOTHENATE_AND_COA_BIOSYNTHESIS                              | -<br>1.64588 | 0.04771  | 0.098978 |
| KEGG_PHENYLALANINE_METABOLISM                                       | -<br>1.59327 | 0.02994  | 0.110038 |
| KEGG_NITROGEN_METABOLISM                                            | -<br>1.55726 | 0.040486 | 0.117068 |
| KEGG_DRUG_METABOLISM_CYTOCHROME_P450                                | -<br>1.55388 | 0.034091 | 0.116979 |
| KEGG_ETHER_LIPID_METABOLISM                                         | -<br>1.50884 | 0.035156 | 0.122849 |