**S3 Table. List of differentially expressed and serum insulin-associated genes in the colon tissue of high-fat diet fed C57BL/J mice.**

1. Inverse relationships between two dietary groups

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accession | Symbol | Definition | P-value(interaction; MPAG1) | FDR(interaction) | P-value(t-test; MDEG) | FDR(t-test) |
| NM\_001033263.1 | *Centg1* | Mus musculus centaurin, gamma 1 (Centg1), mRNA. | 0.0165  | 0.9999 | 0.0021  | 0.9321 |
| NM\_025723.2 | *4921515J06Rik* | Mus musculus RIKEN cDNA 4921515J06 gene (4921515J06Rik), transcript variant 1, mRNA. | 0.0366  | 0.9999 | 0.0277  | 0.9998 |
| NM\_013675.3 | *Spnb1* | Mus musculus spectrin beta 1 (Spnb1), mRNA. | 0.0382  | 0.9999 | 0.0350  | 0.9998 |
| AK053156.1 | *scl0002720.1\_68* | 　 | 0.0447  | 0.9999 | 0.0487  | 0.9998 |

1. Association between gene expression and serum insulin concentration show no difference among the two dietary groups

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accession | Symbol | Definition | P-value(interaction; MPAG1) | P-value(t-test; MDEG) | P-value(no interaction; MPAG2) | FDR(no interaction) |
| NM\_175751.3 | *Zfp608* | Mus musculus zinc finger protein 608 (Zfp608), mRNA.  | 0.5802  | 0.0325  | 0.0005  | 0.9999 |
| AK054364 | *E330019I03Rik* | ILMN\_205263 | 0.6048  | 0.0402  | 0.0022  | 0.9999 |
| NM\_053176.1 | *Hrg* | Mus musculus histidine-rich glycoprotein (Hrg), mRNA. | 0.9739  | 0.0076  | 0.0027  | 0.9999 |
| NM\_023773.1 | *Mphosph8* | Mus musculus M-phase phosphoprotein 8 (Mphosph8), mRNA. | 0.2572  | 0.0005  | 0.0035  | 0.9999 |
| NM\_027978.1 | *Coq2* | Mus musculus coenzyme Q2 homolog, prenyltransferase (yeast) (Coq2), mRNA. | 0.5732  | 0.0109  | 0.0036  | 0.9999 |
| NM\_001033540.2 | *EG330503* | Mus musculus predicted gene, EG330503 (EG330503), mRNA. | 0.6933  | 0.0115  | 0.0039  | 0.9999 |
| XM\_358141.1 | *LOC385241* | ILMN\_201483 | 0.0811  | 0.0246  | 0.0040  | 0.9999 |
| XM\_207109.3 | *LOC280096* | ILMN\_198060 | 0.2662  | 0.0283  | 0.0041  | 0.9999 |
| NM\_172627.3 | *Pggt1b* | Mus musculus protein geranylgeranyltransferase type I, beta subunit (Pggt1b), mRNA. | 0.1850  | 0.0470  | 0.0042  | 0.9999 |
| XM\_911841.2 | *Mocs3* | PREDICTED: Mus musculus molybdenum cofactor synthesis 3 (Mocs3), mRNA. | 0.0821  | 0.0011  | 0.0049  | 0.9999 |
| AK014396 | *3632411M23Rik* | ILMN\_202249 | 0.5078  | 0.0171  | 0.0052  | 0.9999 |
| NM\_145537.1 | *Edem2* | Mus musculus ER degradation enhancer, mannosidase alpha-like 2 (Edem2), mRNA. | 0.4988  | 0.0187  | 0.0056  | 0.9999 |
| NM\_172835.2 | *Peli3* | Mus musculus pellino 3 (Peli3), mRNA. | 0.1318  | 0.0153  | 0.0058  | 0.9999 |
| NM\_020000.2 | *Med8* | Mus musculus mediator of RNA polymerase II transcription, subunit 8 homolog (yeast) (Med8), transcript variant 1, mRNA. | 0.7544  | 0.0384  | 0.0059  | 0.9999 |
| NM\_001081375.1 | *Cnfn* | Mus musculus cornifelin (Cnfn), transcript variant 2, mRNA. | 0.7504  | 0.0472  | 0.0061  | 0.9999 |
| NM\_001081336.1 | *Dgkh* | Mus musculus diacylglycerol kinase, eta (Dgkh), mRNA. | 0.1999  | 0.0274  | 0.0068  | 0.9999 |
| NM\_009420.1 | *Crisp2* | Mus musculus cysteine-rich secretory protein 2 (Crisp2), mRNA. | 0.8057  | 0.0474  | 0.0070  | 0.9999 |
| NM\_007550.3 | *Blm* | Mus musculus Bloom syndrome homolog (human) (Blm), transcript variant 1, mRNA. | 0.9648  | 0.0202  | 0.0070  | 0.9999 |
| AK086629 | *D930042N17Rik* | ILMN\_206534 | 0.5709  | 0.0003  | 0.0074  | 0.9999 |
| NM\_080728.2 | *Myh7* | Mus musculus myosin, heavy polypeptide 7, cardiac muscle, beta (Myh7), mRNA. | 0.1030  | 0.0431  | 0.0074  | 0.9999 |
| NM\_001081236.1 | *2410131K14Rik* | Mus musculus RIKEN cDNA 2410131K14 gene (2410131K14Rik), mRNA. | 0.3194  | 0.0326  | 0.0076  | 0.9999 |
| NM\_053245 | *Aipl1* |  | 0.6464  | 0.0429  | 0.0078  | 0.9999 |
| NM\_001024205.1 | *Nufip2* | Mus musculus nuclear fragile X mental retardation protein interacting protein 2 (Nufip2), mRNA. | 0.3128  | 0.0264  | 0.0080  | 0.9999 |
| NM\_001037941.1 | *Dnajb6* | Mus musculus DnaJ (Hsp40) homolog, subfamily B, member 6 (Dnajb6), transcript variant 2, mRNA. | 0.9977  | 0.0083  | 0.0081  | 0.9999 |
| AK034046.1 | *scl0003131.1\_3* | ILMN\_184796 | 0.9716  | 0.0477  | 0.0088  | 0.9999 |
| NM\_010665 | *Krt1-2* | ILMN\_224273 | 0.1686  | 0.0198  | 0.0088  | 0.9999 |
| XM\_001474585.1 | *EG434758* | PREDICTED: Mus musculus predicted gene, EG434758 (EG434758), mRNA. | 0.6806  | 0.0036  | 0.0091  | 0.9999 |
| XM\_913690.2 | *Gpr39* | PREDICTED: Mus musculus G protein-coupled receptor 39 (Gpr39), mRNA. | 0.2555  | 0.0440  | 0.0094  | 0.9999 |
| NM\_026312.4 | *2610029G23Rik* | Mus musculus RIKEN cDNA 2610029G23 gene (2610029G23Rik), mRNA. | 0.1547  | 0.0029  | 0.0096  | 0.9999 |
| NM\_001001295.1 | *Dis3l* | Mus musculus DIS3 mitotic control homolog (S. cerevisiae)-like (Dis3l), transcript variant 1, mRNA. | 0.3690  | 0.0234  | 0.0100  | 0.9999 |
| XM\_357535.1 | *LOC384276* | ILMN\_200423 | 0.3119  | 0.0030  | 0.0101  | 0.9999 |
| XM\_001477536.1 | *LOC100042083* | PREDICTED: Mus musculus similar to 2810047C21Rik protein (LOC100042083), mRNA. | 0.7745  | 0.0021  | 0.0104  | 0.9999 |
| NM\_001004363 | *B230104P22Rik* | ILMN\_192574 | 0.7869  | 0.0027  | 0.0106  | 0.9999 |
| NM\_022326.2 | *Ctsm* | Mus musculus cathepsin M (Ctsm), mRNA. | 0.2121  | 0.0056  | 0.0107  | 0.9999 |
| XM\_001477976.1 | *LOC100047208* | PREDICTED: Mus musculus similar to trypsinogen 15 (LOC100047208), mRNA. | 0.0509  | 0.0345  | 0.0115  | 0.9999 |
| NM\_183417.2 | *Cdk2* | Mus musculus cyclin-dependent kinase 2 (Cdk2), transcript variant 1, mRNA. | 0.1432  | 0.0413  | 0.0116  | 0.9999 |
| NM\_001007576.1 | *Gucy2f* | Mus musculus guanylate cyclase 2f (Gucy2f), mRNA. | 0.2931  | 0.0125  | 0.0123  | 0.9999 |
| NM\_146885.1 | *Olfr1294* | Mus musculus olfactory receptor 1294 (Olfr1294), mRNA. | 0.9013  | 0.0267  | 0.0124  | 0.9999 |
| NM\_178072.2 | *Glcci1* | Mus musculus glucocorticoid induced transcript 1 (Glcci1), transcript variant 2, mRNA. | 0.3562  | 0.0024  | 0.0125  | 0.9999 |
| XM\_919195.3 | *4921524L21Rik* | PREDICTED: Mus musculus RIKEN cDNA 4921524L21 gene, transcript variant 4 (4921524L21Rik), mRNA. | 0.6080  | 0.0089  | 0.0131  | 0.9999 |
| NM\_053070.1 | *Car7* | Mus musculus carbonic anhydrase 7 (Car7), mRNA. | 0.8770  | 0.0276  | 0.0132  | 0.9999 |
| NM\_010500.1 | *Ier5* | Mus musculus immediate early response 5 (Ier5), mRNA. | 0.9369  | 0.0310  | 0.0143  | 0.9999 |
| XM\_357035.1 | *LOC383407* | ILMN\_200624 | 0.9948  | 0.0384  | 0.0147  | 0.9999 |
| NM\_177608.3 | *3110001I20Rik* | Mus musculus RIKEN cDNA 3110001I20 gene (3110001I20Rik), mRNA. | 0.1701  | 0.0049  | 0.0148  | 0.9999 |
| AK041682 | *A630029M15Rik* | ILMN\_203868 | 0.5812  | 0.0202  | 0.0149  | 0.9999 |
| NM\_010574.2 | *Irx2* | Mus musculus Iroquois related homeobox 2 (Drosophila) (Irx2), mRNA. | 0.4673  | 0.0269  | 0.0151  | 0.9999 |
| NM\_029331.2 | *1700019G17Rik* | Mus musculus RIKEN cDNA 1700019G17 gene (1700019G17Rik), mRNA. | 0.2161  | 0.0447  | 0.0155  | 0.9999 |
| AK042365 | *A630085E16Rik* | ILMN\_205575 | 0.4906  | 0.0122  | 0.0156  | 0.9999 |
| AK038940 | *Enpp2* |  | 0.1553  | 0.0209  | 0.0157  | 0.9999 |
| NM\_145431.1 | *Nle1* | Mus musculus notchless homolog 1 (Drosophila) (Nle1), mRNA. | 0.6923  | 0.0080  | 0.0163  | 0.9999 |
| AK035512 | *9530058K19Rik* | ILMN\_203680 | 0.5309  | 0.0166  | 0.0170  | 0.9999 |
| NM\_001002896.2 | *Bfsp2* | Mus musculus beaded filament structural protein 2, phakinin (Bfsp2), mRNA. | 0.1421  | 0.0048  | 0.0174  | 0.9999 |
| AK050783 | *4933406L09Rik* | ILMN\_205197 | 0.4955  | 0.0129  | 0.0183  | 0.9999 |
| NM\_146642.1 | *Olfr1140* | Mus musculus olfactory receptor 1140 (Olfr1140), mRNA. | 0.3106  | 0.0204  | 0.0190  | 0.9999 |
| NM\_146358.1 | *Olfr677* | Mus musculus olfactory receptor 677 (Olfr677), mRNA. | 0.0925  | 0.0247  | 0.0190  | 0.9999 |
| XM\_140032.2 | *LOC210143* | ILMN\_198180 | 0.8580  | 0.0343  | 0.0196  | 0.9999 |
| XM\_147733.1 | *1700026N04Rik* | ILMN\_196415 | 0.7813  | 0.0363  | 0.0197  | 0.9999 |
| NM\_178116.3 | *Camta2* | Mus musculus calmodulin binding transcription activator 2 (Camta2), mRNA. | 0.9079  | 0.0122  | 0.0198  | 0.9999 |
| NM\_029440.3 | *4930434E21Rik* | Mus musculus RIKEN cDNA 4930434E21 gene (4930434E21Rik), mRNA. | 0.8065  | 0.0121  | 0.0199  | 0.9999 |
| AK006776 | *1700052N19Rik* | ILMN\_202189 | 0.9818  | 0.0100  | 0.0205  | 0.9999 |
| NM\_027462.4 | *Wars2* | Mus musculus tryptophanyl tRNA synthetase 2 (mitochondrial) (Wars2), nuclear gene encoding mitochondrial protein, mRNA. | 0.3524  | 0.0378  | 0.0206  | 0.9999 |
| NM\_001033434.1 | *Gm884* | Mus musculus gene model 884, (NCBI) (Gm884), mRNA. | 0.1450  | 0.0229  | 0.0210  | 0.9999 |
| XM\_142623.3 | *LOC245147* | ILMN\_199311 | 0.4033  | 0.0044  | 0.0212  | 0.9999 |
| NM\_026626.2 | *Efcab2* | Mus musculus EF-hand calcium binding domain 2 (Efcab2), mRNA. | 0.9156  | 0.0147  | 0.0217  | 0.9999 |
| XM\_356568.1 | *LOC382557* | ILMN\_201369 | 0.2162  | 0.0187  | 0.0225  | 0.9999 |
| NM\_173405.2 | *Amz1* | Mus musculus archaelysin family metallopeptidase 1 (Amz1), mRNA. | 0.1282  | 0.0428  | 0.0231  | 0.9999 |
| XM\_357056.1 | *LOC383439* | ILMN\_200658 | 0.6967  | 0.0147  | 0.0243  | 0.9999 |
| NM\_198031.1 | *Tubgcp3* | Mus musculus tubulin, gamma complex associated protein 3 (Tubgcp3), mRNA. | 0.9579  | 0.0028  | 0.0244  | 0.9999 |
| NM\_178041.1 | *Eif5* | Mus musculus eukaryotic translation initiation factor 5 (Eif5), transcript variant 2, mRNA. | 0.5182  | 0.0226  | 0.0244  | 0.9999 |
| AK051805 | *D130099D04Rik* | ILMN\_204932 | 0.8826  | 0.0488  | 0.0244  | 0.9999 |
| NM\_013521.2 | *Fpr1* | Mus musculus formyl peptide receptor 1 (Fpr1), mRNA. | 0.3331  | 0.0187  | 0.0247  | 0.9999 |
| XM\_357061.1 | *LOC383443* | ILMN\_200680 | 0.3078  | 0.0007  | 0.0248  | 0.9999 |
| AK017854 | *5730564E11Rik* | ILMN\_201847 | 0.9668  | 0.0341  | 0.0253  | 0.9999 |
| NM\_013875.2 | *Pde7b* | Mus musculus phosphodiesterase 7B (Pde7b), mRNA. | 0.3622  | 0.0173  | 0.0256  | 0.9999 |
| XM\_137040.1 | *EG215895* | PREDICTED: Mus musculus predicted gene, EG215895 (EG215895), mRNA. | 0.8470  | 0.0208  | 0.0259  | 0.9999 |
| NM\_138604.2 | *Otud5* | Mus musculus OTU domain containing 5 (Otud5), mRNA. | 0.4380  | 0.0276  | 0.0260  | 0.9999 |
| NM\_146477.1 | *Olfr90* | Mus musculus olfactory receptor 90 (Olfr90), mRNA. | 0.6090  | 0.0079  | 0.0260  | 0.9999 |
| NM\_146795.1 | *Olfr812* | Mus musculus olfactory receptor 812 (Olfr812), mRNA. | 0.7210  | 0.0450  | 0.0263  | 0.9999 |
| NM\_177172 | *A830054O04Rik* | ILMN\_194812 | 0.2662  | 0.0180  | 0.0263  | 0.9999 |
| NM\_207271.1 | *Tdpoz3* | Mus musculus TD and POZ domain containing 3 (Tdpoz3), mRNA. | 0.8127  | 0.0406  | 0.0271  | 0.9999 |
| AK019878 | *5031425D22Rik* | ILMN\_202773 | 0.9333  | 0.0092  | 0.0274  | 0.9999 |
|  | *1700037N05Rik* | ILMN\_190174 | 0.8935  | 0.0200  | 0.0280  | 0.9999 |
| XM\_001477492.1 | *LOC100047126* | PREDICTED: Mus musculus similar to Sctr protein, transcript variant 1 (LOC100047126), mRNA. | 0.8055  | 0.0223  | 0.0286  | 0.9999 |
| NM\_145993.2 | *L3mbtl2* | Mus musculus l(3)mbt-like 2 (Drosophila) (L3mbtl2), mRNA. | 0.1429  | 0.0093  | 0.0289  | 0.9999 |
| NM\_026528.3 | *2700060E02Rik* | Mus musculus RIKEN cDNA 2700060E02 gene (2700060E02Rik), mRNA. | 0.3469  | 0.0296  | 0.0289  | 0.9999 |
| NM\_146550.1 | *Olfr810* | Mus musculus olfactory receptor 810 (Olfr810), mRNA. | 0.8301  | 0.0089  | 0.0291  | 0.9999 |
| XR\_004731.1 | *LOC675098* | PREDICTED: Mus musculus similar to jumonji domain containing 2D (LOC675098), mRNA. | 0.6477  | 0.0104  | 0.0292  | 0.9999 |
| XM\_001480092.1 | *LOC100048365* | PREDICTED: Mus musculus similar to keratin associated protein 6-1 (LOC100048365), mRNA. | 0.4070  | 0.0049  | 0.0296  | 0.9999 |
| XM\_357073.1 | *LOC383458* | ILMN\_200692 | 0.8145  | 0.0127  | 0.0319  | 0.9999 |
| XM\_126005.7 | *Pkd1l1* | PREDICTED: Mus musculus polycystic kidney disease 1 like 1 (Pkd1l1), mRNA. | 0.5559  | 0.0247  | 0.0332  | 0.9999 |
| NM\_153054.2 | *Slc18a1* | Mus musculus solute carrier family 18 (vesicular monoamine), member 1 (Slc18a1), mRNA. | 0.1814  | 0.0007  | 0.0337  | 0.9999 |
| XM\_136701.2 | *LOC226955* | ILMN\_197128 | 0.3280  | 0.0215  | 0.0341  | 0.9999 |
| NM\_021510.1 | *Hnrph1* | ILMN\_217576 | 0.4772  | 0.0401  | 0.0350  | 0.9999 |
| NM\_028677.3 | *Ppih* | Mus musculus peptidyl prolyl isomerase H (Ppih), mRNA. | 0.6605  | 0.0014  | 0.0353  | 0.9999 |
| XM\_359179 | *1700008H02Rik* | ILMN\_188746 | 0.7737  | 0.0090  | 0.0356  | 0.9999 |
| NM\_009021.2 | *Rai1* | Mus musculus retinoic acid induced 1 (Rai1), transcript variant 1, mRNA. | 0.3616  | 0.0187  | 0.0358  | 0.9999 |
| AK086955 | *Syn3* |  | 0.3887  | 0.0370  | 0.0367  | 0.9999 |
| NM\_147097.1 | *Olfr628* | Mus musculus olfactory receptor 628 (Olfr628), mRNA. | 0.4587  | 0.0495  | 0.0368  | 0.9999 |
| XM\_001478815.1 | *Omt2a* | PREDICTED: Mus musculus oocyte maturation, alpha, transcript variant 1 (Omt2a), mRNA. | 0.8732  | 0.0404  | 0.0371  | 0.9999 |
| NM\_021351.1 | *Cryba4* | Mus musculus crystallin, beta A4 (Cryba4), mRNA. | 0.6336  | 0.0151  | 0.0376  | 0.9999 |
| NM\_020488.1 | *Gabrq* | Mus musculus gamma-aminobutyric acid (GABA-A) receptor, subunit theta (Gabrq), mRNA. | 0.9691  | 0.0051  | 0.0376  | 0.9999 |
| NM\_026182.4 | *Mtfr1* | Mus musculus mitochondrial fission regulator 1 (Mtfr1), nuclear gene encoding mitochondrial protein, mRNA. | 0.4544  | 0.0449  | 0.0377  | 0.9999 |
| NM\_027868.2 | *Slc41a3* | Mus musculus solute carrier family 41, member 3 (Slc41a3), transcript variant 1, mRNA. | 0.9090  | 0.0152  | 0.0381  | 0.9999 |
| NM\_023042.2 | *Recql* | Mus musculus RecQ protein-like (Recql), mRNA. | 0.4540  | 0.0033  | 0.0388  | 0.9999 |
| XM\_147660.1 | *C130076O07Rik* | ILMN\_221761 | 0.6567  | 0.0433  | 0.0398  | 0.9999 |
| AK054034 | *1700021I09Rik* | ILMN\_205420 | 0.8485  | 0.0009  | 0.0404  | 0.9999 |
| NM\_025616.3 | *Timm50* | Mus musculus translocase of inner mitochondrial membrane 50 homolog (yeast) (Timm50), nuclear gene encoding mitochondrial protein, mRNA. | 0.2452  | 0.0318  | 0.0416  | 0.9999 |
| NM\_008812.1 | *Padi2* | Mus musculus peptidyl arginine deiminase, type II (Padi2), mRNA. | 0.4523  | 0.0147  | 0.0417  | 0.9999 |
| NM\_028623.2 | *Cst6* | Mus musculus cystatin E/M (Cst6), mRNA. | 0.5533  | 0.0156  | 0.0428  | 0.9999 |
| AK076385 | *4732481D19Rik* | ILMN\_207303 | 0.3327  | 0.0247  | 0.0431  | 0.9999 |
| XM\_486217.5 | *EG434401* | PREDICTED: Mus musculus predicted gene, EG434401 (EG434401), mRNA. | 0.1436  | 0.0461  | 0.0435  | 0.9999 |
| NM\_009220.1 | *Ssty1* | Mus musculus spermiogenesis specific transcript on the Y 1 (Ssty1), mRNA. | 0.7129  | 0.0207  | 0.0436  | 0.9999 |
| NM\_001081005.1 | *1500012F01Rik* | Mus musculus RIKEN cDNA 1500012F01 gene (1500012F01Rik), mRNA. | 0.3801  | 0.0027  | 0.0447  | 0.9999 |
| NM\_011400.2 | *Slc2a1* | Mus musculus solute carrier family 2 (facilitated glucose transporter), member 1 (Slc2a1), mRNA. | 0.3458  | 0.0347  | 0.0449  | 0.9999 |
|  | *IGKV2-112\_J00562\_Ig\_kappa\_variable\_2-112\_55* | ILMN\_185204 | 0.5753  | 0.0028  | 0.0450  | 0.9999 |
| AK079848 | *A430092C21Rik* | ILMN\_203084 | 0.9431  | 0.0128  | 0.0452  | 0.9999 |
|  | *MJ-1000-56\_266* | ILMN\_194618 | 0.2878  | 0.0221  | 0.0464  | 0.9999 |
| AK004152 | *Znfn1a3* | ILMN\_201649 | 0.9205  | 0.0259  | 0.0466  | 0.9999 |
| NM\_001033542.1 | *4933429E10Rik* | Mus musculus RIKEN cDNA 4933429E10 gene (4933429E10Rik), mRNA. | 0.3447  | 0.0369  | 0.0467  | 0.9999 |
| XM\_140916.2 | *LOC227757* | ILMN\_197226 | 0.9773  | 0.0206  | 0.0475  | 0.9999 |
| NM\_001033148.2 | *1700029J07Rik* | Mus musculus RIKEN cDNA 1700029J07 gene (1700029J07Rik), mRNA. | 0.7251  | 0.0282  | 0.0477  | 0.9999 |
| NM\_146523.1 | *Olfr850* | Mus musculus olfactory receptor 850 (Olfr850), mRNA. | 0.1510  | 0.0475  | 0.0485  | 0.9999 |
| NM\_146151.3 | *Tesk2* | Mus musculus testis-specific kinase 2 (Tesk2), mRNA. | 0.3849  | 0.0493  | 0.0487  | 0.9999 |
| NM\_138656.1 | *Mvd* | Mus musculus mevalonate (diphospho) decarboxylase (Mvd), mRNA. | 0.4039  | 0.0188  | 0.0499  | 0.9999 |

FDR, false discovery rate using a Benjamini and Hochberg multiple testing correction.