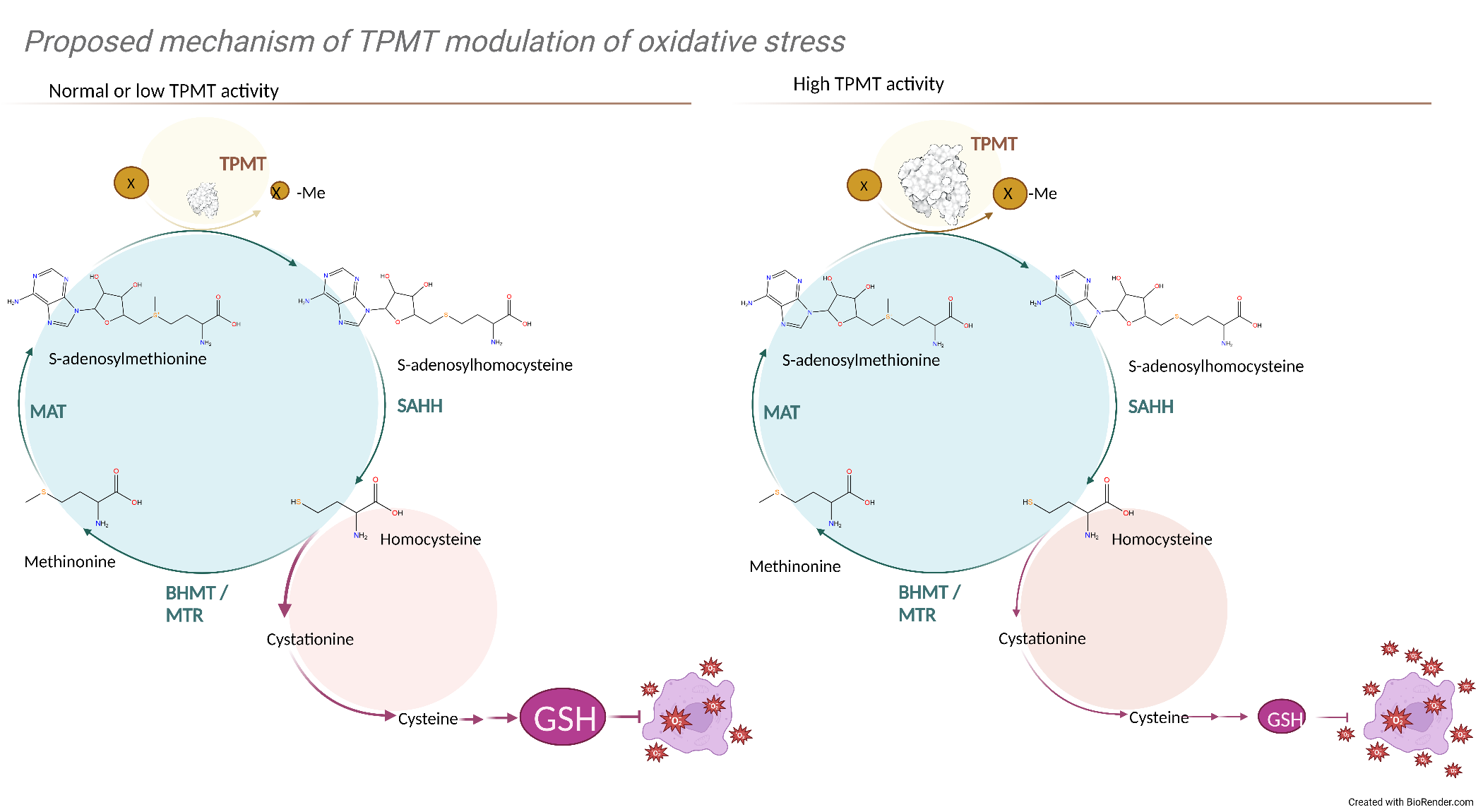
**SUPPLEMENT**

****

**Figure S1. Proposed mechanism of TPMT modulation of oxidative stress.**

In cells with high TPMT activity, consumption of SAM is significantly faster than in cells with normal or low TPMT activity. This causes decreased metabolic flux of SAM towards GSH synthesis, resulting in lower antioxidant capacity of the cell.

Abbreviations used: BHMT: betaine-homocysteine methyltransferase; GSH: glutathione MAT: Methionine adenosyltransferase; MTR: Methionine synthase; SAHH: S-adenosylhomocysteine hydrolase; TPMT: Thiopurine S-methyltransferase

**Table S1. List of genes most closely associated with TPMT and analysed with DAVID functional annotation tool.**

|  |  |  |
| --- | --- | --- |
| Gene Symbol | GenBank Accession Number | Gene Name |
| *NDUFS1* | NM\_005006 | NADH dehydrogenase (ubiquinone) Fe-S protein 1, 75kDa (NADH-coenzyme Q reductase) |
| *PAICS* | NM\_001079524 | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase |
| *SQLE* | NM\_003129 | squalene epoxidase |
| *CBR1* | NM\_001757 | carbonyl reductase 1 |
| *GPAM* | NM\_020918 | glycerol-3-phosphate acyltransferase, mitochondrial |
| *EPT1* | NM\_033505 | selenoprotein I |
| *NAT1* | NM\_000662 | N-acetyltransferase 1 (arylamine N-acetyltransferase) |
| *PDSS1* | NM\_014317 | prenyl (decaprenyl) diphosphate synthase, subunit 1 |
| *GMPS* | NM\_003875 | guanine monphosphate synthetase |
| *TPMT* | NM\_000367 | thiopurine S-methyltransferase |
| *CYP26A1* | NM\_000783 | cytochrome P450, family 26, subfamily A, polypeptide 1 |
| *PPAT* | NM\_002703 | phosphoribosyl pyrophosphate amidotransferase |
| *AASDHPPT* | NM\_015423 | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase |
| *CYP51A1* | NM\_000786 | cytochrome P450, family 51, subfamily A, polypeptide 1 |
| *MTHFR* | NM\_005957 | 5,10-methylenetetrahydrofolate reductase (NADPH) |
| *PTS* | NM\_000317 | 6-pyruvoyltetrahydropterin synthase |
| *IDH1* | NM\_005896 | isocitrate dehydrogenase 1 (NADP+), soluble |
| *NUDT15* | NM\_018283 | nudix (nucleoside diphosphate linked moiety X)-type motif 15 |
| *LOC402175* | NM\_001168331 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 4, 15kDa pseudogene |
| *NDUFB4* | NM\_001168331 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 4, 15kDa |
| *AK2* | NM\_001625 | adenylate kinase 2 |
| *PDP1* | NM\_018444 | pyruvate dehyrogenase phosphatase catalytic subunit 1 |
| *PDP2* | NM\_020786 | pyruvate dehyrogenase phosphatase catalytic subunit 2 |
| *GMPR2* | NM\_001002000 | guanosine monophosphate reductase 2 |
| *NNMT* | NM\_006169 | nicotinamide N-methyltransferase |
| *FLAD1* | NM\_025207 | flavin adenine dinucleotide synthetase 1 |
| *MTMR4* | NM\_004687 | myotubularin related protein 4 |
| *DCTD* | NM\_001012732 | dCMP deaminase |
| *HMBS* | NM\_001024382 | hydroxymethylbilane synthase |
| *TGS1* | NM\_024831 | trimethylguanosine synthase 1 |

**Table S2. Model I - List of genes most closely associated with TPMT**

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **GenBank Accession Number** | **Gene symbol** | **Gene name** |
| 1 | NM\_003875 | *GMPS* | guanine monphosphate synthase (GMPS) |
| 2 | NM\_015423 | *AASDHPPT* | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 3 | NM\_001002000 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 4 | NM\_001079524 | *PAICS* | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 5 | NM\_000031 | *ALAD* | aminolevulinate dehydratase (ALAD) |
| 6 | NM\_025207 | *FLAD1* | flavin adenine dinucleotide synthetase 1 (FLAD1) |
| 7 | NM\_004687 | *MTMR4* | myotubularin related protein 4 (MTMR4) |
| 8 | NM\_001079524 | *PAICS* | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 9 | NM\_000190 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 10 | NM\_001625 | *AK2* | adenylate kinase 2 (AK2) |
| 11 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 12 | NM\_001037277 | *GGPS1* | geranylgeranyl diphosphate synthase 1 (GGPS1) |
| 13 | NM\_014298 | *QPRT* | quinolinate phosphoribosyltransferase (QPRT) |
| 14 | NM\_006877 | *GMPR* | guanosine monophosphate reductase (GMPR) |
| 15 | NM\_018161 | *NADSYN1* | NAD synthetase 1 (NADSYN1) |
| 16 | NM\_178500 | *PHOSPHO1* | phosphatase, orphan 1 (PHOSPHO1) |
| 17 | NM\_000712 | *BLVRA* | biliverdin reductase A (BLVRA) |
| 18 | NM\_019593 | *GPCPD1* | glycerophosphocholine phosphodiesterase GDE1 homolog (S. cerevisiae) (GPCPD1) |
| 19 | NM\_001077447 | *PPCS* | phosphopantothenoylcysteine synthetase (PPCS) |
| 20 | NM\_018129 | *PNPO* | pyridoxamine 5'-phosphate oxidase (PNPO) |
| 21 | NM\_024815 | *NUDT18* | nudix (nucleoside diphosphate linked moiety X)-type motif 18 (NUDT18) |
| 22 | NM\_001077447 | *PPCS* | phosphopantothenoylcysteine synthetase (PPCS) |
| 23 | NM\_024051 | *GGCT* | gamma-glutamylcyclotransferase (GGCT) |
| 24 | NM\_023018 | *NADK* | NAD kinase (NADK) |
| 25 | NM\_001012732 | *DCTD* | dCMP deaminase (DCTD) |
| 26 | NM\_003359 | *UGDH* | UDP-glucose 6-dehydrogenase (UGDH) |
| 27 | NM\_001054 | *SULT1A2* | sulfotransferase family, cytosolic, 1A, phenol-preferring, member 2 (SULT1A2) |
| 28 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 29 | NM\_005027 | *PIK3R2* | phosphoinositide-3-kinase, regulatory subunit 2 (beta) (PIK3R2) |
| 30 | NM\_000662 | *NAT1* | N-acetyltransferase 1 (arylamine N-acetyltransferase) (NAT1) |
| 31 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 32 | NM\_012229 | *NT5C2* | 5'-nucleotidase, cytosolic II (NT5C2) |
| 33 | NM\_015423 | *AASDHPPT* | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 34 | NM\_001024382 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 35 | NM\_001625 | *AK2* | adenylate kinase 2 (AK2) |
| 36 | NM\_003364 | *UPP1* | uridine phosphorylase 1 (UPP1) |
| 37 | NM\_001002000 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 38 | NM\_000167 | *GK* | glycerol kinase (GK) |
| 39 | NM\_000110 | *DPYD* | dihydropyrimidine dehydrogenase (DPYD) |
| 40 | NM\_001040633 | *PRKAG2* | protein kinase, AMP-activated, gamma 2 non-catalytic subunit (PRKAG2) |
| 41 | NM\_000819 | *GART* | phosphoribosylglycinamide formyltransferase, phosphoribosylglycinamide synthetase, phosphoribosylaminoimidazole synthetase (GART) |
| 42 | NM\_000689 | *ALDH1A1* | aldehyde dehydrogenase 1 family, member A1 (ALDH1A1) |
| 43 | NM\_002627 | *PFKP* | phosphofructokinase, platelet (PFKP) |
| 44 | NM\_001634 | *AMD1* | adenosylmethionine decarboxylase 1 (AMD1) |
| 45 | NM\_000104 | *CYP1B1* | cytochrome P450, family 1, subfamily B, polypeptide 1 (CYP1B1) |
| 46 | NM\_024096 | *DCTPP1* | dCTP pyrophosphatase 1 (DCTPP1) |
| 47 | NM\_003275 | *TMOD1* | tropomodulin 1 (TMOD1) |
| 48 | NM\_002703 | *PPAT* | phosphoribosyl pyrophosphate amidotransferase (PPAT) |
| 49 | NM\_006169 | *NNMT* | nicotinamide N-methyltransferase (NNMT) |
| 50 | NM\_005957 | *MTHFR* | methylenetetrahydrofolate reductase (NAD(P)H) (MTHFR) |

**Table S3. Model II - List of genes most closely associated with TPMT**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rank** | **GenBank Accession Number** | **Gene symbol** | **Gene name** | |
| 1 | NM\_001079524 | *PAICS* | | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 2 | NM\_001002000 | *GMPR2* | | guanosine monophosphate reductase 2 (GMPR2) |
| 3 | NM\_025207 | *FLAD1* | | flavin adenine dinucleotide synthetase 1 (FLAD1) |
| 4 | NM\_000031 | *ALAD* | | aminolevulinate dehydratase (ALAD) |
| 5 | NM\_015423 | *AASDHPPT* | | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 6 | NM\_001077525 | *MTMR14* | | myotubularin related protein 14 (MTMR14) |
| 7 | NM\_001625 | *AK2* | | adenylate kinase 2 (AK2) |
| 8 | NM\_004687 | *MTMR4* | | myotubularin related protein 4 (MTMR4) |
| 9 | NM\_001037277 | *GGPS1* | | geranylgeranyl diphosphate synthase 1 (GGPS1) |
| 10 | NM\_001079524 | *PAICS* | | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 11 | NM\_014298 | *QPRT* | | quinolinate phosphoribosyltransferase (QPRT) |
| 12 | NM\_003875 | *GMPS* | | guanine monphosphate synthase (GMPS) |
| 13 | NM\_000190 | *HMBS* | | hydroxymethylbilane synthase (HMBS) |
| 14 | NM\_018161 | *NADSYN1* | | NAD synthetase 1 (NADSYN1) |
| 15 | NM\_006877 | *GMPR* | | guanosine monophosphate reductase (GMPR) |
| 16 | NM\_178500 | *PHOSPHO1* | | phosphatase, orphan 1 (PHOSPHO1) |
| 17 | NM\_001077447 | *PPCS* | | phosphopantothenoylcysteine synthetase (PPCS) |
| 18 | NM\_024815 | *NUDT18* | | nudix (nucleoside diphosphate linked moiety X)-type motif 18 (NUDT18) |
| 19 | NM\_019593 | *GPCPD1* | | glycerophosphocholine phosphodiesterase GDE1 homolog (S. cerevisiae) (GPCPD1) |
| 20 | NM\_001077447 | *PPCS* | | phosphopantothenoylcysteine synthetase (PPCS) |
| 21 | NM\_000712 | *BLVRA* | | biliverdin reductase A (BLVRA) |
| 22 | NM\_018129 | *PNPO* | | pyridoxamine 5'-phosphate oxidase (PNPO) |
| 23 | NM\_001077525 | *MTMR14* | | myotubularin related protein 14 (MTMR14) |
| 24 | NM\_023018 | *NADK* | | NAD kinase (NADK) |
| 25 | NM\_024051 | *GGCT* | | gamma-glutamylcyclotransferase (GGCT) |
| 26 | NM\_001012732 | *DCTD* | | dCMP deaminase (DCTD) |
| 27 | NM\_003359 | *UGDH* | | UDP-glucose 6-dehydrogenase (UGDH) |
| 28 | NM\_012229 | *NT5C2* | | 5'-nucleotidase, cytosolic II (NT5C2) |
| 29 | NM\_001054 | *SULT1A2* | | sulfotransferase family, cytosolic, 1A, phenol-preferring, member 2 (SULT1A2) |
| 30 | NM\_000662 | *NAT1* | | N-acetyltransferase 1 (arylamine N-acetyltransferase) (NAT1) |
| 31 | NM\_001024382 | *HMBS* | | hydroxymethylbilane synthase (HMBS) |
| 32 | NM\_001077525 | *MTMR14* | | myotubularin related protein 14 (MTMR14) |
| 33 | NM\_005027 | *PIK3R2* | | phosphoinositide-3-kinase, regulatory subunit 2 (beta) (PIK3R2) |
| 34 | NM\_015423 | *AASDHPPT* | | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 35 | NM\_001002000 | *GMPR2* | | guanosine monophosphate reductase 2 (GMPR2) |
| 36 | NM\_001625 | *AK2* | | adenylate kinase 2 (AK2) |
| 37 | NM\_006169 | *NNMT* | | nicotinamide N-methyltransferase (NNMT) |
| 38 | NM\_003364 | *UPP1* | | uridine phosphorylase 1 (UPP1) |
| 39 | NM\_001012732 | *DCTD* | | dCMP deaminase (DCTD) |
| 40 | NM\_002703 | *PPAT* | | phosphoribosyl pyrophosphate amidotransferase (PPAT) |
| 41 | NM\_001757 | *CBR1* | | carbonyl reductase 1 (CBR1) |
| 42 | NM\_000190 | *HMBS* | | hydroxymethylbilane synthase (HMBS) |
| 43 | NM\_001010927 | *TIAM2* | | T-cell lymphoma invasion and metastasis 2 (TIAM2) |
| 44 | NM\_018283 | *NUDT15* | | nudix (nucleoside diphosphate linked moiety X)-type motif 15 (NUDT15) |
| 45 | NM\_017570 | *OPLAH* | | 5-oxoprolinase (ATP-hydrolysing) (OPLAH) |
| 46 | NM\_005957 | *MTHFR* | | methylenetetrahydrofolate reductase (NAD(P)H) (MTHFR) |
| 47 | NM\_013411 | *AK2* | | adenylate kinase 2 (AK2) |
| 48 | NM\_014465 | *SULT1B1* | | sulfotransferase family, cytosolic, 1B, member 1 (SULT1B1) |
| 49 | NM\_003706 | *PLA2G4C* | | phospholipase A2, group IVC (cytosolic, calcium-independent) (PLA2G4C) |
| 50 | NM\_016368 | *ISYNA1* | | inositol-3-phosphate synthase 1 (ISYNA1) |

**Table S4. Model III - List of genes most closely associated with TPMT**

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **GenBank Accession Number** | **Gene symbol** | **Gene name** |
| 1 | NM\_176806 | *MOCS2* | molybdenum cofactor synthesis 2 (MOCS2) |
| 2 | NM\_001012969 | *ADAL* | adenosine deaminase-like (ADAL) |
| 3 | NM\_018129 | *PNPO* | pyridoxamine 5'-phosphate oxidase (PNPO) |
| 4 | NM\_001079524 | *PAICS* | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 5 | NM\_177536 | *SULT1A1* | sulfotransferase family, cytosolic, 1A, phenol-preferring, member 1 (SULT1A1) |
| 6 | NM\_178500 | *PHOSPHO1* | phosphatase, orphan 1 (PHOSPHO1) |
| 7 | NM\_016368 | *ISYNA1* | inositol-3-phosphate synthase 1 (ISYNA1) |
| 8 | NM\_005027 | *PIK3R2* | phosphoinositide-3-kinase, regulatory subunit 2 (beta) (PIK3R2) |
| 9 | NM\_000858 | *GUK1* | guanylate kinase 1 (GUK1) |
| 10 | NM\_001055 | *SULT1A1* | sulfotransferase family, cytosolic, 1A, phenol-preferring, member 1 (SULT1A1) |
| 11 | NM\_003364 | *UPP1* | uridine phosphorylase 1 (UPP1) |
| 12 | NM\_015040 | *PIKFYVE* | phosphoinositide kinase, FYVE finger containing (PIKFYVE) |
| 13 | NM\_001002000 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 14 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 15 | NM\_012229 | *NT5C2* | 5'-nucleotidase, cytosolic II (NT5C2) |
| 16 | NM\_023018 | *NADK* | NAD kinase (NADK) |
| 17 | NM\_001012732 | *DCTD* | dCMP deaminase (DCTD) |
| 18 | NM\_005989 | *AKR1D1* | aldo-keto reductase family 1, member D1 (AKR1D1) |
| 19 | NM\_153183 | *NUDT10* | nudix (nucleoside diphosphate linked moiety X)-type motif 10 (NUDT10) |
| 20 | NM\_001077447 | *PPCS* | phosphopantothenoylcysteine synthetase (PPCS) |
| 21 | NM\_006877 | *GMPR* | guanosine monophosphate reductase (GMPR) |
| 22 | NM\_001077447 | *PPCS* | phosphopantothenoylcysteine synthetase (PPCS) |
| 23 | NM\_001625 | *AK2* | adenylate kinase 2 (AK2) |
| 24 | NM\_001037277 | *GGPS1* | geranylgeranyl diphosphate synthase 1 (GGPS1) |
| 25 | NM\_016576 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 26 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 27 | NM\_001079524 | *PAICS* | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 28 | NM\_001002000 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 29 | NM\_015423 | *AASDHPPT* | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 30 | NM\_000190 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 31 | NM\_014298 | *QPRT* | quinolinate phosphoribosyltransferase (QPRT) |
| 32 | NM\_003875 | *GMPS* | guanine monphosphate synthase (GMPS) |
| 33 | NM\_000031 | *ALAD* | aminolevulinate dehydratase (ALAD) |
| 34 | NM\_025207 | *FLAD1* | flavin adenine dinucleotide synthetase 1 (FLAD1) |
| 35 | NM\_004687 | *MTMR4* | myotubularin related protein 4 (MTMR4) |
| 36 | NM\_019593 | *GPCPD1* | glycerophosphocholine phosphodiesterase GDE1 homolog (S. cerevisiae) (GPCPD1) |
| 37 | NM\_000712 | *BLVRA* | biliverdin reductase A (BLVRA) |
| 38 | NM\_013411 | *AK2* | adenylate kinase 2 (AK2) |
| 39 | NM\_018161 | *NADSYN1* | NAD synthetase 1 (NADSYN1) |
| 40 | NM\_024815 | *NUDT18* | nudix (nucleoside diphosphate linked moiety X)-type motif 18 (NUDT18) |
| 41 | NM\_001054 | *SULT1A2* | sulfotransferase family, cytosolic, 1A, phenol-preferring, member 2 (SULT1A2) |
| 42 | NM\_001625 | *AK2* | adenylate kinase 2 (AK2) |
| 43 | NM\_024051 | *GGCT* | gamma-glutamylcyclotransferase (GGCT) |
| 44 | NM\_001024382 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 45 | NM\_003359 | *UGDH* | UDP-glucose 6-dehydrogenase (UGDH) |
| 46 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 47 | NM\_021823 | *PPCDC* | phosphopantothenoylcysteine decarboxylase (PPCDC) |
| 48 | AL354794 | *///* | Human DNA sequence from clone RP11-203L2 on chromosome 9q21.11-21.2, complete |
| 49 | NM\_000662 | *NAT1* | N-acetyltransferase 1 (arylamine N-acetyltransferase) (NAT1) |
| 50 | NM\_006169 | *NNMT* | nicotinamide N-methyltransferase (NNMT) |

**Table S5. Model IV - List of genes most closely associated with TPMT**

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **GenBank Accession Number** | **Gene symbol** | **Gene name** |
| 1 | NM\_001079524 | *PAICS* | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 2 | NM\_003875 | *GMPS* | guanine monphosphate synthase (GMPS) |
| 3 | NM\_001002000 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 4 | NM\_000031 | *ALAD* | aminolevulinate dehydratase (ALAD) |
| 5 | NM\_025207 | *FLAD1* | flavin adenine dinucleotide synthetase 1 (FLAD1) |
| 6 | NM\_015423 | *AASDHPPT* | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 7 | NM\_004687 | *MTMR4* | myotubularin related protein 4 (MTMR4) |
| 8 | NM\_000190 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 9 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 10 | NM\_001625 | *AK2* | adenylate kinase 2 (AK2) |
| 11 | NM\_001037277 | *GGPS1* | geranylgeranyl diphosphate synthase 1 (GGPS1) |
| 12 | NM\_001079524 | *PAICS* | phosphoribosylaminoimidazole carboxylase, phosphoribosylaminoimidazole succinocarboxamide synthetase (PAICS) |
| 13 | NM\_014298 | *QPRT* | quinolinate phosphoribosyltransferase (QPRT) |
| 14 | NM\_006877 | *GMPR* | guanosine monophosphate reductase (GMPR) |
| 15 | NM\_018161 | *NADSYN1* | NAD synthetase 1 (NADSYN1) |
| 16 | NM\_000712 | *BLVRA* | biliverdin reductase A (BLVRA) |
| 17 | NM\_178500 | *PHOSPHO1* | phosphatase, orphan 1 (PHOSPHO1) |
| 18 | NM\_024815 | *NUDT18* | nudix (nucleoside diphosphate linked moiety X)-type motif 18 (NUDT18) |
| 19 | NM\_019593 | *GPCPD1* | glycerophosphocholine phosphodiesterase GDE1 homolog (S. cerevisiae) (GPCPD1) |
| 20 | NM\_001077447 | *PPCS* | phosphopantothenoylcysteine synthetase (PPCS) |
| 21 | NM\_018129 | *PNPO* | pyridoxamine 5'-phosphate oxidase (PNPO) |
| 22 | NM\_001077447 | *PPCS* | phosphopantothenoylcysteine synthetase (PPCS) |
| 23 | NM\_023018 | *NADK* | NAD kinase (NADK) |
| 24 | NM\_024051 | *GGCT* | gamma-glutamylcyclotransferase (GGCT) |
| 25 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 26 | NM\_001012732 | *DCTD* | dCMP deaminase (DCTD) |
| 27 | NM\_003359 | *UGDH* | UDP-glucose 6-dehydrogenase (UGDH) |
| 28 | NM\_001054 | *SULT1A2* | sulfotransferase family, cytosolic, 1A, phenol-preferring, member 2 (SULT1A2) |
| 29 | NM\_000662 | *NAT1* | N-acetyltransferase 1 (arylamine N-acetyltransferase) (NAT1) |
| 30 | NM\_005027 | *PIK3R2* | phosphoinositide-3-kinase, regulatory subunit 2 (beta) (PIK3R2) |
| 31 | NM\_015423 | *AASDHPPT* | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase (AASDHPPT) |
| 32 | NM\_001077525 | *MTMR14* | myotubularin related protein 14 (MTMR14) |
| 33 | NM\_001024382 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 34 | NM\_012229 | *NT5C2* | 5'-nucleotidase, cytosolic II (NT5C2) |
| 35 | NM\_001625 | *AK2* | adenylate kinase 2 (AK2) |
| 36 | NM\_003364 | *UPP1* | uridine phosphorylase 1 (UPP1) |
| 37 | NM\_001002000 | *GMPR2* | guanosine monophosphate reductase 2 (GMPR2) |
| 38 | NM\_006169 | *NNMT* | nicotinamide N-methyltransferase (NNMT) |
| 39 | NM\_001012732 | *DCTD* | dCMP deaminase (DCTD) |
| 40 | NM\_002703 | *PPAT* | phosphoribosyl pyrophosphate amidotransferase (PPAT) |
| 41 | NM\_005957 | *MTHFR* | methylenetetrahydrofolate reductase (NAD(P)H) (MTHFR) |
| 42 | NM\_001757 | *CBR1* | carbonyl reductase 1 (CBR1) |
| 43 | NM\_018283 | *NUDT15* | nudix (nucleoside diphosphate linked moiety X)-type motif 15 (NUDT15) |
| 44 | NM\_000190 | *HMBS* | hydroxymethylbilane synthase (HMBS) |
| 45 | NM\_001010927 | *TIAM2* | T-cell lymphoma invasion and metastasis 2 (TIAM2) |
| 46 | NM\_002627 | *PFKP* | phosphofructokinase, platelet (PFKP) |
| 47 | NM\_001040633 | *PRKAG2* | protein kinase, AMP-activated, gamma 2 non-catalytic subunit (PRKAG2) |
| 48 | NM\_006409 | *ARPC1A* | actin related protein 2/3 complex, subunit 1A, 41kDa (ARPC1A) |
| 49 | NM\_024096 | *DCTPP1* | dCTP pyrophosphatase 1 (DCTPP1) |
| 50 | NM\_000167 | *GK* | glycerol kinase (GK) |