

| Gene names |                                       | Protein names  | bestbest<br>(kcal/mol) | Num in<br>Largest<br>Cluster |
|------------|---------------------------------------|--|------------------------|------------------------------|
| 1          | BCAT2 BCATM<br>BCT2 ECA40             | Branched-chain-amino-acid aminotransferase, mitochondrial (BCAT(m)) (EC 2.6.1.42) (Placental protein 18) (PP18)  | -11.390000             | 15.000000                    |
| 2          | AADAT KAT2                            | Kynurenine/alpha-aminoadipate aminotransferase, mitochondrial (KAT/AadAT) (2-aminoadipate aminotransferase) (2-aminoadipate transaminase) (EC 2.6.1.39) (Alpha-aminoadipate aminotransferase) (AadAT) (Kynurenine aminotransferase II) (Kynurenine--oxoglutarate aminotransferase II) (Kynurenine--oxoglutarate transaminase 2) (EC 2.6.1.7) (Kynurenine--oxoglutarate transaminase II)            | -11.020000             | 37.000000                    |
| 3          | AGXT AGT1<br>SPAT                     | Serine--pyruvate aminotransferase (SPT) (EC 2.6.1.51) (Alanine--glyoxylate aminotransferase) (AGT) (EC 2.6.1.44)   | -10.910000             | 28.000000                    |
| 4          | GOT2                                  | Aspartate aminotransferase, mitochondrial (mAspAT) (EC 2.6.1.1) (EC 2.6.1.7) (Fatty acid-binding protein) (FABP-1) (Glutamate oxaloacetate transaminase 2) (Kynurenine aminotransferase 4) (Kynurenine aminotransferase IV) (Kynurenine--oxoglutarate transaminase 4) (Kynurenine--oxoglutarate transaminase IV) (Plasma membrane-associated fatty acid-binding protein) (FABPpm) (Transaminase A) | -10.890000             | 12.000000                    |
| 5          | ODC1                                  | Ornithine decarboxylase (ODC) (EC 4.1.1.17)  | -10.880000             | 8.000000                     |
| 6          | KYAT3 CCBL2<br>KAT3                   | Kynurenine--oxoglutarate transaminase 3 (EC 2.6.1.7) (Cysteine-S-conjugate beta-lyase 2) (EC 4.4.1.13) (Kynurenine aminotransferase 3) (Kynurenine aminotransferase III) (KATIII) (Kynurenine--glyoxylate transaminase) (EC 2.6.1.63) (Kynurenine--oxoglutarate transaminase III)  | -10.680000             | 32.000000                    |
| 7          | BCAT1 BCT1<br>ECA39                   | Branched-chain-amino-acid aminotransferase, cytosolic (BCAT(c)) (EC 2.6.1.42) (Protein ECA39)  | -10.610000             | 23.000000                    |
| 8          | CTH                                   | Cystathionine gamma-lyase (EC 4.4.1.1) (Cysteine-protein sulfhydrase) (Gamma-cystathionase)  | -10.560000             | 23.000000                    |
| 9          | GOT1                                  | Aspartate aminotransferase, cytoplasmic (cAspAT) (EC 2.6.1.1) (EC 2.6.1.3) (Cysteine aminotransferase, cytoplasmic) (Cysteine transaminase, cytoplasmic) (cCAT) (Glutamate oxaloacetate transaminase 1) (Transaminase A)   | -10.440000             | 14.000000                    |
| 10         | KYAT1 CCBL1                           | Kynurenine--oxoglutarate transaminase 1 (EC 2.6.1.7) (Cysteine-S-conjugate beta-lyase) (EC 4.4.1.13) (Glutamine transaminase K) (GTK) (Glutamine--phenylpyruvate transaminase) (EC 2.6.1.64) (Kynurenine aminotransferase 1) (Kynurenine aminotransferase I) (KATI) (Kynurenine--oxoglutarate transaminase I)  | -10.430000             | 27.000000                    |
| 11         | SEPSECS<br>TRNP48                     | O-phosphoseryl-tRNA(Sec) selenium transferase (EC 2.9.1.2) (Liver-pancreas antigen) (LP) (SLA-p35) (SLA/LP autoantigen) (Selenocysteine synthase) (Sec synthase) (Selenocysteinyl-tRNA(Sec) synthase) (Sep-tRNA:Sec-tRNA synthase) (SepSecS) (Soluble liver antigen) (SLA) (UGA suppressor tRNA-associated protein) (tRNA(Ser/Sec)-associated antigenic protein)                                   | -10.040000             | 13.000000                    |
| 12         | PYGL                                  | Glycogen phosphorylase, liver form (EC 2.4.1.1)  | -9.660000              | 25.000000                    |
| 13         | DDC AADC                              | Aromatic-L-amino-acid decarboxylase (AADC) (EC 4.1.1.28) (DOPA decarboxylase) (DDC)  | -9.640000              | 9.000000                     |
| 14         | SDSL                                  | Serine dehydratase-like (L-serine deaminase) (L-serine dehydratase/L-threonine deaminase) (L-threonine dehydratase) (TDH) (EC 4.3.1.19) (Serine dehydratase 2) (SDH 2) (EC 4.3.1.17)   | -9.620000              | 9.000000                     |
| 15         | HDC                                   | Histidine decarboxylase (HDC) (EC 4.1.1.22)  | -9.610000              | 28.000000                    |
| 16         | CSAD CSD                              | Cysteine sulfinic acid decarboxylase (EC 4.1.1.29) (Aspartate 1-decarboxylase) (EC 4.1.1.11) (Cysteine-sulfinate decarboxylase) (Sulfinoalanine decarboxylase)   | -9.600000              | 10.000000                    |
| 17         | TAT                                   | Tyrosine aminotransferase (TAT) (EC 2.6.1.5) (L-tyrosine:2-oxoglutarate aminotransferase)  | -9.590000              | 23.000000                    |
| 18         | GADL1                                 | Acidic amino acid decarboxylase GADL1 (Aspartate 1-decarboxylase) (ADC) (HuADC) (EC 4.1.1.11) (Cysteine sulfinic acid decarboxylase) (CSADC) (HuCSADC) (EC 4.1.1.29) (Glutamate decarboxylase-like protein 1)  | -9.530000              | 10.000000                    |
| 19         | GAD1 GAD<br>GAD67                     | Glutamate decarboxylase 1 (EC 4.1.1.15) (67 kDa glutamic acid decarboxylase) (GAD-67) (Glutamate decarboxylase 67 kDa isoform)   | -9.480000              | 18.000000                    |
| 20         | PHYKPL<br>AGXT2L2<br>PP9286           | 5-phosphohydroxy-L-lysine phospho-lyase (EC 4.2.3.134) (Alanine--glyoxylate aminotransferase 2-like 2)   | -9.320000              | 13.000000                    |
| 21         | SGPL1<br>KIAA1252                     | Sphingosine-1-phosphate lyase 1 (S1PL) (SP-lyase 1) (SPL 1) (hSPL) (EC 4.1.2.27) (Sphingosine-1-phosphate aldolase)  | -9.300000              | 30.000000                    |
| 22         | OAT                                   | Ornithine aminotransferase, mitochondrial (EC 2.6.1.13) (Ornithine delta-aminotransferase) (Ornithine--oxo-acid aminotransferase) [Cleaved into: Ornithine aminotransferase, hepatic form; Ornithine aminotransferase, renal form]   | -9.270000              | 19.000000                    |
| 23         | ABAT GABAT                            | 4-aminobutyrate aminotransferase, mitochondrial (EC 2.6.1.19) ((S)-3-amino-2-methylpropionate transaminase) (EC 2.6.1.22) (GABA aminotransferase) (GABA-AT) (Gamma-amino-N-butyrate transaminase) (GABA transaminase) (GABA-T) (L-AIBAT)   | -9.270000              | 61.000000                    |
| 24         | GPT2 AAT2<br>ALT2                     | Alanine aminotransferase 2 (ALT2) (EC 2.6.1.2) (Glutamate pyruvate transaminase 2) (GPT 2) (Glutamic--alanine transaminase 2) (Glutamic--pyruvic transaminase 2)   | -9.200000              | 11.000000                    |
| 25         | ACCS PHACS                            | 1-aminocyclopropane-1-carboxylate synthase-like protein 1 (ACC synthase-like protein 1)  | -9.070000              | 21.000000                    |
| 26         | GAD2 GAD65                            | Glutamate decarboxylase 2 (EC 4.1.1.15) (65 kDa glutamic acid decarboxylase) (GAD-65) (Glutamate decarboxylase 65 kDa isoform)   | -9.020000              | 5.000000                     |
| 27         | SRR                                   | Serine racemase (EC 5.1.1.18) (D-serine ammonia-lyase) (D-serine dehydratase) (EC 4.3.1.18) (L-serine ammonia-lyase) (L-serine dehydratase) (EC 4.3.1.17)  | -8.980000              | 16.000000                    |
| 28         | PSAT1 PSA                             | Phosphoserine aminotransferase (EC 2.6.1.52) (Phosphohydroxythreonine aminotransferase) (PSAT)   | -8.950000              | 6.000000                     |
| 29         | SDS SDH                               | L-serine dehydratase/L-threonine deaminase (SDH) (EC 4.3.1.17) (L-serine deaminase) (L-threonine dehydratase) (TDH) (EC 4.3.1.19)  | -8.910000              | 30.000000                    |
| 30         | CBSL                                  | Cystathionine beta-synthase-like protein (EC 4.2.1.22) (Beta-thionase) (Serine sulfhydrase)  | -8.900000              | 8.000000                     |
| 31         | SPTLC3<br>C20orf38<br>SPTLC2L         | Serine palmitoyltransferase 3 (EC 2.3.1.50) (Long chain base biosynthesis protein 2b) (LCB2b) (Long chain base biosynthesis protein 3) (LCB 3) (Serine-palmitoyl-CoA transferase 3) (SPT 3)  | -8.890000              | 78.000000                    |
| 32         | ALAS2 ALASE<br>ASB                    | 5-aminolevulinate synthase, erythroid-specific, mitochondrial (ALAS-E) (EC 2.3.1.37) (5-aminolevulinic acid synthase 2) (Delta-ALA synthase 2) (Delta-aminolevulinate synthase 2)  | -8.880000              | 55.000000                    |
| 33         | ALAS1 ALAS3<br>ALASH OK/SW-<br>cl.121 | 5-aminolevulinate synthase, nonspecific, mitochondrial (ALAS-H) (EC 2.3.1.37) (5-aminolevulinic acid synthase 1) (Delta-ALA synthase 1) (Delta-aminolevulinate synthase 1)   | -8.770000              | 18.000000                    |
| 34         | SPTLC2<br>KIAA0526 LCB2               | Serine palmitoyltransferase 2 (EC 2.3.1.50) (Long chain base biosynthesis protein 2) (LCB 2) (Long chain base biosynthesis protein 2a) (LCB2a) (Serine-palmitoyl-CoA transferase 2) (SPT 2)  | -8.770000              | 49.000000                    |
| 35         | SHMT1                                 | Serine hydroxymethyltransferase, cytosolic (SHMT) (EC 2.1.2.1) (Glycine hydroxymethyltransferase) (Serine methylase)   | -8.760000              | 25.000000                    |
| 36         | PYGB                                  | Glycogen phosphorylase, brain form (EC 2.4.1.1)  | -8.710000              | 24.000000                    |
| 37         | SHMT2                                 | Serine hydroxymethyltransferase, mitochondrial (SHMT) (EC 2.1.2.1) (Glycine hydroxymethyltransferase) (Serine methylase)   | -8.690000              | 10.000000                    |
| 38         | SCLY SCL                              | Selenocysteine lyase (hSCL) (EC 4.4.1.16)  | -8.460000              | 18.000000                    |
| 39         | ETNPPL<br>AGXT2L1                     | Ethanolamine-phosphate phospho-lyase (EC 4.2.3.2) (Alanine--glyoxylate aminotransferase 2-like 1)  | -8.440000              | 43.000000                    |
| 40         | GCAT KBL                              | 2-amino-3-ketobutyrate coenzyme A ligase, mitochondrial (AKB ligase) (EC 2.3.1.29) (Aminoacetone synthase) (Glycine acetyltransferase)   | -8.270000              | 21.000000                    |
| 41         | PYGM                                  | Glycogen phosphorylase, muscle form (EC 2.4.1.1) (Myophosphorylase)  | -8.180000              | 16.000000                    |
| 42         | GLDC GCSP                             | Glycine dehydrogenase (decarboxylating), mitochondrial (EC 1.4.4.2) (Glycine cleavage system P protein) (Glycine decarboxylase) (Glycine dehydrogenase (aminomethyl-transferring))   | -7.800000              | 18.000000                    |
| 43         | GPT AAT1 GPT1                         | Alanine aminotransferase 1 (ALT1) (EC 2.6.1.2) (Glutamate pyruvate transaminase 1) (GPT 1) (Glutamic--alanine transaminase 1) (Glutamic--pyruvic transaminase 1)   | -7.743000              | 23.000000                    |
| 44         | MOCOS                                 | Molybdenum cofactor sulfurase (MCS) (MOS) (MoCo sulfurase) (hMCS) (EC 2.8.1.9) (Molybdenum cofactor sulfurtransferase)   | -7.420000              | 14.000000                    |
| 45         | KYNU                                  | Kynureninase (EC 3.7.1.3) (L-kynurenine hydrolase)   | -7.410000              | 10.000000                    |
| 46         | AGXT2 AGT2                            | Alanine--glyoxylate aminotransferase 2, mitochondrial (AGT 2) (EC 2.6.1.44) ((R)-3-amino-2-methylpropionate--pyruvate transaminase) (EC 2.6.1.40) (Beta-ALAAT II) (Beta-alanine-pyruvate aminotransferase) (D-AIBAT)   | -7.400000              | 20.000000                    |
| 47         | GOT1L1                                | Putative aspartate aminotransferase, cytoplasmic 2 (EC 2.6.1.1) (Glutamate oxaloacetate transaminase 1-like protein 1) (Transaminase A-like protein 1)   | -7.100000              | 7.000000                     |
| 48         | ACCSL                                 | Probable inactive 1-aminocyclopropane-1-carboxylate synthase-like protein 2 (ACC synthase-like protein 2)  | -7.000000              | 11.000000                    |
| 49         | AZIN1 OAZI<br>OAZIN                   | Antizyme inhibitor 1 (AZI) (AZI1) (Ornithine decarboxylase antizyme inhibitor)   | -6.940000              | 7.000000                     |
| 50         | THNSL1                                | Threonine synthase-like 1 (TSH1)   | -6.480000              | 8.000000                     |
| 51         | THNSL2                                | Threonine synthase-like 2 (TSH2) (EC 4.2.3.-) (Secreted osteoclastogenic factor of activated T-cells) (SOFAT)  | -6.440000              | 14.000000                    |
| 52         | PLPBP PROSC                           | Pyridoxal phosphate homeostasis protein (PLP homeostasis protein) (Proline synthase co-transcribed bacterial homolog protein) (Pyridoxal phosphate-binding protein)  | -6.370000              | 7.000000                     |
| 53         | NFS1 NIFS<br>HUSSY-08                 | Cysteine desulfurase, mitochondrial (EC 2.8.1.7)   | -6.310000              | 9.000000                     |