	COMPARTME				P. pastoris
REACTION NAME Propane-1,2-diol:NAD+ oxidoreductase	T Cytosol	METABOLIC REACTIONS 12PDO + NAD -> LALD + NADH + H	E.C.# 1.1.1.77	SUBSYSTEM	gene locus
Endo-1,3-beta-Glucan Glucohydrase Endo-1,3-beta-Glucan Glucohydrase	Cytosol Cytosol	138DGLCn + H2O -> GLC 138DGLCn + H2O -> GLC	EC-3.2.1.58 EC-3.2.1.58	Starch and sucrose Metabolism Starch and sucrose Metabolism	PIPAD1958 PIPAD1798 PIPAD1518
Exo-1,3-beta-Glucan Glucohydrase, extracellular 1.3-beta-Glucan synthase	Extracellular Cytosol	13BDGLCn + H2O >> GLC UPPs > 13BDGLCn + H + UDP	EC-3.2.1.58 EC-2.4.1.34	Starch and sucrose Metabolism Alternate Carbon Metabolism	PIPAU1518 PIPAU2524 PIPAU0699
2Dehydro-3DeoxyD-arabino-heptonate7-phohsphate mitochondrial transport via diffusion	Cytosoi	2dda7P[c] <> 2dda7P[m]	102.4.1.34	Transport, Mitochondrial	1174043
2Dehydropantoate mitochondrial transport 2-METhylcitrate mitochondrial transport via diffusion		$2dhP(c) \Leftrightarrow 2dhP(m)$ $2mClT(c) \Leftrightarrow 2mClT(m)$		Transport, Mitochondrial Transport, Mitochondrial	
Octaprenyl-6-hydroxyphenol nuclear transport Octaprenyl-6-METhoxyprenol mitochondrial transport		2oPP(_S[q] <> 2oPP(_S[n]) 2omP(_S[q] <> 2omP(_S[q]) 2omP(_S[q] <> 2omP(_S[q])		Transport, Nuclear Transport, Mitochondrial Transport, Nuclear	
Octaprenyl-6-METhoxyprenol nuclear transport Oxoadipate transport out of mitochondria via diffusion Hydroxyphenylpyruvate:oxygen oxidoreductase	Cytosol	ZOWADP[m] > ZOWADP[c] 3&hPP + OZ > COZ + Hgentis	EC-1.13.11.27	Transport, Notation Transport, Mitochondrial Tyrosine, Tryptophan, and Phenylalanine Metabolism	
3-(4-hydroxyphenyl)pyruvate mitochondrial transport via Proton symp		34hPP(c) + H(c) <> 34hPP(m) + H(m)		Transport, Mitochondrial	
3-(4-hydroxyphenyl)pyruvate peroxisomal transport via Proton sympo 2-isoPropylmalate transport, diffusion, mitochondrial		34hPP(c) + H(c) <> 34hPP(x) + H(x)		Transport, Peroxisomal	
2-isorropyimaiate transport, diffusion, mitochondnai 3-Carboxy-4-METhyl-2-oxopentanoate transport, diffusion, mitochond		3c3hmP(c) <> 3c3hmP(m) 3c4MOP(c) <> 3c4MOP(m)		Transport, Mitochondrial Transport, Mitochondrial	
3Dehydrosphinganine reductase 3-hydroxyanthranilate 3.4Dioxygenase	Cytosol	3dsPHgn + H + NADPH :> NADP + sPHgn 3hanthrn + O2 -> cmusa + H	EC-1.1.1.102 EC-1.13.11.6	Sphingolipid Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02095 PIPA05874
 METhyl-2-oxobutanoate transport, diffusion, mitochondrial METhyl-2-oxopentanoate transport, diffusion, mitochondrial 		3MOB(c) <> 3MOB(m) 3MOP(c) <> 3MOP(m)		Transport, Mitochondrial Transport, Mitochondrial	
3-Octaprenyl-4-hydroxybenzoate mitochondrial transport 3Sulfinot-alanine:2-oxoGiutarate aminotransFerase 4-aminobutanal mitochondrial transport via diffusion	Cytosol	3oPHb_5(c) <> 3oPHb_5(lm) SALA + AKC -> \$PPR + GLU 4abura(c) <> 4abura(m)	2.6.1.1	Transport, Mitochondrial Cysteine Metabolism Transport, Mitochondrial	PIPAD3996
4-aminobutanoate mitochondrial transport via diffusion 4-Aminobenzoate mitochondrial transport via diffusion		4abut(c) <> 4abut(m) 4abut(c) <> 4abut(m)		Transport, Mitochondrial Transport, Mitochondrial Transport, Mitochondrial	
4-hydroxy-2-oxoGlutarate mitochondrial transport via diffusion 4-hydroxy-2-oxoGlutarate peroxisomal transport via diffusion		4H2Ogtt[c] <> 4H2Ogtt[m] 4H2Ogtt[c] <> 4H2Ogtt[x]		Transport, Mitochondrial Transport, Peroxisomal	
4-Hydroxybenzoate mitochondrial transport L4-hydroxyGlutamate semialdehyde dehydrogenase, mitochondrial	Mitochondria	4hbt/c < > 4hbt/m 4 hbt/c > 4hbt/m	EC-1.5.1.12	Transport, Mitochondrial Arginine and Proline Metabolism	PIPAD0869
trans-4-hydroxyl-Proline mitochondrial transport via diffusion 4-Hydroxyl-threonine synthase	Cytosol	4hPROT(c) <> 4hPROT(m) H20 + PHth >> 4hthr + Pl	1013111	Transport, Mitochondrial Threonine and Lysine Metabolism	PIPA02214
5-Amino-4-exopentanoate transport in via Proton symport 5-Amino-4-exopentanoate mitochondrial transport		$SaoP(c) + H(c) \rightarrow SaoP(c) + H(c)$ $SaoP(c) \Leftrightarrow SaoP(m)$		Transport, Extracellular Transport, Mitochondrial	
S-METhyltetrahydrofolate mitochondrial transport via diffusion 6-phosphoD-Glucono-1,5Lactone endoplasmic reticular transport via diffusion		SmTHF[q] <> SmTHF[m] 6Pg[lc] <> 6Pg[r]		Transport, Mitochondrial Transport, Endoplasmic Reticular	
8-Amino-7-oxononanoate reversible transport via Proton symport 4-acetamidobutyrate deacetylase	Cytosol	orgu; → orgu; 8aonn(e) + H(e) <> 8aonn(c) + H(c) 4aabutn + H2O → 4abut + HC	EC-3.5.1.63	Transport, Extracellular Other Amino Acid Metabolism	
L-aminoadipateSemialdehyde dehydrogenase (NADph) L-aminoadipateSemialdehyde dehydrogenase (NADH)	Cytosol	L2aADP + ATP + H + NADPH -> L2aADP6sa + AMP + NADP + PPI L2aADP + ATP + H + NADH -> L2aADP6sa + AMP + NAD + PPI	EC-1.2.1.31 EC-1.2.1.31	Threonine and Lysine Metabolism Threonine and Lysine Metabolism	PIPAD2090 PIPAD2090
2-aminoadipate transaminase 4-aminobutyrate transaminase I. arabioliti transport via passive diffusion	Cytosol Cytosol	20x0ADP + GLU <> LZaADP + AKG 4abut + AKG <> GLU + SUCrall shife <> shife <> shife	EC-2.6.1.57 EC-2.6.1.19	Threonine and Lysine Metabolism GLUtamate Metabolism Transport, Extracellular	PIPA01534
L-arabinitol transport via passive diffusion Aminobutyraldehyde dehydrogenase, mitochondrial 4-aminobutyrate transport in via Proton symport	Mitochondria		EC-1.2.1.19	Transport, Extracellular Transport, Extracellular Transport, Extracellular	PIPA00390 PIPA00701
acetyl-COA C-acetyltransFerase acetyl-COA C-acetyltransFerase (octanoyl-COA), peroxisomal	Cytosol Peroxisome	2 ACCOA > BACOA + COA 3 OdCOA + COA > ACCOA + OCCOA	EC-2.3.1.9 EC-2.3.1.16	Fatty Acid Biosynthesis Fatty Acid Degradation	PIPA03702 PIPA10023
acetyl-COA C-acyttransFerase (decanoyl-COA), peroxisomal acetyl-COA C-acetyltransFerase (dodecanoyl), peroxisomal	Peroxisome Peroxisome	3oddCDA + CDA → ACCDA + C100CDA 3oddCDA + CDA → ACCDA + C100CDA 3oddCDA + CDA → ACCDA + C100CDA	EC-2.3.1.16 EC-2.3.1.16	Fatty Acid Degradation Fatty Acid Degradation	PIPA10023 PIPA10023
acetul-COA acyltransFerase (tetrADEcanoyl-COA), peroxisomal acetyl-COA acyltransFerase (hexADEcanoyl-COA), peroxisomal acetaldehyde reversible transport	Peroxisome Peroxisome	SONDICUS * C.U.S > ACCUS + C.140,CUS SONDICUS + C.O.S > ACCUS + C.160COS ACAL(e) <> ACAL(c)	EC-2.3.1.16 EC-2.3.1.16	Fatty Acid Degradation Fatty Acid Degradation Transport, Extracellular	PIPA10023 PIPA10023
acetyl-COA carboxylate, reversible reaction N-acetylGlucosamine-6-phosphate synthase, nucleus	Cytosol Nucleus	ACCOA + ATP + HCO3 <> ADP + H + malCOA + PI ACCOA + GAM6P > naga6P + COA + H	EC-6.4.1.2 EC-2.3.1.4	Fatty Acid Biosynthesis GLUtamate Metabolism	PIPA03698 PIPA00425
phosphoacetylGlucosamine mutase acetylGlutamate kinase, mitochondrial	Cytosol Mitochondria	naga6P <> naga1P	EC-5.4.2.3 EC-2.7.2.8	GLUtamate Metabolism Arginine and Proline Metabolism	PIPAD0097 PIPAD3617
N-acteylGlutamate synthase, mitochondrial	Mitochondria	a ACCOA + GLU -> ACGLU + COA + H	EC-2.3.1.1	Arginine and Proline Metabolism	PIPAD1733 or PIPAD5144
2-aceto-2-hydroxybutanoate synthase, mitochondrial	Mitochondrin	20but + H + PYR > Zahbut + COZ	EC-2.2.1.6	Valine, leucine, and isoleucine Metabolism	PIPAD1887 and PIPAD5498
, , , , , , , , , , , , , , , , , , , ,					PIPAD1887 and
acetolactate synthase, mitochondrial acetyl-COA hydrolase	Mitochondria Cytosol	AC + COA + H -> ACCOA + H2O	EC-2.2.1.6 EC-3.1.2.1	Valine, leucine, and isoleucine Metabolism Pyruvate Metabolism	PIPA05498 PIPA03095
acyl-CDA oxidase (decanoyl-CDA), peroxisomal acyl-CDA oxidase (dodecanoyl-CDA), peroxisomal acyl-CpA oxidase (tetrADEcanoyl-CDA), peroxisomal	Peroxisome Peroxisome Peroxisome	C100COA + O2 → dc2COA + H2O2 C120COA + O2 → dd2COA + H2O2 C2 + C140COA → H2O2 + H2COA	EC-1.3.3.6 EC-1.3.3.6 EC-1.3.3.6	Fatty Acid Degradation Fatty Acid Degradation Fatty Acid Degradation	PIPAD4007 PIPAD4007 PIPAD4007
acyl-CpA oxidase (tetrAbcanoyl-CDA), peroxisomal acyl-CDA oxidase (hexADEcanoyl-CDA), peroxisomal acyl-CDA oxidase (octADEcanoyl-CDA), peroxisomal	Peroxisome Peroxisome Peroxisome	02+ C39CC0A >> H202+ H0d2C0A 02 + C38CC0A >> H202 + H0d2C0A	EC-1.3.3.6 EC-1.3.3.6	Fatty Acid Degradation Fatty Acid Degradation Fatty Acid Degradation	PIPAU4007 PIPAU4007 PIPAU4007
Acetyl-CDA ACP transacylase	Cytosol	ACCOA + ACP <> ACACP + COA	EC-2.3.1.38	Fatty Acid Biosynthesis	PIPAD1904 PIPAD3692
Acetyl-CDA ACP transacylase, mitochondrial aconitase	Mitochondria Cytosol	a ACCOA + ACP <> ACACP + COA CIT <> ICIT	EC-2.3.1.41 EC-4.2.1.3	Fatty Acid Biosynthesis Citrate Cycle (TCA)	PIPAD1920 PIPAD0361
Aconitate hydratase, mitochondrial acteylomithine transaminase, irreversible, mitochondrial	Mitochondria Mitochondria	o CIT≪>ICIT o AC@Sca • GU > ACORN + AKG	EC-4.2.1.3 EC-2.6.1.11	Citrate Cycle (TCA) Arginine and Proline Metabolism	PIPAD0361 or PIPAD2833 PIPAD1565
acteyorinciniae transamiase, interestable, intochondrial acid phosphatase, extracellular (socreted) acyl carrier Protein synthase, mitochondrial	Extracellular Mitochondria	fmn + H2O -> Pi + RiBfly	EC-3.1.3.2	Riboflavin Metabolism Pantothenate and COA Biosynthesis	PIPAULOGO
O-acetylcarnintine transport into mitochondria via diffusion acetylcarnitine transport out of peroxisome		ACRN(c) -> ACRN(m) ACRN(x) -> ACRN(c)		Transport, Mitochondrial Transport, Peroxisomal	
acetyl-CDA synthetase acetyl-CDA synthetase	Cytosol Cytosol	AC + ATP + COA -> ACCOA + AMP + PPI AC + ATP + COA -> ACCOA + AMP + PPI	EC-6.2.1.1 EC-6.2.1.1	Pyruvate Metabolism Pyruvate Metabolism	PIPA00753 PIPA02278
acetyl-COA synthetase, mitochondrial acetate reversible transport via Proton symport acetate transport, mitochondrial	Mitochondria	a $A(+ATP+COA-ACCOA+AMP+PPI$ $AC(a)+H[a] \Leftrightarrow AC(c)+H[c]$ $AC(c) \Leftrightarrow AC(m)$	EC-6.2.1.1	Pyruvate Metabolism Transport, Extracellular Transport, Mitochondrial	PIPADO753
acetate transport, peroxisomal ADEnosine deaminase	Cytosol	AC(c) <> AC(x) adn + H + H2O >> ins + NH4	EC-3.5.4.4	Transport, Peroxisomal Nucleotide Salvage Pathways	
4-aminobenzoate synthase 4-amino-4Deoxychorismate synthase	Cytosol Cytosol	4adcho -> 4abz + H + PYR chor + GLN -> 4adcho + GLU		Folate Metabolism Folate Metabolism	PIPAD6225 PIPAD2950
ADEnine deaminase ADEnine transport in via Proton symport ADEnine reversible transport, mitochondria	Cytosol	ADE + H + H2O -> HXAH + HH4 ADE(e) + H(e) -> ADE(c) + H(c) ADE(c) -> ADE(m)	EC-3.5.4.2	Nucleotide Salvage Pathways Transport, Extracellular Transport, Mitochondrial	PIPAD1906 PIPAD1955
NADph-dependent 1-acyl dihydroxyacetone phosphate reductase four in lipid particles	d Cytosol	13GLY3P + H + NADPH > 13G3P + NADP	1.1.1.101	phospholipid Biosynthesis	PIPAD7090
ADEnylate kinase ADEnylate kinase, mitochondrial	Cytosol Mitochondria		EC-2.7.4.3 EC-2.7.4.3	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPAD3101 PIPAD1439
ADEntylate kinase (GTP) ADEntylate kinase (GTP) ADEntylate kinase (ITP)	Cytosol Mitochondria		EC-2.7.4.3 EC-2.7.4.3	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPAD3101 PIPAD1439 PIPAD3101
ADEntylate kinase (ITP), mitochondrial ADEnylate kinase (ITP), mitochondrial ADEnylate kinase (damp)	Cytosol Mitochondria Cytosol	AMP + ITP <> ADP + IDP AMP + ITP <> ADP + IDP ATP + dAMP >> ADP + dADP	EC-2.7.4.3 EC-2.7.4.3 EC-2.7.4.3	Nucleotide Salvage Pathways Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPAD1439 PIPAD3101
ADEnosylMEThionine decarboxylase ADEnylate cyclase, nucleus	Cytosol Nucleus	SAM + H > AMETAM + CO2 GTP -> 35cGMP + PPI	EC-4.1.1.50 EC-4.6.1.1	Nucleotide Salvage Pathways Arginine and Proline Metabolism PURIne and Pyrimidine Biosynthesis	PIPA02148 PIPA00156
ADEnylate cyclase, nucleus ADEnosine kinase	Nucleus Cytosol	ATP > cAMP + PPI adn + ATP <> ADP + AMP + H	EC-4.6.1.1 EC-2.7.1.20	PURline and Pyrimidine Biosynthesis Nucleotide Salvage Pathways	PIPA00156 PIPA09698
ADEnosine transport in via Proton symport adnuc ADEnine phosphoribosyltransFerase	Cytosol	adn(e) + H(e) > adn(e) + H(c) adn(e) + H(D) > ADE + RIB ADE + PPP > AMP + PPI	EC-2.4.2.7	Transport, Extracellular Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPAD1977
ADEnylylSulfate kinase ADEnylsuccinate lyase	Cytosol	APS + ATP -> ADP + H + PAPS dramp -> AMP + FIIM	EC-2.7.1.25 EC-4.3.2.2	Cysteine Metabolism PURIne and Pyrimidine Biosynthesis	PIPA02826 PIPA03749
ADEnylosuccinate lyase ADEnylosuccinate synthase	Cytosol Cytosol	SAICAR -> AICAR + FUIM ASP + GTP + IMP -> dcAMP + GDP + 2 H + PI	EC-4.3.2.2 EC-6.3.4.4	PURIne and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis	PIPAD3749 PIPAD3830
1-Acyl-glycerol-3-phosphate acyltransFerase N-acetyl-e-Glutamyl-phosphate reductase, irreversible, mitochondrial	Cytosol Mitochondria	1aG3P + 0.02 C100CDA + 0.05 C120CDA + 0.17 HdCDA + 0.09 ocdycACDA + 0.24 odeCDA + 0.27 C160CDA + 0.05 C180CDA + 0.1 C140CDA > COA + PA A Cq5P + H + NADPH > A Cq51a + NADP + Pi	EC-2.3.1.51 EC-1.2.1.38	phospholipid Biosynthesis Arginine and Proline Metabolism	PIPA03489 PIPA03617
alanine-glyoxylate transaminase ADEnosylhomocysteinase	Cytosol	ALA+GLX <> GLY+PYR AHCY+H3D <> ado+HCYS	EC-2.6.1.44 EC-3.3.1.1	Glycine and Serine Metabolism Methionine Metabolism	PIPA03335 PIPA03335
S-ADEnosylL-homocysteine reversible transport, mitochondrial S-ADEnosylL-homocysteine nuclear transport		AHCIS[c] <> AHCIS[m] AHCIS[c] <> AHCIS[n]		Transport, Mitochondrial Transport, Nuclear	
4-amino-5-hydroxyMEThyl-2-METhylpyrimidine synthetase O-acetylhomoserine (thiol)Lyase	Cytosol	air + 2 H -> 4ahmmP + gcAL + PI ACISSER + ch4s -> AC + MET ACISSER + ch5s -> AC + MCS	EC-2.5.1.49	Thiamine Metabolism Methionine Metabolism Methionine Metabolism	PIPAD2949 PIPAD2949
O-acetylhomoserine (thiol)Lyase phosphoribosylaminoimidazolecarboxamide formyltransFerase phosphoribosylaminoimidazole carboxylase	Cytosol Cytosol	ALTINER + HL2A > AL. + HLTS 10/THF + ALCAR <> fAICAR + THF air + COZ <> CAIR + H	EC-2.5.1.49 EC-2.1.2.3 EC-4.1.1.21	PURIne and Pyrimidine Biosynthesis PURIne and Pyrimidine Biosynthesis PURIne and Pyrimidine Biosynthesis	PIPA02949 PIPA00700 PIPA00941
					PIPA04793 PIPA08345
oxoGlutarate dehydrogenase (lipoamide), mitochondrial oxoGlutarate dehydrogenase (dihydrolipoamide SSuccinyltransFerase)		a AKG+H+IPAm <> CO2+sdhlam	EC-1.2.4.2	Citrate Cycle (TCA)	PIPAD0560 PIPAD4793 PIPAD8345
mitochondrial alpha-ketoGlutarate/malate transporter	Mitochondria	AKG[c] + MAL[e] <> AKG[e] + MAL[c]	EC-2.3.1.61	Citrate Cycle (TCA) Transport, Extracellular	PIPA08345 PIPA00560
2-oxoGlutarate nuclear transport via Proton symport 2-oxoGlutarate reversible transport via symport		$AKG[c] + H[c] \Leftrightarrow AKG[n] + H[n]$ $AKG[e] + H[e] \Leftrightarrow AKG[c] + H[c]$		Transport, Nuclear Transport, Extracellular	
alkaline phosphatase (Dihydroneopterin) 5-aminolevulinate synthase, mitochondrial	Cytosol Mitochondria	ahdt + 3 H2O -> dhnPt + 2 H + 3 Pl a GLY + H + SUCCOA -> SaoP + CO2 + COA	EC-3.1.3.1 EC-2.3.1.37	Folate Metabolism Porphyrin and Chlorophyll Metabolism	PIPA00525 PIPA00805 PIPA0004
Lalanine reversible transport via Proton symport Lalanine transaminase	Cytosol	ALA(e) + H(e) <> ALA(c) + H(c) ALG + ALA <> GLU + PYR	EC-2.6.1.2	Transport, Extracellular Alanine and aspartate Metabolism	PIPA00044 PIPA03101 PIPA03183
L-alanine transaminase, mitochondrial Alanvi-tRNA synthetase	Mitochondria Cytosol	AKG + ALA <> GLU + PYR ALA + ATP + trnaål A -> ALAtrna + AMP + PPi	EC-2.6.1.2 EC-6.1.1.7	Alanine and aspartate Metabolism	PIPA03183 PIPA03175
alcohol dehydrogenase (glycerol, NADP)	Cytosol	GLYAL + H + NADPH > GL + NADP etoh + NAD <>> ACAL + H + NADH	EC-1.1.1	Glycerolipid Metabolism Pyruvate Metabolism	PIPAD2620 PIPAD3313 PIPAD2544
alcohol dehydrogenase (ethanol) aldehyde dehydrogenase (phenylacetaldehyde, NAD)	Cytosol Cytosol	H2O + NAD + PACAL -> 2 H + NADH + PAC	EC-1.2.1.39	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPAU2544 PIPAU2523
aldehyde dehydrogenase (indole-3-acetaldehyde, NAD), mitochondria aldehyde dehydrogenase (indole-3-acetaldehyde, NADP)	Mitochondria Cytosol	HZO + Id3ACAL + NAD -> 2 H + Ind3AC + NADH HZO + Id3ACAL + NADP -> 2 H + Ind3AC + NADPH		Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00390
aldehyde dehydrogenase (indole-3-acetaldehyde, NADP), mitochondri	al Mitochondria			Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00390
aldehyde dehydrogenase (acetyLALDehyde, NAD), mitochondrial aldehyde dehydrogenase (acetaldehyde, NADP) aldehyde dehydrogenase (acetyLALDehyde, NADP), mitochondrial	Mitochondria Cytosol Mitochondria	ACAL + H2O + NADP -> AC + 2 H + NADPH	EC-1.2.1.3 EC-1.2.1.4 EC-1.2.1.4	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00390 PIPA00390
Allantoate aminohydrolase, reversible allantoinase, reversible reaction	Cytosol Cytosol	alltt + H2O <> urdGLYc + urea alltn + H2O <> alltt + H	EC-3.5.3.4 EC-3.5.2.5	Histidine Metabolism Histidine Metabolism	PIPA00771 PIPA00369
aliantoin irreversible uniport aliantoate irreversible uniport		$alltn[e] \rightarrow alltn[c]$ $alltn[e] \rightarrow alltn[c]$		Transport, Extracellular Transport, Extracellular	PIPA00326 PIPA04975
allophanate hydrolase aminomuconateSemialdehyde dehydrogenase ADEnosylMEThionine-8-amino-7-oxononanoate transaminase	Cytosol Cytosol	allPHn + 3 H + H2O -> 2 CO2 + 2 NH4 amisiar + H2O + NAO -> amisco + 2 H + NADH 8ann + SAM -> aMIO8 + ZANN	EC-3.5.1.54 EC-1.2.1.32 EC-2.6.1.62	Nitrogen Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism Pantothenate and COA Biosynthesis	PIPAD1753
ADEnosylMEThionine-8-amino-7-oxononanoate transaminase S-ADEnosylL-METhionine transport in via Proton symport S-ADEnosylL-METhionine reversible transport, mitochondrial	cytusul	$SAM(e) + H(e) \rightarrow SAM(c) + H(c)$ $SAM(c) \leftrightarrow SAM(m)$	L-2.0.1.02	Pantothenate and COA Biosynthesis Transport, Extracellular Transport, Mitochondrial	
S-ADEnosylL-METhionine nuclear transport amidase	Cytosol	SAM(c) <> SAM(n) 4gudbd + H2O -> 4gudbutn + NH4	EC-3.5.1.4	Transport, Nuclear Arginine and Proline Metabolism	PIPA03131
amidase amidase	Cytosol Cytosol	H2O + PAd -> NH4 + PAC H2O + iad -> Ind3AC + NH4	EC-3.5.1.4 EC-3.5.1.4	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA03131 PIPA03131
ADEnosine monophosphate deaminase AMP nucleosidase anthranilate phosphoribosyltransFerase	Cytosol Cytosol Cytosol	AMP + H + H2Q > MP + NH4 AMP + H2Q > ADE + rSP anth + PPP > PPI + Pran	3.5.4.6 EC-3.2.2.4 EC-2.4.2.18	PURine and Pyrimidine Biosynthesis Nucleotide Salvage Pathways Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02727 PIPA02727 PIPA02942
anthranilate synthase	Cytosol	chor + GLN -> anth + GLU + H + PYR	EC-4.1.3.27	GLUtamine Metabolism	PIPA05793 PIPA03453
Alcohol oxidase	Peroxisome	meoh + O2 -> fald + H2O2		Methanol Metabolism	PIPA09762 PIPA03969
Ap4A hydrolase, reversible 5-amino-6 (5-phosphoribosylamino)uracil reductase N-acetyloutrescine: oxygen oxireductase (deaminating)	Cytosol Cytosol	aP4a + H2O <> 2 ADP + 2 H SaPru + H + NADPH - 5 SaPruu + NADP aPrut + H2O - 20 > +H2O2 + p48buth = NH4	EC-3.6.1.41 EC-1.1.1.193 EC-1.4.3.4	PURIne and Pyrimidine Biosynthesis Riboflavin Metabolism Other Amino Acid Metabolism	PIPA03607??? PIPA00904
Apyrase with wide substrate specificity Apyrase with wide substrate specificity	Nucleus Nucleus	ATP + H2O -> ADP + PI CDP + H2O -> CMP + PI	EC- 3.6.1.5 EC- 3.6.1.5		PIPA00037 PIPA00037
Apyrase with wide substrate specificity Apyrase with wide substrate specificity	Nucleus Nucleus	dTTP + H2O > dTDP + PI dTDP + H2O > dtmP + PI ADP + H2O > dmP + PI	EC- 3.6.1.5 EC- 3.6.1.5		PIPA00037 PIPA00037 PIPA00037
Apyrase with wide substrate specificity Apyrase with wide substrate specificity Apyrase with wide substrate specificity	Nucleus Nucleus Nucleus	ADP + H2O -> AMP + PI GTP + H2O -> GDP + PI GDP + H2O -> GMP + PI	EC- 3.6.1.5 EC- 3.6.1.5 EC- 3.6.1.5		PIPA00037 PIPA00037 PIPA00037
Apyrase with wide substrate specificity Apyrase with wide substrate specificity	Nucleus Nucleus	IDP + PI >> ITP + H2O IDP + H2O -> IMP + PI	EC- 3.6.1.5 EC- 3.6.1.5		PIPA0037 PIPA0037
Apyrase with wide substrate specificity Apyrase with wide substrate specificity	Nucleus Nucleus	UTP + H2O -> UDP + PI UDP + H2O -> UMP + PI	EC- 3.6.1.5 EC- 3.6.1.5		PIPAD0037 PIPAD0037 PIPAD0037
Apyrase with wide substrate specificity Apyrase with wide substrate specificity	Nucleus	CTP + H2O → CDP + PI	EC- 3.6.1.5		

D-arabinose 1Dehydrogenase (NAD)	Cytosol	arabD + NAD -> Dara14IAC + H + NADH	EC-1.1.1.117	Arabinose Metabolism	PIPA00745
D-arabinose 1Dehydrogenase (NADP) D-arabinose reversible transport L-arabinoase extracellular transport	Cytosol	arabD + NADP > Darat4IAC + H + NADPH arabD[e] <> arabD[c] arabD[d] <> arabD[d]	EC-1.1.1.117	Arabinose Metabolism Transport, Extracellular Transport, Extracellular	PIPA00745
arabinose reductase Arginase	Cytosol	arabL + H + NADPH > abt + NADP ARG + H2O > ORN + urea	EC-1.1.1.21 EC-3.5.3.1	Arabinose Metabolism Arginine and Proline Metabolism	PIPAD2620 PIPAD3793
Argininosuccinate lyase Argininosuccinate synthase, reversible Arginine mitochondrial transport via Proton symport	Cytosol	ARGSUC -> ARG + FUM ASP + ATP + CTIC -> AMP + ARGSUC + H + PPI ARG(c) + H(c) -> ARGP(m) + H(m)	EC-4.3.2.1 EC-6.3.4.5	Arginine and Proline Metabolism Arginine and Proline Metabolism Transport, Mitochondrial	PIPA01398 PIPA03066 PIPA02307
L-Arganine reversible transport via Proton symport		ARG[e] + H[e] <> ARG[c] + H[c]		Transport, Extracellular	PIPAD0044 PIPAD2787
Arginyl-tRNA synthetase, mitochondria Arginyl-tRNA synthetase, mitochondrial	Mitochondria Mitochondria		EC-6.1.1.19 EC-6.1.1.19	Arginine and Proline Metabolism Arginine and Proline Metabolism	PIPA0916 PIPA05189 PIPA06188
S-ADEnoxyl-L-METhionine:L-histidine N-METhyltransFerase				Histidine Metabolism	PIPA05407 PIPA00037 PIPA01291
S-ADEnosyl-L-METhionine:L-histidine N-METhyltransFerase aromatic-amino-acid transaminase	Cytosol	SAM + HIS -> mhis + AHCYS 2Kmb + GLU -> MET + AKG	2.1.1 EC-2.6.1.57	Histidine Metabolism	PIPAD1291 PIPAD2780 or PIPAD1785
Arsenite transporter aspartateSemialdehyde dehydrogenase, irreversible L-asparaginase	Cytosol Cytosol	ars(e) -> ars(c) 4PASP + H + NADPH -> ASPSa + NADP + PI ASN + H2O -> ASP + NH4	EC-1.2.1.11 EC-3.5.1.1	Alanine and aspartate Metabolism Asparagine Metabolism	PIPA01672 PIPA03195 PIPA02580
L-asparaginase, extracellular	Extracellular	ASN + H2O -> ASP + NH4	EC-3.5.1.1	Asparagine Metabolism	PIPA04195 PIPA02815
asparagine synthase (Giutamine-hydrolysing) asparagine mitochondrial transport via Proton transport L-asparagine reversible transport via Proton symport	Cytosol	ASP + ATP + GLN + HZO - S-AMP + ASN + GLU + H + PPI ASN(c + H(c <> ASN(c) + H(c) <> ASN(EC-6.3.5.4	Alanine and aspartate Metabolism Transport, Mitochondrial Transport, Extracellular	PIPA07879 PIPA02307 PIPA00044
Asparaginyl-tRNA synthetase asparaginyl-tRNA synthetase, miotchondrial	Cytosol Mitochondria	ASN + ATP + trnaASN -> AMP + ASNtrna + PPI ASN + ATP + trnaASN -> AMP + ASNtrna + PPI	EC-6.1.1.22 EC-6.1.1.22	Asparagine Metabolism Asparagine Metabolism	PIPAD1397 PIPAD1397
aspartate 1Decarboxylase aspartate carbamoyltransFerase, nuclear aspartate-Glutamate peroxisomal shuttle	Cytosol Nucleus	ASP +t- > b4L4 + CD2 ASP +t- > > cb4SP + H + P! ASP(c) - \$UU(c) - ASP(c) + GUU(c)	EC-4.1.1.11 EC-2.1.3.2	Pantothenate and COA Biosynthesis PURIne and Pyrimidine Biosynthesis Transport, Peroxisomal	
aspartate kinase, irreversible aspartate oxidase aspartate mitochondrial transport via Proton symport	Cytosol	ASP + ATP > 4PASP + ADP ASP(c) + fad(m) > tab(2(m) + iASP(c) ASP(c) + th(c) <> ASP(m) + t(m)	EC-2.7.2.4	Alanine and aspartate Metabolism Folate Metabolism Transport, Mitochondrial	PIPAD8847 PIPAD2307
aspartate nuclear transport via Proton symport		ASP(c) + H(c) <-> ASP(n) + H(n)		Transport, Nuclear	PIPARIONAA
L-aspartate reversible transport via Proton symport aspartate transaminase aspartate transaminase, mitochondrial	Cytosol Mitochondria	$ASP(e) + I(e) \Leftrightarrow ASP(c) + II(c)$ $AXG + ASF \Leftrightarrow GU + OAA$ $AXG + ASF \Leftrightarrow GU + OAA$	EC-2.6.1.1 EC-2.6.1.1	Transport, Extracellular Alanine and aspartate Metabolism Alanine and aspartate Metabolism	PIPAD2947 PIPAD3996 PIPAD3884
aspartate transaminase, peroxisomal Aspartyl-tRNA synthetase	Peroxisome Cytosol	AKG + ASP <> GLU + OAA ASP + ATP + tmaASP -> AMP + ASPtma + PPI	EC-2.6.1.1 EC-6.1.1.12	Alanine and aspartate Metabolism Alanine and aspartate Metabolism Alanine and aspartate Metabolism	PIPAD3996 PIPAD2003
Aspartyl-RNA synthetase, mitochondrial AMP/ATP transporter, peroxisomal ATP ADEnylyltransFerase	Mitochondria Cytosol	ASP + ATP + trnaASP \sim AMP + ASP(rna + PPi AMP[n] + ATP[c] + H[n] \sim AMP[c] + ATP[n] + H[c] ADP + ATP + H \sim aP4a + Pi	EC-2.7.7.53	Alanine and aspartate Metabolism Transport, Peroxisomal PURIne and Pyrimidine Biosynthesis	PIPADO429 PIPADO149
ATP ADEnylyltransFerase ATP ADEnylyltransFerase	Cytosol	ADP + GTP + H -> aP4g + Pi GDP + GTP + H -> gP4g + Pi	EC-2.7.7.53 EC-2.7.7.53	PURIne and Pyrimidine Biosynthesis PURIne and Pyrimidine Biosynthesis	PIPAD0189 PIPAD0189
ATP maintenance requirement ATP phosphoribosyltransFerase ATPase, cytosolic	Cytosol	ATP + H2O -> ADP - H - PI ATP + PIPPP <> PPI + PrbATP ATP(c) + H2O(c) -> ADP(c) + H(e) + PI(c)	EC-2.4.2.17 EC-3.6.3.6	Nucleotide Salvage Pathways Histidine Metabolism Transport, Extracellular	PIPA04632 PIPA00002
ATP synthase, mitochondrial		ADP(m) + 3 H(c) + Pi(m) -> ATP(m) + 2 H(m)	EC-3.6.3.14	Ovidative phosphorylation	PIPAD6092 or PIPAD5364
ADP/ATP transporter, mitochondrial ADP/ATP transporter, peroxisomal 3',5'-bisphosphate nucleotidase	Cytosol	$ADP[c] + ATP[m] + H[c] \rightarrow ADP[m] + ATP[c] + H[m]$ $ADP[a] + ATP[d] + H[d] \rightarrow ADP[a] + ATP[a] + H[c]$ $+ZD + PAP \rightarrow ADP + P$ $+ZD + PAP \rightarrow ADP + P$	EC-3.1.3.7	Transport, Mitochondrial Transport, Peroxisomal Cysteine Metabolism	PIPA02901 PIPA00149 PIPA02326
Biotin uptake biotin synthase, mitochondria	Mitochondria	btn[e] + H[e] -> btn[c] + H[c] dtbt + s <> btn + 2 H	EC-2.8.1.6	Transport, Extracellular Pantothenate and COA Biosynthesis	PIPA00334
C-14 sterol reductase C-22 sterol desaturase C-22 sterol desaturase, mitochondria	Cytosol Cytosol Mitochondria	44mctr + H + NADPH -> 44mzym + NADP ergtrof + H + NADPH -> 2- ergsetrof + 2 H2O + NADP ergtrof + H + NADPH + Q2- ergsetrof + 2 H2O + NADP	1.3.1.70	Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis	PIPAD4863 PIPAD1112 PIPAD1112
CS24 sterol reductase, endoplamic reticular C-3 sterol dehydrogenase (4-METhylzymosterol)	ER Cytosol	ergtetrol + H + NADPH -> ergst + NADP Amount int1 + NAD -> Amount int2 + CO2 + H + NADH	EC-1.1.1.170	Sterol Biosynthesis Sterol Biosynthesis	PIPA00422 PIPA05446
C-3 sterol dehydrogenase (zymosterol) C-3 sterol keto reductase (4-METhylzymosterol), mitochondria C-3 sterol keto reductase (zymosterol), mitochondria	Cytosol Mitochondria Mitochondria	NAD + zym_int1 -> CO2 + H + NADH + zym_int2 4mzym_int2 + H + NADPH -> 4mzym_n * NADP 4. NADDH -> 1 mz he z -> NADD -> 1 mz he z	EC-1.1.1.170 1.1.1.270 1.1.1.270	Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis	PIPA05446 PIPA00732 PIPA00732
C-4 sterol METhyl axidase (4,4DiMEThylzymasterol) C-4 sterol METhyl axidase (4-METhylzymasterol)	Cytosol Cytosol	H + NADPH + zym_int2 -> NADP + zymst 44mzym = 3 H + 3 NADPH + 3 D 22 -> 4mzym_inst + 4 H2D + 3 NADP 4mzym = 3 H + 3 NADPH + 3 D 2 -> 4 H2D + 3 NADP + zym_inst	1.14.13.72 1.14.13.72	Sterol Biosynthesis Sterol Biosynthesis	PIPAD0945 PIPAD0945
C-5 sterol desaturase C-8 sterol isomerase	Cytosol	ePat + H + NADPH + O2 → ergtrol + 2 H2O + NADP FeCOS → ePitt 2 H2O → 0 H2 H2O + O2		Sterol Biosynthesis Sterol Biosynthesis Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPAD3649 PIPAD2913
catalase catalase A, peroxisomal N-carbomoylL-aspartate transport, diffusion	Cytosol Peroxisome	2 H2O2 → 2 H2O + O2 chASP(n) ← > chASP(c)	EC-1.11.1.6 EC-1.11.1.6	Tyrosine, Tryptophan, and Phenylalanine Metabolism Transport Nuclear	PIPAD4208 PIPAD4208
carbamoyi-phosphate synthase (Glutamine-hydrolysing) carbamoyi-phosphate synthase (Glutamine-hydrolysing), nuclear carbamoyi phosphate nuclear transport via diffusion	Cytosol Nucleus	2 ATP + GLN + H2O + HCO3 -> 2 ADP + cbP + GLU + 2 H + PI 2 ATP + GLN + H2O + HCO3 -> 2 ADP + cbP + GLU + 2 H + PI	EC-6.3.5.5 EC-6.3.5.5	Arginine and Proline Metabolism Arginine and Proline Metabolism Transport Nuclear	PIPA09183 PIPA08211
CDPDiacylglycerol-Serine O-phosphatidyltransFerae , mitochondrial	Mitochondria		EC-2.7.8.5	phospholipid Biosynthesis	PIPAD1023
CDP nuclear transport choline phosphate cytididyltransFerase	Cytosol	$CDP(c) \Leftrightarrow CDP(n)$ $CHOLP + CTP + H \Rightarrow CDPCHOL + PPI$	EC-2.7.7.15	Transport, Nuclear phospholipid Biosynthesis	PIPAD0863
cholestenol delta-isomerase, lumped reaction choline transport via Proton symport Choline kinase	Cytosol	SAM + O 2 + njmrt - AHCP; + engtetrol + H + 2 H2O CHCL(e) + H(e) -> CHCL(z) + H(z) ATP + CHG: -> ATP - CHOUP + H	EC-5.3.3.5 EC-2.7.1.32	Sterol Biosynthesis Transport, Extracellular phospholipid Biosynthesis	PIPAD1116 PIPAD0640
chorismate mutase chorismate synthase	Cytosol	chor ←> PPHN 3PSme →> chor + PI	EC-5.4.99.5 EC-4.2.3.5	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00432 PIPA00721
Chorismate pyruvate lyase chitin deacetylase	Cytosol	Chor → 4hbz + PYR CHT + H2O → AC + CHITOS + H	EC-3.5.1.41	Quinone Biosynthesis Aminosugars Metabolism	PIPADS793 PIPAD3453 PIPAD5771
					PIPA01394 PIPA07083
chitin synthase citrate reversible transport via symport citrate transport, mitochondrial	Cytosol	UDPACGAL >> CHIT + H + UDP CIT(e) + H(e) (<>> CIT(f) + H(e) CIT(e) + H(e) CIT(EC-2.4.1.16	GLUtamate Metabolism Transport, Extracellular Transport, Mitochondrial	PIPAD1213 PIPAD1720
ctrate transport, mitocnondrial ctrate/malate antiport into peroxisome citrate transport, mitochondrial		$GT[c] + MAL[m] \Leftrightarrow GT[m] + MAL[c]$ $GT[c] + MAL[c] \Leftrightarrow GT[c] + MAL[c]$ $GT[c] + PpP[m] \Leftrightarrow GT[m] + PpP[c]$		Transport, Mitochondrial Transport, Peroxisomal Transport, Mitochondrial	PIPA01720
citrate transport, mitochondrial citrate/isocitrate antiport into peroxisome		ा(d + Per[m] <> वा[m] + Per[c] वा[d + critim] <> वा[m] - i critic वा[d + critim] <> वा[m] - i critic वा[d + critim] <> वा[m] - i critic		Transport, Mitochondrial Transport, Peroxisomal	PIPA01720
cardiolipin synthase , mitochondrial CMP nucleosidase CMP transport, diffusion, mitochondrial	Mitochondria Cytosol	0.01 C0Pdag + 0.01 Pg > 0.01 cdPn + CMP + H CMP + H2O >> cm + rSP CMP(<) <> CMP(m)	EC-2.7.8.5 EC-3.2.2.10	phospholipid Biosynthesis Nucleotide Salvage Pathways Transport, Mitochondrial	PIPA09130
CO2 transporter via diffusion CO2 Golgi transport		CO2(e) <> CO2(c) CO2(c) <> CO2(g)		Transport, Extracellular Transport, Golgi Apparatus	
CO2 transport (diffusion), mitochondrial CO2 nuclear transport via diffusion CO2 peroxisomal transport		CO2(c) <> CO2(m) CO2(n) <> CO2(c) CO2(d) <> CO2(d)		Transport, Mitochondrial Transport, Nuclear Transport, Peroxisomal	
CO2 vacuolar transport	Cytosol	COZ(c) <> COZ(v) CPPPs3 + 2 H + O2 > 2 COZ + 2 H2O + PPPs9	EC-1.3.3.3	Transport, Vacuolar Promburin and Chlorophull Metabolism	PIPAD3434
coProporphyrinogen oxidase (O2 required) carnithine-acetylcarnithine carrier, mitochondrial carnitine-acetylcarnitine carrier, peroxisomal		$ACRN[c] + CRN[m] \rightarrow ACRN[m] + CRN[c]$ $ACRN[x] + CRN[c] \rightarrow ACRN[c] + CRN[x]$		Transport, Mitochondrial Transport, Peroxisomal	PIPA00483
L-carnitine reversible transport L-carnitine transport out of mitochondria via diffusion carnitine transport into peroxsiome		CRN(e) <> CRN(c) CRN(m) > CRN(c) CRN(m) > CRN(c)		Transport, Extracellular Transport, Mitochondrial Transport, Recognical	PIPAD2609
citrate synthase, mitochondrial carnitine O-acetyltransFerase	Mitochondria Cytosol	ACCDA+H2O+OAA-> CIT+COA+H ACCDA+CRN-> ACRN+COA	EC-2.3.3.1 EC-2.3.1.7	Transport, Peroxisomal Citrate Cycle (TCA) Alanine and aspartate Metabolism	PIPAD3577 PIPAD2024
carnitine O-aceyltransFerase, forward reaction, mitochondrial carnitine O-acetyltransFerase, reverse direction, mitochondrial Cytosine deaminase	Mitochondria Mitochondria Cytosol	ACRN + CDA -> ACCDA + CRN ACCDA + CRN -> ACRN + CDA CCDA + CRN -> ACRN + CDA CCDA ++ H + H2O -> NH4 - UBA	EC-2.3.1.7 EC-2.3.1.7 EC-3.5.4.1	Alanine and aspartate Metabolism Alanine and aspartate Metabolism PURine and Pyrimidine Biosynthesis	PIPA02024 PIPA00924
cytosine transport in via Proton symport CTP synthase (NH3)	Cytosol	CSR(e) + H(e) -> CSR(c) + H(c) ΔTD + NH4 + (TD -> ΔDD + CTD + 2 H + P)	EC-6.3.4.2	Transport, Extracellular PURIne and Pyrimidine Biosynthesis	PIPAD1906 PIPAD1624
CTP synthase (Glutamine) cytochrome c oxidase, mitochondrial ubiquinol-6 cytochrome c reductase	Cytosol	ATP + GAN + H2O + UTP > ADP + CTP + GAU + 2H + PI $4 FOCTC(m) + 6 F(m) + 0 Z(m) > 4 FOCTC(m) + 6 F(C) + 2 H2O(m)$ $2 FOCTC(m) + 2 F(m) + 0 Z(m) - 2 FOCTC(m) + 1 - 1 F(C) + 0 Z(m)$	EC-6.3.4.2 EC-1.9.3.1 EC-1.10.2.2	PURine and Pyrimidine Biosynthesis Oxidative phosphorylation Oxidative phosphorylation	PIPAD1624
ubiquinoi-o cytochrome c reductase cysteine dioxygenase cysteine synthase	Cytosol Cytosol	Z HCTIC(m) + 1.5 H(m) + Qen.2(m) -> 2 FUCY1C(m) + 1.5 H(c) + Qe(m) CYS + Q2 -> SALA ACSER + HZ5 -> AC + CYS + H	EC-1.10.2.2 EC-1.13.11.20 EC-2.5.1.47	Cysteine Metabolism Cysteine Metabolism	PIPAD3757 PIPAD2347
High-affinity cysteineSpecific transporter with similarity to the DalSp family of transporters L-cysteine reversible transport via Proton symport		CYS[e] <> CYS[c] CYS[e] + H[e] <> CYS[c] + H[c]		Transport, Extracellular	PIPAD0376 PIPAD0044
cysteine reversiole transport via Proton symport cystathionine glyase Cysteinyl-tRNA synthetase	Cytosol Cytosol	L'SIQI + HQI <> L'SIQI + HIC LICH + H2Q > SOUN + C'S + SHI-4 ATP + C'IS + InnAC'S > AMP + C'Strna + PPI	EC-4.4.1.1 EC-6.1.1.16	Methionine Metabolism Cysteine Metabolism	PIPAD2403 PIPAD5670
cystathionine betaSynthase cystathionine betaSynthase, nucleus	Cytosol Nucleus	HCYS + SER → II.d + H2O HCYS + SER → II.d + H2O	EC-4.2.1.22 EC-4.2.1.22	Glycine and Serine Metabolism Glycine and Serine Metabolism	PIPAD4214 PIPAD4214
cystathione peroxisomal transport cytidine deaminase cytidine kinase (GTP)	Cytosol	Ict(c) <> Ict(d) <> Ict(d) < Ict(d) < < < < < < < < <	EC-3.5.4.5 EC-2.7.1.48	Transport, Peroxisomal PURIne and Pyrimidine Biosynthesis Nucleotide Salvage Pathways	PIPAD4330 PIPAD0749
cytidine kinase (GTP), nucleus cytidine transport in via Proton symport	Nucleus	cytd + GTP -> CMP + GDP + H cytdlel + Hiel -> cytdicl + Hicl	EC-2.7.1.48	Nucleotide Salvage Pathways Transport, Extracellular	PIPADO749
cytidylate kinase (CMP) cytidylate kinase (dCMP) cytidylate kinase (UMP)	Cytosol Cytosol Cytosol	ATP + CMP <> ADP + CDP ATP + GCMP <> ADP + GCP ATP + MCMP <> ADP + GCP ATP + MMP <> ADP + UDP	EC-2.7.4.14 EC-2.7.4.14 EC-2.7.4.14	Nucleotide Salvage Pathways Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
DeoxyADEnosine deaminase deoxyADEnylate kinase	Cytosol	dad + H + H2O -> din + NH4 ATP + dAMP <>> ADP + dADP	EC-2.7.4.11	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
deoxyADEnosine transport in via Proton symport DADP nuclear transport diacy(glycerol cholinephosphotransFerase	Cytosol	dad(e) + H(e) = dad(c) + H(c) dADP(c) <> dADP(n) DER + CDP(CHU) = DMP + H + PC	EC-2.7.8.2	Transport, Extracellular Transport, Nuclear phospholipid Biosynthesis	PIPA07078
Diacylglycerol Kinase	Cytosol	DGR + ATP -> PA + ADP	2.7.1.107	Glycerolipid Metabolism	PIPA00927 PIPA05615
diacy(glycerol pyrophosphate phosphatase 7,8Diaminononanoate reversible transport via Proton symport CDPDiacy(glycerol synthetase	Cytosol	H20 + PA → D(R + PI DANN(R) + H(R) < DANN(C) + H(C) CTP + H + PA < CD(Mag + PPI	EC-3.1.3.4 EC-2.7.7.41	phospholipid Biosynthesis Transport, Extracellular phospholipid Biosynthesis	PIPA02615 PIPA00564
CDPDiacylglycerol synthetase, mitochondrial 3,4Dihydroxy-2-butanone-4-phosphate	Mitochondria Cytosol	CIP + + PA <> CURONG + PM CIP + H + PA <> CURONG + PM CISPO - 0.04P + F ORM + H AT + COZ + COMN <> ADP - dtd + 3 H + PI	EC-2.7.7.41	phospholipid Biosynthesis Riboffraio Metabolico	PIPADO564 PIPADO564
dethiobiotin synthase dCDP nuclear transport dCMP deaminase	Cytosol	ATP + CO2 + DANN <> ADP + dtbt + 3 H + PI dCDP(<) <> dCDP(n) dCMP + H + H2O > dUMP + NH4	EC-6.3.3.3 EC-3.5.4.12	Pantothenate and COA Biosynthesis Transport, Nuclear PURline and Pyrimidine Biosynthesis	PIPAD9600
dCTP deaminase deoxycytidine deaminase	Cytosol	dCTP + H + H2O -> dUTP + NH4 dcyt + H + H2O -> dURI + NH4	EC-3.5.4.13 EC-3.5.4.14	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPA04330
deoxycytidine deaminase deoxycytidine transport in via Proton symport	Cytosol	dcyt + H + H2O -> NH4 + dUR dcyt[e] + H[e] -> dcyt[c] + H[c]	EC-3.5.4.5	PURIne and Pyrimidine Biosynthesis Transport, Extracellular	PIPA04330 PIPA02053 or
3DecxyD-arabino-heptulosonate 7-phosphate synthetase	Cytosol	E4P + H2O + PeP -> 2dda7P + PI	2.5.1.54	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPAD5722
2DeoxyD-arabino-heptulosonate 7-phosphate synthetase, mitochondris Myristicoyl-CDA desaturase (n-C14:0CDA -> n-C14:1CDA)	al Mitochondria Cytosol	E4P + H2O + PeP >> 2dda7P + PI H + NADPH + O2 + CL40COA >> 2 H2O + NADP + CL44COA H. NADPH - O2 + CEPPCOA >> 2 H2O + NADP + CL44COA	2.5.1.54 EC-1.14.19.1 EC-1.14.19.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism Fatty Acid Biosynthesis	PIPA05722 PIPA01207
Palmitoyi-COA desaturase (n-C16:0COA -> n-C16:1COA) stearoyi-COA desaturase (n-C18:0COA -> n-C18:1COA) Oleoyi-COA desaturase (n-C18:1COA -> n-C18:2COA)	Cytosol Cytosol Cytosol	H + NADPH + 02 + c180C0A - 2 +210 + NADP + c181CDA H + NADPH + 02 + c180C0A - 2 +210 + NADP + c181CDA H + NADPH + 02 - c80C0A - 2 +210 + NADP + 0c6yACOA	EC-1.14.19.1 EC-1.14.19.1 EC-1.14.19.1	Fatty Acid Biosynthesis Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPAD1207 PIPAD1207
dGDP nuclear transport deoxyguanylate kinase (dGMP:ATP)	Cytosol	$dGDP(c) \sim dGDP(n)$ ATP + dGDP $dGDP(c) \sim ADP + dGDP$ $dGDP(c) \sim dGDP(c) \sim dGDP($	EC-2.7.4.8	Transport, Nuclear PURIne and Pyrimidine Biosynthesis	PIPAD4167
deoxyguanosine transport in via Proton symport dihydroxy-acid dehydratase (2,3Dihydroxy-3-METhylbutanoate), mitochondrial	Mitochondria	dgsri(e) + H(e) -> dgsri(c) + H(c) 23dhmb -> 3MOB + H2O	EC-4.2.1.9	Transport, Extracellular Valine, leucine, and isoleucine Metabolism	PIPA02433
dihydroxy-acid dehydratase (2,3Dihydroxy-3-METhylpentanoate), mitochondrial	Mitochondria	23dhmP -> 3MOP + H2O	EC-4.2.1.9	Valine, leucine, and isoleucine Metabolism	PIPA02433
dihydroxyacetone kinase dihydroxyacetone phosphate transport, mitochondrial dihydroxyacetone synthase	Cytosol	ATP + dha -> ADP + DHAP + H DHAP[m] -> DHAP[c] faid + XUSP > CBP + dha	EC-2.7.1.29	Glycerolipid Metabolism Transport, Mitochondrial Methanol Metabolism	PIPA02501 PIPA02595
dihydroxyacetone transport peroxisome dihydrofolate reductase (irreversible)	Cytosol	dha x > dha c dhf + H + NADPH > NADP + THE	EC-1.5.1.3	Transport Folate Metabolism	PIPA05839
dihydrofolate reductase, mitochondrial dihydrofolate synthase	Mitochondria Cytosol	dhf + H + NADPH >> NADP + THE ATP + dhPt + GLU >> ADP + dhf + Pi	EC-1.5.1.3 EC-6.3.2.12	Folate Metabolism	PIPA05839 PIPA00276
dihydrofolate reversible mitochondrial transport dihydroneopterin aldolase, mitochondrial dhnpt mitochondrial transport	Mitochondria	dhf(c) ~ dhf(m) dhnP ~ 2.ahhmP e gCAL + H dhnP(c) <~ dhnPf(m)	EC-4.1.2.25	Transport, Mitochondrial Folate Metabolism Transport, Mitochondrial	PIPAD5878
dihydoOROTic acid dehydrogenase dihydoOROTic acid (ubiquinone-6)	Cytosol	dhorS \downarrow 02 \Leftrightarrow H2O2+OROT dhorS \downarrow 0}+ \downarrow 6[m] \Leftrightarrow OROT \downarrow 0}+ \downarrow 6h2[m]	EC-1.3.3.1 EC-1.3.3.1	PURIne and Pyrimidine Biosynthesis PURIne and Pyrimidine Biosynthesis	
(S)Dihydrooroate nuclear transport dihydroOROTase dihydroOROTase, nuclear	Cytosol Nucleus	dhor5(c) <> dhor5(n)	EC-3.5.2.3 EC-3.5.2.3	Transport, Nuclear PURIne and Pyrimidine Biosynthesis PURIne and Pyrimidine Biosynthesis	PIPA01872 PIPA01872
diaminohydroxyphosphoribosylaminopyrimidine deaminase dihydropteroate synthase, mitochondrial	Cytosol Mitochondria	25dhPP + H + H2O -> 5aPru + NH4 2ahhmP + 4abz -> dhPt + H2O	EC-3.5.4.26 EC-2.5.1.15	Riboflavin Metabolism	PIPAD1872 PIPAD0904 PIPAD5878
Dihydropteroate mitochondrial transport via diffusion 3Dehydroquinate synthase 3Dehydroquinate dehydratase, irreversible	Cytosol Cytosol	dhPt[c] <> dhPt[m] 2dda7P > 3dhq + Pl 3dho > 3dhc + H2O	4.2.3.4 EC-4.2.1.10	Transport, Mitochondrial Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPAD1111 PIPAD1111
diamine transaminase dicarboxylate transport, mitochondrial	Cytosol	$ACCOA + SPRM \rightarrow NISPRM + COA + H$ $MAL(c) + SUCC(m) \Leftrightarrow MAL(m) + SUCC(c)$	EC-2.6.1.29	Tyrosine, Tryptophan, and Phenylalanine Metabolism Transport, Mitochondrial	PIPAD1111 PIPAD1441
deoxylnosine transport in via Proton symport diphthine synthase	Cytosol	din(e) + H(e) -> din(c) + H(c) SAM+ caPHs -> AHCYS + cmaPHis + H	EC-2.1.1.98	Transport, Extracellular Methionine Metabolism	PIPA05055

Diactate dehydrogensae, mitochondrial Diactate transport, mitochondrial Diactate transport, mitochondrial 30MMT/hydrogensoci 3 MT hytrareif erase, mitochondrial Dihydroneopterin moophosphate desopsolphor/sise Dihydroneopterin triphosphate pryorphosphatase Diddy-phosphate the mannocytrareif erase Oxforty-phosphate the mannocytrareif erase	Mitochondri: Cytosol Mitochondri: Cytosol Cytosol	2 FICTIC + DIAC - 2 FICCTIC + PVR N(t) = CDAC(t) < > N(m) + CDAC(m) 2 mmhml 5 - SAM > ANCC S + 1 + qD2 dhmbr 9 - 100 - dhmbr + 10 and + 100 - dhmbr + 10 and + 100 - dhmbr + 10 - dhmbr 100 - dh	EC1.1.2.4 EC2.5.1.1 EC2.4.1.83	Alternate Carbon Metabolism Transport, Mitochondrial Quincos Bioyethesis Quincos Bioyethesis Folate Metabolism Folate Metabolism Gyopportolin Metabolism	PIPA03305 PIPA02817 PIPA03712 PIPA01728
					(PIPA02138 and PIPA02226) or
Dolichyl-phosphate-mannoseProtein mannosyltransFerase, endoplasmic reticular	ER	dolmanP -> dolP + H + mannan	EC-2.4.1.109	Glycoprotein Metabolism	PIPA08326 or PIPA01639
dolichol phosphate endoplasmic reticular transport via Proton sympor dephospho-COA kinase	Cytosol	dolp[c] + H[c] <> dolp[r] + H[r] $ATP + dFCOA > ADP + COA + H$	EC-2.7.1.24	Transport, Endoplasmic Reticular Pantothenate and COA Biosynthesis	
dephospho-COA kinase, mitochondrial Diphosphoglyceromutase	Mitochondria Cytosol	ATP + dPCOA > ADP + COA + H 13dPg <> 23dPg + H	EC-2.7.1.24	Pantothenate and COA Biosynthesis Glycolysis/GLUconeogenesis	PIPA02723
diphosphomevalonate decarboxylase, nucleus 2Dehydropantoate 2-reductase 2Dehydropantoate 2-reductase, mitochondrial	Nucleus Cytosol Mitochondria	5dPmev + ATP -> ADP + CO2 + IP(P + P) 2diP + H + NADPH -> NADP + PANT 2diP + H + NADPH -> NADP + PANT 2diP + H + NADPH -> NADP + PANT	EC-4.1.1.33 EC-1.1.1.169 EC-1.1.1.169	Sterol Biosynthesis Pantothenate and COA Biosynthesis Pantothenate and COA Biosynthesis	PIPA00282 PIPA01307 PIPA01365
Deoxyribokinase dTMP kinase	Cytosol	ATP + dRIB >> 2drSP + ADP + H ATP + dtmP <> ADP + dTDP	EC-2.7.1.15 EC-2.7.4.9	Pentose phosphate Cycle Nucleotide Salazan Bathwayer	PIPADISSS PIPADSSSS
dTTP reversible uniport dUMP kinase	Cytosol	$dTTP[e] \Leftrightarrow dTTP[c]$ $ATP + dUMP \Leftrightarrow ADP + dUDP$	EC-2.7.4.9	Transport, Extracellular Nucleotide Salvage Pathways	PIPA05592
dUMP nuclear transport deoxyURIdine kinase (ATP:DeoxyURIdine) deoxyURIdine phosphorylase	Cytosol Cytosol	GUMP(c) <> GUMP(n) ATT+GUNI > ADP+GUMP + H GUNI > POP+GUMP + URA		Transport, Nuclear PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis	PIPA03953
deoxyURIdine transport in via Proton symport dUTP diphosphatase	Cytosol	dURI[e] + H[e] -> dURI[c] + H[c] dUTP + H2O -> dUMP + H + PPI	EC-3.6.1.23	Transport, Extracellular PURIne and Pyrimidine Biosynthesis	PIPA05307
deoxyhypusine synthase, cytosolic/mitochondrial		q6(m) + sPmd(c) -> 13dAMPP(c) + 4abutn(c) + q6h2(m)	EC-1.5.99.6	Arginine and Proline Metabolism	PIPAD8572
Lerythro-4-hydroxyGlutamate mitochondrial transport via diffusion Lerythro-4-hydroxyGlutamate peroxisomal transport via diffusion D-erythrose 4-phosphate mtiochondrial transport via diffusion		e4hGLU() <> e4hGLU(m) e4hGLU() <> e4hGLU(x) E4P() <> E4P(m)		Transport, Mitochondrial Transport, Peroxisomal Transport, Mitochondrial	
3-hydroxyacyl-COA dehydratase (3-hydroxyhexacosyl-COA), peroxisom	al Peroxisome	H2O + Hxc2COA <> 3hxcCOA	EC-4.2.1.17	Fatty Acid Degradation	PIPA00744
3-hydroxyacyl-COA dehydratase (3-hydroxydecanoyl-COA), peroxisom 3-hydroxyacyl-COA dehydratase (3-hydroxydodecanoyl-COA),	l Peroxisome	3hdCOA <>> dc2COA + H2O	EC-4.2.1.17	Fatty Acid Degradation	PIPA00744
peroxisomal 3-hydroxyacyl-COA dehydratase (3-hydroxytetrADEcanoyl-COA),	Peroxisome	3hddCOA <> dd2COA + H2O	EC-4.2.1.17	Fatty Acid Degradation	PIPA00744
peroxisomal 3-hydroxyacyl-COA dehydratase (3-hydroxyhexADEcanoyl-COA),	Peroxisome	3htdCOA <> H2O + td2COA	EC-4.2.1.17	Fatty Acid Degradation	PIPA00744
peroxisomal 3-hydroxyacyl-COA dehydratase (3-hydroxyoctADEcanoyl-COA),	Peroxisome Peroxisome	3hhdCDA <> H2O + Hdd2CDA 3hodCDA <> H2O + od2CDA	EC-4.2.1.17 EC-4.2.1.17	Fatty Acid Degradation Fatty Acid Degradation	PIPA00744 PIPA00744
Lerythro-4-HydroxyGlutamate:2-oxoGlutarate aminotransFerase L-erythro-4-HydroxyGlutamate:2-oxoGlutarate aminotransFerase,	Cytosol	AKG + e4hGLU -> 4H2Ogit + GLU	EC-2.6.1.1	Arginine and Proline Metabolism	PIPA03996
mitochondrial L-erythro-4-HydroxyGlutamate:2-oxoGlutarate aminotransFerase,	Mitochondria	AKG + 64hGLU -> 4H2Oght + GLU AKG + 64hGLU -> 4H2Oght + GLU	EC-2.6.1.1 EC-2.6.1.1	Arginine and Proline Metabolism Arginine and Proline Metabolism	PIPAD3884 PIPAD3996
peroxisomal enolase ergosterol reversible transport	Peroxisome Cytosol	ARG + 6400LU > 447.201 + 6LU 2Pg <> H2O + PeP ensstle <> ensstlc	EC-4.2.1.11	Glycolysis/GLUconeogenesis Transport, Extracellular	PIPAD0938
ergosterol endoplasmic reticular transport		ergst[r] <> ergst[c]		Transport, Endoplasmic Reticular	
Ergott=5,6,22,24,(28)-tetraen-3beta-ol endoplamic reticular transport Ethanolamine kinase EthanolaminephosphotransFerase ethanol reversible transport ethanol transport to mitochondria (diffusion)	Cytosol Cytosol	ergistrol(-) - orgistrol(-) ###################################	EC-2.7.1.82 EC-2.7.8.1	Transport, Endoplasmic Reticular phospholipid Biosynthesis phospholipid Biosynthesis Transport, Extracellular Transport, Mittchondrial	PIPA07078
fatty acid peroxisomal transport fatty-acyl-ACP hydrolase	Cytosol	C100(c) > C100(x) c120ACP + H2O <> ACP + H + c120	EC-3.1.2.14	Transport, Peroxisomal Fatty Acid Biosynthesis	PIPAD1904 PIPAD3692
fatty-acyl-ACP mitochondrial transport fatty acid peroxisomal transport	.,	C120ACP[n] > C120ACP[c] C120[c] > C120[x]		Transport, Mitochondrial Transport, Peroxisomal	
fatty-acyl-ACP hydrolase	Cytosol	c140ACP + H2O <>> ACP + H + c140	EC-3.1.2.14	Fatty Acid Biosynthesis Transport, Mitochondrial	PIPAD1904 PIPAD3692
fatty-acyl-ACP mitochondrial transport fatty acid peroxisomal transport via ABC system		$C140ACP[m] \rightarrow C140ACP[c]$ $ATP[n] + C140COA[c] \rightarrow ADP[n] + P[n] + C140COA[n]$		Transport, Mitochondrial Transport, Peroxisomal	PIPAD2717 PIPAD1145
fatty acid peroxisomal transport		C143ACP + H2O <> ACP + H + C141		Transport, Peroxisomal	PIPA01904
fatty-acyl-ACP hydrolase fatty-acyl-ACP mitochondrial transport	Cytosol	$C141ACP + H2O \Leftrightarrow ACP + H + C141$ $C141ACP[m] \Rightarrow C141ACP[c]$	EC-3.1.2.14	Fatty Acid Biosynthesis Transport, Mitochondrial	PIPA03692 PIPA02717
fatty acid peroxisomal transport via ABC system fatty acid peroxisomal transport		$ATP[x] + CL41COA[c] \rightarrow ADP[x] + P[[x] + CL41COA[x]$ $CL41[c] \rightarrow CL42[x]$		Transport, Peroxisomal Transport, Peroxisomal	PIPAD1145
fatty-acyl-ACP hydrolase	Cytosol	c160ACP + H2O <> ACP + H + c160	EC-3.1.2.14	Fatty Acid Biosynthesis	PIPAD1904 PIPAD3692
fatty-acyl-ACP mitochondrial transport fatty acyl-COA peroxisomal transport via ABC system		$PAImACP[m] \rightarrow PAImACP[c]$ $ATP[n] + C160CDA(c) \rightarrow ADP[n] + PI[n] + C160CDA[n]$		Transport, Mitochondrial Transport, Peroxisomal	PIPAD2717 PIPAD1145
fatty acid peroxisomal transport		hdca(c) -> Hdca(x)		Transport, Peroxisomal	PIPAD1904
fatty-acyl-ACP hydrolase fatty-acyl-ACP mitochondrial transport	Cytosol	c161ACP + H2O <> ACP + H + c161 C161ACP[m] > C161ACP[c]	EC-3.1.2.14	Fatty Acid Biosynthesis Transport, Mitochondrial	PIPA03692 PIPA02717
fatty acyl-COA peroxisomal transport via ABC system fatty acid peroxisomal transport		$ATP[x] + HdCOA(c] \rightarrow ADP[x] + HdCOA[x] + PI[x]$ $hdcoa[c] \rightarrow Hdcoa[x]$		Transport, Peroxisomal Transport, Peroxisomal	PIPAD1145
fatty-acyl-ACP hydrolase	Cytosol	c180ACP + H2O <> ACP + H + c180	EC-3.1.2.14	Fatty Acid Biosynthesis	PIPAD1904 PIPAD3692
fatty-acyl-ACP mitochondrial transport fatty acyl-COA transport via ABC system		C180ACP[n] > C180ACP[c] $ATP[n] + C180C0A[c] > ADP[n] + P[n] + C180C0A[n]$		Transport, Mitochondrial Transport, Peroxisomal	PIPAD2717 PIPAD1145
fatty-acyl-ACP hydrolase	Cytosol	c181ACP + H2O <>> ACP + H + c181	EC-3.1.2.14	Fatty Acid Biosynthesis	PIPAD1904 PIPAD3692
fatty-acyl-ACP mitochondrial transport		octeACP(m) -> octeACP(c)		Transport, Mitochondrial	PIPA02717
fatty acyl-COA peroxisomal transport via ABC system fatty-acyl-ACP hydrolase	Cytosol	ATP[x] + odeCOA[c] - sADP[x] + odeCOA[x] + P[x] $c182ACP + H2O <> ACP + H + c182$	EC-3.1.2.14	Transport, Peroxisomal Fatty Acid Biosynthesis	PIPAD1904 PIPAD3692
fatty-acyl-ACP mitochondrial transport	-,	C182ACP(m) -> C182ACP(c)		Transport, Mitochondrial	PIPA02717
fatty acyl-COA peroxisomal transport via ABC system fatty acid peroxisomal transport fatty-acidCOA ligase (decanoate), nucleus	Nucleus	$ATP[x] + octycACOA[c] \rightarrow ADP[x] + octycACOA[x] + P[[x]$ $octa[c] \rightarrow octa[x]$ $-100 + ATP + CDA <> AMP + PPI + c100COA$	EC-6.2.1.3	Transport, Peroxisomal Transport, Peroxisomal Fatty Acid Biosynthesis	PIPAD1145 PIPAD0167
fatty-acid-COA ligase (dodecanoate), nucleus fatty-acid-COA ligase (tetrADEcanoate)	Nucleus Cytosol	c120 + ATP + COA <>> AMP + PPI + C120COA c140 + ATP + COA <>> AMP + PPI + C140COA	EC 6.2.1.3 EC 6.2.1.3	Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPA00167 PIPA00727
fatty-acidCOA ligase (tetrADEcanoate), nucleus fatty-acidCOA ligase (tetrADEcenoate) fatty-acidCOA ligase (tetrADEcenoate), nucleus	Nucleus Cytosol Nucleus	L4I0 - ATP + CDA <> AMP + PPI = CL4ICOA L4I1 - ATP + CDA <> AMP + PPI = CL4ICOA L4I1 - ATP + CDA <> AMP + PPI = CL4ICOA	EC-6.2.1.3 EC-6.2.1.3 EC-6.2.1.3	Fatty Acid Biosynthesis Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPA00167 PIPA00727 PIPA00167
fatty-acid-COA ligase (hexADEcanoate), micross fatty-acid-COA ligase (hexADEcanoate) fatty-acid-COA ligase (hexADEcanoate), nucleus	Cytosol Nucleus	c160 + ATP + CDA <> AMP + PPi + c160COA c160 + ATP + CDA <> AMP + PPi + c160COA	EC 6.2.1.3 EC 6.2.1.3	Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPADO167 PIPADO167
fatty-acidCOA ligase (hexADEcenoate) fatty-acidCOA ligase (hexADEcenoate), nucleus	Cytosol Nucleus	c161 + ATP + COA <>> AMP + PPI + c161COA c161 + ATP + COA <>> AMP + PPI + c161COA	EC 6.2.1.3 EC 6.2.1.3	Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPADO727 PIPADO167
fatty-acid-COA ligase (octADEcanoate) fatty-acid-COA ligase (octADEcenoate) fatty-acid-COA ligase (octADEcynoate)	Cytosol Cytosol Cytosol	C180 + ATP + CDA <> AMP + PPI + C18CDA C181 + ATP + CDA <> AMP + PPI + C181CDA C182 + ATP + CDA <> AMP + PPI + C182CDA	EC-6.2.1.3 EC-6.2.1.3 EC-6.2.1.3	Fatty Acid Biosynthesis Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPA00727 PIPA00727 PIPA00727
fatty-acidCOA ligase (octanoate), nucleus FAD/FMN antiport	Nucleus	c080 + ATP + COA <> AMP + PPI + c080COA fad(c + fmn(m) -> fad(m) + fmn(c)	EC 6.2.1.3	Fatty Acid Biosynthesis Transport, Mitochondrial	PIPADO167 PIPAD23D4
FAD/FMN antiport formaldehyde dehydrogenase	Cytosol	fad(n) + fmn(c) -> fad(n) + fmn(c) fald + GTHRD + NAD +> SIGLUIth + H + NADH	EC-1.2.1.1	Transport, Nucleus Pyruvate Metabolism	PIPA02304 PIPA03313
fatty acid oxidation , peroxisomal fatty acid oxidation , peroxisomal fatty acid oxidation , peroxisomal	Peroxisome Peroxisome Peroxisome	6 CDA + 6 HZD + 6 NAD + 5 C2 + C14 LCDA - 7 ACCDA + 6 H + 5 HZO2 + 6 NADH 6 CDA + 6 HZD + 6 NAD + NADPH + 6 OZ + C14 LCDA - 7 ACCDA + 5 H + 6 HZO2 + 6 NADH + NADP 7 CDA + 7 HZO + HdCDA + 7 NAD + 6 OZ - 8 ACCDA + 7 H + 6 HZO2 + 7 NADH		Fatty Acid Degradation Fatty Acid Degradation Fatty Acid Degradation	
fatty acid oxidation , peroxisomal fatty acid oxidation , peroxisomal	Peroxisome Peroxisome	7 COA + 7 H2O + HdCOA + 7 NAD + NADPH + 7 O2 -> 8 ACCOA + 6 H + 7 H2O2 + 7 NADH + NADP 8 COA + 8 H2O + 8 NAD + 7 O2 + odeCOA -> 9 ACCOA + 8 H + 7 H2O2 + 8 NADH		Fatty Acid Degradation Fatty Acid Degradation	
fatty acid oxidation , peroxisomal fatty acid oxidation , peroxisomal fatty acid oxidation , peroxisomal	Peroxisome Peroxisome Peroxisome	8 COA + 8 H2O + 8 NAD + NADPH + 8 O2 + ode/COA - 9 ACCOA + 7 H + 8 H2O2 + 8 NADH + NADP 8 COA + 8 H2O + 8 NAD + 6 O2 + ode/ACOA - 9 ACCOA + 8 H + 6 H2O2 + 8 NADH 8 COA + 8 H2O + 8 NAD + NADPH + 7 O2 + ode/ACOA - 9 ACCOA + 7 H + 7 H2O2 + 8 NADH + NADP		Fatty Acid Degradation Fatty Acid Degradation Fatty Acid Degradation	
fatty acid oxidation , peroxisomal fatty acid oxidation , peroxisomal	Peroxisome Peroxisome	8 COA + 8 H2O + 8 NAD + 2 NADPH + 8 O2 + ocdycACOA -> 9 ACCOA + 6 H + 8 H2O2 + 8 NADH + 2 NADP 3 COA + 3 H2O + 3 NAD + 3 O2 + ocCOA -> 4 ACCOA + 3 H + 3 H2O2 + 3 NADH		Fatty Acid Degradation Fatty Acid Degradation	
					DIDAGESTA and
					PIPA03698 and (PIPA03692
fatty acid synthase (n-C10:0)	Cytosol	3 H + malCOA + 2 NADPH + c080 -> CO2 + COA + c100 + H2O + 2 NADP	EC-2.3.1.85	Fatty Acid Biosynthesis	PIPA01904) PIPA02354
fatty-acyl-ACP synthase (n-C10:0ACP), mitochondrial	Mitochondria	3 H + mALACP + 2 NADPH + c080ACP -> ACP + C02 + c100ACP + H2O + 2 NADP		Fatty Acid Biosynthesis	PIPA01920
					PIPA05824 and
					PIPA03698 and (PIPA03692
fatty acyl-COA synthase (n-C10:0COA)	Cytosol	3 H + malCOA + 2 NADPH + c080COA -> CO2 + COA + c100COA + H2O + 2 NADP	EC-2.3.1.86	Fatty Acid Biosynthesis	PIPAD1904)
					PIPA05824 and PIPA03698 and
					(PIPA03692 and
fatty acid synthase (n-C12:0)	Cytosol	c100 + 3 H + malCOA + 2 NADPH -> CO2 + COA + c120 + H2O + 2 NADP	EC-2.3.1.85	Fatty Acid Biosynthesis	PIPA01904) PIPA02354
fatty-acyl-ACP synthase (n-C12:0ACP), mitochondrial	Mitochondria	c100ACP + 3 H + mALACP + 2 NADPH -> ACP + C02 + c120ACP + H2O + 2 NADP		Fatty Acid Biosynthesis	PIPA01920
					PIPA05824 and PIPA03698 and
					(PIPA03692 and
fatty-acyl-COA synthase (n-C12:0COA)	Cytosol	c100COA + 3 H + malCOA + 2 NADPH -> CO2 + COA + c120COA + H2O + 2 NADP	EC-2.3.1.86	Fatty Acid Biosynthesis	PIPA01904)
					PIPADS824 and PIPAD3698 and
					(PIPA03692 and
fatty acid synthase (n-C14:0) fatty-acyl-ACP synthase (n-C14:0ACP), mitochondrial	Cytosol Mitochondria	c120 + 3 H + maIxC0A + 2 NADPH -> CO2 + COA + H2O + 2 NADP + c140 c120ACP + 3 H + mAIACP + 2 NADPH -> ACP + CO2 + H2O + c140ACP + 2 NADP	EC-2.3.1.85	Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPA01904) PIPA02354 PIPA01920
, any transport processory, modernment	uoutonulna	TALESCONE CONTRACTOR C		, come many consend	
					PIPA05824 and PIPA03698 and (PIPA03692
fatty-acyl-COA synthase (n-C14:0COA)	Cytosol	c120COA + 3 H + malCOA + 2 NADPH -> CO2 + COA + H2O + 2 NADP + c140COA	EC-2.3.1.86	Fatty Acid Biosynthesis	and PIPA01904)
fatty-acyl-ACP synthase (n-C14:1ACP), mitochondrial		c120ACP + 4 H + mALACP + 3 NADPH + O2 -> ACP + CO2 + 3 H2O + 3 NADP + c141ACP		Fatty Acid Biosynthesis	PIPAD2354 PIPAD1920
					PIPAD5824 and
					PIPA03698 and (PIPA03692
fatty acid synthase (n-C16:0)	Cytosol	3 H + malCOA + 2 NADPH + c140 -> CO2 + COA + H2O + c160 + 2 NADP	EC-2.3.1.85	Fatty Acid Biosynthesis	and PIPAD1904) PIPAD2354
fatty-acyl-ACP synthase (n-C16:0ACP), mitochondrial	Mitochondria	3 H + mALACP + c140ACP + 2 NADPH -> ACP + CO2 + H2O + 2 NADP + c160ACP		Fatty Acid Biosynthesis	PIPA02354 PIPA01920

					PIPA05824 and PIPA03698 and
fatty.arvii.CDA synthase (n.C16:0COA)	Cytosol	3 H + malCOA + 2 NADPH + c140CDA -> CO2 + COA + H2O + 2 NADP + c160CDA	EC-2-3.1.86	Fatty Acid Biosynthesis	(PIPA03692 and PIPA01904)
fatty-acyl-ACP synthase (n-C16:1ACP), mitochondrial	.,	4 H + malaCP + c140ACP + 3 NADPH + O2 -> ACP + C02 + 3 H2O + c161ACP + 3 NADP	1013130	Fatty Acid Biosynthesis	PIPA02354 PIPA01920
					PIPA05824 and
					PIPA03698 and (PIPA03692
fatty acid synthase (n-C18:0)	Cytosol	3 H + c160 + malCOA + 2 NADPH -> CO2 + COA + H2O + 2 NADP + c180	EC-2.3.1.85	Fatty Acid Biosynthesis	and PIPA01904)
fatty-acyl-ACP synthase (n-C18:0ACP), mitochondrial	Mitochondria	3 H + mALACP + 2 NADPH + c160ACP -> ACP + C02 + H2O + 2 NADP + c180ACP		Fatty Acid Biosynthesis	PIPA02354 PIPA01920
					PIPA05824 and
					PIPA03698 and (PIPA03692
fatty-acyl-COA synthase (n-C18:0COA)	Cytosol	3 H + malCOA + 2 NADPH + c160COA -> CO2 + COA + H2O + 2 NADP + c180COA	EC-2.3.1.86	Fatty Acid Biosynthesis	and PIPAD1904) PIPAD2354
fatty-acyl-ACP synthase (n-C18:1ACP), mitochondrial	Mitochondria	4 H + mALACP + 3 NADPH + O2 + c160ACP -> ACP + CO2 + 3 H2O + 3 NADP + c181ACP		Fatty Acid Biosynthesis	PIPA01920 PIPA02354
fatty-acyl-ACP synthase (n-C18:2ACP), mitochondrial	Mitochondria	5 H + mALACP + 4 NADPH + 2 O2 + C160ACP -> ACP + CO2 + 5 H2O + 4 NADP + C182ACP		Fatty Acid Biosynthesis	PIPA01920
					PIPA05824 and PIPA03698 and
					(PIPA03692 and
fatty acid synthase (n-C8:0), lumped reaction fatty acyl-ACP synthase (n-C8:0ACP), mitochondrial, lumped reaction	Cytosol	ACCDA + 8 H + 3 malCDA + 6 NADPH -> 3 CO2 + 4 CDA + 2 H2O + 6 NADP + c080 ACACP + 9 H + 3 mALACP + 6 NADPH -> 3 ACP + 3 CO2 + 3 H2O + 6 NADP + c080ACP	EC-2.3.1.85	Fatty Acid Biosynthesis Fatty Acid Biosynthesis	PIPA01904) PIPA02354
ratty acyi-ACP synthase (n-CS:UACP), mitochondrial, lumped reaction	Mitochondna	ACACP + 9 H + 3 MALALP + 6 NAUPH -> 3 ACP + 3 CUZ + 3 HZU + 6 NAUP + CUSUACP		Fatty Acid Biosynthesis	PIPA01920
					PIPA05824 and PIPA03698 and
fatty acyl-COA synthase (n-C8:0COA), Jumped reaction	Cytosol	ACCOA + 9 H + 3 malCOA + 6 NADPH -> 3 CO2 + 3 COA + 3 H2O + 6 NADP + ocCOA	EC-2-3.1.86	Fatty Acid Biosynthesis	(PIPA03692 and PIPA01904)
Fructose-bisphosphate aldolase D-Fructose 1-phosphate D-glyceraldehyde-3-phosphateLyase	Cytosol Cytosol	FDP <> DHAP + G3P F1P <>> DHAP + G1YAI	EC-4.1.2.13	Glycolysis/GLUconeogenesis Glycolysis/GLUconeogenesis	PIPA00092 PIPA00092
Fructose-bisphosphatase Fructose-2,6-bisphosphate 2-phosphatase	Cytosol	FDP + H2O → F6P + PI f26bP + H2O → F6P + PI	EC-4.1.2.13 EC-3.1.3.11 EC-3.1.3.46	Anaplerotic reactions FRUctose and mannose Metabolism	PIPA02635 PIPA04890
Ferrochelatase, mitochondrial formate dehydrogenase formate dehydrogenase, cytosolic/mitochondrial	Mitochondria Cytosol	Fe2 \times PP99 \times 2 H \times PHeme FORM \times NAD \times CO2 \times HAD FORM \times FORM	EC-4.99.1.1 EC-1.2.1.2 EC-1.2.2.1	Porphyrin and Chlorophyll Metabolism Methane Metabolism	PIPA03109 PIPA03425
termate denyarogenase, cytosoic/mitocnondriai High affinity iron permease involved in the transport of iron across the plasma membrane		Felial <> Fel Cl	EC-1.2.2.1	Oxidative phosphorylation Transport, Extracellular	PIPA00255
METhionyl-tRNA formyltransFerase, mitochondrial FMN ADEnylyltransFerase	Mitochondria Cytosol	10fTHF + METtrna -> fMETtrna + H + THF ATP + fmn + H -> fad + PPI	EC-2.1.2.9 EC-2.7.7.2	Folate Metabolism Riboflavin Metabolism	PIPA05948 PIPA04726
FMN ADEnylyltransFerase, mitochondrial fold, mitochondrial	Mitochondria Mitochondria	ATP + fmn + H -> fad + PPI 2ahhmd + 4abz -> dhPt + PPI	EC-2.7.7.2	Riboflavin Metabolism Folate Metabolism Transport Extracellular	PIPA05878
formate transport via diffusion formate mitochondrial transport fumarate reductase, cytosolic/mitochondrial		FORM(e) <> FORM(c) FORM(n) > FORM(c) fabric fa	EC-1.3.99.1	Transport, Mitochondrial	PIPA03069
fumarate reductase, mitochondrial D-Fructose transport in via Proton symport	Mitochondria	fadh2 + FUM -> fad + SUCC FRU[e] + H[e] -> FRU[c] + H[c]	EC-1.3.99.1	Oxidative phosphorylation Transport, Extracellular	PIPA00236
5-forMEThyltetrahydrofolate cycloLigase 5-forMEThyltetrahydrofolate cycloLigase, mitochondrial	Cytosol Mitochondria	SfTHF + ATP -> ADP + METHF + PI SfTHF + ATP -> ADP + METHF + PI	EC-6.3.3.2 EC-6.3.3.2	Folate Metabolism Folate Metabolism Folate Metabolism	PIPA06649
5-Formyltetrahydrofolate:10-Formyltetrahydrofolate isomerase formate-tetrahydrofolate ligase formate-tetrahydrofolate ligase, mitochondrial	Cytosol Cytosol Mitochondria	STIHF+ATP+H2O >- 10THF+ADP+Pi ATP+F0RM+THF <td>EC-6.3.4.3 EC-6.3.4.3</td> <td>Folate Metabolism Folate Metabolism Folate Metabolism</td> <td>PIPA09767 PIPA06623</td>	EC-6.3.4.3 EC-6.3.4.3	Folate Metabolism Folate Metabolism Folate Metabolism	PIPA09767 PIPA06623
fumarase, mitochondrial	Cytosol Mitochondria	FUM+H2O <> MAL	EC-4.2.1.2 EC-4.2.1.2	Oxidative phosphorylation Oxidative phosphorylation	PIPA02844 PIPA02844
fumarate reversible transport via symport		FUM(e) + H(e) <> FUM(c) + H(c)		Transport, Extracellular	PIPA07880
					PIPA00281 PIPA06049 PIPA05619
Glycolipid 1,2-alphaD-mannosytransFerase, Golgi apparatus Glycolipid 1,2-alphaD-mannosytransFerase, Mitochondria	Golgi Mitochondria	GDPmann + m2mACCHITPPdol -> GDP + H + m3mACCHITPPdol GDPmann + m2mACCHITPPdol -> GDP + H + m3mACCHITPPdol	EC-2.4.1.131 EC-2.4.1.131	Glycoprotein Metabolism Glycoprotein Metabolism	PIPA00539 PIPA00281
					PIPA07880 PIPA00281
					PIPA05049 PIPA05619
Glycolipid 1,2-alphaD-mannosyltransFerase, Golgi apparatus Glycolipid 1,2-alphaD-mannosyltransFerase, Mitochondria	Golgi Mitochondria	GDPmann + m3mACCHTPPdol -> GDP + H + m4mACCHTPPdol GDPmann + m3mACCHTPPdol -> GDP + H + m4mACCHTPPdol	EC-2.4.1.131 EC-2.4.1.131	Glycoprotein Metabolism Glycoprotein Metabolism	PIPA00539 PIPA00281 PIPA00571
Glycolipid 1,3-alphaD-mannosyltransFerase, Golgi apparatus Glycolipid 1,6-alphaD-mannosyltransFerase, Golgi apparatus	Golgi Golgi	GDPmann + mImACCHTPPdol > GDP + H + mImACCHTPPdol GDPmann + mImACCHTPPdol > GDP + H + mImACCHTPPdol	EC-2.4.1.132	Glycoprotein Metabolism Glycoprotein Metabolism	PIPA00571 PIPA00571
glycerol 3-phosphate acyltransferase glycerol-3-phosphate dehydrogenase (NAD)	Cytosol	GLYC3P + ACCDA -> 1AG3P + COA DHAP + H + NADH -> GLYc3P + NAD	2.3.1.15 EC-1.1.1.8	Glycerolipid Metabolism Glycerolipid Metabolism	PIPA00930 PIPA06084
glycerol-3-phosphate dehydrogenase (NAD), mitochondrial glycerol-3-phosphate dehydrogenase (FAD), mitochondrial	Mitochondria Mitochondria	DHAP + H + NADH → GLYC3P + NAD fad + GLYC3P → DHAP + ADD fulSia → 9 PRS5 + H + H2D	EC-1.1.1.8 EC-1.1.99.5	Glycerolipid Metabolism Glycerolipid Metabolism Arginine and Proline Metabolism	PIPA06084 PIPA02567
L-Glutamate SSemialdehyde dehydratase, reversible L-Glutamate SSemialdehyde dehydratase, reversible, mitochondrial	Cytosol Mitochondria	GLUS::a <> 19185:: + H + H20 GLUS::a <> 19185:: + H + H20		Arginine and Proline Metabolism Arginine and Proline Metabolism	
Glutamate-SSemialdehyde dehydrogenase Glutamate-SSemialdehyde dehydrogenase	Cytosol Cytosol	GLUSP + H + NADH -> GLUSSa + NADP + PI GLUSP + H + NADH -> GLUSSa + NAD + PI	EC-1.2.1.41 EC-1.2.1.41	Arginine and Proline Metabolism Arginine and Proline Metabolism	PIPA01546 PIPA01546
Glucosamine-6-phosphate deaminase Glucose 6-phosphate dehydrogenase	Cytosol	GAM6P + H2O -> F6P + NH4 G6P + NADP -> F6P + H + NADPH	EC-3.5.99.6 EC-1.1.1.49	GLUcoSAMine Metabolism Pentose phosphate Cycle	PIPA08178
Glucose 6-phosphate dehydrogenase, endoplasmic reticular Glucose-6-phosphate 1-epimerase Glucose-6-phosphate isomerase	ER Cytosol Cytosol	GGP + NADP > GPJ + H + NADPH GGP <> bGGP GGP <> bGGP	EC-5.1.3.15 EC-5.3.1.9	Pentose phosphate Cycle Glycolysis/GLUconeogenesis Glycolysis/GLUconeogenesis	PIPA00254 PIPA03258
Glucose-6-phosphate isomerase Glucose-6-phosphate 1-epimerase, nucleus	Cytosol Nucleus	GGP <> bGP GGP <> bGP	EC 5.3.1.9 EC 5.1.3.15	Glycolysis/GLUconeogenesis Glycolysis/GLUconeogenesis	PIPA03258 PIPA00254
Glucose 6-phosphate endoplasmic reticular transport via diffusion		$G6P(c) \Leftrightarrow G6P(r)$		Transport, Endoplasmic Reticular	PIPA00044
D-galactose transport in via Proton symport UTP-Glucose-1-phosphate URidylyltransFerase UTP-Glucose-1-phosphate URidylyltransFerase, nucleus	Cytosol Nucleus	GAL(e) + H(e) > GAL(c) + H(c) G1P + H + UTP <> PP) + UDPg G1P + H + UTP <> PP) + UDPg	EC-2.7.7.9 EC-2.7.7.9	Transport, Extracellular Galactose Metabolism Galactose Metabolism	PIPA09569 PIPA03522 PIPA03522
UTP-Glucose-1-pnospnate Unolylytransrerase, nucleus D-Glucosamine 6-phosphate reversible uniport glyceraldehyde-3-phosphate dehydrogenase	Cytosol	$G_{1}P + H + U_{1}P \Leftrightarrow PH + U_{2}P + U_{3}P + U$	EC-1.2.1.12	Transport, Extracellular Glycolysis/GLUconeogenesis	PIPA03522 PIPA02510
glyceraldehyde-3-phosphate transport peroxisome		$gaP(x) \Rightarrow gaP(c)$		Transport	
phosphoribosylglycinamide formyltransFerase, irreversible, mitochondria glycerol 3-phosphate acyltransFerase (glycerol 3-phosphate)	Mitochondria Cytosol	10fTHF + GAR > 1GAR + H + THF 0.02 C100CDA + 0.05 C120CDA + G1Yc3P + 0.17 H9CDA + 0.09 oxfscACDA + 0.24 odeCDA + 0.27 C160CDA + 0.05 C180CDA + 0.1 C140CDA > 0.01 1aG3P + CDA	EC-2.1.2.2	PURIne and Pyrimidine Biosynthesis phospholipid Biosynthesis	PIPA01418
glycerol 3-phosphate acyltransFerase (glycerone phosphate)	Cytosol	0.02 C100C0A + 0.05 C120COA + DHAP + 0.17 HdCOA + 0.09 ordycACOA + 0.24 odeCOA + 0.27 C160COA + 0.05 C180COA + 0.1 C140COA -> 0.01 1aG1Y3P + COA		phospholipid Biosynthesis	
1,4-alpha-Glucan branching enzyme GlyCOAldehydye reversible transport	Cytosol	14GLUN -> GLYCOGEN + H2O gcAL[e] <> gcAL[c]	EC-2.4.1.18	Alternate Carbon Metabolism Transport, Extracellular	PIPA00350
glyCOAldehyde mitochondrial transport		gcAL(c) <> gcAL(m)		Transport, Mitochondrial	PIPA09545 PIPA08867
glycine-cleavage complex (lipoamide), mitochondrial	Mitochondria	GLY + H + IPAm <> alPAm + CO2	EC-1.4.4.2	Glycine and Serine Metabolism	PIPA05480 PIPA10454
					PIPA09545 PIPA08867
glycine-cleavage system (lipoamide) irreversible, mitochondrial	Mitochondria	alPAm +THF-> dhlam + MLTHF + NH4	EC-2.1.2.10	Glycine and Serine Metabolism	PIPA05480 PIPA10454 PIPA09545
					PIPA08867 PIPA05480
glycine-cleavage complex (lipoamide), mitochondrial	Mitochondria	dhlam + NAD <> H + IPAm + NADH	EC-1.8.1.4	Glycine and Serine Metabolism	PIPA10454 PIPA09545
		GLY+H+IPRO->aIPRO+CO2			PIPA08867 PIPA05480
glycine-cleavage complex (lipoy/Protein), mitochondrial	www.cnondria	GETT TO THE CONTRACT COME	EC-1.4.4.2	Glycine and Serine Metabolism	PIPA10454 PIPA09545 PIPA08867
glycine-cleavage complex (lipoylProtein) irreversible, mitochondrial	Mitochondria	aIPRO + THF -> dhIPRO + MLTHF + NH4	EC-2.1.2.10	Glycine and Serine Metabolism	PIPA05480 PIPA10454
					PIPA09545 PIPA08867 PIPA05480
glycine-cleavage complex (lipoylProtein), mitochondrial guanine phosphoribosyltransFerase	Mitochondria Cytosol	dhipro + nad -> H + ipro + nadh Gua + PriP -> GMP + PR	EC-1.8.1.4 EC-2.4.2.7	Glycine and Serine Metabolism Nucleotide Salvage Pathways	PIPA05480 PIPA10454 PIPA01977
GDP Golgi transport via Proton anitport GDP nuclear transport		$GDP[g] + H[c] \Leftrightarrow GDP[c] + H[g]$ $GDP[c] \Leftrightarrow GDP[n]$		Transport, Golgi Apparatus Transport, Nuclear	
Glutamine-Fructose-6-phosphate transaminase Glutamine-Fructose-6-phosphate transaminase, nucleus	Cytosol Nucleus	F6P + GLN > GAM6P + GLU F6P + GLN > GAM6P + GLU SER + THF < > GLP + F2D + MLTHF	EC-2.6.1.16 EC-2.6.1.16 EC-2.1.2.1	GLUtamine Metabolism GLUtamine Metabolism Glycine and Serine Metabolism	PIPA00734 PIPA00734 PIPA02193
glycine hydroxyMEThyttransFerase, reversible glycine hydroxyMEThyttransFerase, reversible, mitochondrial guanviate kinase (GMP-ATP)	Cytosol Mitochondria Cytosol	SER + THF <> GLY + H2.0 + MLTH SER + THF <> GLY + H2.0 + MLTH ATP + GMP <> ADP + GDP	EC-2.1.2.1 EC-2.7.4.8	Glycine and Serine Metabolism Glycine and Serine Metabolism PURIne and Pyrimidine Biosynthesis	PIPA03855 PIPA04167
guanylate kinase (GMP:dATP) glycogen phosphorylase	Cytosol Cytosol	dATP+GMP<>>dADP+GDP GLYCOGEN+PI>>GIP+14GLUN	EC-2.7.4.8 EC-2.4.1.1	PURIne and Pyrimidine Biosynthesis Alternate Carbon Metabolism	PIPA04167 PIPA02179
glycogen synthase (UDPGLC)	Cytosol	UDPg -> GLYCOGEN + H + UDP	EC-2.4.1.11	Alternate Carbon Metabolism	PIPA02677 PIPA00236 PIPA09569
Glucose transport (uniport) Glucose transport, vacuolar		GLC(c) <> GLC(v)		Transport, Extracellular Transport, Vacuolar	PIPA02561
Glutamine synthetase Glutamine nuclear transport via Proton symport	Cytosol	$ATP + GLU + NH4 \rightarrow ADP + GLN + H + PI$ $GLN(c) + H(c) \Leftrightarrow GLN(n) + H(n)$	EC-6.3.1.2	GLUtamine Metabolism Transport, Nuclear	PIPA01630
L-Glutamine reversible transport via Proton symport Glutaminvi-tRNA synthetase	Cytosol	GLN(e) + H(e) <> GLN(c) + H(c) ATP + GLN + trnagin > AMP + gintrna + PPI	EC-6.1.1.18	Transport, Extracellular GLUtamine Metabolism	PIPA00044 PIPA01630 PIPA03133
glycylpeptide N-tetrADEcanoyltransFerase Glutamate 5-kinase	Cytosol Cytosol	g P + C140COA -> COA + tg P ATP + GLU -> ADP + GLUSP	EC-2.3.1.97 EC-2.7.2.11	Other Amino Acid Metabolism Arginine and Proline Metabolism	PIPA03311 PIPA05604
gamma-Glutamylcysteine synthetase Glutamate Decarboxylase	Cytosol Cytosol	ATP + CYS + GLU -> ADP + GLUCYS + H + Pi GLU + H -> 4abut + CO2	EC-6.3.2.2 EC-4.1.1.15	Other Amino Acid Metabolism GLUtamate Metabolism	PIPAD3899 PIPAD7969
Glutamate dehydrogenase (NAD), nucleus	Cytosol Nucleus	GLU +H2O + NAD <> AKG + H + NADH + NH4 GLU +H2O + NAD <> AKG + H + NADH + NH4 GLU +H2O + NAD <> AKG + H + NADH + NH4 GLU +H2O + NAD <> AKG + H + NADH + NH4	EC-1.4.1.2 EC-1.4.1.2 EC-1.4.1.4	GLUtamate Metabolism GLUtamate Metabolism GLUtamate Metabolism	PIPA04110 PIPA04110 PIPA03564
Glutamate dehydrogenase (NADP) Glucokinase Glutamine phosphoribosykliphosphate amidotransFerase	Cytosol Cytosol Cytosol	GLU + H2D + NADP <>> AGF + H · NADPH + NH4 ATP + GLC >> ADP + bGSP + H GLN + H2D + PPP >> GLU + PPI + PRAM	EC-1.4.1.4 EC-2.7.1.2 EC-2.4.2.14	GLUtamate Metabolism Glycolysis/GLUconeogenesis PURIne and Pyrimidine Biosynthesis	PIPA03564 PIPA03821 PIPA01366
Glutamate synthase (NADH2) Glutamate synthase (NADH2), nucleus	Cytosol Nucleus	AKK + GUN + H + NADH -> 2 GU + NAD AKG + GUN + H + NADH -> 2 GU + NAD	EC-1.4.1.14 EC-1.4.1.14	GLUtamate Metabolism GLUtamate Metabolism	PIPA03309 PIPA03309
L-Glutamate reversible transport via Proton symport, mitochondrial		GLU[c] + H[c] <> GLU[m] + H[m] GLU[c] + H[c] <> GLU[n] + H[n]		Transport, Mitochondrial	PIPA02307
Glutamate nuclear transport via Proton symport		acold 4 uld 25 acold 4 HM		Transport, Nuclear	PIPA00044 PIPA02947
L-Glutamate transport via Proton symport, reversible		$GLU[e] + H[e] \Leftrightarrow GLU[c] + H[c]$		Transport, Extracellular	PIPA09569
L-Glutamate transport into mitochondria via hydroxide ion antiport Glutamyl-tRNA synthetase	Cytosol	GLU[c] + ch1[m] > GLU[m] + ch1[c] ATP + GLU+ trnaGLU > AMP + GLUtrna + PPI	EC-6.1.1.17	Transport, Mitochondrial GLUtamine Metabolism	PIPA02307 PIPA02788
Giutamyl-tRNA synthetase, mitochondrial glyoxylate transport, peroxisomal glycerol-3-phosphate shuttle	Mitochondria	ATP + GLU + trnaGLU -> AMP + GLUtrna + PPi GLY(c] <> -> GLY(x) GLY(x)P(c] >> GLY(x)P[m]	EC-6.1.1.17	GLUtamine Metabolism Transport, Peroxisomal Transport, Mitochondrial	PIPA03065
A.1 a broadbroad money		· · · · · · · · · · · · · · · · · · ·			PIPA09545 PIPA08867
glycine cleavage system, mitochondrial	Mitochondria	GLY+NAD+THF->CO2+MLTHF+NADH+NH4	EC-2.1.2.10	Glycine and Serine Metabolism	PIPA05480 PIPA00560
glycerol transport via channel glycerol/Proton symporter glycogen (starch) synthase	Cytosol	GLY(c) <> GLY(c) GLY(c) + H(c) <- GLY(c) + H(c) H(c) + UD(c) <- SLAGLUM + H + UDP	EC-2.4.1.11	Transport, Extracellular Transport, Extracellular Alternate Carbon Metabolism	PIPA09569 PIPA02677
glycerol kinase hydroxyacylGlutathione hydrolase	Cytosol Cytosol	ATP+GL>> ADP+GLY(3P+H H2O+LGT-> GTHRD+H+DLAC	EC-2-7.1.30 EC-3.1.2.6	Glycerolipid Metabolism Alternate Carbon Metabolism	PIPA01632 PIPA05405
glycine mitochondrial transport via Proton symport		$GLY(c) + H(c) \Leftrightarrow GLY(m) + H(m)$		Transport, Mitochondrial	PIPA02307

glycine reversible transport via Proton symport		$GLY[q] + H[q] \Leftrightarrow GLY[c] + H[c]$		Transport, Extracellular	PIPADO044 PIPADO701
Glycyl-tRNA synthetase Glycyl-tRNA synthetase, mitochondria	Cytosol Mitochondria	ATP + GLY + trnaGLY -> AMP + GLYtrna + PPI ATP + GLY + trnaGLY -> AMP + GLYtrna + PPI	EC 6.1.1.14 EC 6.1.1.14	Glycine and Serine Metabolism Glycine and Serine Metabolism PURIne and Pyrimidine Biosynthesis	PIPAD2995 PIPAD2995
GMP synthase phosphoGluconate dehydrogenase	Cytosol	ATP + GLN + H2O + XMP -> AMP + GLU + GMP + 2 H + PPI 6Pgc + NADP -> CO2 + NADPH + ruSPD	EC-5.3.5.2 EC-1.1.1.44	Pentose phosphate Cycle	PIPAD3521 PIPAD3124
gnnuc geranyltranstransFerase guanosine kinase	Cytosol Cytosol Cytosol	gan +120 > GUA + RIB graff + IPHP > frdP + PPI ATP + gan > ADP + GMP + H	EC-2.5.1.10	Nucleotide Salvage Pathways Sterol Biosynthesis Nucleotide Salvage Pathways	PIPA03712
guanosine triansport in via Proton symport guanosine mitochondrial transport via Proton symport	Cytosoi	Sgn(e) + H(e) > ggn(c) + H(c) ggn(c) + H(e) > ggn(m) + H(m)		Transport, Extracellular Transport, Mitochondrial	
Glutathione oxidoreductase Glutathione oxidoreductase, mitochondria	Cytosol Mitochondria	SMC + MC SMM + MM + MM P MM P MM P MM P MM P MM	EC-1.8.1.7 EC-1.8.1.7	Other Amino Acid Metabolism Other Amino Acid Metabolism	PIPAD3299 PIPAD3299
oxidized Glutathione irreversible uniport Glutathione peridoxase		ginox + 1 + neuer = 2 of neuer neuer gthx(e) = gthx(ot) = 2 2 GTHRD + H2O2 <> gthxx + 2 H2O	EC-1.11.1.9	Transport, Extracellular Other Amino Acid Metabolism	PIPAD3299
Glutathione synthetase	Cytosol	Z G1HKU+HZUZ <> gmon + Z HZU ATP + GLUCIS + GLY > ADP + GTHRD + H + PI ALA + GTHRD > GLY + GLULIA	EC-6.3.2.3 EC-2.3.2.2	Other Amino Acid Metabolism Other Amino Acid Metabolism Other Amino Acid Metabolism	PIPAD2397 PIPAD6784
g-GlutamyltransFerase GTP cyclohydrolase I GTP cyclohydrolase II	Cytosol	ALA + G I HOL > COLT + SUDALA GTP + 12O > a hdt + FORM GTP + 3 HOL > 2 5 dhPP + FORM + 2 H + PPI	EC-3.5.4.16 EC-3.5.4.25	Other Amino Acid Metabolism Folate Metabolism Riboflavin Metabolism	PIPADO046 PIPADO785
guanine deaminase	Cytosol Cytosol	GUA + H2O <> XAN + NH4	EC-3.5.4.25	PURIne and Pyrimidine Biosynthesis	PIPAD2406 PIPAD3308
guanine phosphoribosyltransFerase guanine reversible transport via Proton symport	Cytosol	$GUA + PrPP \rightarrow GMP + PPI$ $GUA[e] + H[e] \Leftrightarrow GUA[c] + H[c]$		Nucleotide Savage Pathway Transport, Extracellular	PIPA03308 PIPA01906
guanine mitochondrial transport via diffusion H2O transport via diffusion		GUA(c) <> GUA(m) H2O(e) <> H2O(c)		Transport, Mitochondrial Transport, Extracellular	PIPA02657
H2O endoplasmic reticulum transport H2O transport, mitochondrial		H2D(c) <> H2D(r) H2D(c) <> H2D(m)		Transport, Endoplasmic Reticular Transport, Mitochondrial	PIPA02657 PIPA02657
H2O transport, nuclear water transport by diffusion, peroxisomal		H2O[n] <> H2O[c] H2O[c] <> H2O[x]		Transport, Nuclear Transport, Peroxisomal	PIPA02657 PIPA02657
H2O transport, vacuolar		H2O(c) <> H2O(v)		Transport, Vacuolar	PIPA02657
3-hydroxyacyl-COA dehydrogenase (3-oxohexacosyl-COA), peroxisomal	Peroxisome	3hxcCOA + NAD <-> 3ohxcCOA + H + NADH	EC-1.1.1.35	Fatty Acid Degradation	PIPA00744
3-hydroxyacyl-COA dehydrogenase (3-oxodecanoyl-COA), peroxisomal	Peroxisome	3odCOA + H + NADH <> 3hdCOA + NAD	EC-1.1.1.35	Fatty Acid Degradation	PIPA00744
3-hydroxyacyl-COA dehydrogenase (3-oxodecanoyl-COA), peroxisomal 3-Hydroxyacyl-COA dehydrogenase (3-oxotetrADEcanoyl-COA),	Peroxisome	3oddCDA + H + NADH <> 3hddCOA + NAD	EC-1.1.1.35	Fatty Acid Degradation	PIPA00744
peroxisomal	Peroxisome	3otdCOA + H + NADH <> 3htdCOA + NAD	EC-1.1.1.35	Fatty Acid Degradation	PIPA00744
 hydroxyacyl-COA dehydrogenase (3-oxohexADEcanoyl-COA), peroxisomal 	Peroxisome	3ohdCOA + H + NADH <> 3hhdCOA + NAD	EC-1.1.1.35	Fatty Acid Degradation	PIPA00744
3-hydroxyacyl-COA dehydrogenase (3-oxooctADEcanoyl-COA), peroxisomal	Peroxisome	3ohodCOA + H + NADH <> 3hodCOA + NAD	EC-1.1.1.35	Fatty Acid Degradation	PIPA00744
3-hydroxyacyl-COA dehydrogenase, peroxisomal homoacontinate hydratase, mitochondrial	Peroxisome Mitochondria	3hACOA + NAD <-> 3oACOA + H + NADH b124tc + H2O <-> HICIT	EC-1.1.1.35 EC-4.2.1.36	Fatty Acid Biosynthesis Threonine and Lysine Metabolism	PIPADO744 PIPAD1619
Hydroxybenzoate octaprenyltransFerase	Cytosol	4hbz + ocTDP_5 -> 3oPHb_5 + PPI		Quinone Biosynthesis	PIPA07346 PIPA04318
Hydroxybenzoate octaprenyltransFerase, mitochondrial	Mitochondria	4hbz+ocTDP 5 > 30PHb 5 + PPi		Quinone Biosynthesis	PIPA09310 PIPA01595
homocitrate synthase	Cytosol	ACCOA + AKG + H2O → COA + H + HCIT	EC-4.1.3.21	Pyruvate Metabolism	PIPA01705 Remove fro
homocitrate synthase, mitochondrial	Mitochondria Cytosol	ACCOA + AKG + H2O > COA + H + HCIT COZ + H2O <> H + HCO3	EC-2.3.3.14	Pyruvate Metabolism	network
	Mitochondria	CO2 + H2O <> H + HCO3			
homocysteine S-METhyltransFerase	Nucleus Cytosol	CO2 + H2O <> H + HCO3 SAM + HCYS -> AHCYS + H + MET	EC-2.1.1.10	Alanine and aspartate Metabolism	PIPAD1549
Homocysteine peroxisomal transport via Proton symport HexADEcanoate (n-C16:0) transport in via uniport		$h(c) + HCYS(c) \Leftrightarrow H(x) + HCYS(x)$ $hdca(e) \Rightarrow Hdca(c)$		Transport, Peroxisomal Transport, Extracellular	
hexADEcenoate (n-C16:1) transport in via uniport hydroxyethylthiazole kinase	Cytosol	hdcea[e] -> Hdcea[c] 4mhetz + ATP -> 4mPetz + ADP + H	EC-2.7.1.50	Transport, Extracellular Thiamine Metabolism	PIPAD2604
hexokinase (D-Glucose:ATP)	Cytosol	ATP+GIC co ANP+GGP+H	EC-2.7.1.1	Glycolysis/GLUconeogenesis	PIPA05652 PIPA03821
hexokinase (D-mannose:ATP) hexokinase (D-Fructose:ATP)	Cytosol	ATP + man <> ADP + H + man6P ATP + FRU <> ADP + F6P + H	EC-2.7.1.1 EC-2.7.1.1	Glycolysis/GLUconeagenesis Glycolysis/GLUconeagenesis	PIPA05652 PIPA05652
nexokinase (U-Frictose:AIP) homoisocitrate dehydrogenase, mitochondrial histidine mitochondrial transport via Proton symport	Mitochondria	AIV+RNL <> AIV+RNL + NADH+ crag hfml+HSfml <> HCl+HScl	EC-1.1.1.87	Threonine and Lysine Metabolism Transport. Mitochondrial	PIPAD4242 PIPAD2307
L-histidine reversible transport via Proton symport		h(e) + HIS[e] <-> H(c) + HIS[c]		Transport, Extracellular	PIPA00044
histidinol dehydrogenase histidinol-phosphatase	Cytosol Cytosol	H2O + Histd + 2 NAD -> 3 H + HIS + 2 NADH H2O + HisP -> Histd + Pi	EC-1.1.1.23 EC-3.1.3.15	Histidine Metabolism Histidine Metabolism	PIPAD2083 PIPAD1390
Histidyl-tRNA synthetase histidyl-tRNA synthetase, mitochondrial	Cytosol Mitochondria	ATP + HIS + trnahis -> AMP + Histma + PPI ATP + HIS + trnahis -> AMP + Histma + PPI	EC-6.1.1.21 EC-6.1.1.21	Histidine Metabolism Histidine Metabolism	PIPA07236 PIPA07236
3-Hydroxyt-kynurenine hydrolase hydroxyMEThylbilane synthase	Cytosol Cytosol	H2O + HLKyer -> 3hanthrn + ALA H2O + 4 PPbng -> Hmbil + 4 NH4	EC-3.7.1.3 EC-4.3.1.8	Tyrosine, Tryptophan, and Phenylalanine Metabolism Porphyrin and Chlorophyll Metabolism	PIPAD1128 PIPAD5855
HydroxyMEThylGlutaryl CDA reductase HydroxyMEThylGlutaryl CDA synthase	Cytosol Cytosol	ZH + HmgCOA + 2 NADPH > COA + MEV + 2 NADP COA + H + HmgCOA <> aACOA + ACCOA + HZO	EC-1.1.1.34 EC-4.1.3.5	Sterol Biosynthesis Sterol Biosynthesis	PIPA04176 PIPA05179
HydroxyMEThylGlutaryl COA synthase, mitochondrial HydroxyMEThylGlutaryl COA reversible mitochondrial transport	Mitochondria	COA + H + HmgCOA <> JACOA + ACOA + H2O hmgCOA(c) <> JACOA + H2O	EC-4.1.3.5	Sterol Biosynthesis Transport, Mitochondrial	PIPAUS179
	Oscari	AnnmP + ATP > 4AMPm + ADP + H	EC-2.7.1.49	Triamsport, Mitochondrial Thiamine Metabolism	PIPA02603 PIPA02107
hydroxyMEThylpyrimidine kinase (ATP) 2-amino-4-hydroxy-6-hydroxyMEThyldihydropteridine diphosphokinase,	Cytosol	4ahmmP + ATP -> 4AMPm + ADP + H 2ahhmP + ATP -> 2ahhmP + AMP + H		Thiamine Metabolism Foliate Metabolism	PIPA02107
mitochondrial L-hydroxyProline reductase (NAD)	Cytosol	1P3hSc + 2 H + NADH -> 4hPROT + NAD	EC-2.7.6.3 EC-1.5.1.2	Arginine and Proline Metaholism	PIPA02182
L-hydroxyProline reductase (NADP) L-hydroxyProline dehydrogenase (NAD), mitochondrial	Cytosol Mitochondria	1P3h5c + 2 H + NADPH -> 4hPROT + NADP 4hPROT + NAD -> 1P3h5c + 2 H + NADH	EC-1.5.1.2 EC-1.5.1.12	Arginine and Proline Metabolism	PIPA02182 PIPA00869
L-hydroxyProline dehydrogenase (NADP), mitochondrial homoserine dehydrogenase (NADH), irreversible	Mitochondria Cytosol	4hPROT + NADP -> 1P3hSc + 2 H + NADPH ASPSa + H + NADH -> HomL + NAD	EC-1.5.1.12 EC-1.1.1.3	Arginine and Proline Metabolism Glycine and Serine Metabolism	PIPA00869 PIPA00283
homoserine dehydrogenase (NADP), irreversible homoserine O-trans-acetylase, nucleus	Cytosol Nucleus	ASPSa + H + NADP + > Hom! + NADP ACCOA + Hom! -> AChSER + COA	EC-1.1.1.3 EC-2.3.1.31	Glycine and Serine Metabolism Methionine Metabolism	PIPADO283 PIPAD1442
homoserine kinase	Cytosol	ATP + HomL -> ADP + H + PPHSER	EC-2.7.1.39	Glycine and Serine Metabolism	PIPA03392
histidinol-phosphate transaminase hypoxanthine reversible transport via Proton symport	Cytosol	$GLU + ImACP \rightarrow AKG + HisP$ h(e) + HKAN(e) <> H(c) + HKAN(c)	EC-2.6.1.9	Histidine Metabolism Transport, Extracellular	PIPA00673
hexokinase (D-Glucosamine:ATP) hypoxanthine phosphoribosyltransFerase (Hypoxanthine)	Cytosol Cytosol	GAM + ATP <> GAM6P + ADP + H HXAN + PIPP >> IMP + PPI	EC-2.7.1.1 EC-2.4.2.8	Aminosugars Metabolism Nucleotide Salvage Pathways	PIPAD3652 PIPAD3308
hypothetical enyme	Cytosol	H2O + PyamSP -> PI + Pydam		Pyridoxine Metabolism	PIPA08104
Isocitrate dehydrogenase (NAD+), mitochondrial isocitrate dehydrogenase (NADP)	Mitochondria Cytosol	ICIT + NAD -> AKG + CO2 + NADH ICIT + NADP -> AKG + CO2 + NADPH	EC-1.1.1.41 EC-1.1.1.42	Citrate Cycle (TCA) Citrate Cycle (TCA)	PIPAD1416 PIPAD1886
Isocitrate dehydrogenase (NADP+), mitochondrial	Mitochondria Cytosol	ICIT + NADP >> AKG + CO2 + NADPH ICIT -> GLX + SUCC	EC-1.1.1.42 EC-4.1.3.1	Citrate Cycle (TCA) Anaelerotic reactions	PIPA05575 PIPA03739
indole-3-acetaldehyde mitochondrial transport via diffusion		id3ACAL(c) <> id3ACAL(m)	104.1.3.1	Transport, Mitochondrial	
Imidazole-glycerol-3-phosphate synthase imidazoleglycerol-phosphate dehydratase	Cytosol	GLN + PriP -> AlCAR + eiG3P + GLU + H eiG3P -> H2O + ImACP	EC-4.2.1.19	Histidine Metabolism Histidine Metabolism	PIPAD1503 PIPAD2683
indole-3-glycerol-phosphate synthase L-isoleucine reversible transport via Proton symport	Cytosol	2cPr5P + H -> 3iG3P + CO2 + H2O h(e) + ILE(e) <> H(c) + ILE(c)	EC-4.1.1.48	Tyrosine, Tryptophan, and Phenylalanine Metabolism Transport, Extracellular	PIPA03453 PIPA00044
isoleucine transaminase isoleucine transaminase, mitochondrial	Cytosol Mitochondria	AKG + ILE <> 3MOP + GLU AKG + ILE <> 3MOP + GLU	EC-2.6.1.42 EC-2.6.1.42	Valine, leucine, and isoleucine Metabolism Valine, leucine, and isoleucine Metabolism	PIPAD6648 PIPAD6648
Isoleucyi-tRNA synthetase isoleucyi-tRNA synthetase, mitochondrial	Cytosol Mitorhondria	ATP + ILE + trnalLE -> AMP + ILEtrna + PPi ATP + ILE + trnalLE -> AMP + ILEtrna + PPi	EC 6.1.1.5 EC 6.1.1.5	Valine, leucine, and isoleucine Metabolism Valine, leucine, and isoleucine Metabolism	PIPA01499 PIPA01421
IMP cyclohydrolase	Cytosol	ALT FILE FURNILE OF MANY FILE UNIT A PPI HZO + IMP <> FAICAR HZO + IMP + NAD > H + NADH + XMP	EC-2.1.2.3	PURIne and Pyrimidine Biosynthesis	PIPADO700 PIPAD9619
IMP dehydrogenase indole-3-acetate mitochondrial transport via diffusion	Cytosol	ind3AC[c] <-> ind3AC[m]	EC-1.1.1.205	PURIne and Pyrimidine Biosynthesis Transport, Mitochondrial	
Indole-3-pyruvate carboxylase Indole-3-pyruvate carboxylase	Cytosol Nucleus	H + indPYR <> CO2 + id3ACAL H + indPYR <> CO2 + id3ACAL	EC-4.1.1.74 EC-4.1.1.74	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00951 PIPA00951
insosine kinase inosine transport in via Proton symport	Cytosol	ATP + ins -> ADP + H + IMP h(e) + ins(e) -> H(c) + ins(c)	EC-2.7.1.73	Nucleotide Salvage Pathways Transport, Extracellular	
inositol transport in via Proton symport isopentenylDiphosphate D-isomerase, nucleus	Nucleus	h(e) + INOST(e) -> H(c) + INOST(c) IPdP <> dmPP	EC 5.3.3.2	Transport, Extracellular Sterol Biosynthesis	PIPA06590 PIPA01961
3-isoPropylmalate dehydrogenase 3-isoPropylmalate dehydratase	Cytosol	3c2hmP + NAD <> 3c4MOP + H + NADH 3c2hmP <> 2IPPm + HZO	EC-1.1.1.85 EC-4.2.1.33	Valine, leucine, and isoleucine Metabolism Valine, leucine, and isoleucine Metabolism	PIPA01173
2-isoPropylmalate hydratase	Cytosol	2iPPm + H2O <> 3c3hmP	EC-4.2.1.33	Valine, leucine, and isoleucine Metabolism	PIPAD4056 PIPAD2487
2-isoPropylmalate synthase	Cytosol	3MOB + ACCOA + H2O -> 3c3hmP + COA + H	EC-2.3.3.13	Valine, leucine, and isoleucine Metabolism	PIPA08576
2-isoPropylmalate synthase, mitochondrial	Mitochondria	3MOB + ACCOA + H2O -> 3c3hmP + COA + H	EC-2.3.3.13	Valine, leucine, and isoleucine Metabolism	PIPA02487 PIPA02591
Itaconate COA ligase (ADP-forming), mitochondrial acetohydroxy acid isomeroreductase, mitochondrial	Mitochondria Mitochondria	ATP + COA + ItACon <> ADP + ItACCOA + PI ALACS + H + NADPH <> 23dhmb + NADP	EC-6.2.1.5 EC-1.1.1.86	Citrate Cycle (TCA) Valine, leucine, and isoleucine Metabolism	PIPA00866 PIPA01365
ketol-acid reductoisomerase (2-Aceto-2-hydroxybutanoate), mitochondrial	Mitochondria	Zahbut + H + NADPH <> 23dhmP + NADP	EC-1.1.1.86	Valine, leucine, and isoleucine Metabolism	PIPAD1365
3 Netoacyl-CDA thiolase, peroxisomal potassium reversible transport via Proton symport	Peroxisome	2.411.014 H T MAUPH X 2.5311111 H T MAUP 3.0ACOA + COA > ACCOA + ACOA	EC-2.3.1.16	Fatty Acid Biosynthesis Transport, Extracellular	PIPA10023
Putative K+/H+ antiporter with a Probable role in intracellular cation					DIDA
homeostasis kynureninase	Cytosol	K(e) + H(c) <> K(c) + H(e) LKynr + H2O -> ALA + anth + H	EC-3.7.1.3	Transport, Extracellular Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPADO261 PIPAD1128
kynurenine 3-monooxygenase lactaldehyde dehydrogenase, mitochondrial	Cytosol Mitochondria	LKynr + H + NADPH + O2 -> H2O + HLKynr + NADP H2O + LALDL + NAD <> 2 H + IACL + NADH	EC-1.14.13.9 EC-1.2.1.22	Tyrosine, Tryptophan, and Phenylalanine Metabolism Other Amino Acid Metabolism	PIPA01584
LLeucine reversible transport via Proton symport leucine transaminase	Cytosol	$h(e) + LEU(e) \Leftrightarrow H(c) + LEU(c)$ $AKG + LEU \Leftrightarrow AMOP + GLU$	EC-2.6.1.42	Transport, Extracellular Valine, leucine, and isoleucine Metabolism	PIPAD0044 PIPAD6648
leucine transaminase, mitochondrial	Mitochondria Cytosol	AKG + LEU <> 4MOP + GLU ATP + IFII + trna FII > 4MOP + IFIItrna + PPI	EC-2.6.1.6	Valine, leucine, and isoleucine Metabolism Valine, leucine, and isoleucine Metabolism	PIPA06648 PIPA06030
Leucyl-tenna synthetase leucyl-tenna synthetase, mitochondrial lactoul/Silitathione lusse	Mitochondria Cytosol	ATP + LEU + trinaLEU -> AMP + LEUtrina + PPI ATP + LEU + trinaLEU -> AMP + LEUtrina + PPI GTHRO + MTHGXL -> LGT	EC-6.1.1.4 EC-6.1.1.4 EC-4.4.1.5	Valine, leucine, and isoleucine Metabolism Valine, leucine, and isoleucine Metabolism Alternate Carbon Metabolism	PIPAD8159 PIPAD1572
lactoylculutatilione lyase LLactate dehydrogenase, mitochondrial LLactate reversible transport via Proton symport	Mitochondria	G I RIGH + M I HOUL -0 LED 2 FICYTC + I ACL -> 2 FOCYTC + PYR h[e] + I ACL[e] -> h[c] + I ACL[c]	EC-1.1.2.3	Alternate Carbon Metabolism Alternate Carbon Metabolism Transport, Extracellular	PIPAD5538 PIPAD5648
LLactate reversible transport via Proton symport cystathionie bLyase cystathione blyase nerwisomal	Cytosol	lict + H2O -> HCYS + NH4 + PYR	EC-4.4.1.8	Methionine Metabolism	PIPA04067
cytochrome P450 lanosterol 14-alphADEMEThylase	Peroxisome Cytosol	lkt + H2O -> HCYS + NH4 + PYR 2 H + lanOSt + 3 NADPH + 3 O2 -> 44mctr + FORM + 4 H2O + 3 NADP	EC-4.4.1.8 EC-1.14.13.70	Methionine Metabolism Sterol Biosynthesis	PIPAD4067 PIPAD3447
lanosterol synthase	Cytosol	Ssq23ePx -> lanOSt	EC-5.4.99.7	Sterol Biosynthesis	PIPA06577 PIPA05615
lipid phosphate phosphatase Lysine mitochondrial transport via Proton symport	Cytosol	dagPy + H2O > H + PA + Pi $h(c) + LYS(c) < > H(m) + LYS(m)$		phospholipid Biosynthesis Transport, Mitochondrial	PIPA02615 PIPA02307
Lysine reversible transport via Proton symport		h(e) + LYS(e) <> H(c) + LYS(c)		Transport, Extracellular	PIPADO712 PIPADO044
LLysine reversible transport via Proton symport Lysyl-tRNA synthetase Lysyl-tRNA synthetase, mitochondrial	Cytosol Mitochondria	n(e) ± 13(e) <= h(c) ± 12(c) ATP ± LYS ± frusky >= AMP = h(strna + PPi ATP ± LYS ± trnalys >= AMP = h(strna + PPi	EC-6.1.1.6 EC-6.1.1.6	Transport, Extraceilular Threonine and Lysine Metabolism Threonine and Lysine Metabolism	PIPAD3440
malate/oxaloacetate shuttle		MAL[x] + DAA[c] <> MAL[c] + DAA[x]	EC 6.1.1.6 EC 2.3.3.9	Threonine and Lysine Metabolism Transport, Peroxisomal Anaplerotic reactions	PIPAD1789
malate synthase L-malate reversible transport via Proton symport	Cytosol	ACCOA + GLX + H2O → COA + H + MAL h e + MAL e → H(+ MAL c	EU 2.3.3.9	Transport Extracellular	
malate transport, mitochondrial maltose transport in via Proton symport		$MAL[c] + Pi[m] \Leftrightarrow MAL[m] + Pi[c]$ $h[e] + malt[e] \Rightarrow H[c] + malt[c]$		Transport, Mitochondrial Transport, Extracellular	PIPAD1441
mannose-1-phosphate guanylytransFerase mannose-6-phosphate isomerase	Cytosol Cytosol	GTP + H + man1P -> GDPmann + PPI man6P <> F6P	EC-2.7.7.13 EC-5.3.1.8	FRUctose and mannose Metabolism FRUctose and mannose Metabolism	PIPAD2637 PIPAD2352
mannan endoplasmic reticulum transport via diffusion D-Mannitol: NAD+ 2-oxidoreductase	Cytosol	mannan(c) <> mannan(r) mannd + NAD <> FRU + NADH + H	1.1.1.67	Transport, Endoplasmic Reticular	PIPAD0378
D-mannose transport in via Proton symport 2-METhylcitrate dehydratase, mitochondrial	Mitochondria		EC-4.2.1.36	Transport, Extracellular Threonine and Lysine Metabolism	PIPADO378 PIPADO236 PIPAD1619
2-METhylcitrate dehydratase, mitochondrial Malonyl-CDA-ACP transacylase		HCT <> b124tc + H2O ACP + malCOA <> COA + mALACP	EC-2.3.1.39	Threonine and Lysine Metabolism Fatty Acid Biosynthesis	PIPAD1619 PIPAD1904 PIPAD3692
Malonyl-CDA-ACO transacylase, mitochondrial	Cytosol Mitochondria	ACP + malCOA <-> COA + mALACP	EC-2.3.1.39	Fatty Acid Biosynthesis	rir#U3692
malate dehydrogenase malate dehydrogenase, mitochondrial	Cytosol Mitochondria	MAL+ NAD <> H + NADH + OAA MAL+ NAD <> H + NADH + OAA	EC-1.1.1.37 EC-1.1.1.37	Oxidative phosphorylation Oxidative phosphorylation	PIPA02244
malate dehydrogenase, peroxisomal	Peroxisome Mitochondria	MAL+ NAD <> H + NADH + OAA MAL+ NAD <> CO2 + NADH + PYR	EC-1.1.1.37 EC-1.1.1.38	Oxidative phosphorylation Anaplerotic reactions	PIPAD1599 PIPAD4997
	Mitochondria	MAL + NADP -> CO2 + NADPH + PYR h(e) + melib(e) -> H(c) + melib(c)	EC-1.1.1.40	Anaplerotic reactions Transport, Extracellular	PIPA04997
malic enzyme (NADP), mitochondrial melibiose transport in via symport	Cytosol	n(e) + men(o)(e) -> H(c) -> men(o)(e) men(h(e) -> mech(x) ATP + HZO -> MET -> SAM + PI + PPI	EC-2.5.1.6	Methanol Metabolism Methionine Metabolism	PIPA00230
malic enzyme (NADP), mitochondrial melibiose transport in via symport METhanol transport	Cytosol Cytosol	AChSER + CYS -> AC + IIct + H	EC-2.5.1.48	Methionine Metabolism	PIPA00769
malic enzyme (NADP), mitochondrial melibiose transport in via symport McThanol transport McTholonine ADEnocyltransFerase McTbol Theory of the Company of the Company McTbol Theory of the Company of the Company of the Comp		SUChms + H2S -> HCYS + SUCC SmTHF + HCYS -> MET + THF	EC-2.5.1.48 EC-2.1.1.13	Methionine Metabolism Methionine Metabolism	PIPA00769 PIPA03596
malic ensyme (NADP), mitochondrial melloliose fransport in via symport ME Thanol transport ME Thionine ADEnosyltransFerase METO METOLIO METOLI	Cytosol	SmTHF + HCYS -> MET + THF h(m) + MET(m) <> H(c) + MET(c)	EC-2.1.1.13	Methionine Metabolism Transport, Mitochondrial	PIPA03596 PIPA02307
malic enzyme (MADP), mitochondrail mediolose transport in via symport METhanol transport METhanol ADEnoxyltransFerase METhal GASccinyl, Homoscerine-hydrogen sulfide METhionine synthase METhionine synthase METhionine synthase	Mitochondria				PIPA00044 PIPA04071
malic enzyme (NADP), mitochondrial meliolose transport in via symport Mit Thanot I ransport Mit Thanot I ransport Mit Thanot RoffnosyltransFerase Mit Tal OSuscimyl. Nomosenine hydrogen sulfide Mit Thionine symthase Mit Thionine symthase Mit Thionine symthase				Transport, Extracellular Methionine Metabolism	PIPA05261 PIPA04076
malic enspre (NADP), introchondral mellisober tanaport in say seport MiThanoid Tanaport MiThanoid Tanaport MiThanoid Tanaport MiThanoid Parket Obbecrafish, homosarine hydrogen sulfide MiThanoide synthase, netochondral MiThanoide synthase, netochondral	Mitochondria	h(e) + MET(e) <> H(c) + MET(c) ATP + MET + trnaMET -> AMP + METtrna + PPi	EC.6 1 1 10		PIPAD2539 PIPAD5751
mails enzyme (NADP), intochondral mellisober transport in sy report METHOD into sy repor	Mitochondria Cytosol Mitochondria	ATP + MET + trnaMET -> AMP + METtrna + PPi ATP + MET + trnaMET -> AMP + METtrna + PPi	EC 6.1.1.10 EC 6.1.1.10	Methionine Metabolism	
malic entyme (NADP), introchondral mellisolate rangen fru sky mport. McThaud ir sangen from the sangen from th	Mitochondria Cytosol Mitochondria Cytosol Cytosol	ATP MET + tmalRET > AMP + METtras = PPI ATP MET = tmalRET > AMP + METtras = PPI ATP MET > tmalret > AMP + METtras = PPI ATP MET > tmalret > AMP + METtras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP MET > Spray + ADP + METTras = PPI ATP METTRAS = PP	EC-6.1.1.10 EC-2.7.1.36 EC-2.7.1.36	Methionine Metabolism Sterol Biosynthesis Sterol Biosynthesis	PIPA05751
malic entyme (MADP), introchondrial mellikolat rasappart in va ymport McThand i transport McThand i transport McThand	Cytosol Mitochondria Cytosol Cytosol Cytosol Cytosol	ATP - MIT * ImmAET - AUP - MITTER - PPI ATP - MIT * ImmAET - AUP - MITTER - PPI ATP - MIT - STROW - AUP - MITTER - PPI ATP - MIT - STROW - AUP - PPI - FT - MIT - STROW - AUP - PPI - FT - MIT - STROW - CUP + PI - FT -	EC-6.1.1.10 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36	Methionine Metabolism Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis	PIPADS751 PIPADS751 PIPADS751
malic entyme (MADP), mitochondrial mellikobe transport in via symport METhand of transport ME	Mitochondria Cytosol Mitochondria Cytosol Cytosol Cytosol	ATP - MF - I modATT - AMP - MTMTma - PFI ATP - MF - I modATT - AMP - MTMTma - PFI ATP - MF - I modATT - AMP - MTMTma - PFI ATP - MF - I modATT - MTM - MTMTma - PFI ATP - MTM - S pTmm - CDP + I ATP - MTM - S pTmm - CDP + I ATP - MTM - S pTmm - MTM - MTMTma	EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36	Methionine Metabolism Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis	PIPADS751 PIPADS751 PIPADS751 PIPADS388 PIPAD1154
METhonine Addronytranderace METhonine Addronytranderace METhonine Addronytranderace METhonine synthase METhonine synthase METhonine synthase METhonine synthase METhonine synthase METhonine synthase METhonine mischchodraid transport via Proton symport METhonine mischchodraid transport via Proton symport METhonine METhonine mischchodraid memorial synthase METhonine Stellay synthase synthase METhonine Stellay synthases, mischodraid memorialands kinase (gip) menolosiate kinase (gip) menolosiate kinase (gip) METhylene Staty and je hospitalijate synthase Putaken magnetismi transporter	Cytosol Mitochondria Cytosol Cytosol Cytosol Cytosol	ATP - MIT * ImmAET - AUP - MITTER - PPI ATP - MIT * ImmAET - AUP - MITTER - PPI ATP - MIT - STROW - AUP - MITTER - PPI ATP - MIT - STROW - AUP - PPI - FT - MIT - STROW - AUP - PPI - FT - MIT - STROW - CUP + PI - FT -	EC-6.1.1.10 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36	Methionine Metabolism Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis	PIPA05751 PIPA05751 PIPA05751 PIPA05388
malic earyne (NADP), intochondral medischer tangrap in va spropri McThanier Strangert McThanier syntham, mitochondria Proton symport McThanier McTha	Cytosol Mitochondria Cytosol Cytosol Cytosol Cytosol	ATP - MF - I modATT - AMP - MTMTma - PFI ATP - MF - I modATT - AMP - MTMTma - PFI ATP - MF - I modATT - AMP - MTMTma - PFI ATP - MF - I modATT - MTM - MTMTma - PFI ATP - MTM - S pTmm - CDP + I ATP - MTM - S pTmm - CDP + I ATP - MTM - S pTmm - MTM - MTMTma	EC-6.1.1.10 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36	Methionine Metabolism Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis Sterol Biosynthesis	PIPADS751 PIPADS751 PIPADS751 PIPADS388 PIPAD1154
make caryone (NACP), mitochondrial makibious trassiport in via proport missious trassiport in via proport MCTholinon Addrosophranderase MCTholinon MCTholinon Addrosophranderase MCTholinon MCTholinon mischohondria trassiport via Proton symport MCTholinon mischohondria transport via Proton symport MCTholinon mischohondria transport via Proton symport MCTholinon mischohondria transport via Proton symport MCTholinon reversible transport via Proton symport MCTholinon reversible transport via Proton symport merculonate kinase (pi) merculonate (pi) merculonat	Cytosol Mitochondria Cytosol Cytosol Cytosol Cytosol Cytosol Cytosol	ATP - MET 'smakET - AMP - METTINE PPI ATP - MET 'smakET - AMP - METTINE PPI ATP - MET 's - Share - AMP - METTINE PPI ATP - MET - Share - AMP - METTINE PPI ATP - MET - Share - AMP - METTINE PPI ATP - METTINE - AMP - METTINE	EC-6.1.1.10 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36 EC-2.7.1.36 EC-2.1.1.16	Methioline Metabolism Sterol Biosphithesis Sterol Biosphithesis Sterol Biosphithesis Sterol Biosphithesis Sterol Biosphithesis phospholipid Biosphithesis phospholipid Biosphithesis	PIPA05751 PIPA05751 PIPA05751 PIPA05388 PIPA01154 PIPA02002

myo-inositol-1-phosphate synthase 5,10-METhylenetetrahydrofolate transport, diffusion, mitochondrial					
5.10-METhylenetetrahydrofolate transport, diffusion, mitochondrial	Cytosol	GSP -> milPD	EC-5.5.1.4	phospholipid Biosynthesis	PIPA04248
S-METhylMEThionine permease		$MLTHF[c] \Leftrightarrow MLTHF[m]$ $h[e] + mhMET[e] \Rightarrow H[c] + mhET[c]$		Transport, Mitochondrial Transport, Extracellular	
Divalent METal ion transporter involved in manganese homeostasis, low					PIPA00118
affinity manganese transporter (pho84) 3-METhyl-2-oxobutanoate hydroxyMEThyltransFerase	Cytosol	$mn(e) \Leftrightarrow mn(c)$ $3MOB + H2O + MLTHF \Rightarrow 2dhP + THF$	EC-2.1.2.11	Transport, Extracellular Pantothenate and COA Biosynthesis	PIPA00159 PIPA03300
METhenyltetrahydrofolate cyclohydrolase METhenyltetrahydrifikate cyclohydrolase, mitochondrial	Cytosol Mitochondria	H2O + METHF <> 10fTHF H2O + METHF <> 10fTHF	EC-3.5.4.9 EC-3.5.4.9	Folate Metabolism Folate Metabolism	PIPA09767 PIPA06623
METhylenetetrahydrofolate dehydrogenase (NADP) METhylenetetrahydrofolate dehydrogenase (NAD)	Cytosol Cytosol	MLTHF + NADP <> H + METHF + NADPH MLTHF + NAD >> H + METHF + NADH	EC-1.5.1.5 EC-1.5.1.15	Folate Metabolism Folate Metabolism	PIPA09767 PIPA01003
	Mitochondria	MITHE + NADP co H + METHE + NADPH	EC-1.5.1.5	Folate Metaholism	PIPAN6623
METhylenetetrahydrofolate dehydrogenase (NADP), mitochondrial 5,10-METhylenetetrahydrofolatereductase (NADph)	Cytosol	H + MLTHF + NADPH -> 5mTHF + NADP	EC-1.5.1.20	Folate Metabolism	PIPAD6623 PIPAD4221
N4-Acetylaminobutanal:NAD+ oxidoreductase NADH dehydrogenase, cytosolic/mitochondrial	Cytosol	H2O + n4abutn + NAD -> 4aabutn + 2 H + NADH h[c] + NADH[c] + q6[m] -> NAD[c] + q6h2[m]	EC-1.2.1.3 EC-1.6.99.3	Other Amino Acid Metabolism Oxidative phosphorylation	PIPA03697
NADH dehydrogenase, mitochondrial	Mitochondria	H + NADH + q6 -> NAD + q6h2	EC-1.6.99.3	Oxidative phosphorylation	PIPAD2354 PIPAD1684
NAD kinase	Cytosol	ATP + NAD -> ADP + H + NADP	EC-2.7.1.23	NAD Biosynthesis	PIPAD8918 PIPAD8918
NAD kinase, mitochondrial	Mitochondria	ATP + NAD -> ADP + H + NADP	EC-2.7.1.23	NAD Biosynthesis	PIPA00479
NAD kinase, nucleus NAD nucleosidase	Nucleus Cytosol	ATP + NAD -> ADP + H + NADP H2O + NAD -> ADPRIB + H + ncam	EC-3.2.2.5	NAD Biosynthesis	PIPADO467
NAD nucleosidase, mitochondrial NADP phosphatase	Mitochondria Cytosol	H2O + NAD -> ADPRIB + H + ncam H2O + NADP -> NAD + PI	EC-3.2.2.5	NAD Biosynthesis NAD Biosynthesis	
NADP phosphatase NAD synthase (nh3)	Mitochondria Cytosol	H2O + NADP -> NAD + PI ATP + dNAD + NH4 -> AMP + H + NAD + PPI	EC-6.3.1.5	NAD Biosynthesis NAD Biosynthesis	PIPA02871
NAD synthase (nh3), mitochondrial NAPRTase	Mitochondria Cytosol	ATP + dNAD + NH4 -> AMP + H + NAD + PPI H + nAC + PrPP -> nICRNt + PPI	EC-6.3.1.5 EC-2.4.2.11	NAD Biosynthesis NAD Biosynthesis	PIPA02871 PIPA02128
NAPRTase, mitochondrial	Mitochondria	H + nAC + PrPP -> niCRNt + PPi	EC-2.4.2.11	NAD Biosynthesis	PIPA02128
sodium Proton antiporter (H:NA is 1:1) nucleosideDiphosphatase (GDP)	Cytosol	h(e) + na1(c) <> H(c) + na1(e) GDP + H2O <> GMP + H + Pi	EC-3.6.1.6	Transport, Extracellular Nucleotide Salvage Pathways	PIPAD6547
nucleosideDiphosphatase (GDP), Golgi apparatus nucleosideDiphosphatase (dGDP)	Golgi Cytosol	GDP + H2O -> GMP + H + Pi dGDP + H2O -> dGMP + H + Pi	EC-3.6.1.6 EC-3.6.1.6	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
nucleosideDiphosphate kinase (ATP:GDP) nucleosideDiphophate kinase (ATP:dIDP)	Cytosol Cytosol	ATP + GDP <> ADP + GTP $ATP + dIDP <> ADP + dITP$	EC-2.7.4.6 EC-2.7.4.6	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPADOSSO PIPADOSSO
nucleosideDiphosphate kinase (ATP:UDP) nucleosideDiphosphate kinase (ATP:CDP)	Cytosol	ATP + UDP <> ADP + UTP ATP + CDP <> ADP + CTP	EC-2.7.4.6 EC-2.7.4.6	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPA00550 PIPA00550
nucleosideDiphosphate kinase (ATP:dTDP) nucleosideDiphosphate kinase (ATP:dGDP)	Cytosol	ATP + dTDP <>> ADP + dTTP	EC-2.7.4.6		PIPADOSSO PIPADOSSO
nucleosideDiphosphate kinase (ATP:dUDP)	Cytosol	ATP + dGDP <> ADP + dGTP ATP + dUDP <> ADP + dUTP	EC-2.7.4.6 EC-2.7.4.6	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPA00550
nucleosideDiphosphate kinase (ATP:dCDP) nucleosideDiphosphate kinase (ATP:dADP)	Cytosol	ATP + dCDP <> ADP + dCTP ATP + dADP <> ADP + dATP	EC-2.7.4.6 EC-2.7.4.6	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPA00550 PIPA00550
nucleosideDiphophate kinase (ATP:IDP)	Cytosol	ATP + IDP <>> ADP + ITP	EC-2.7.4.6	Nucleotide Salvage Pathways	PIPA00550 PIPA00855
ammonia reversible transport		NH4[e] <> NH4[c]		Transport, Extracellular Transport, Mitochondrial	PIPAD0634
NH3 mitochondrial transport ammonia peroxisomal transport		NH4[c] <> NH4[m] NH4[c] <> NH4[x]		Transport, Peroxisomal	
nicotinamide-nucleotide ADEnylyltransFerase, mitochondrial NMN mitochondrial transport via Proton symport	Mitochondria	ATP + H + nmn :> NAD + PPi $h(c) + nmn(c) <> H(m) + nmn(m)$	EC-2.7.7.1	NAD Biosynthesis Transport, Mitochondrial	PIPA02063
NMN peroxisomal transport via Proton symport nmnto		h(c) + nmn(c) <> H(x) + nmn(x) h(e) + nmn(e) -> H(c) + nmn(c)		Transport, Peroxisomal Transport, Extracellular	
nicotinamidase, reversible nicotinamidase, reversible, mitochondrial	Cytosol Mitochondria	H2O + ncam <> nAC + NH4 H2O + ncam <> nAC + NH4	EC-3.5.1.19 EC-3.5.1.19	NAD Biosynthesis NAD Biosynthesis	PIPA03003 PIPA03003
nicotinate-nucleotide ADEnylyltransFerase	Cytosol	ATP + H + niCRN1 -> dNAD + PPI	EC-2.7.7.18	NAD Biosynthesis	PIPA02063
nicotinate-nucleotide ADEnylyltransFerase, mitochondrial nicotinate-nucleotide diphosphorylase (carboxylating)	Mitochondria Cytosol	ATP + H + niCRNt -> dNAD + PPI 2 H + PrPP + quin -> CO2 + niCRNt + PPI	EC-2.7.7.18 EC-2.4.2.19	NAD Biosynthesis NAD Biosynthesis	PIPAD2063 PIPAD3406
nicotinate-nucleotide diphosphorylase (carboxylating), mitochondrial	Mitochondria	2 H + PrPP + quin -> CO2 + niCRNt + PPI	EC-2.4.2.19	NAD Biosynthesis	PIPA03406
5'-nucleotidase (dUMP) 5'-nucleotidase (XMP)	Cytosol Cytosol	dUMP + H2O > dURI + PI H2O + XMP -> PI + xtsn	EC-3.1.3.5 EC-3.1.3.5	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
5'-nucleotidase (MMP) 5'-nucleotidase (UMP)	Cytosol	72.0 ± ANP → IN + NIA H2.0 ± IMP → IN + PI H2.0 ± IMP → PI + URI	EC-3.1.3.5	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
5'-nucleotidase (dCMP)	Cytosol	dCMP + H2O -> dryt + Pi	EC-3.1.3.5 EC-3.1.3.5		
S'-nucleotidase (CMP) S'-nucleotidase (dTMP)	Cytosol	CMP + H2O > cytd + Pi dtmP + H2O > Pi + THYMd	EC-3.1.3.5 EC-3.1.3.5	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
S'-nucleotidase (dAMP) S'-nucleotidase (AMP)	Cytosol	dAMP + H2O -> dad + Pi AMP + H2O -> add + Pi	EC3.1.3.5 EC3.1.3.5	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	
5'-nucleotidase (dGMP)	Cytosol	dGMP + H2O -> dgsn + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5'-nucleotidase (GMP) Inosine 5'-triphosphate pyrophosphohydrolase	Cytosol	GMP + H2O -> gsn + Pi ITP + H2O -> IMP + PPi	EC-3.1.3.5 EC-3.6.1.19	Nucleotide Salvage Pathways	
Guanosine S'-triphosphate pyrophosphohydrolase URIdine triphosphate pyrophosphohydrolase	Cytosol	GTP + H2O -> GMP + PPi UTP + H2O -> UMP + PPi	EC-3.6.1.19 EC-3.6.1.19		
2 Deoxyguanosine 5 - triphosphate diphosphohydrolase dUTP nucleotidohydrolase	Cytosol	GTP+H2O > dGMP+PPI dUTP+H2O > dUMP+PPI	EC-3.6.1.19 EC-3.6.1.19		PIPA03380 PIPA03380
XTP pyrophosphohydrolase	Cytosol	XTP + H2O -> XMP + PPi	EC-3.6.1.19		
2'Deoxyinosine-5'-triphosphate pyrophosphohydrolase nucleoside-triphosphatase (GTP)	Cytosol	dITP + H2O -> dIMP + PPI GTP + H2O -> GDP + H + PI	EC-3.6.1.19 EC-3.6.1.15	Nucleotide Salvage Pathways	PIPA03380
nucleoside-triphosphatase (dGTP)	Cytosol	dGTP+H2O->dGDP+H+PI	EC-3.6.1.15	Nucleotide Salvage Pathways	PIPAD9154
nitrilase	Cytosol	2 H2O + ind3ACnl -> ind3AC + NH4	EC-3.5.5.1	Nitrogen Metabolism	PIPA00538
nitrilase	Cytosol	aPROP + 2 H2O -> ALA + NH4	EC-3.5.5.1	Other Amino Acid Metabolism	PIPA09154 PIPA00538
nitrilase	Cytosol	ACvbut + 2 H2O -> GLU + NH4	EC-3.5.5.1	Other Amino Acid Metabolism	PIPAD9154 PIPAD0538
O2 transport (diffusion) O2 endoplamic reticulum transport		O2(e) <> O2(c) O2(c) <> O2(f)		Transport, Extracellular Transport, Endoplasmic Reticular	
O2 transport (diffusion)		O2[c] <> O2[m]		Transport, Mitochondrial	DIDADOLOS
oxaloacetate transport, mitochondrial ornithine carbamoyltransFerase, irreversible, mitochondria	Mitochondria	$h(c) + OAA(c) \Leftrightarrow H(m) + OAA(m)$ $cbP + ORN \Rightarrow CITIL + H + PI$	EC-2.1.3.3	Transport, Mitochondrial Arginine and Proline Metabolism	PIPA00102 PIPA00596
OctADEcanoate (n-C18:0) transport in via uniport OctADEcenoate (n-C18:1) transport in via uniport		C180(e) > C180(c) C181(e) > C181(c)		Transport, Extracellular Transport, Extracellular	
OctADEcynoate (n-C18:2) transport in via uniport		C182(e) → C182(c)		Transport, Extracellular	
all-trans-Octaprenyl diphosphate		octdp_s(c) <> octdp_s(m)		Transport, Mitochondrial	
O-phospho-4-hydroxyL-threonine:2-oxoGlutarate aminotransFerase 2-octaprenyl-6-hydroxyphenol METhylase, nuclear	Cytosol Nucleus	GLU + ohPb <> AKG + PHthr 2ohPH 5 + SAM > 2omPH 5 + AHCYS + H	EC-2.6.1.52	Pyridoxine Metabolism Quinone Biosynthesis	PIPAD3592
2-Octaprenyl-6-METhoxy-benzoquinol METhylase, mitochodnrial 2-Oxo-4-METhyl-3-carboxypentanoate decarboxylation	Mitochondria Cytosol	2ombs! 5 + SAM -> 2ommbl 5 + AHCYS + H 3c4MOP + H -> 4MOP + CO2		Quinone Biosynthesis Valine, leucine, and isoleucine Metabolism	PIPA04608 PIPA06648
2-oxo-4-METhyl-3-carboxypentanoate decarboxylation, mitochondrial 2-Octaprenyl-3-METhyl-6-METhoxy-1,4-benzoquinol hydroxylase,	Mitochondria	3c4MOP + H -> 4MOP + CO2		Valine, leucine, and isoleucine Metabolism	PIPA06648
mitochodnrial OROTidine-5'-phosphate decarboxylase	Mitochondria Cytosol	2ommbl_5 + 0.5 02 > 2omhmbl_5 H = OROTEP > CO2 = IIMP	EC-4.1.1.23	Quinone Biosynthesis PURIne and Pyrimidine Biosynthesis	PIPA03775 PIPA09019
2-octaprenyl-6-METhoxyphenol hydroxylase, mitochondrial Octaprenyl-hydroxybenzoate decarboxylase	Mitochondria Cytosol	2omPH_5 + 0.5 Q2 -> 2ombdl_5 3oPHb_5 + H> 2oPH_5 + CQ2		Quinone Biosynthesis Quinone Biosynthesis	
2-Octaprenylphenol hydroxylase	Cytosol	20PH 5 + 0.5 O2 -> 20hPH 5		Quinone Biosynthesis	
Ornithine Decarboxylase Ornithine Decarboxylase, nucleus	Cytosol Nucleus	H + ORN → CO2 + Ptrc H + ORN → CO2 + Ptrc	EC-4.1.1.17 EC-4.1.1.17	Arginine and Proline Metabolism Arginine and Proline Metabolism	PIPA02292 PIPA02292
orntithine reversible transport in via Proton symport		h(e) + ORN(e) <> H(c) + ORN(c)		Transport, Extracellular	PIPADO044 PIPAD2787
ornithine mitochondrial transport via Proton sympoti ornithine mitochondrial transport via Proton antiport ornithine transaminase		$h(c) + ORN[m] \Leftrightarrow H[m] + ORN[c]$	EC-2.6.1.13	Transport, Mitochondrial Arginine and Proline Metabolism	PIPA00957
ornithine transacetylase, irreversible, mitochondrial	Cytosol Mitochondria	AKG+ORN→GLU→ACGLU+ORN	EC-2.3.1.35	Arginine and Proline Metabolism	PIPAD2285 PIPAD1733
OROTate phosphoribosyltransFerase non-enzymatic reaction, mitochondrial	Cytosol Mitochondria	OROTSP + PPI <> OROT + PrPP H + orag <> 20x0ADP + CO2	EC-2.4.2.10 1.1.1.87	PURine and Pyrimidine Biosynthesis Threonine and Lysine Metabolism	PIPA01341 PIPA04242
2-oxodicarboylate transporter, mitochondrial 1-pyrroline-5-carboxylate dehydrogenase, mitochondrial		AKG[m] + axag[c] <> AKG[c] + axag[m] 1PVRSc + 2 H2O + NAD > GLU + H + NADH	1.5.1.12	Transport, Mitochondrial GLUtamate Metabolism	PIPAD6327 PIPAD0869
pyrroline-5-carboxylate reductase	Cytosol	1PYR5c+2 H+NADPH<>NADP+PRO	EC-1.5.1.2	Arginine and Proline Metabolism	PIPA02182
	Cytosol	ATP + 0.01 PA -> ADP + 0.01 dagPy PANMP(c) <> PANMP(m)		phospholipid Biosynthesis Transport, Mitochondrial	
phosphatidate kinase panthetheine 4'-phosphate reversible mitochondrial transport	Cytosol	bala + ATP + PANT -> AMP + H + PNTO + PPI PANT[c] <> PANT[m]	EC-6.3.2.1	Pantothenate and COA Biosynthesis Transport, Mitochondrial	PIPA02047
panthetheine 4'-phosphate reversible mitochondrial transport pantothenate synthase		PAPS+TRDRD → 2 H+PAP+SO3+TRDOX PAP(e) <> PAP(c)	EC-1.8.4.8	Cysteine Metabolism Transport. Extracellular	PIPA04682
panthetheine 4'-phosphate reversible mitochondrial transport pantothenate synthase pantothenate mitochondrial transport phosphoADEmyly(Sulfate reductase (thioredoxin)	Cytosol			Transport, Mitochondrial	
panthetheine 4-jehosphate reversible mitochondrial transport pantothenate synthase pantothenate mitochondrial transport phospha.Obernyl/Sulfate reductase (thioredoxin) PAP reversible uniport ABE notine 13 ⁵ bisphosphate mitochondrial transport	Cytosol	PAP(c) <> PAP(m)			
panthetheline 4: phosphate reversible mitochondrial transport pantochemiate synthase pantochemiate mitochondrial transport phosphatoClimy(disflate reductase (thioredoxin) PAP reversible uniport AB nosine 37; shipshopshate mitochondrial transport phosphatidate reversible transport, mitochondrial pyruvate carbonylase	Cytosol	PAP(c) <> PAP(m) PA(c) <> PAP(m) ATP + HCO3 + PRI >> ADP + H + CIAA + PI	EC-6.4.1.1	Transport, Mitochondrial Anaplerotic reactions	PIPA00584
partitherlates 4" phosphate reversible mitochondrial transport partitherlates septimate interaction and interaction partition and interaction	Cytosol Cytosol Cytosol	PAIRÍ CA PAIRÍN ATH CASH I ATH CASH A PH A	2.3.1.158 EC-4.1.1.45	Anaplerotic reactions phospholipid Biosynthesis Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00584 PIPA00663
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parathethese et principates reversible mischooded transport parathethese et principates (exception mischooded transport parathethese) et principates (exception et al., exception place) (exception et al., exception et al., except	Cytosial Cyt	PAPE (4	231118 CC41140 CC31417 CC3117 CC3117 CC3117 CC3117 CC31117 CC31111 CC31117 CC3	Anaptiment naziona physiophysi	PIPA00663 PIPA01391 PIPA014793 PIPA08346 PIPA08346 PIPA083785 PIPA083785 PIPA01163 PIPA02477 PIPA020785 PIPA01163 PIPA02477 PIPA02077 PIPA020
persistentione of principates reversible mischooded transport particulations of principates and consistent of transport particulations of principates and consistent of principates and co	Cytosial Cyt	PAPE (4 O - PAPE) PAPE (5 O - PAPE) PAPE (5 O - PAPE) PAPE (5 O - PAPE) PAPE (6 O - P	231118 CC41140 CC31417 CC3117 CC3117 CC3117 CC3117 CC31117 CC31111 CC31117 CC3	Asspirence reactions phosphosphosphosphosphosphosphosphosphos	PIPA00663 PIPA01391 PIPA0273 PIPA06236 PIPA06273 PIPA06276 PIPA05786 PIPA03776 PIPA03776 PIPA03776 PIPA03776 PIPA03776 PIPA03776 PIPA03777 PIPA02077 PIPA02078 PIPA0377 PIPA037

phosphate vacuolar transport via Proton symport phosphate transport via hydroxide ion symport, mitochondrial		$h(c) + P(c) \Leftrightarrow H(v) + P(v)$ $ch1(m) + P(c) \Leftrightarrow ch1(c) + P((m)$		Transport, Vacuolar Transport, Mitochondrial	PIPA01318
phosphomannomutase	Cytosol	man1P <> man6P	EC-5.4.2.8	FRUctose and mannose Metabolism	PIPA00555
phosphomannomutase, nucleus pyrimidine phosphatase	Nucleus Cytosol	man1P <> man6P SaPrbu + H2O -> 4rSau + Pl	EC-5.4.2.8	FRUctose and mannose Metabolism Riboflavin Metabolism	PIPA00555
phosphatidyl-N-METhylethanolamine N-METhyltransFerase phosphomevalonate kinase	Cytosol	SAM + Ptd2meeta -> AHCYS + H + PC SPmey + ATP -> SdPmey + ADP	EC-2.1.1.16 EC-2.7.4.2	phospholipid Biosynthesis Sterol Biosynthesis	PIPA05388 PIPA03761
phosphoMEThylpyrimidine kinase	Cytosol	4AMPm + ATP -> 2mahmP + ADP	EC-2.7.4.7	Thiamine Metabolism	PIPA02603 PIPA02107
pantothenate kinase pantothenate kinase, nucleus	Cytosol	ATP + PNTO -> 4PPAN + ADP + H	EC-2.7.1.33	Pantothenate and COA Biosynthesis Pantothenate and COA Biosynthesis	PIPA00200
Pantothenate reversible transport via Proton symport	Nucleus	ATP + PNTO : > 4PPAN + ADP + H h(e) + PNTO(e) < > H(c) + PNTO(c)	EC-2.7.1.33	Transport, Extracellular	PIPA00200
polyamine oxidase povlamine oxidase	Cytosol	N1ASPmd + H2O + O2 -> aPROa + aPrut + H2O2 N1SPRM + H2O + O2 -> N1ASPmd + aPROa + H2O2	EC-1.5.3.11 EC-1.5.3.11	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	
inorganic diphosphatase inorganic diphosphatase, mitochondrial	Cytosol Mitochondria	H2O + PPI → H + 2 PI H2O + PPI → H + 2 PI	EC-3.6.1.1 EC-3.6.1.1	Oxidative phosphorylation Oxidative phosphorylation	PIPA00357 PIPA00316
porphobilinogen synthase	Cytosol	2 SaoP -> H + 2 H2O + PPbng	EC-4.2.1.24	Porphyrin and Chlorophyll Metabolism	PIPA01256
phosphopantothenoylcysteine decarboxylase phosphoenolpyruvate carboxykinase	Cytosol Cytosol	4PPCYS + H → CO2 + PAN4P ATP + OAA <>> ADP + CO2 + PeP	EC-4.1.1.36 EC-4.1.1.49	Pantothenate and COA Biosynthesis Anaplerotic reactions	PIPA00735 PIPA01065
phosphopentomutase	Cytosol Nucleus	r19 co r59	EC-5.4.2.7	Pentose phosphate Cycle	PIPAD3658 PIPAD4602
phosphopentomutase, nucleus phosphopantothenate-cysteine ligase	Nucleus Cytosol	r IP <> rSP 4PPAN + CTP + CVS -> 4PPCVS + CMP + H + PPI	EC-5.4.2.7 EC-5.4.2.7 EC-6.3.2.5	Pentose phosphate Cycle Pentose phosphate Cycle Pantothenate and COA Biosynthesis	PIPAD4602
prephenate dehydrogenase, nad/nadh prephenate dehydrogenase (NADP)	Cytosol	NAD + PPHN -> 34hPP + CO2 + NADH	EC-1.3.1.12	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA03762
prephenate dehydratase	Cytosol	NADP + PPHN → 34hPP + CO2 + NADPH H + PPHN → CO2 + H2O + PHPYR	EC-1.3.1.13 EC-4.2.1.51	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA03762
Protoporphyrinogen IX mitochondrial transport Protoporphyrinogen oxidase, mitochondrial	Mitochondria	PPPg9(c) <> PPPg9(m) 3 O2 + 2 PPPg9 -> 6 H2O + 2 PPP9	EC-1.3.3.4	Transport, Mitochondrial Porphyrin and Chlorophyll Metabolism	PIPA00428
phosphoribosylglycinamide synthase	Cytosol	ATP + GLY + PRAM <> ADP + GAR + H + PI	EC-6.3.4.13 EC-5.3.1.24	PURIne and Pyrimidine Biosynthesis	PIPAD2664 PIPAD0356
phosphoribosylanthranilate isomerase (irreversible) phosphoribosylanthranilate isomerase (irreversible), nucleus	Cytosol Nucleus	Pran → 2¢PrSP Pran → 2¢PrSP	EC-5.3.1.24	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00356
phosphoribosylaminoimidazole synthase phosphoribosyl-AMP cyclohydrolase	Cytosol	ATP + fGAM > ADP + air + 2 H + Pi H2O + frbAMP > PrfP	EC 6.3.3.1 EC 3.5.4.19	PURIne and Pyrimidine Biosynthesis Histidine Metabolism	PIPAD2664 PIPAD2083
phosphoribosylaminoimidazolesuccinocarboxamide synthase	Cytosol	CAIR + ASP + ATP <> SAICAR + ADP + H + PI H2O + PrbATP >> H + PPi + PrbAMP	EC-6.3.2.6	PURIne and Pyrimidine Biosynthesis Histidine Metabolism	PIPA02441
phosphoribosyl-ATP pyrophosphatase phosphoribosylformylglycinamidine synthase	Cytosol	$ATP + fGAR + GLN + H2O \Rightarrow ADP + fGAM + GLU + H + PI$	EC-3.6.1.31 EC-6.3.5.3	PURIne and Pyrimidine Biosynthesis	PIPAD2083 PIPAD1143
phosphoribosylformylglycinamidine synthase, nucleus 1-(5-phosphoribosyl)-5-[(5-	Nucleus	ATP + fGAR + GLN + H2O -> ADP + fGAM + GLU + H + PI	EC-6.3.5.3	PURIne and Pyrimidine Biosynthesis	PIPA01143
phosphoribosylamino)METhylideneamino)imidazole-4-carboxamide		PriP to PriP		Histidine Metabolism	PIPA00153
isomerase (irreversible) 1-(S-phosphoribosyl)-5-[(S-	Cytosol	NUL > NUL	EC-5.3.1.16	Histidine Metabolism	PIPADU153
phosphoribosy(amino)METhylideneamino)imidazole-4-carboxamide isomerase (irreversible, nucleus)	Nucleus	PrfP → PrfP	EC-5.3.1.16	Histidine Metabolism	PIPA00153
Proline oxidase (NAD), mitochondrial	Mitochondria	NAD + PRO -> 1PYRSc + 2 H + NADH		phospholipid Biosynthesis	PIPA01051 PIPA00044
L-Proline reversible transport via Proton symport		$h(e) + PRO(e) \Leftrightarrow H(c) + PRO(c)$		Transport, Extracellular	PIPA00701 PIPA02307
L-Proline transport, diffusion, mitochondrial Prolyl-tRNA synthetase	Cytosol	PRO(c) <> PRO(m) ATP + PRO + trnaPRO -> AMP + PPi + PROtrna	EC-6.1.1.15	Transport, Mitochondrial Arginine and Proline Metabolism	PIPA00130
					PIPAD4853 or PIPAD0899 or
phosphoribosylovrophosphate synthetase	Cytosol	$\Delta TP + rSP \Leftrightarrow \Delta MP + H + PrPP$	EC-2.7.6.1	Histidine Metabolism	PIPA00010 or PIPA06093
PRPP reversible transport, mitochondrial	.,	PrPP[c] <> PrPP[m]		Transport, Mitochondrial	
3-phosphoshikimate 1-carboxyvinyltransFerase, irreversible phosphatidylserine decarboxylase, Golgi apparatus	Cytosol Golgi	PeP + sKm5P -> 3PSme + Pi H + PS -> CO2 + Pe	EC-2.5.1.19 EC-4.1.1.65	Tyrosine, Tryptophan, and Phenylalanine Metabolism phospholipid Biosynthesis	PIPAD1111 PIPAD6189
phosphatidylserine decarboxylase, mitochondrial	Mitochondria	H + PS -> CO2 + Pe	EC-4.1.1.65	phospholipid Biosynthesis	PIPA04399
phosphatidylserine decarboxylase, vacuolar phosphatidylserine synthase	Vacuole Cytosol	H + PS >> CO2 + Pe CDPdag + SER -> CMP + H + PS	EC-4.1.1.65 EC-2.7.8.8	phospholipid Biosynthesis phospholipid Biosynthesis	PIPA06189 PIPA01373
phosphatidylserine synthase , mitochondrial phosphoserine transaminase	Mitochondria Cytosol	CDPdag + SER -> CMP + H + PS 3PHP + GLU -> AKG + PSER	EC-2.7.8.8 EC-2.6.1.52	phospholipid Biosynthesis Glycine and Serine Metabolism	PIPA01373 PIPA03592
phosphoserine phosphatase (LSerine) phytosphingosine phosphate lyase	Cytosol	HIZO + PSER > PI + SER PSHII -> Zhhudai + ethAMP	EC-3.1.3.3	Glycine and Serine Metabolism Sphingolipid Metabolism	PIPA09279 PIPA03846
phytosphingosine synthesis	Cytosol	H + NADPH + O2 + sPHgn -> H2O + NADP + PSPHings		Sphingolipid Metabolism	PIPAD3846 PIPAD9021
phosphatidylserine Golgi transport phosphatidylserine mitochondrial transport		PS(c) <> PS(g) PS(c) <> PS(m)		Transport, Golgi Apparatus Transport, Mitochondrial	
phosphatidylserine vacuolar transport phosphatidyl-1D-myo-insoltol nuclear transport		Ptdlino[c] <> Ptdlino[n]		Transport, Vacuolar Transport, Nuclear	
phosphatidyl-1D-myo-4-inositol nuclear transport		Ptd4ino[c] <> Ptd4ino[n]		Transport, Nuclear Transport, Nuclear	PIPA00531
Mitochondrial phosphate carrier pantetheine-phosphate ADEnylyltransFerase	Cytosol	P(c <> P(m) ATP + H + PAN4P >> dPCDA + PPI	EC-2.7.7.3	Pantothenate and COA Biosynthesis	PIPA01318
panthetheine-phosphate ADEnylyltransFerase putrescine transport in via Proton symport	Mitochondria	ATP + H + PAN4P > dPCOA + PPI N(e) + Ptrc(e) > H(c) + Ptrc(c)	EC-2.7.7.3	Pantothenate and COA Biosynthesis	PIPA00466
pURine-nucleoside phosphorylase (ADEnosine)	Cytosol	adn + Pi <> ADE + r1P	EC-2.4.2.1	Transport, Extracellular Nucleotide Salvage Pathways	PIPA03953
pURIne-nucleoside phosphorylase (ADEnosine), mitochondrial pURIne-nucleoside phosphorylase (DeoxyADEnosine)	Mitochondria Cytosol	adn + Pi <> ADE + r1P dad + Pi <> 2dr1P + ADE	EC-2.4.2.1 EC-2.4.2.1	NAD Biosynthesis Nucleotide Salvage Pathways	PIPA03953 PIPA03953
pURIne-nucleoside phosphorylase (Guanosine) pURIne-nucleoside phosphorylase (Guanosine), mitochondrial	Cytosol Mitochondria	gsm + Pi <> GUA + rIP gsm + Pi <> GUA + rIP	EC-2.4.2.1 EC-2.4.2.1	Nucleotide Salvage Pathways NAD Biosynthesis	PIPA03953 PIPA03953
pURIne-nucleoside phosphorylase (Deoxyguanosine)	Cytosol	dgsn + Pi <> 2dr1P + GUA	EC-2.4.2.1	Nucleotide Salvage Pathways	PIPAD3953
pURIne-nucleoside phosphorylase (Inosine) pURIne-nucleoside phosphorylase (Deoxylnosine)	Cytosol	ins + Pi <> HXAN + r1P din + Pi <> 2dr1P + HXAN	EC-2.4.2.1 EC-2.4.2.1	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPA03953 PIPA03953
pURIne-nucleoside phosphorylase (Xanthosine) pURIne-nucleoside phosphorylase (DeoxyURIdine)	Cytosol Cytosol	Pi + xtsn <> r1P + XAN dURi + Pi <> URA + 2dr1P	EC-2.4.2.1 EC-2.4.2.1	Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPAD3953 PIPAD3953
(S)-1-pyrroline-5-carboxylate:NAD+ oxidoreductase	Cytosol	1P3h5c + NAD + 2 H2O <> GLU + NADH + H	EC-1.5.1.12	GLUtamate Metabolism	PIPAD0869
(S)-1-pyrroline-5-carboxylate:NADP+ oxidoreductase pyridoxamine 5'-phosphate oxidase	Cytosol	1P3hSc + NADP + 2 H2O <> GLU + NADPH + H H2O + O2 + PvamSP >> H2O2 + NH4 + PvdxSP	EC-1.5.1.12 EC-1.4.3.5	GLUtamate Metabolism Pyridoxine Metabolism	PIPA00869 PIPA04880
pyridoxamine s -prospirate oxidase pyridoxamine kinase pyridoxal kinase	Cytosol	H2O + O2 + PyamSP -> H2O2 + NH4 + PydxSP ATP + Pydam -> ADP + H + PydmSP ATP + Pydx -> ADP + H + PydxSP	EC-2.7.1.35 EC-2.7.1.35	Pyridoxine Metabolism Pyridoxine Metabolism	
pyridoxine kinase	Cytosol	ATP + Pydxn -> ADP + H + PdxSP	EC-2.7.1.35	Pyridoxine Metabolism	
pyridoxine oxidase pyridoxal oxidase	Cytosol	O2 + Pydxn <> H2O2 + Pydx 2 H2O + NH4 + 0.5 O2 + Pydx <> 2 H2O2 + Pydam	EC-1.4.3.5 EC-1.4.3.5	Pyridoxine Metabolism Pyridoxine Metabolism	PIPAD4880 PIPAD4880
pyruvate kinase pyrimidine-nucleoside phosphorylase (uracil)	Cytosol Cytosol	ADP + H + PeP → ATP + PYR PI + URI ←> rIP + URA	EC-2.7.1.40 EC-2.4.2.2	Glycolysis/GLUconeogenesis Nucleotide Salvage Pathways	PIPA00751
D1-pyrroline-5-carboxylate dehydrogenase, mitochondrial	Mitochondria	GLUSsa + H2O + NADP <> GLU + 2 H + NADPH	EC-1.5.1.12	GLUtamate Metabolism	PIPA00869
pyruvate decarboxylase	Cytosol	H+PYR->ACAL+CO2	EC-4.1.1.1	Pyruvate Metabolism	PIPA03164 PIPA01726
pyruvate transport in via Proton symport pyruvate mitochondrial transport via Proton symport		$h(e) + PYR(e) \rightarrow H(e) + PYR(e)$ $h(e) + PYR(e) \Leftrightarrow H(m) + PYR(m)$		Transport, Extracellular Transport, Mitochondrial	PIPA05648
pyruvate peroxisomal transport via Proton symport		DHAP + IASP -> H + 2 H2O + PI + quin		Transport, Peroxional Folate Metabolism	
quinolinate synthase Quinolinate reversible mitochondrial transport	Cytosol	DHAP + IASP -> H + 2 H2O + Pi + quin quin(c) <>> quin(m)		Transport, Mitochondrial	
quinolinate synthase Quinolinate reversible mitochondrial transport riboflavin kinase	Cytosol	quin(c) <> quin(m) ATP + RiBfly -> ADP + fmn + H	EC-2.7.1.26	Transport, Mitochondrial Riboflavin Metabolism	PIPAD1612
quinolinate synthase Quinolinate reversible mitochondrial transport riboffavin kinase, riboffavin kinase, mitochondrial riboffavin synthase	Cytosol Mitochondria Cytosol	quint(1-> quint(m) - q	EC-2.7.1.26 EC-2.5.1.9	Transport, Mitochondrial Riboflavin Metabolism Riboflavin Metabolism Riboflavin Metabolism	PIPA01612 PIPA03322
quinolinate synthase Quinolinate reversible mitochondrial transport riboffavin kinase riboffavin kinase, mitochondrial riboffavin synthase riboffavin synthase riboffavin synthase	Cytosol Mitochondria Cytosol Cytosol Cytosol	quin(c) < quin(m) ATP + 880h > ADP + mn + H ATP + 880h > ADP + mn + H ATP + 880h > ADP + mn + H ATP + 880h > ADP - H + 15P 2 dmb > ASS = + 880h ATP + 880 > ADP - H + 15P	EC-2.7.1.26 EC-2.5.1.9 EC-2.5.1.9 EC-2.7.1.15	Transport, Mitochondrial Riboflavin Metabolism Riboflavin Metabolism	PIPAD1612 PIPAD3322 PIPAD4456 PIPAD0653
quinolinate synthase Quinolinate revrible mitochondrial transport risoflavin kinase risoflavin kinase, mitochondrial risoflavin kinase, mitochondrial risoflavin synthase risoflavin synthase risoflavin synthase risoflavinse L-thamnose isomerase	Cytosol Mitochondria Cytosol Cytosol Cytosol Cytosol	quin((< > quin() (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<) (<)	EC-2.7.1.26 EC-2.5.1.9 EC-2.5.1.9 EC-2.7.1.15 5.3.1.14	Transport, Mitochondrial Riboflavin Metabolism Riboflavin Metabolism Riboflavin Metabolism Riboflavin Metabolism	PIPA01612 PIPA03322 PIPA04456 PIPA00653 PIPA03544
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					PIPA07591
SuccinateCDA ligase (ADP-forming), mitochondrial	Mitochondria		EC-6.2.1.4	Citrate Cycle (TCA)	PIPA02591 PIPA00866
sucrose transport in via Proton symport		h(e) + SUCr(e) -> H(c) + SUCr(c)		Transport, Extracellular	PIPAD3369 or
suffite reductase (NADph2) transaldolase	Cytosol	3 H2O + H2S + 3 NADP <>> 5 H + 3 NADPH + SO3 G3P + S7P <>> E4P + F6P	EC-1.8.2.2 EC-2.2.1.2	Cysteine Metabolism Pentose phosphate Cycle	PIPAD4045 PIPAD3744
					PIPA09545 PIPA08867
tetrahydrofolate aminoMEThyltransFerase, mitochondrial	Mitochondria	H2O + METHF -> SITHF + H	EC-2.1.2.10	Folate Metabolism	PIPAD5480 PIPA10454
Tetrahudrofolato: I. Glutamato nammal inaco (ADB formina)	Cytosol	ATR & GITTA THE AND ADRA MADIA THEGHT	EC-6.3.2.17	Folate Metabolism	PIPA01736 or PIPA00276
5,6,7,8-Tetrahydrofolate transport, diffusion, mitochondrial thiamin diphosphatase, extracellular	Extracellular	THE(c) <> THE(m) 2 H2O + thmPP -> H + 2 PI + thm	EC-3.1.3.2	Transport, Mitochondrial Thiamine Metabolism	
thymidine transport in via Proton symport thiamin phosphatase	Cytosol	H2O + thmm? -> Pi + thm	103.13.2	Transport, Extracellular Thiamine Metabolism	
thiamin phosphatase thiamin phosphatase, extracellular Thiamine transport in via Proton symport	Extracellular	H2O + thmm? > N + thm H2O + thmm? > N + thm h[e] + thm[e] -> H[c] + thm[c]	EC-3.1.3.2	Thiamine Metabolism	
Threonine aldolase	Cytosol	GLY + ACAL<> THR	EC-4.1.2.5	Transport, Extracellular Threonine and Lysine Metabolism	PIPA01820
L-threonine deaminase L-threonine deaminase, mitochondrial threonine synthase	Cytosol Mitochondria	THS -> Debut + NH4 THS -> Debut + NH4 PPMSER + H2O -> PI + THR	EC-4.3.1.19 EC-4.2.3.1	Threonine and Lysine Metabolism Threonine and Lysine Metabolism Threonine and Lysine Metabolism	PIPA00867 PIPA00829 PIPA02214
threonine mitochondrial transport via Proton symport	Cytosol	h(c) + THR(c) <> H(m) + THR(m)	EC-4.2.3.1		PIPA02307
L-threonine reversible transport via Proton symport Threonyl-tRNA synthetase	Cytosol	h(e) = TRI(e) <> H(f) = TRI(f) = TRI(f) = ATP = TRI = TRI(f) = ATP = TRI = TRIAGE(f) = ATP = TRI = TRIAGE(f) = AMP = PPP = thrrma ATP = TRIE = TRIAGE(f) = AMP = PPP = thrrma	EC-6.1.1.3	Transport, Extracellular Threonine and Lysine Metabolism Threonine and Lysine Metabolism	PIPAD0044 PIPAD4183
threonyl-tRNA synthetase, mitochondrial thymine reversible transport via Proton antiport	Mitochondria	h(e) + THYM(c) <> H(c) + THYM(e)	EC-6.1.1.3	Transport, Extracellular	PIPAD0685
thiazole phosphate synthesis (xylulose 5-phosphate) thiazole phosphate synthesis (ribose 5-phosphate), yeastSpecifc	Cytosol Cytosol	ACKSER + CVS + GLV + H + VLISR -> 4-hut + 4-mport + AC + CO2 + 2 H2O + NH4 + DVR		Thiamine Metabolism Thiamine Metabolism	
transketolase transketolase	Cytosol	ACCISER + CS - GLY - H + SP - Adout + 4mPetz + AC + CO2 + 3 H2O + NM4 + PFR +SP + XUSF < O- GSP + SP - EP + XUSF < O- GSP - GSP	EC-2.2.1.1 EC-2.2.1.1	Pentose phosphate Cycle Pentose phosphate Cycle	PIPAD2093 PIPAD2093
About des bloom (ATRA) unidies)	Cytosol	ATD - TIDBAN - ADD - down - II	FC 2 7 4 24	PURIne and Pyrimidine Biosynthesis	DIRANGES
thiamine diphosphokinase thymidine phosphorylase	Cytosol Cytosol	A(F*) riving JSA(F*) Gliff *A ATF + thm > AMP + 1 + thmPP F* + TrMM(<>> 2019 + TrYM ATF + thmPF > AMP + thmPP	EC-2.7.6.2 EC-2.4.2.4 EC-2.7.4.15	PURIne and Pyrimidine Biosynthesis Thiamine Metabolism	PIPA03953
thiamineDiphosphate kinase thymidylate synthase thiaminase	Cytosol			PURIne and Pyrimidine Biosynthesis Thiamine Metabolism	PIPA08552 PIPA03286
thiamine-phosphate kinase	Cytosol Cytosol	USBB * (PACE * STATE * CALIFORNIA * ARTHOLIZ * H ATD * thmm 5 - Adhrenia * Artholiz * H ATD * thmm 6 - ADD * thmm? Tanhan * Ambert * H > PPI * thmm?	EC-2.7.4.16	Thiamine Metabolism	
thiamine-phosphate diphosphorylase triose-phosphate isomerase	Cytosol	DHAP <> G3P	EC-2.5.1.3 EC-5.3.1.1	Thiamine Metabolism Glycolysis/GLUconeogenesis	PIPAD2604 PIPAD3441
thioredoxin reductase (NADph) thioredoxin reductase (NADph), mitochondrial	Cytosol Mitochondria	H + NADPH + TRDOX > NADP + TRDRD H + NADPH + TRDOX > NADP - TRDRD H + NADPH + TRDOX > NADP - TRDRD H + NADPH + TRDOX > NADP - TRDRD	EC-1.8.1.9 EC-1.8.1.9	PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis	PIPAD4190 PIPAD4190
thioredoxin peroxidase	Peroxisome	H + NADPH + TRDOX -> NADP + TRDRD		PURIne and Pyrimidine Biosynthesis	PIPA04168
					PIPA09664 and
trehalose-phosphatase	Cytosol	H2O + TRESP -> PI + TRE	EC-3.1.3.12	Alternate Carbon Metabolism	PIPA09664 and PIPA00330 and PIPA00782
	-,				
					PIPA09664 and PIPA00330 and
alpha,alpha-trehalose-phosphate synthase (UDP-forming) alpha,alpha-trehalase, golgi	Cytosol	$G6P + UDP_R > H + TRE6P + UDP$ H2O + TRE > 2 GLC	EC-2.4.1.15 EC-3.2.1.28	Alternate Carbon Metabolism Alternate Carbon Metabolism	PIPA00350 and PIPA00782 PIPA04352
aipna, aipna-trenaiase, goigi alpha, alpha-trenalase trehalose transport in via Proton symporter	Golgi Mitochondria	H2O+ TRE >> 2 GLC Nol+ TRE(d) > H(c) + TRE(c)	EC-3.2.1.28 EC-3.2.1.28	Alternate Carbon Metabolism Alternate Carbon Metabolism Transport, Extracellular	PIPA06400
trehalose transport in via Proton symporter trehalose vacuolar transport via Proton symport		h(e) + TRE(e) -> H(c) + TRE(c) h(c) + TRE(c) -> H(v) + TRE(v)		Transport, Extracellular Transport, Vacuolar	
triglycerol synthesis	Cytosol	0.01 DGR + 0.02 C100COA + 0.06 C120COA + 0.17 HdCOA + 0.09 ocdycACOA + 0.24 odeCOA + 0.27 C160COA + 0.05 C180COA + 0.1 C140COA -> COA + 0.01 triG	iLYc	Glycerolipid Metabolism	
L-Tryptophan:oxygen 2,3-oxidoreductase (decyclizing) tryptophan synthase (indoleglycerol phosphate)	Cytosol	O2 + TRP -> LfmKynr 3KG3P + SER -> G3P + H2O + TRP	EC-1.13.11.11 EC-4.2.1.20	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism Transport, Mitochondrial	PIPA02017 PIPA04573
tryptophan synthase (indoleglycerol phosphate) tryptophan mitochondrial transport via Proton symport L-tryptophan reversible transport via Proton symport		3639** 546.* > 338** 742.* * 10** 16(e) + TRP(e) < > H(e) + TRP(e) < > H(c) + TRP(c)		Transport, Mitochondrial Transport, Extracellular	PIPAUS37 PIPAU0044
	Cytosol Mitochondria	ATP + trnaTRP+ TRP.> AMP + PPI + TRPtrna ATP + trnaTRP+ TRP.> AMP + PPI + TRPtrna	EC-6.1.1.2 EC-6.1.1.2	Tyrosine, Tryptophan, and Phenylalanine Metabolism Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00915 PIPA04192
Tryptophanyl-tRNA synthetase, mitochondrial TetrADEcanoate (n-C14:0) transport in via uniport tyrosine mitochondrial transport via Proton symport		C140(e) > C140(c) h(c) + TYR(c) <> H(m) + TYR(m)		Tyrosine, Tryptophan, and Phenylalanine Metabolism Transport, Extracellular Transport, Mitochondrial	PIPA02307
hyrorine perovicemal transport via Broton cumport		h(c) + TVP(c) c > H(v) + TVP(v)		Transport, Peroxisomal Transport, Extracellular	PIPAGGAA
L-tyrosine reversible transport via Proton symport tyrosine transaminase	Cytosol	h(g) + TNR(g) + K(g) + TNR(g) AKG + TYR <> 34hPP + GLU	EC-2.6.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA03996 PIPA02780 or
tyrosine transaminase, irreversible tyrosine transaminase, mitochondrial	Cytosol Mitochondria	34hPP+GLU >> AKG+TYR AKG+TYR<>> 34hPP+GLU	EC-2.6.1.5 EC-2.6.1.5	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA01785 PIPA03884
tyrosine transaminase, intochononal tyrosine transaminase, peroxisomal tyrosyl-tRNA synthetase	Peroxisome	ARG +TIRCY SHIPP GLU ARG +TIRCY SHIPP GLU ATP + trnaTYR + TYR - AMP + PPI + TYRtma	EC-2.6.1.1 EC-6.1.1.1	Tyrosine, Tryptophan, and Phenylalainine Metabolism Tyrosine, Tryptophan, and Phenylalainine Metabolism Tyrosine, Tryptophan, and Phenylalainine Metabolism	PIPAU3996 PIPAU3988
tyrosyl-tRNA synthetase, mitochondrial	Cytosol Mitochondria		EC-6.1.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA05252
UDP-N-acetylGlucosamine diphosphorylase UDPGlucose 4-epimerase	Cytosol	ATT STATE OF THE CONTROL OF THE CONT	EC-2.7.7.23 EC-5.1.3.2	GLUtamate Metabolism Galactose Metabolism	PIPA02814 PIPA01576
Protein with a role in UDP-galactose transport to the Golgi lumen	Cytosol		EC-3.5.3.19	Histidine Metabolism	PIPA00665 PIPA02195
UMP kinase UMP kinase, nuclear	Cytosol Nucleus	ATP + UMP <> ADP + UDP ATP + UMP <> ADP + UDP		Nucleotide Salvage Pathways Nucleotide Salvage Pathways	PIPADGSS4 PIPADGSS4
	Cytosol	UMP(c) <> UMP(n) 2.54M + 100×2 <> 2.54M + 100×2 <> 3.54M	EC-2.1.1.107	Transport, Nuclear	BIDAGESPO
uroporphyrinogen METhyltransFerase uroporphyrinogen-III synthase uroporphyrinogen decarboxylase (uroporphyrinogen III)	Cytosol	2-min unga-o-a-cita-i i i i i Himili - HZD - 1975 - 4 (DZ - 1979)3 HH - unga-o-4 (DZ - 1979)3 PPF + UBA - 0-79 + UMP	EC-4.2.1.75 EC-4.1.1.37 EC-2.4.2.9	Porphyrin and Chlorophyll Metabolism Porphyrin and Chlorophyll Metabolism	PIPADS245 PIPAD3444 PIPAD1654
uracii pnospnoribosyttransi erase, mitochondria uracii transport in via Proton symport	Mitochondria		EC-2.4.2.9	Prophyrin and Chlorophyll Metabolism Porphyrin and Chlorophyll Metabolism Porphyrin and Chlorophyll Metabolism PURIne and Pyrimidine Biosynthesis Transport, Extracellular	
Uric acid-xanthine permease (UAPA transporter)		URAT[e] <> URAT[c]			PIPA02377 PIPA04802
urea reversible transport via Proton symport (2 H+)		2 H[e] + urea[e] <> 2 H[c] + urea[c]		Transport, Extracellular	PIPA02507 PIPA02562 PIPA02130
urea reversible transport via Proton symport (2 H+) urea carboxylase URIdylate kinase (dUMP)	Cytosol Cytosol	Z H(g) + umal(g) <> Z H(g) + umal(g) ATP + HCO3 + ymal <> ADP + allPhn + H + P(ATP + dUMP <> ADP + dUDP	EC-6.3.4.6	Ntrogen Metabolism Nucleotide Salvage Pathways	PIPAU3130 PIPAU3133 PIPAU6554
URIdylate kinase (dUMP), nuclear	Nucleus	ATP + dUMP <> ADP + dUDP		Nucleotide Salvage Pathways	PIPAD6554
URIdine kinase (ATP:URIdine) URIdine kinase (ATP:URIdine), nucleus	Cytosol Nucleus	URI + ATP -> UMP + ADP + H URI + ATP -> UMP + ADP + H	EC-2.7.1.48 EC-2.7.1.48	PURIne and Pyrimidine Biosynthesis PURIne and Pyrimidine Biosynthesis	PIPA00749 PIPA00749
URidine kinase (ATP:URidine), nucleus URidine kinase (GTP:URidine) URidine kinase (GTP:URidine), nucleus	Cytosol Nucleus	URI + GTP > URIP + GDP + H URI + GTP > UMP + GDP + H	EC-2.7.1.48 EC-2.7.1.48 EC-2.7.1.48	PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis PURine and Pyrimidine Biosynthesis	PIPA00749 PIPA00749
URIdine transport in via Proton symport	Cytosol	h(e) + URI(e) -> H(c) + URI(c) URAT + H2O + O2 -> 5-hydroxy(soURAT + H2O2	EC-1.7.3.3	Transport, Extracellular	
Valine reversible mitochondrial transport via Proton symport L-valine reversible transport via Proton symport		h(c) + VAL(c) <> H(m) + VAL(c) h(e) + VAL(e) <> H(c) + VAL(c)		Transport, Mitochondrial Transport, Extracellular	PIPA02307 PIPA00044
valine transaminase Valvi.tRNA conthetase	Cytosol	AKG + VAL <> 3MOB + GLU	EC-2.6.1.42 EC-6.1.1.9	Valine, leurine, and isoleucine Metabolism Valine, leurine, and isoleucine Metabolism	PIPAD6648 PIPAD7648
valyl-tRNA synthetase, mitochondrial xanthine oxidase	Mitochondria Cytosol	ATP + trius/2 + VAL - AMP + PP + valtria XAN + H2O + O2 -> URAT + H2O2	EC-6.1.1.9 EC-1.17.3.2	Valine, leucine, and isoleucine Metabolism	PIPA02648 PIPA03032
vanthing oxidare	Cytosol		EC-1.17.3.2	Transport, Extracellular	PIPA03032
xanthine countries wanthine reversible transport Uric acid xanthine permease (UAPA transporter) xanthine phosphoribosyltransFerase	Cytosol	XAM 6	EC-2.4.2.22	Nucleotide Salvage Pathways	PIPAD2377 PIPAD0676
xanthine priosprioriosystrans-erase xanthosine transport in via Proton symport xylulokinase	Cytosol	PPP+ XAN -> PP+ XANE (e) + xSn(e) -> H(c) + xSn(c) ATP + xy(u -> ADP + H + XUSP	EC-2.7.1.17	Nucleotide Salvage Pathways Transport, Extracellular Xviose Metabolism	PIPA01671
xyluloxinase xylose reductase D-xylose reversible transport	Cytosol	H + NADPH + xyl -> NADP + xylt	EC-1.1.1.21	Xylose Metabolism Transport, Extracellular	PIPAD2620
D-xylose reversible transport Xylitol transport via passive diffusion vIIMP conthetase		yr[e] <> xr[c] yr[t] <> xr[c] <> xr[c]	FC42170	Transport, Extracellular Transport, Extracellular PLIRIne and Purimidine Riosynthesis	PIPA01711
yUMP synthetase, nucleus	Cytosol Nucleus	rSP + URA <> H2O + PSdSP	EC-4.2.1.70 EC-4.2.1.70	PURline and Pyrimidine Biosynthesis PURline and Pyrimidine Biosynthesis	PIPA01211 PIPA01052 PIPA01928
Vacuolar membrane zinc transporter zymosterol reversible transport		zn(c) <> zn(v) zymstle) <> zymstlc)		Transport. Extracellular	
	Cytosol Cytosol	CYS+H2O <> PYR+NH4+H2S LCYSIn+H2O <> tCYS+PYR+NH4	EC-4.4.1.8 EC-4.4.1.8	Methionine Metabolism Methionine Metabolism	PIPAD4067 PIPAD4067
	Cytosol Cytosol Cytosol	bala + AKG <> GUI + MALSA GIVE - SVEN + COL3	EC-2.6.1.19		PIPAD1534
	Cytosol	rhul + ATP - rhulP + ADP rhulP <> DHAP + LALD			
Na+/Pi cotransporter		$na[e] + P[e] \Rightarrow na[c] + P[c]$			PIPA02248

ABBREVIATION	METABOLITE NAME	COMPARTMENT
10FTHF(c)	10-Formyltetrahydrofolate	Cytosol
12DGR(c)	1,2-Diacylglycerol	Cytosol
13bDGLCN(c)	1,3-beta-D-Glucan	Cytosol
13DAMPP(c)	1,3-Diaminopropane	Cytosol
13DPG(c)	3-Phospho-D-glyceroyl phosphate	Cytosol
14GLUN(c)	(1,4-alpha-D-Glucosyl)n	Cytosol
16bDGLCN(c)	1,6-beta-D-Glucan	Cytosol
1AG3P(c)	1-Acyl-sn-glycerol 3-phosphate	Cytosol
1AGLY3P(c)	1-Acyl-glycerone 3-phosphate	Cytosol
1AGPC(c)	1-Acyl-sn-glycerol-3-phosphocholine	Cytosol
1DGALI(c)	1-alpha-D-Galactosyl-myo-inositol	Cytosol
1MNCAM(c)	1-Methylnicotinamide	Cytosol
1P3H5C(c)	L-1-Pyrroline-3-hydroxy-5-carboxylate	Cytosol
1PYR5C(c)	1-Pyrroline-5-carboxylate	Cytosol
23cAMP(c)	2',3'-Cyclic AMP	Cytosol
23DPG(c)	2,3-Disphospho-D-glycerate	Cytosol
SAICAR(c)	(S)-2-[5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamido]succinate	Cytosol
25DHPP(c)	2,5-Diamino-6-hydroxy-4-(5'-phosphoribosylamino)-pyrimidine	Cytosol
25DTHPP(c)	2,5-diamino-6-ribitylamino-4(3H)-pyrimidinone 5'-phosphate	Cytosol
2AMSA(c)	2-Aminomalonate semialdehyde	Cytosol
2AOBUT(c)	L-2-Amino-3-oxobutanoate	Cytosol
2CPR5P(c)	1-(2-Carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate	Cytosol
2DCA7P(c)	2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate	Cytosol
2DGLC(c)	2-Deoxy-D-glucose	Cytosol
2DHP(c)	2-Dehydropantoate	Cytosol
2DOXG6P(c)	2-Deoxy-D-glucose 6-phosphate	Cytosol
2DR1P(c)	2-Deoxy-D-ribose 1-phosphate	Cytosol
2DR5P(c)	2-Deoxy-D-ribose 5-phosphate	Cytosol
2HB(c)	2-Hydroxybutyrate	Cytosol
2HHXDAL(c)	2-Hydroxy-hexadecanal	Cytosol
2IPPM(c)	2-Isopropylmaleate	Cytosol
2KMB(c)	2-keto-4-methylthiobutyrate	Cytosol
2MAHMP(c)	2-Methyl-4-amino-5-hydroxymethylpyrimidine diphosphate	Cytosol
2MBAC(c)	2-methylbutyl acetate 2-Oxobutanoate	Cytosol
2OBUT(c) 2OXOADP(c)	2-Oxoadipate 2-Oxoadipate	Cytosol Cytosol
2PG(c)	D-Glycerate 2-phosphate	Cytosol
2PHETOH(c)	2-phenylethanol	Cytosol
34HPP(c)	3-(4-Hydroxyphenyl)pyruvate	Cytosol
35cCMP(c)	3',5'-Cyclic CMP	Cytosol
35cdAMP(c)	3',5'-Cyclic dAMP	Cytosol
35cGMP(c)	3',5'-Cyclic GMP	Cytosol
35cIMP(c)	3',5'-Cyclic IMP	Cytosol
3C2HMP(c)	3-Carboxy-2-hydroxy-4-methylpentanoate	Cytosol
3C3HMP(c)	3-Carboxy-3-hydroxy-4-methylpentanoate	Cytosol
3C4MOP(c)	3-Carboxy-4-methyl-2-oxopentanoate	Cytosol
3CH5HPB(c)	3-Hexaprenyl-4,5-dihydroxybenzoate	Cytosol
3DHq(c)	3-Dehydroquinate	Cytosol
3DHSK(c)	3-Dehydroshikimate	Cytosol
3DSPHGN(c)	3-Dehydrosphinganine	Cytosol
3HANTHRN(c)	3-Hydroxyanthranilate	Cytosol
3IG3P(c)	C'-(3-Indolyl)-glycerol 3-phosphate	Cytosol
3IPMMEST(c)	3-isopropylmalate-methyl-ester	Cytosol
3MOB(c)	3-Methyl-2-oxobutanoate	Cytosol
3MOP(c)	(S)-3-Methyl-2-oxopentanoate	Cytosol
3OPHB_5(c)	3-Hexaprenyl-4-hydroxybenzoate	Cytosol
3PG(c)	3-Phospho-D-glycerate	Cytosol
3PHP(c)	3-Phosphohydroxypyruvate	Cytosol
3PSME(c)	5-O-(1-Carboxyvinyl)-3-phosphoshikimate	Cytosol
44MCTR(c)	4,4-dimethylcholesta-8,14,24-trienol	Cytosol
44MZYM(c)	4,4-dimethylzymosterol	Cytosol
4AABUTN(c)	4-Acetamidobutanoate	Cytosol
4ABUT(c)	4-Aminobutanoate	Cytosol

4ABUTN(c)	4-Aminobutanal	Cytosol
4ABZ(c)	4-Aminobatanai 4-Aminobenzoate	Cytosol
4ADCHO(c)	4-amino-4-deoxychorismate	Cytosol
4AHMMP(c)	4-Amino-5-hydroxymethyl-2-methylpyrimidine	Cytosol
4AMPM(c)	4-Amino-2-methyl-5-phosphomethylpyrimidine	Cytosol
4FUMACAC(c)	4-Fumarylacetoacetate	Cytosol
4GUCBD(c)	4-Guanidinobutanamide	Cytosol
4GUCBUTN(c)	4-Guanidinobutanoate	Cytosol
4H2OGLT(c)	4-Hydroxy-2-oxoglutarate	Cytosol
4HBZ(c)	4-Hydroxybenzoate	Cytosol
4HPROLT(c)	trans-4-Hydroxy-proline	Cytosol
4HTHR(c)	4-Hydroxy-threonine	Cytosol
4MHETZ(c)	4-Methyl-5-(2-hydroxyethyl)-thiazole	Cytosol
4MLACAC(c)	4-Maleylacetoacetate	Cytosol
4MOP(c)	4-Methyl-2-oxopentanoate	Cytosol
4MPETZ(c)	4-Methyl-5-(2-phosphoethyl)-thiazole	Cytosol
4MZYM(c)	4-methylzymosterol	Cytosol
4MZYM_INT1(c)	4-Methylzymosterol intermediate 1	Cytosol
4MZYM_INT2(c)	4-Methylzymosterol intermediate 2	Cytosol
4PASP(c)	4-Phospho-aspartate	Cytosol
4PPAN(c)	D-4'-Phosphopantothenate	•
4PPCYS(c)		Cytosol
4R5AU(c)	N-((R)-4-Phosphopantothenoyl)-cysteine	Cytosol
	4-(1-D-Ribitylamino)-5-aminouracil	Cytosol Cytosol
CAIR(c)	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylate	-
5AOP(c)	5-Amino-4-oxopentanoate	Cytosol
5APRBU(c)	5-Amino-6-(5'-phosphoribitylamino)uracil	Cytosol
5CPMEV(c)	(R)-5-Diphosphomevalonate	Cytosol
5FTHF(c)	5-Formyltetrahydrofolate	Cytosol
5MCR1P(c)	5-Methylthio-5-deoxy-D-ribose 1-phosphate	Cytosol
5MCRU1P(c)	5-Methylthio-5-deoxy-D-ribulose 1-phosphate	Cytosol
5MTA(c)	5-Methylthioadenosine	Cytosol
5MTHF(c)	5-Methyltetrahydrofolate	Cytosol
5PMEV(c)	(R)-5-Phosphomevalonate	Cytosol
6PGC(c)	6-Phospho-D-gluconate	Cytosol
6PGL(c)	6-phospho-D-glucono-1,5actone	Cytosol
8AONN(c)	8-Amino-7-oxononanoate	Cytosol
AACAL(c)	Aminoacetaldehyde	Cytosol
AACOA(c)	Acetoacetyl-CoA	Cytosol
AACT(c)	Aminoacetone	Cytosol
ABT(c)	L-Arabinitol	Cytosol
AC(c)	Acetate	Cytosol
ACAC(c)	Acetoacetate	Cytosol
ACACP(c)	Acetyl-ACP	Cytosol
ACAL(c)	Acetaldehyde	Cytosol
ACCOA(c)	Acetyl-CoA	Cytosol
ACES(c)	Acetic ester	Cytosol
NAGA1P(c)	N-Acetyl-D-glucosamine 1-phosphate	Cytosol
NAGA6P(c)	N-Acetyl-D-glucosamine 6-phosphate	Cytosol
ACHMS(c)	O-Acetyl-homoserine	Cytosol
ACHSER	O-Acetylhomoserine	Cytosol
ACON5M(c)	E-3-carboxyl-2-pentenedioate 5-methyl ester	Cytosol
ACON-T(c)	trans-Aconitate	Cytosol
ACP(c)	acyl carrier protein	Cytosol
ACRN(c)	O-Acetylcarnitine	Cytosol
ACSER(c)	O-Acetyl-serine	Cytosol
ACTN-R(c)	(R)-Acetoin	Cytosol
ACYBUT(c)	gamma-Amino-gamma-cyanobutanoate	Cytosol
ADE(c)	Adenine	Cytosol
ADN(c)	Adenosine	Cytosol
ADP(c)	ADP	Cytosol
ADPRIB(c)	ADPribose	Cytosol
AHCYS(c)	S-Adenosyl-homocysteine	Cytosol
AHDT(c)	2-Amino-4-hydroxy-6-(erythro-1,2,3-trihydroxypropyl)dihydropteridine triphos	
AICAR(c)	5-Amino-1-(5-Phospho-D-ribosyl)imidazole-4-carboxamide	Cytosol

AIR(c)	5-amino-1-(5-phospho-D-ribosyl)imidazole	Cytosol
AKG(c)	2-Oxoglutarate	Cytosol
bALA(c)	beta-Alanine	Cytosol
ALA(c)	L-Alanine	Cytosol
ALAtrna(c)	L-Alanyl-tRNA(Ala)	Cytosol
ALLPHN(c)	Allophanate	Cytosol
ALLTN(c)	Allantoin	Cytosol
ALLTT(c)	Allantoate	Cytosol
SAM(c)	S-Adenosyl-methionine	Cytosol
AMETAM(c)	S-Adenosylmethioninamine	Cytosol
AMOB(c)	S-Adenosyl-4-methylthio-2-oxobutanoate	Cytosol
AMP(c)	AMP	Cytosol
AMP2P(c)	Adenosine 2'-phosphate	Cytosol
ANTH(c)	Anthranilate	Cytosol
AP4A(c)	P1,P4-Bis(5'-adenosyl) tetraphosphate	Cytosol
AP4G(c)	P1-(5'-adenosyl),P4-(5'-guanosyl) tetraphosphate	Cytosol
APEP(c)	Nalpha-Acetylpeptide	Cytosol
APROA(c)	3-Aminopropanal	Cytosol
APROP(c)	alpha-Aminopropiononitrile	Cytosol
APRUT(c)	N-Acetylputrescine	Cytosol
APS(c)	Adenosine 5'-phosphosulfate	Cytosol
ARABD(c)	D-Arabinose	Cytosol
ARAB(c)	L-Arabinose	Cytosol
ARG(c)	L-Arginine	Cytosol
ARGSUC(c)	N(omega)-(L-Arginino)succinate	Cytosol
ARGSOC(c) ARGtrna(c)	L-Arginyl-tRNA(Arg)	Cytosol
ARS(c)	Arsenite	Cytosol
ASN(c)	L-Asparagine	Cytosol
ASNtrna(c)	L-Asparaginyl-tRNA(Asn)	Cytosol
ASP(c) ASPSA(c)	L-Aspartate L-Aspartate 4-semialdehyde	Cytosol Cytosol
ASPtrna(c)	L-Aspartyl-tRNA(Asp)	Cytosol
ATHR(c)	L-Allo-threonine	
ATP(c)	ATP	Cytosol
BTAMP(c)	Biotinyl-5'-AMP	Cytosol
` '	Biotin	Cytosol Cytosol
BTN(c) cAMP(c)	cAMP	Cytosol
CAPHIS(c)	2-(3-Carboxy-3-aminopropyl)-histidine	Cytosol
CBASP(c)	N-Carbamoyl-aspartate	Cytosol
	Carbamoyl phosphate	•
CBP(c) CDP(c)	CDP	Cytosol Cytosol
CDPCHOL(c)	CDPcholine	Cytosol
CDPCAG(c)	CDPdiacylglycerol	Cytosol
CDPEA(c)	CDPethanolamine	Cytosol
CGLY(c)	Cys-Gly	Cytosol
CH4S(c)	Methanethiol	Cytosol
CHIT(c)	Chitin (monomer)	Cytosol
CHITOS(c)	Chitosan	Cytosol
CHOL(c)	Choline	Cytosol
CHOLP(c)	Choline phosphate	Cytosol
CHOR(c)	chorismate	Cytosol
CIT(c)	Citrate	Cytosol
CITR(c)	L-Citrulline	Cytosol
CMAPHIS(c)	2-[3-Carboxy-3-(methylammonio)propyl]-histidine	Cytosol
CMP(c)	CMP	Cytosol
CMUSA(c)	2-Amino-3-carboxymuconate semialdehyde	Cytosol
CO2(c)	CO2	Cytosol
COA(c)	Coenzyme A	Cytosol
CPPPG3(c)	Coproporphyrinogen III	Cytosol
CRN(c)	L-Carnitine	Cytosol
CSN(c)	Cytosine	Cytosol
CTP(c)	CTP	Cytosol
CYS(c)	L-Cysteine	Cytosol
LLCT(c)	L-Cystathionine	Cytosol
	= 0 ₁ 5.cc.mo.m.c	Cy (030)

CVC+ma(a)	L Contained tRNA(Con)	Cutocal
CYStrna(c) CYTD(c)	L-Cysteinyl-tRNA(Cys) Cytidine	Cytosol
DAC(c)	•	Cytosol
dACP(c)	Deoxyadenosine dADP	Cytosol Cytosol
DAGPY(c)	diacylglycerol pyrophosphate	Cytosol
dAMP(c)	dAMP	Cytosol
DANN(c)	7,8-Diaminononanoate	Cytosol
DARA14LAC(c)	D-Arabinono-1,4-lactone	Cytosol
dATP(c)	dATP	Cytosol
DB4P(c)	3,4-dihydroxy-2-butanone 4-phosphate	Cytosol
C100(c)	Decanoate (n-C10:0)	Cytosol
C100COA(c)	Decanoyl-CoA (n-C10:0CoA)	Cytosol
DCAMP(c)	N6-(1,2-Dicarboxyethyl)-AMP, Adenylosuccinate	Cytosol
dCDP(c)	dCDP	Cytosol
dCMP(c)	dCMP	Cytosol
dCTP(c)	dCTP	Cytosol
DCYT(c)	Deoxycytidine	Cytosol
C120(c)	Dodecanoate (n-C12:0)	Cytosol
C120ACP(c)	Dodecanoyl-ACP (n-C12:0ACP)	Cytosol
C120COA(c)	Dodecanoyl-CoA (n-C12:0CoA)	Cytosol
dGDP(c)	dGDP	Cytosol
dGMP(c)	dGMP	Cytosol
DGSN(c)	Deoxyguanosine	Cytosol
dGTP(c)	dGTP	Cytosol
DHA(c)	Dihydroxyacetone	Cytosol
DHAP(c)	Dihydroxyacetone phosphate	Cytosol
DHF(c)	7,8-Dihydrofolate	Cytosol
DHNPT(c)	Dihydroneopterin	Cytosol
DHOR-S(c)	(S)-Dihydroorotate	Cytosol
DHPMP(c)	Dihydroneopterin monophosphate	Cytosol
DHPT(c)	Dihydropteroate	Cytosol
DIN(c)	Deoxyinosine	Cytosol
DKMPP(c)	2,3-diketo-5-methylthio-1-phosphopentane	Cytosol
DMLZ(c)	6,7-Dimethyl-8-(1-D-ribityl)lumazine	Cytosol
DMPP(c)	Dimethylallyl diphosphate	Cytosol
DNAD(c)	Deamino-NAD+	Cytosol
DOL(c)	Dolichol	Cytosol
DOLP(c)	Dolichol phosphate	Cytosol
DPDOA(c)	Dephospho-CoA	Cytosol
DRIB(c)	Deoxyribose	Cytosol
DSDL(c)	dihydrosirohydrochlorin Dethiobiotin	Cytosol
DTBT(c)	dTDP	Cytosol
dTDP(c) dTMP(c)	dTMP	Cytosol Cytosol
dTTP(c)	dTTP	Cytosol
dUDP(c)	dUDP	Cytosol
dUMP(c)	dUMP	Cytosol
DURI(c)	Deoxyuridine	Cytosol
dUTP(c)	dUTP	Cytosol
E4HGLU(c)	L-erythro-4-Hydroxyglutamate	Cytosol
E4P(c)	D-Erythrose 4-phosphate	Cytosol
EIG3P(c)	D-erythro-1-(Imidazol-4-yl)glycerol 3-phosphate	Cytosol
EPIST(c)	episterol	Cytosol
EPISTEST(c)	episterol ester	Cytosol
EPM(c)	Epimelibiose	Cytosol
ERGST(c)	Ergosterol	Cytosol
ERGST3GLC(c)	ergosterol 3-beta-D-glucoside	Cytosol
ERGSTEST(c)	ergosterol ester	Cytosol
ERGTETROL(c)	Ergosta-5,7,22,24,(28)-tetraen-3beta-ol	Cytosol
ERGTROL(c)	ergosta-5,7,24(28)-trienol	Cytosol
ETHA(c)	Ethanolamine	Cytosol
ETHAMP(c)	Ethanolamine phosphate	Cytosol
ETOH(c)	Ethanol	Cytosol
F1P(c)	D-Fructose 1-phosphate	Cytosol

F36BD(c)	D Fructose 2.6 hisphosphate	Outocal
F26BP(c) F6P(c)	D-Fructose 2,6-bisphosphate D-Fructose 6-phosphate	Cytosol Cytosol
FAD(c)	Flavin adenine dinucleotide oxidized	Cytosol
FALD(c)	Formaldehyde	Cytosol
FDP(c)	D-Fructose 1,6-bisphosphate	Cytosol
FE2(c)	Fe2+	Cytosol
FECOST(c)	fecosterol	Cytosol
FECOSTEST(c)	fecosterol ester	Cytosol
FGAR(c)	N2-Formyl-N1-(5-phospho-D-ribosyl)glycinamide	Cytosol
FMN(c)	FMN	Cytosol
FMNH2(c)	Reduced FMN	Cytosol
FORM(c)	Formate	Cytosol
FGAM(c)	2-(Formamido)-N1-(5-phospho-D-ribosyl)acetamidine	Cytosol
FAICAR(c)	5-Formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide	Cytosol
FRDP(c)	Farnesyl diphosphate	Cytosol
FRU(c)	D-Fructose	Cytosol
FUM(c)	Fumarate	Cytosol
G1P(c)	D-Glucose 1-phosphate	Cytosol
G3P(c)	Glyceraldehyde 3-phosphate	Cytosol
G3PC(c)	sn-Glycero-3-phosphocholine	Cytosol
G3Pi(c)	sn-Glycero-3-phospho-1-inositol	Cytosol
G6P(c)	D-Glucose 6-phosphate	Cytosol
BG6P(c)	beta-D-glucose 6-phosphate	Cytosol
GAL(c)	D-Galactose	Cytosol
GAL1P(c)	alpha-D-Galactose 1-phosphate	Cytosol
GAM1P(c)	D-Glucosamine 1-phosphate	Cytosol
GAM6P(c)	D-Glucosamine 6-phosphate	Cytosol
GAR(c)	N1-(5-Phospho-D-ribosyl)glycinamide	Cytosol
GCAL(c)	Glycolaldehyde	Cytosol
GDP(c)	GDP	Cytosol
GDPMANN(c)	GDP-D-mannose	Cytosol
GGDP(c)	Geranylgeranyl diphosphate	Cytosol
GGL(c)	Galactosylglycerol	Cytosol
GLC(c)	D-Glucose	Cytosol
GLN(c)	L-Glutamine	Cytosol
GLNtrna(c)	L-Glutaminyl-tRNA(Gln)	Cytosol
GLP(c)	Glycylpeptide	Cytosol
GLU5P(c)	L-Glutamate 5-phosphate	Cytosol
GLU5SA(c)	L-Glutamate 5-semialdehyde	Cytosol
GLUALA(c)	5-Glutamyl-alanine	Cytosol Cytosol
GLUCYS(c) GLU(c)	gamma-Glutamyl-cysteine L-Glutamate	Cytosol
GLUtrna(c)	L-Glutamate L-Glutamyl-tRNA(Glu)	Cytosol
GLX(c)	Glyoxylate	Cytosol
GLY(c)	Glycine	Cytosol
GLYAL(c)	D-Glyceraldehyde	Cytosol
GL(c)	Glycerol	Cytosol
GLYC3P(c)	Glycerol 3-phosphate	Cytosol
GLYCOGEN(c)	glycogen	Cytosol
GLYtrna(c)	Glycyl-tRNA(Gly)	Cytosol
GMP(c)	GMP	Cytosol
GP4G(c)	P1,P4-Bis(5'-guanosyl) tetraphosphate	Cytosol
GRDP(c)	Geranyl diphosphate	Cytosol
GSN(c)	Guanosine	Cytosol
GTHOX(c)	Oxidized glutathione	Cytosol
GTHRD(c)	Reduced glutathione	Cytosol
GTP(c)	GTP	Cytosol
GUA(c)	Guanine	Cytosol
H(c)	H+	Cytosol
H2O(c)	H2O	Cytosol
H2O2(c)	Hydrogen peroxide	Cytosol
H2S(c)	Hydrogen sulfide	Cytosol
HCO3(c)	Bicarbonate	Cytosol
HCYS(c)	L-Homocysteine	Cytosol

0160()		0
C160(c)	Hexadecanoate (n-C16:0)	Cytosol
C161(c)	Hexadecenoate (n-C16:1)	Cytosol
C160(c)	Hexadecenoyl-CoA (n-C16:1CoA)	Cytosol
C161ACP(c)	cis-hexadec-9-enoyl-[acyl-carrier protein] (n-C16:1)	Cytosol
HEXDP(c)	all-trans-Hexaprenyl diphosphate	Cytosol
HGENTIS(c)	Homogentisate	Cytosol
HIS(c)	L-Histidine	Cytosol
HISP(c)	L-Histidinol phosphate	Cytosol
HISTD(c)	L-Histidinol	Cytosol
HIStrna(c)	L-Histidyl-tRNA(His)	Cytosol
HLKYNR(c)	3-Hydroxy-kynurenine	Cytosol
HMBIL(c)	Hydroxymethylbilane	Cytosol
HMGCOA(c)	Hydroxymethylglutaryl-CoA	Cytosol
HOIURAT	5-Hydroxyisourate	Cytosol
HOML(c)	L-Homoserine	Cytosol
HPGLU(c)	Tetrahydropteroyltri-glutamate	Cytosol
HTAUR	Hypotaurine	Cytosol
HXAN(c)	Hypoxanthine	Cytosol
HXDCAL(c)	Hexadecanal	Cytosol
IAC(c)	Indole-3-acetamide	Cytosol
IAMAC(c)	isoamyl acetate	Cytosol
IAMOH(c)	Isoamyl alcohol	Cytosol
IASP(c)	Iminoaspartate	Cytosol
IBUTAC(c)		
	isobutyl acetate	Cytosol
IBUTOH(c)	isobutyl alcohol	Cytosol
ICIT(c)	Isocitrate	Cytosol
ID3ACAL(c)	Indole-3-acetaldehyde	Cytosol
IDP(c)	IDP	Cytosol
ILE(c)	L-Isoleucine	Cytosol
ILEtrna(c)	L-Isoleucyl-tRNA(IIe)	Cytosol
IMACP(c)	3-(Imidazol-4-yl)-2-oxopropyl phosphate	Cytosol
IMP(c)	IMP	Cytosol
IND3AC(c)	Indole-3-acetate	Cytosol
IND3ACNL(c)	Indole-3-acetonitrile	Cytosol
IND3ETH(c)	Indole-3-ethanol	Cytosol
INDPYR(c)	Indolepyruvate	Cytosol
INOST(c)	myo-Inositol	Cytosol
INS(c)	Inosine	Cytosol
IPDP(c)	Isopentenyl diphosphate	Cytosol
ITP(c)	ITP	Cytosol
K(c)	potassium	Cytosol
2AADP(c)	L-2-Aminoadipate	Cytosol
2AADP6SA(c)	L-2-Aminoadipate 6-semialdehyde	Cytosol
DLAC(c)	D-Lactate	Cytosol
LAC(c)	Lactate	Cytosol
LALD(c)	Lactaldehyde Lanosterol	Cytosol Cytosol
LANOST(c)		•
LANOSTEST(c)	lanosterol ester	Cytosol
LCYSTIN(c)	L-Cystine	Cytosol
LEU(c)	Leucine	Cytosol
LEUtrna(c)	Leucyl-tRNA(Leu)	Cytosol
LFMKYNR(c)	L-Formylkynurenine	Cytosol
LGT(c)	(R)-Sactoylglutathione	Cytosol
LKYNR(c)	L-Kynurenine	Cytosol
LYS(c)	Lysine	Cytosol
LYStrna(c)	Lysine-tRNA (Lys)	Cytosol
MALACP(c)	Malonyl-[acyl-carrier protein]	Cytosol
MALCOA(c)	Malonyl-CoA	Cytosol
MAL(c)	L-Malate	Cytosol
MALSA	Malonate semialdehyde	Cytosol
MALT(c)	Maltose	Cytosol
MAN(c)	D-Mannose	Cytosol
MAN1P(c)	D-Mannose 1-phosphate	Cytosol
MAN2MI1P-C(c)	Mannose-(inositol-P)2	Cytosol
		Cy10301

NAANCD(-)	D. Manusca C. uhasuhata	C.+I
MANAPACA	D-Mannose 6-phosphate	Cytosol
MANMI1P-C(c)	mannose-1D-myo-Inositol 1-phosphate	Cytosol
MANNAN(c) MELIB(c)	Mannan Melibiose	Cytosol Cytosol
MELT(c)	melibiitol	Cytosol
METHF(c)	5,10-Methenyltetrahydrofolate	Cytosol
MET(c)	L-Methionine	Cytosol
METtrna(c)	L-Methionyl-tRNA (Met)	Cytosol
MEV(c)	(R)-Mevalonate	Cytosol
MHIS(c)	1-Methylhistidine	Cytosol
MHPGLU(c)	5-Methyltetrahydropteroyltri-glutamate	Cytosol
MI13456P(c)	1D-myo-Inositol 1,3,4,5,6-pentakisphosphate	Cytosol
MI145P(c)	1D-myo-Inositol 1,4,5-trisphosphate	Cytosol
MI1P-C(c)	1D-myo-Inositol 1-phosphate	Cytosol
MINOHP(c)	myo-Inositol hexakisphosphate	Cytosol
MLTHF(c)	5,10-Methylenetetrahydrofolate	Cytosol
MMET(c)	S-Methyl-methionine	Cytosol
MTHGXL(c)	Methylglyoxal	Cytosol
C140ACP(c)	Myristoyl-ACP (n-C14:0ACP)	Cytosol
N1ASPMD(c)	N1-Acetylspermidine	Cytosol
N1SPRM(c)	N1-Acetylspermine	Cytosol
N4ABUTN(c)	N4-Acetylaminobutanal	Cytosol
NA1(c)	Sodium	Cytosol
NAC(c)	Nicotinate	Cytosol
NAD(c)	Nicotinamide adenine dinucleotide	Cytosol
NADH(c)	Nicotinamide adenine dinucleotide - reduced	Cytosol
NADP(c)	Nicotinamide adenine dinucleotide phosphate	Cytosol
NADPH(c)	Nicotinamide adenine dinucleotide phosphate - reduced	Cytosol
NAGA	N-Acetyl-D-glucosamine	Cytosol
NAGAD	N-Acetyl-D-glucosaminide	Cytosol
NBFORTYR(c)	N,N-bisformyl-dityrosine	Cytosol
NCAM(c)	Nicotinamide	Cytosol
NFORTYR(c)	N-Formyl-tyrosine	Cytosol
NH4(c)	Ammonium	Cytosol
NICRNT(c)	Nicotinate D-ribonucleotide	Cytosol
NMN(c)	NMN	Cytosol
O2(c)	02	Cytosol
OAA(c)	Oxaloacetate	Cytosol
C080COA(c)	Octanoyl-CoA (n-C8:0CoA)	Cytosol
C180(c)	octadecanoate (n-C18:0)	Cytosol
C180ACP(c)	Octadecanoyl-ACP (n-C18:0ACP)	Cytosol
C181(c)	octadecenoate (n-C18:1)	Cytosol
C182(c)	octadecadienoate (n-C18:2) Octadecynoyl-ACP (n-C18:2ACP)	Cytosol
C182ACP(c) C182COA(c)		Cytosol
C182COA(c)	Octadecynoyl-CoA (n-C18:2CoA) octanoate (n-C8:0)	Cytosol Cytosol
C181ACP(c) C181COA(c)	cis-octadec-11-enoyl-[acyl-carrier protein] (n-C18:1) Octadecenoyl-CoA (n-C18:1CoA)	Cytosol Cytosol
OH1(c)	hydroxide ion	Cytosol
OHPB(c)	2-Oxo-3-hydroxy-4-phosphobutanoate	Cytosol
ORN(c)	Ornithine	Cytosol
OROT(c)	Orotate	Cytosol
OROT5P(c)	Orotidine 5'-phosphate	Cytosol
OXAG(c)	Oxaloglutarate	Cytosol
PA(c)	Phosphatidate	Cytosol
PAC(c)	Phenylacetic acid	Cytosol
PACAL(c)	Phenylacetaldehyde	Cytosol
PAD(c)	2-Phenylacetamide	Cytosol
C160ACP(c)	Palmitoyl-ACP (n-C16:0ACP)	Cytosol
PAN4P(c)	Pantetheine 4'-phosphate	Cytosol
PANT(c)	(R)-Pantoate	Cytosol
PAP(c)	Adenosine 3',5'-bisphosphate	Cytosol
PAPS(c)	3'-Phosphoadenylyl sulfate	Cytosol
PC(c)	Phosphatidylcholine	Cytosol

PDX5P(c)	Pyridoxine 5'-phosphate	Cytosol
PE(c)	phosphatidylethanolamine	Cytosol
PENDP(c)	all-trans-Pentaprenyl diphosphate	Cytosol
PEP(c)	Phosphoenolpyruvate	Cytosol
PEPC(c)	peptide	Cytosol
PHEAC(c)	Phenethyl acetate	Cytosol
PHE(c)	L-Phenylalanine	Cytosol
PHEtrna(c)	L-Phenylalanyl-tRNA(Phe)	Cytosol
PHPYR(c)	Phenylpyruvate	Cytosol
PHTHR(c)	O-Phospho-4-hydroxy-threonine	Cytosol
Pi(c)	Phosphate	Cytosol
C160COA(c)	Palmitoyl-CoA (n-C16:0CoA)	Cytosol
PNTO-R(c)	(R)-Pantothenate	Cytosol
PPBNG(c)	Porphobilinogen	Cytosol
PPHN(c)	Prephenate	Cytosol
PPHSER	O-Phosphorylhomoserine	Cytosol
PPi(c)	Diphosphate	Cytosol
PPMI12346P(c)	5-Diphosphoinositol pentakisphosphate	Cytosol
PPMI1346P(c)	Diphosphoinositol tetrakisphosphate	Cytosol
PPPG9(c)	Protoporphyrinogen IX	Cytosol
PRAM(c)	5-Phospho-beta-D-ribosylamine	Cytosol
PRAN(c)	N-(5-Phospho-D-ribosyl)anthranilate	Cytosol
PRBAMP(c)	1-(5-Phosphoribosyl)-AMP	Cytosol
PRBATP(c)	1-(5-Phosphoribosyl)-ATP	Cytosol
PRFP(c)	1-(5-Phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino]imidazole-	Cytosol
PRLP(c)	5-[(5-phospho-1-deoxyribulos-1-ylamino)methylideneamino]-1-(5-phosphoribo	Cytosol
PRO(c)	L-Proline	Cytosol
PROtrna(c)	L-Prolyl-tRNA(Pro)	Cytosol
PRPP(c)	5-Phospho-alpha-D-ribose 1-diphosphate	Cytosol
PS(c)	phosphatidylserine	Cytosol
PSD5P(c)	Pseudouridine 5'-phosphate	Cytosol
PSER(c)	O-Phospho-serine	Cytosol
PSPH1P(c)	Phytosphingosine 1-phosphate	Cytosol
PSPHINGS(c)	Phytosphingosine	Cytosol
PTD134BP(c)	phosphatidyl-1D-myo-inositol 3,4-bisphosphate	Cytosol
PTD135BP(c)	1-Phosphatidyl-D-myo-inositol 3,5-bisphosphate	Cytosol
PTD145BP(c)	1-Phosphatidyl-D-myo-inositol 4,5-bisphosphate	Cytosol
PTD1INO(c)	phosphatidyl-1D-myo-inositol	Cytosol
PTD2MEETA(c)	Phosphatidyl-N-dimethylethanolamine	Cytosol
PTD3INO(c)	phosphatidyl-1D-myo-3-inositol	Cytosol
PTD4INO(c)	phosphatidyl-1D-myo-4-inositol, yeast specific	Cytosol
PTDMEETA(c)	Phosphatidyl-N-methylethanolamine	Cytosol
PTRC(c)	Putrescine	Cytosol
PYAM5P(c)	Pyridoxamine 5'-phosphate	Cytosol
PYDAM(c)	Pyridoxamine	Cytosol
PYDX(c)	Pyridoxal	Cytosol
PYDX5P(c)	Pyridoxal 5'-phosphate	Cytosol
PYDXN(c)	Pyridoxine	Cytosol
PYR(c)	Pyruvate	Cytosol
qULN(c)	Quinolinate	Cytosol
R1P(c)	alpha-D-Ribose 1-phosphate	Cytosol
R5P(c)	alpha-D-Ribose 5-phosphate	Cytosol
RAFFIN(c)	Raffinose	Cytosol
RIB(c)	D-Ribose	Cytosol
RIBFLV(c)	Riboflavin	Cytosol
RNAM(c)	N-Ribosylnicotinamide	Cytosol
RU5P(c)	D-Ribulose 5-phosphate	Cytosol
S(c) S17RD(c)	Sulfur Sadohentulose 1.7-hisphosphate	Cytosol
S17BP(c)	Sedoheptulose 7-phosphate	Cytosol
S7P(c) SACCRP(c)	Sedoheptulose 7-phosphate L-Saccharopine	Cytosol Cytosol
SALCA SALA	3-Sulfinoalanine	Cytosol
DSBT(c)	D-Sorbitol	Cytosol
SBT(c)	L-Sorbitol	Cytosol
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SCL(c)	sirohydrochlorin	Cytosol
SENCYS	Selenocysteine	Cytosol
SER(c)	L-Servit +DNA/Ser\	Cytosol
SERtrna(c)	L-Seryl-tRNA(Ser)	Cytosol
SFGLUTTH(c)	S-Formylglutathione Siroheme	Cytosol Cytosol
SHEME(c) SKM(c)	Shikimate	Cytosol
SKM5P(c)	Shikimate S-phosphate	Cytosol
SLCYSTH	Selenocystathionine	Cytosol
SO3(c)	Sulfite	Cytosol
SO4(c)	Sulfate	Cytosol
SPH1P(c)	Sphinganine 1-phosphate	Cytosol
SPHGN(c)	Sphinganine	Cytosol
SPMD(c)	Spermidine	Cytosol
SPRM(c)	Spermine	Cytosol
SPYR	3-Sulfinylpyruvate	Cytosol
SqL(c)	Squalene	Cytosol
SRB(c)	L-Sorbose	Cytosol
SSq23EPX(c)	(S)-Squalene-2,3-epoxide	Cytosol
C180COA(c)	Stearoyl-CoA (n-C18:0CoA)	Cytosol
SUCC(c)	Succinate	Cytosol
SUCHMS	O-Succinylhomoserine	Cytosol
SUCR(c)	Sucrose	Cytosol
SUCSAL(c)	Succinic semialdehyde	Cytosol
TAG6P(c)	D-Tagatose 6-phosphate	Cytosol
TAGDP(c)	D-Tagatose 1,6-biphosphate	Cytosol
TAUR(c)	Taurine	Cytosol
TCHOLA(c)	taurocholic acid	Cytosol
TCYS	Thiocysteine	Cytosol
C140COA(c)	Tetradecanoyl-CoA (n-C14:0CoA)	Cytosol
C141ACP(c)	cis-tetradec-7-enoyl-[acyl-carrier protein] (n-C14:1)	Cytosol
C141COA(c)	Tetradecenoyl-CoA (n-C14:1CoA)	Cytosol
TGLP(c)	N-Tetradecanoylglycylpeptide	Cytosol
THF(c)	5,6,7,8-Tetrahydrofolate	Cytosol
THFGLU(c)	Tetrahydrofolyl-[Glu](2)	Cytosol
THM(c)	Thiamin	Cytosol
THMMP(c)	Thiamin monophosphate	Cytosol
THMPP(c)	Thiamine diphosphate	Cytosol
THMTP(c)	Thiamin triphosphate	Cytosol
THR(c)	L-Threonine	Cytosol
THRtrna(c)	L-Threonyl-tRNA(Thr)	Cytosol
THYM(c)	Thymine Thymidine	Cytosol
THYMD(c)	Oxidized thioredoxin	Cytosol
TRDOX(c) TRDRD(c)	Reduced thioredoxin	Cytosol Cytosol
TRE(c)	Trehalose	Cytosol
TRE6P(c)	alpha,alpha'-Trehalose 6-phosphate	Cytosol
TRIGLYC(c)	triglyceride	Cytosol
trnaALA(c)	tRNA(Ala)	Cytosol
trnaARG(c)	tRNA(Arg)	Cytosol
trnaASN(c)	tRNA(Asn)	Cytosol
trnaASP(c)	tRNA(Asp)	Cytosol
trnaCYS(c)	tRNA(Cys)	Cytosol
trnaGLN(c)	tRNA(Gln)	Cytosol
trnaGLU(c)	tRNA (Glu)	Cytosol
trnaGLY(c)	tRNA(Gly)	Cytosol
trnaHIS(c)	tRNA(His)	Cytosol
trnalLE(c)	tRNA(IIe)	Cytosol
trnaLEU(c)	tRNA(Leu)	Cytosol
trnaLYS(c)	tRNA(Lys)	Cytosol
trnaMET(c)	tRNA(Met)	Cytosol
trnaPHE(c)	tRNA(Phe)	Cytosol
trnaPRO(c)	tRNA(Pro)	Cytosol
trnaSER(c)	tRNA(Ser)	Cytosol

trnaTHR(c) tRNA(Thr) Cytosol trnaTRP(c) tRNA(Trp) Cytosol trnaTYR(c) tRNA(Tyr) Cytosol trnaVAL(c) tRNA(Val) Cytosol TRP(c) Cytosol L-Tryptophan TRPtrna(c) L-Tryptophanyl-tRNA(Trp) Cytosol C140(c) tetradecanoate (n-C14:0) Cytosol C141(c) tetradecenoate (n-C14:1) Cytosol TYR(c) L-Tyrosine Cytosol TYRtrna(c) L-Tyrosyl-tRNA(Tyr) Cytosol UDP(c) Cytosol UDP UDP-N-acetyl-D-galactosamine Cytosol UDPACGAL(c) UDPG(c) **UDPglucose** Cytosol UDPGAL(c) **UDPgalactose** Cytosol UMP(c) **UMP** Cytosol UPPG3(c) Uroporphyrinogen III Cytosol URA(c) Uracil Cytosol **URAT** Cytosol Urate URDGLYC(c) (-)-Ureidoglycolate Cytosol UREA(c) Urea Cytosol URI(c) Uridine Cytosol UTP(c) UTP Cytosol VAL(c) L-Valine Cytosol VALtrna(c) L-Valyl-tRNA(Val) Cytosol XAN(c) Xanthine Cytosol XMP(c) Xanthosine 5'-phosphate Cytosol XTSN(c) Cytosol Xanthosine D-Xylulose 5-phosphate XU5P(c) Cytosol XYL(c) D-Xylose Cytosol XYLT(c) Xvlitol Cvtosol XYLU(c) D-Xvlulose Cvtosol ZYM INT1(c) zymosterol intermediate 1 Cytosol ZYM_INT2(c) zymosterol intermediate 2 Cytosol ZYMST(c) zymosterol Cytosol ZYMSTEST(c) zymosterol ester Cytosol 6-phospho-D-glucono-1,5actone **Endoplasmic Reticulum** 6PGL(r) COA(r) Coenzyme A **Endoplasmic Reticulum** Dolichyl phosphate D-mannose DOLMANP(r) **Endoplasmic Reticulum** DOLP(r) Dolichol phosphate **Endoplasmic Reticulum** ERGST(r) Ergosterol **Endoplasmic Reticulum** ERGTETROL(r) Ergosta-5,7,22,24,(28)-tetraen-3beta-ol **Endoplasmic Reticulum** G6P(r) D-Glucose 6-phosphate **Endoplasmic Reticulum** H(r) H+ **Endoplasmic Reticulum** H2O(r) H20 **Endoplasmic Reticulum** MANNAN(r) Mannan **Endoplasmic Reticulum** NAD(r) Nicotinamide adenine dinucleotide **Endoplasmic Reticulum** NADH(r) Nicotinamide adenine dinucleotide - reduced **Endoplasmic Reticulum** NADP(r) Nicotinamide adenine dinucleotide phosphate **Endoplasmic Reticulum** NADPH(r) Nicotinamide adenine dinucleotide phosphate - reduced **Endoplasmic Reticulum Endoplasmic Reticulum** O2(r) Pi(r) Phosphate **Endoplasmic Reticulum** PSPH1P(r) Phytosphingosine 1-phosphate **Endoplasmic Reticulum** PSPHINGS(r) Phytosphingosine **Endoplasmic Reticulum** SPH1P(r) Sphinganine 1-phosphate **Endoplasmic Reticulum** SPHGN(r) Sphinganine **Endoplasmic Reticulum** SqL(r) Squalene **Endoplasmic Reticulum** SSq23EPX(r) (S)-Squalene-2,3-epoxide **Endoplasmic Reticulum** 13BDGLCN(e) 1,3-beta-D-Glucan External 2HB(e) 2-Hydroxybutyrate External 2-methylbutyl acetate External 2MBAC(e) 2PHETOH(e) 2-phenylethanol External 3C3HMP(e) 3-Carboxy-3-hydroxy-4-methylpentanoate External 3MBALC(e) 3-Methylbutanal External

External

3MOP(e)

(S)-3-Methyl-2-oxopentanoate

4ABUT(e)	4-Aminobutanoate	External
4ABZ(e)	4-Aminobenzoate	External
5AOP(e)	5-Amino-4-oxopentanoate	External
8AONN(e)	8-Amino-7-oxononanoate	External
ABT(e)	L-Arabinitol	External
AC(e)	Acetate	External
ACALC(e)	Acetaldehyde	External
ACES(e)	Acetic ester	External
ADE(e)	Adenine	External
ADN(e)	Adenosine	External
AKG(e)	2-Oxoglutarate	External
ALA(e)	L-Alanine	External
ALLTN(e)	Allantoin	External
ALLTT(e)	Allantoate	External
SAM(e)	S-Adenosyl-methionine	External
DARAB(e)	D-Arabinose	External
ARAB(e)	L-Arabinose	External
ARG(e)	L-Arginine	External
ARS(e)	Arsenite	External
ASN(e)	L-Asparagine	External
ASP(e)	L-Aspartate	External
BTN(e)	Biotin	External
CHOL(e)	Choline	External
CO2(e)	CO2	External
CRN(e)	L-Carnitine	External
CSN(e)	Cytosine	External
CYS(e)	L-Cysteine	External
CYTC(e)	Cytidine	External
DAD(e)	Deoxyadenosine	External
DANN(e)	7,8-Diaminononanoate	External
C100(e)	Decanoate (n-C10:0)	External
DCYT(e)	Deoxycytidine	External
C120(e)	Dodecanoate (n-C12:0)	External
DGSN(e)	Deoxyguanosine	External
DIN(e)	Deoxyinosine	External
dTTP(e)	dTTP	External
DURI(e)	Deoxyuridine	External
EPIST(e)	episterol	External
EPISTEST(e)	episterol ester	External
ERGST(e)	Ergosterol	External
ERGSTEST(e)	ergosterol ester	External
ETHA(e)	Ethanolamine	External
ETOH(e)	Ethanol	External
FE2(e)	Fe2+	External
FECOST(e)	fecosterol	External
FECOSTEST(e)	fecosterol ester	External
FMN(e)	FMN	External
FORM(e)	Formate	External
FRU(e)	D-Fructose	External
FUM(e)	Fumarate	External
G3PC(e)	sn-Glycero-3-phosphocholine	External
G3Pi(e)	sn-Glycero-3-phospho-1-inositol	External
GAL(e)	D-Galactose	External
GALUR(e)	D-Galacturonate	External
GAM6P(e)	D-Glucosamine 6-phosphate	External
GCALC(e)	Glycolaldehyde	External
GLC(e)	D-Glucose	External
GLN(e)	L-Glutamine	External
GLU(e)	L-Glutamate	External
GLX(e)	Glyoxylate	External
GLY(e)	Glycine	External
GL(e)	Glycerol	External
GSN(e)	Guanosine	External
GTHOX(e)	Oxidized glutathione	External

GTHRD(e)	Reduced glutathione	External
GUA(e)	Guanine	External
H(e)	H+	External
H2O(e)	H2O	External
C160(e)	Hexadecanoate (n-C16:0)	External
C161(e)	Hexadecenoate (n-C16:1)	External
HIS(e)	L-Histidine	External
HXAN(e)	Hypoxanthine	External
IAMAC(e)	isoamyl acetate	External
IAMOH(e)	Isoamyl alcohol	External
IBUTAC(e)	isobutyl acetate	External
IBUTOH(e)	isobutyl alcohol	External
ID3ACALD(e)	Indole-3-acetaldehyde	External
ILE(e)	L-Isoleucine	External
IND3ETH(e)	Indole-3-ethanol	External
INOST(e)	myo-Inositol	External
INS(e)	Inosine	External
K(e)	potassium Dactate	External External
LACD(e) LAC(e)	Lactate	External
LAC(e)	Lanosterol	External
LANOSTEST(e)	lanosterol ester	External
LEU(e)	Leucine	External
LYS(e)	Lysine	External
MAL(e)	L-Malate	External
MALT(e)	Maltose	External
MAN(e)	D-Mannose	External
MELIB(e)	Melibiose	External
MET(e)	L-Methionine	External
MMET(e)	S-Methyl-methionine	External
NA1(e)	Sodium	External
NAC(e)	Nicotinate	External
NADP(e)	Nicotinamide adenine dinucleotide phosphate	External
NBFORTYR(e)	N,N-bisformyl-dityrosine	External
NH4(e)	Ammonium	External
NMN(e)	NMN	External
O2(e)	02	External
OAA(e)	Oxaloacetate	External
C180(e) C181(e)	octadecanoate (n-C18:0) octadecenoate (n-C18:1)	External External
C182(e)	octadecadienoate (n-C18:2)	External
ORN(e)	Ornithine	External
PACALD(e)	Phenylacetaldehyde	External
PAP(e)	Adenosine 3',5'-bisphosphate	External
PC(e)	Phosphatidylcholine	External
PECTIN(e)	Pectin	External
PEPD(e)	peptide	External
PHEAC(e)	Phenethyl acetate	External
PHE(e)	L-Phenylalanine	External
Pi(e)	Phosphate	External
PNTO-R(e)	(R)-Pantothenate	External
PRO(e)	L-Proline	External
PTD1INO(e)	phosphatidyl-1D-myo-inositol	External
PTRC(e)	Putrescine	External
PYR(e)	Pyruvate	External
DRIB(e)	D-Ribose Riboflavia	External
RIBFLV(e) DSBT(e)	Riboflavin D-Sorbitol	External External
SBT(e)	L-Sorbitol	External
SER(e)	L-Serine	External
SO3(e)	Sulfite	External
SO4(e)	Sulfate	External
SPMD(e)	Spermidine	External
SPRM(e)	Spermine	External

CDD/a)		
SRB(e)	L-Sorbose	External
SUCC(e)	Succinate	External
SUCR(e)	Sucrose	External
TAUR(e)	Taurine	External
THM(e)	Thiamin	External
THMMP(e)	Thiamin monophosphate	External
THMPP(e)	Thiamine diphosphate	External
THR(e)	L-Threonine	External
THYM(e)	Thymine	External
THYMD(e)	Thymidine	External
TRE(e)	Trehalose	External
TRP(e)	L-Tryptophan	External
C140(e)	tetradecanoate (n-C14:0)	External
TYR(e)	L-Tyrosine	External
URA(e)	Uracil	External
UREA(e)	Urea	External
URI(e)	Uridine	External
VAL(e)	L-Valine	External
XAN(e)	Xanthine	External
XTSN(e)	Xanthosine	External
DXYL(e)	D-Xylose	External
XYLT(e)	Xylitol	External
ZYMST(e)	zymosterol	External
ZYMSTEST(e)	zymosterol ester	External
ADP(g)	ADP	Golgi Apparatus
ATP(g)	ATP	Golgi Apparatus
CO2(g)	CO2	Golgi Apparatus
GDP(g)	GDP	Golgi Apparatus
GDPMANN(g)	GDP-D-mannose	Golgi Apparatus
GMP(g)	GMP	Golgi Apparatus
H(g)	H+	Golgi Apparatus
H2O(g)	H2O	Golgi Apparatus
M1MADCHITPPCOL(g)	alpha-D-mannosyl-beta-D-mannosyl-diacylchitobiosyldiphosphodolichol	Golgi Apparatus
M2MADCHITPPCOL(g)	(alpha-D-mannosyl)2-beta-D-mannosyl-diacetylchitobiosyldiphosphodolichol	Golgi Apparatus
M3MADCHITPPCOL(g)	(alpha-D-mannosyl)3-beta-D-mannosyl-diacetylchitodiphosphodolichol	Golgi Apparatus
M4MADCHITPPCOL(g)	(alpha-D-Mannosyl)4-beta-D-mannosyl-diacetylchitobiosyldiphosphodolichol	Golgi Apparatus
MADCHITPPCOL(g)	beta-D-Mannosyldiacetylchitobiosyldiphosphodolichol	Golgi Apparatus
PE(g)	phosphatidylethanolamine	Golgi Apparatus
Pi(g)	Phosphate	Golgi Apparatus
PS(g)		
	phosphatidylserine	Golgi Apparatus
UDPGAL(g)	UDPgalactose	Golgi Apparatus
UDPGAL(g) 10FTHF(m)	UDPgalactose 10-Formyltetrahydrofolate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate	Golgi Apparatus Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate	Golgi Apparatus Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m) 2DHP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxy-1hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone	Golgi Apparatus Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2MCIT(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxy-1horoxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2MCIT(m) 2OBUT(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2MCIT(m) 2OXOADP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate 2-Oxoadipate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2AHHMP(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMMBq(m) 2HPMMBq(m) 2MCIT(m) 2OXOADP(m) 2PHETOH(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate 2-Oxoadipate 2-phenylethanol	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2OBUT(m) 2OXOADP(m) 2PHETOH(m) 34HPL(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate 2-Oxoadipate 2-phenylethanol 3-(4-Hydroxyphenyl)lactate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2MCIT(m) 2OSOADP(m) 2PHETOH(m) 34HPL(m) 34HPP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate 2-Oxoadipate 2-phenylethanol 3-(4-Hydroxyphenyl)lactate 3-(4-Hydroxyphenyl)pyruvate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2MCIT(m) 2OSOADP(m) 2PHETOH(m) 34HPP(m) 3C3HMP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate 2-Oxoadipate 2-phenylethanol 3-(4-Hydroxyphenyl)lactate 3-(4-Hydroxyphenyl)pyruvate 3-Carboxy-3-hydroxy-4-methylpentanoate	Golgi Apparatus Mitochondria
UDPGAL(g) 10FTHF(m) 1P3H5C(m) 1PYR5C(m) 23DHMB(m) 23dHMP(m) 2AHBUT(m) 2AHHMD(m) 2DCA7P(m) 2DHP(m) 2HP6MBq(m) 2HP6MP(m) 2HPMHMBq(m) 2HPMMBq(m) 2MCIT(m) 2OSOADP(m) 2PHETOH(m) 34HPL(m) 34HPP(m)	UDPgalactose 10-Formyltetrahydrofolate L-1-Pyrroline-3-hydroxy-5-carboxylate 1-Pyrroline-5-carboxylate (R)-2,3-Dihydroxy-3-methylbutanoate (R)-2,3-Dihydroxy-3-methylpentanoate (S)-2-Aceto-2-hydroxybutanoate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate 2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine 2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate 2-Dehydropantoate 2-Hexaprenyl-6-methoxy-1,4-benzoquinone 2-Hexaprenyl-6-methoxyphenol 2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone 2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone 2-Methylcitrate 2-Oxobutanoate 2-Oxoadipate 2-phenylethanol 3-(4-Hydroxyphenyl)lactate 3-(4-Hydroxyphenyl)pyruvate	Golgi Apparatus Mitochondria

3HPH5MB(m)	3-Hexaprenyl-4-hydroxy-5-methoxybenzoate	Mitochondria
3MOB(m)	3-Methyl-2-oxobutanoate	Mitochondria
3MOP(m)	(S)-3-Methyl-2-oxopentanoate	Mitochondria
3OPHB_5(m)	3-Hexaprenyl-4-hydroxybenzoate	Mitochondria
4ABUT(m)	4-Aminobutanoate	Mitochondria
4ABUTN(m)	4-Aminobutanal	Mitochondria
4ABZ(m)	4-Aminobenzoate	Mitochondria
4H2OGLT(m)	4-Hydroxy-2-oxoglutarate	Mitochondria
4HBZ(m)	4-Hydroxybenzoate	Mitochondria
4HBZCOA(m)	4-hydroxybenoyl-CoA	Mitochondria
4HGLUSA(m)	L-4-Hydroxyglutamate semialdehyde	Mitochondria
4HPROLT(m)	trans-4-Hydroxy-proline	Mitochondria
4MOP(m)	4-Methyl-2-oxopentanoate	Mitochondria
5AOP(m)	5-Amino-4-oxopentanoate	Mitochondria
5FTHF(m)	5-Formyltetrahydrofolate	Mitochondria
AACOA(m)	Acetoacetyl-CoA	Mitochondria
AC(m)	Acetate	Mitochondria
ACACP(m)	Acetyl-ACP	Mitochondria
ACAL(m)	Acetaldehyde	Mitochondria
ACCOA(m)	Acetyl-CoA	Mitochondria
ACG5P(m)	N-Acetyl-glutamyl 5-phosphate	Mitochondria
ACG5SA(m)	N-Acetyl-glutamate 5-semialdehyde	Mitochondria
ACGLU(m)	N-Acetyl-glutamate	Mitochondria
ACORN(m)	N2-Acetyl-ornithine	Mitochondria
ACP(m)	acyl carrier protein	Mitochondria
ACRN(m)	O-Acetylcarnitine	Mitochondria
ADE(m)	Adenine	Mitochondria
ADN(m)	Adenosine	Mitochondria
ADP(m)	ADP	Mitochondria
ADPRIB(m)	ADPribose	Mitochondria
` '		Mitochondria
AHCYS(m)	S-Adenosyl-homocysteine	
AKG(m)	2-Oxoglutarate	Mitochondria
ALACS(m)	(S)-2-Acetolactate	Mitochondria
ALA(m)	L-Alanine	Mitochondria
ALPAM(m)	S-aminomethyldihydrolipoamide	Mitochondria
ALPRO(m)	S-Aminomethyldihydrolipoylprotein	Mitochondria
SAM(m)	S-Adenosyl-methionine	Mitochondria
AMP(m)	AMP	Mitochondria
ARG(m)	L-Arginine	Mitochondria
ARGtrna(m)	L-Arginyl-tRNA(Arg)	Mitochondria
ASN(m)	L-Asparagine	Mitochondria
ASNtrna(m)	L-Asparaginyl-tRNA(Asn)	Mitochondria
ASP(m)	L-Aspartate	Mitochondria
ASPtrna(m)	L-Aspartyl-tRNA(Asp)	Mitochondria
ATP(m)	ATP	Mitochondria
B124TC(m)	But-1-ene-1,2,4-tricarboxylate	Mitochondria
CDPCAG(m)	CDPdiacylglycerol	Mitochondria
CIT(m)	Citrate	Mitochondria
CLPN(m)	Cardiolipin	Mitochondria
CMP(m)	CMP	Mitochondria
CO2(m)	CO2	Mitochondria
COA(m)	Coenzyme A	Mitochondria
COUCOA(m)	p-coumaroyl-CoA	Mitochondria
CRN(m)	L-Carnitine	Mitochondria
CTP(m)	СТР	Mitochondria
C100ACP(m)	Decanoyl-ACP (n-C10:0ACP)	Mitochondria
C120ACP(m)	Dodecanoyl-ACP (n-C12:0ACP)	Mitochondria
DHAP(m)	Dihydroxyacetone phosphate	Mitochondria
DHF(m)	7,8-Dihydrofolate	Mitochondria
DHLAM(m)	Dihydrolipoamide	Mitochondria
DHLPRO(m)	Dihydrolipolprotein	Mitochondria
DHNPT(m)	Dihydroneopterin	Mitochondria
DHPT(m)	Dihydropteroate	Mitochondria
DNAD(m)	Danning NAD	Mitochondria

Mitochondria

DNAD(m)

Deamino-NAD+

DPDOA(m) Dephospho-CoA Mitochondria E4HGLU(m) L-erythro-4-Hydroxyglutamate Mitochondria E4P(m) D-Erythrose 4-phosphate Mitochondria ETOH(m) Ethanol Mitochondria Flavin adenine dinucleotide oxidized FAD(m) Mitochondria FADH2(m) Flavin adenine dinucleotide reduced Mitochondria FE2(m) Fe2+ Mitochondria FICYTC(m) Ferricytochrome c Mitochondria FMETtrna(m) N-Formylmethionyl-tRNA Mitochondria FMN(m) Mitochondria FOCYTC(m) Ferrocytochrome c Mitochondria Mitochondria FORM(m) **Formate** FRDP(m) Farnesyl diphosphate Mitochondria FUM(m) **Fumarate** Mitochondria GCAL(m) Glycolaldehyde Mitochondria GDP(m) GDP Mitochondria L-Glutamate 5-semialdehyde GLU5SA(m) Mitochondria GLU(m) L-Glutamate Mitochondria L-Glutamyl-tRNA(Glu) GLUtrna(m) Mitochondria GLY(m) Glycine Mitochondria GLYC3P(m) Glycerol 3-phosphate Mitochondria GSN(m) Guanosine Mitochondria GTHOX(m) Oxidized glutathione Mitochondria GTHRD(m) Reduced glutathione Mitochondria GTP(m) GTP Mitochondria GUA(m) Guanine Mitochondria H(m) H+ Mitochondria H20 Mitochondria H2O(m) Mitochondria H2O2(m) Hydrogen peroxide HCIT(m) 2-Hydroxybutane-1,2,4-tricarboxylate Mitochondria HCO3(m) Bicarbonate Mitochondria C161ACP(m) cis-hexadec-9-enoyl-[acyl-carrier protein] (n-C16:1) Mitochondria Mitochondria HemeA(m) Heme A Mitochondria HemeO(m) Heme O Mitochondria HEXDP(m) all-trans-Hexaprenyl diphosphate HICIT(m) Homoisocitrate Mitochondria HIS(m) L-Histidine Mitochondria L-Histidyl-tRNA(His) HIStrna(m) Mitochondria HMGCOA(m) Hydroxymethylglutaryl-CoA Mitochondria IAMOH(m) Isoamyl alcohol Mitochondria IBUTOH(m) isobutyl alcohol Mitochondria ICIT(m) Isocitrate Mitochondria ID3ACAL(m) Indole-3-acetaldehyde Mitochondria IDP(m) Mitochondria ILE(m) L-Isoleucine Mitochondria ILEtrna(m) L-Isoleucyl-tRNA(Ile) Mitochondria IND3AC(m) Indole-3-acetate Mitochondria IND3ETH(m) Indole-3-ethanol Mitochondria IPDP(m) Isopentenyl diphosphate Mitochondria ITACCOA(m) Itaconyl-CoA Mitochondria Mitochondria ITACON(m) Itaconate Mitochondria ITP ITP(m) DLAC(m) Mitochondria D-Lactate Mitochondria LAC(m) Lactate LEU(m) Leucine Mitochondria LEUtrna(m) Leucyl-tRNA(Leu) Mitochondria LGT(m) (R)-Sactoylglutathione Mitochondria LPAM(m) Lipoamide Mitochondria LPRO(m) Lipoylprotein Mitochondria Mitochondria LYS(m) Lysine LYStrna(m) Lysine-tRNA (Lys) Mitochondria MALACP(m) Malonyl-[acyl-carrier protein] Mitochondria

Mitochondria

Mitochondria

MALCOA(m)

MAL(m)

Malonyl-CoA

L-Malate

METHF(m) 5,10-Methenyltetrahydrofolate Mitochondria MET(m) I-Methionine Mitochondria METtrna(m) L-Methionyl-tRNA (Met) Mitochondria MICIT(m) methylisocitrate Mitochondria MLTHF(m) 5,10-Methylenetetrahydrofolate Mitochondria Myristoyl-ACP (n-C14:0ACP) C140ACP(m) Mitochondria NAC(m) **Nicotinate** Mitochondria NAD(m) Nicotinamide adenine dinucleotide Mitochondria NADH(m) Nicotinamide adenine dinucleotide - reduced Mitochondria NADP(m) Nicotinamide adenine dinucleotide phosphate Mitochondria NADPH(m) Nicotinamide adenine dinucleotide phosphate - reduced Mitochondria Mitochondria NCAM(m) Nicotinamide NH4(m) Ammonium Mitochondria NICRNT(m) Nicotinate D-ribonucleotide Mitochondria NMN(m) NMN Mitochondria Mitochondria O2(m) 02 OAA(m) Oxaloacetate Mitochondria Octanoyl-ACP (n-C8:0ACP) C080ACP(m) Mitochondria Octadecanoyl-ACP (n-C18:0ACP) C180ACP(m) Mitochondria C182ACP(m) Octadecynoyl-ACP (n-C18:2ACP) Mitochondria C181ACP(m) cis-octadec-11-enoyl-[acyl-carrier protein] (n-C18:1) Mitochondria OH1(m) hydroxide ion Mitochondria ORN(m) Ornithine Mitochondria OXAG(m) Oxaloglutarate Mitochondria PA(m) Phosphatidate Mitochondria PACAL(m) Phenylacetaldehyde Mitochondria C160ACP(m) Palmitoyl-ACP (n-C16:0ACP) Mitochondria Pantetheine 4'-phosphate PAN4P(m) Mitochondria PANT(m) (R)-Pantoate Mitochondria PAP(m) Adenosine 3'.5'-bisphosphate Mitochondria PE(m) phosphatidylethanolamine Mitochondria PENDP(m) all-trans-Pentaprenyl diphosphate Mitochondria Mitochondria PEP(m) Phosphoenolpyruvate PG(m) Mitochondria Phosphatidylglycerol Mitochondria PGP(m) Phosphatidylglycerophosphate PHE(m) L-Phenylalanine Mitochondria PHEME(m) Mitochondria Protoheme L-Phenylalanyl-tRNA(Phe) PHEtrna(m) Mitochondria Pi(m) Phosphate Mitochondria PPCOA(m) Propanoyl-CoA Mitochondria PPi(m) Diphosphate Mitochondria PPP9(m) Protoporphyrin Mitochondria PPPG9(m) Protoporphyrinogen IX Mitochondria PRO(m) L-Proline Mitochondria PRPP(m) 5-Phospho-alpha-D-ribose 1-diphosphate Mitochondria PS(m) phosphatidylserine Mitochondria PYR(m) Pyruvate Mitochondria q6(m) Ubiquinone-6 Mitochondria q6H2(m) Ubiquinol-6 Mitochondria qULN(m) Quinolinate Mitochondria Mitochondria R1P(m) alpha-D-Ribose 1-phosphate Mitochondria RIBFLV(m) Riboflavin SCHLAM(m) S-Succinyldihydrolipoamide Mitochondria Mitochondria SER(m) L-Serine SUCC(m) Succinate Mitochondria SUCCOA(m) Succinyl-CoA Mitochondria T4HCINNM(m) trans-4-Hydroxycinnamate Mitochondria C141ACP(m) cis-tetradec-7-enoyl-[acyl-carrier protein] (n-C14:1) Mitochondria THF(m) 5,6,7,8-Tetrahydrofolate Mitochondria THMPP(m) Thiamine diphosphate Mitochondria THR(m) Mitochondria L-Threonine THRtrna(m) L-Threonyl-tRNA(Thr) Mitochondria TRDOX(m) Oxidized thioredoxin Mitochondria

Mitochondria

TRDRD(m)

Reduced thioredoxin

	10114/4	
trnaARG(m)	tRNA(Arg)	Mitochondria
trnaASN(m)	tRNA(Asn)	Mitochondria
trnaASP(m)	tRNA(Asp)	Mitochondria
trnaGLU(m)	tRNA (Glu)	Mitochondria
trnaHIS(m)	tRNA(His)	Mitochondria
trnalLE(m)	tRNA(IIe)	Mitochondria
trnaLEU(m)	tRNA(Leu)	Mitochondria
trnaLYS(m)	tRNA(Lys)	Mitochondria
trnaMET(m)	tRNA(Met)	Mitochondria
trnaPHE(m)	tRNA(Phe)	Mitochondria
trnaTHR(m)	tRNA(Thr)	Mitochondria
trnaTRP(m)	tRNA(Trp)	Mitochondria
trnaTYR(m)	tRNA(Tyr)	Mitochondria
trnaVAL(m)	tRNA(Val)	Mitochondria
TRP(m)	L-Tryptophan	Mitochondria
TRPtrna(m)	L-Tryptophanyl-tRNA(Trp)	Mitochondria
TYR(m)	L-Tyrosine	Mitochondria
TYRtrna(m)	L-Tyrosyl-tRNA(Tyr)	Mitochondria
UMP(m)	UMP	Mitochondria
UTP(m)	UTP	Mitochondria
VAL(m)	L-Valine	Mitochondria
VALtrna(m)	L-Valyl-tRNA(Val)	Mitochondria
ACCOA(n)	Acetyl-CoA	Nucleus
ACCOA(II) ADP(n)	ADP	Nucleus
AKG(n)	2-Oxoglutarate	Nucleus
AMP(n)	AMP	Nucleus
ASP(n)	L-Aspartate	Nucleus
ATP(n)	ATP	Nucleus
CBASP(n)	N-Carbamoyl-aspartate	Nucleus
CBP(n)	Carbamoyl phosphate	Nucleus
CDP(n)	CDP	Nucleus
CO2(n)	CO2	Nucleus
COA(n)	Coenzyme A	Nucleus
dACP(n)	dADP	Nucleus
dCDP(n)	dCDP	Nucleus
dGDP(n)	dGDP	Nucleus
DNAD(n)	Deamino-NAD+	Nucleus
dUDP(n)	dUDP	Nucleus
dUMP(n)	dUMP	Nucleus
GDP(n)	GDP	Nucleus
GLN(n)	L-Glutamine	Nucleus
GLU(n)	L-Glutamate	Nucleus
H(n)	H+	Nucleus
H2O(n)	H2O	Nucleus
H2O2(n)	Hydrogen peroxide	Nucleus
HCIT(n)	2-Hydroxybutane-1,2,4-tricarboxylate	Nucleus
HCO3(n)	Bicarbonate	Nucleus
MI13456P(n)	1D-myo-Inositol 1,3,4,5,6-pentakisphosphate	Nucleus
MI1345P(n)	1D-myo-lnositol 1,3,4,5-tetrakisphosphate	Nucleus
MI1456P(n)	1D-myo-lnositol 1,4,5,6-tetrakisphosphate	Nucleus
MI145P(n)	1D-myo-Inositol 1,4,5-trisphosphate	Nucleus
MINOHP(n)	myo-Inositol hexakisphosphate	Nucleus
NAD(n)	Nicotinamide adenine dinucleotide	Nucleus
NH4(n)	Ammonium	Nucleus
Pi(n)	Phosphate	Nucleus
PPi(n)	Diphosphate	Nucleus
PTD1INO(n)	phosphatidyl-1D-myo-inositol	Nucleus
` '		
PTD4INO(n)	phosphatidyl-1D-myo-4-inositol, yeast specific	Nucleus
TRDDD(n)	Oxidized thioredoxin	Nucleus
TRDRD(n)	Reduced thioredoxin	Nucleus
UDP(n)	UDP	Nucleus
UMP(n)	UMP	Nucleus
34HPP(x)	3-(4-Hydroxyphenyl)pyruvate	Peroxisome

3HDCOA(x)

(S)-3-Hydroxydecanoyl-CoA

Peroxisome

3HDDCOA(x)	(S)-3-Hydroxydodecanoyl-CoA	Peroxisome
3HHDCOA(x)	(S)-3-Hydroxyhexadecanoyl-CoA	Peroxisome
3HODCOA(x)	(S)-3-Hydroxyoctadecanoyl-CoA	Peroxisome
3HTDCOA(x)	(S)-3-Hydroxytetradecanoyl-CoA	Peroxisome
3HXDCOA(x)	(S)-3-Hydroxyhexacosyl-CoA	Peroxisome
30DCOA(x)	3-Oxodecanoyl-CoA	Peroxisome
3ODDCOA(x)	3-Oxododecanoyl-CoA	Peroxisome
3OHDCOA(x)	3-Oxohexadecanoyl-CoA	Peroxisome
3OHODCOA(x)	3-Oxooctadecanoyl-CoA	Peroxisome
3OHXDCOA(x)	3-Oxohexacosyl-CoA	Peroxisome
3OTDCOA(x)	3-Oxotetradecanoyl-CoA	Peroxisome
4H2OGLT(x)	4-Hydroxy-2-oxoglutarate	Peroxisome
AC(x)	Acetate	Peroxisome
ACCOA(x)	Acetyl-CoA	Peroxisome
ACRN(x)	O-Acetylcarnitine	Peroxisome
ADP(x)	ADP	Peroxisome
AKG(x)	2-Oxoglutarate	Peroxisome
AMP(x)	AMP	Peroxisome
ASP(x)	L-Aspartate	Peroxisome
ATP(x)	ATP	Peroxisome
CIT(x)	Citrate	Peroxisome
CO2(x)	CO2	Peroxisome
COA(x)	Coenzyme A	Peroxisome
CRN(x)	L-Carnitine	Peroxisome
LLCT(x)	L-Cystathionine	Peroxisome
DC2COA(x)	trans-Dec-2-enoyl-CoA	Peroxisome
C100(x)	Decanoate (n-C10:0)	Peroxisome
C100COA(x)	Decanoyl-CoA (n-C10:0CoA)	Peroxisome
DC2COA(x)	trans-Dodec-2-enoyl-CoA	Peroxisome
C120(x)	Dodecanoate (n-C12:0)	Peroxisome
C120COA(x)	Dodecanoyl-CoA (n-C12:0CoA)	Peroxisome
E4HGLU(x)	L-erythro-4-Hydroxyglutamate	Peroxisome
GLU(x)	L-Glutamate	Peroxisome
GLX(x)	Glyoxylate	Peroxisome
H(x)	H+ H2O	Peroxisome
H2O(x)		Peroxisome Peroxisome
H2O2(x) HCYS(x)	Hydrogen peroxide	
	L-Homocysteine Hexadecanoate (n-C16:0)	Peroxisome Peroxisome
C160(x) C161(x)	Hexadecenoate (n-C16:1)	
C160(x)	Hexadecenoyl-CoA (n-C16:1CoA)	Peroxisome Peroxisome
HDC2COA(x)	trans-Hexadec-2-enoyl-CoA	Peroxisome
HXC2COA(x)	trans-Hexacos-2-enoyl-CoA	Peroxisome
ICIT(x)	Isocitrate	Peroxisome
MAL(x)	L-Malate	Peroxisome
NAD(x)	Nicotinamide adenine dinucleotide	Peroxisome
NADH(x)	Nicotinamide adenine dinucleotide - reduced	Peroxisome
NADP(x)	Nicotinamide adenine dinucleotide phosphate	Peroxisome
NADPH(x)	Nicotinamide adenine dinucleotide phosphate - reduced	Peroxisome
NH4(x)	Ammonium	Peroxisome
NMN(x)	NMN	Peroxisome
O2(x)	02	Peroxisome
OAA(x)	Oxaloacetate	Peroxisome
C080COA(x)	Octanoyl-CoA (n-C8:0CoA)	Peroxisome
C180(x)	octadecanoate (n-C18:0)	Peroxisome
C182COA(x)	Octadecynoyl-CoA (n-C18:2CoA)	Peroxisome
C080(x)	octanoate (n-C8:0)	Peroxisome
OD2COA(x)	trans-Octadec-2-enoyl-CoA	Peroxisome
C181COA(x)	Octadecenoyl-CoA (n-C18:1CoA)	Peroxisome
PAN4P(x)	Pantetheine 4'-phosphate	Peroxisome
PAP(x)	Adenosine 3',5'-bisphosphate	Peroxisome
Pi(x)	Phosphate	Peroxisome
C160COA(x)	Palmitoyl-CoA (n-C16:0CoA)	Peroxisome
PPi(x)	Diphosphate	Peroxisome

PYR(x) Pyruvate
C180COA(x) Stearoyl-CoA (n-C18:0CoA)
TD2COA(x) trans-Tetradec-2-enoyl-CoA
C140COA(x) Tetradecanoyl-CoA (n-C14:0CoA)
C141COA(x) Tetradecenoyl-CoA (n-C14:1CoA)

TRDOX(x) Oxidized thioredoxin
TRDRD(x) Reduced thioredoxin
C140(x) tetradecanoate (n-C14:0)
C141(x) tetradecenoate (n-C14:1)

TYR(x) L-Tyrosine ADP(v) ADP ARG(v) L-Arginine ASN(v) L-Asparagine L-Aspartate ASP(v) ATP(v) ATP CO2(v) CO₂ GLC(v) D-Glucose GLN(v) L-Glutamine GLU(v) L-Glutamate GLYCOGEN(v) glycogen

GTHRD(v) Reduced glutathione

 H(v)
 H+

 H2O(v)
 H2O

 HIS(v)
 L-Histidine

 ILE(v)
 L-Isoleucine

 LCYSTIN(v)
 L-Cystine

 LEU(v)
 Leucine

 LYS(v)
 Lysine

PE(v) phosphatidylethanolamine

Pi(v) Phosphate
PS(v) phosphatidylserine
TCHOLA(v) taurocholic acid
TRE(v) Trehalose
TYR(v) L-Tyrosine
CYST L-Cysteate

DHDOLPP Dehydrodolichol diphosphate
DOLPP Dolichol diphosphate

DOLPP Dolichol diphosp
GAM D-Glucosamine
GCOA Glutaryl-coa

Peroxisome Peroxisome Peroxisome Peroxisome Peroxisome Peroxisome Peroxisome Peroxisome Peroxisome Vacuole Vacuole

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