Table S4. Enzymes considered in the metabolic network.

Pathway	Enzyme
Glycolysis	hexokinase [EC:2.7.1.1 2.7.1.2]
	glucose-6-phosphate isomerase [EC:5.3.1.9]
	6-phosphofructokinase [EC:2.7.1.11]
	fructose-1,6-bisphosphatase I [EC:3.1.3.11]
	fructose-bisphosphate aldolase, class I [EC:4.1.2.13]
	triosephosphate isomerase (TIM) [EC:5.3.1.1]
	glyceraldehyde 3-phosphate dehydrogenase [EC:1.2.1.12]
	phosphoglycerate kinase [EC:2.7.2.3]
	phosphoglycerate mutase [EC:5.4.2.1]
	enolase [EC:4.2.1.11]
	pyruvate kinase [EC:2.7.1.40]
	L-lactate dehydrogenase [EC:1.1.1.27]
Galactose metabolism	galactokinase [EC:2.7.1.6]
	UDPglucose--hexose-1-phosphate uridylyltransferase [EC:2.7.7.12]
	phosphoglucomutase [EC:5.4.2.2]
	UDP-glucose 4-epimerase [EC:5.1.3.2]
Oxidative decarboxylation	pyruvate dehydrogenase E1 component subunit alpha [EC:1.2.4.1]
	pyruvate dehydrogenase E2 component (dihydrolipoamideacetyltransferase) [EC:2.3.1.12]
	dihydrolipoamide dehydrogenase [EC:1.8.1.4]
Pentose phosphate pathway	glucose-6-phosphate 1-dehydrogenase [EC:1.1.1.49]
	6-phosphogluconolactonase [EC:3.1.1.31]
	6-phosphogluconate dehydrogenase [EC:1.1.1.44]
	ribose 5-phosphate isomerase A [EC:5.3.1.6]
	ribulose-phosphate 3-epimerase [EC:5.1.3.1]
Other cytosolic reactions	ATP citrate (pro-S)-lyase [EC:2.3.3.8]
	malate dehydrogenase [EC:1.1.1.37]
TCA cycle	citrate synthase [EC:2.3.3.1]
	aconitate hydratase 1 [EC:4.2.1.3]
	isocitrate dehydrogenase [EC:1.1.1.41/42]
	2-oxoglutarate dehydrogenase E1 component [EC:1.2.4.2]
	2-oxoglutarate dehydrogenase E2 component (dihydrolipoamide succinyltransferase) [EC:2.3.1.61]
	dihydrolipoamide dehydrogenase [EC:1.8.1.4]
	succinyl-CoA synthetase beta subunit [EC:6.2.1.4 6.2.1.5]
	succinate dehydrogenase (ubiquinone) flavoprotein subunit [EC:1.3.5.1]
	fumarate hydratase, class II [EC:4.2.1.2]
	malate dehydrogenase [EC:1.1.1.37]
Pyruvate metabolism	phosphoenolpyruvate carboxykinase (GTP) [EC:4.1.1.32]
	malate dehydrogenase (oxaloacetate-decarboxylating) [EC:1.1.1.38]
	malate dehydrogenase (oxaloacetate-decarboxylating)(NADP+) [EC:1.1.1.40]
	pyruvate carboxylase subunit A [EC:6.4.1.1]
Oxidative phosphorylation	NADH dehydrogenase (ubiquinone) Fe-S protein 7 [EC:1.6.5.3 1.6.99.3]
	succinate dehydrogenase (ubiquinone) flavoprotein subunit [EC:1.3.5.1]
	ubiquinol-cytochrome c reductase iron-sulfur subunit [EC:1.10.2.2]
	cytochrome c oxidase subunit VIb [EC:1.9.3.1]
	F-type H+-transporting ATPase subunit d [EC:3.6.3.14]
Amino acid metabolism	alanine transaminase [EC:2.6.1.2]
	alanyl-tRNA synthetase [EC:6.1.1.7]
	arginase [EC:3.5.3.1]
	ornithine--oxo-acid transaminase [EC:2.6.1.13]
	1-pyrroline-5-carboxylate dehydrogenase [EC:1.5.1.12]
	arginyl-tRNA synthetase [EC:6.1.1.19]
	asparagine synthase (glutamine-hydrolysing) [EC:6.3.5.4]
	asparaginyl-tRNA synthetase [EC:6.1.1.22]
	aspartate aminotransferase [EC:2.6.1.1]
	aspartyl-tRNA synthetase [EC:6.1.1.12]
	cysteine dioxygenase [EC:1.13.11.20]
	aspartate aminotransferase [EC:2.6.1.1]
	cysteinyl-tRNA synthetase [EC:6.1.1.16]
	glutamine synthetase [EC:6.3.1.2]
	glutaminyl-tRNA synthetase [EC:6.1.1.18]

glutamate dehydrogenase (NAD(P)+) [EC:1.4.1.3]
glutamyl-tRNA synthetase [EC:6.1.1.17]
glycine hydroxymethyltransferase [EC:2.1.2.1]
glycyl-tRNA synthetase [EC:6.1.1.14]
histidine ammonia-lyase [EC:4.3.1.3]
urocanate hydratase [EC:4.2.1.49]
imidazolonepropionase [EC:3.5.2.7]
glutamate formiminotransferase [EC:2.1.2.5]
histidyl-tRNA synthetase [EC:6.1.1.21]
branched-chain amino acid aminotransferase [EC:2.6.1.42]
2-oxoisovalerate dehydrogenase E1 component, alpha subunit [EC:1.2.4.4]
2-oxoisovalerate dehydrogenase E2 component (dihydrolipoyl transacylase) [EC:2.3.1.168]
dihydrolipoamide dehydrogenase [EC:1.8.1.4]
acyl-CoA dehydrogenase [EC:1.3.99.3]
enoyl-CoA hydratase [EC:4.2.1.17]
3-hydroxyacyl-CoA dehydrogenase [EC:1.1.1.35]
acetyl-CoA acyltransferase 2 [EC:2.3.1.16]
propionyl-CoA carboxylase alpha chain [EC:6.4.1.3]
methylmalonyl-CoA epimerase [EC:5.1.99.1]
methylmalonyl-CoA mutase [EC:5.4.99.2]
isoleucyl-tRNA synthetase [EC:6.1.1.5]
branched-chain amino acid aminotransferase [EC:2.6.1.42]
2-oxoisovalerate dehydrogenase E1 component, alpha subunit [EC:1.2.4.4]
2-oxoisovalerate dehydrogenase E2 component (dihydrolipoyl transacylase) [EC:2.3.1.168]
dihydrolipoamide dehydrogenase [EC:1.8.1.4]
acyl-CoA dehydrogenase [EC:1.3.99.3]
3-methylcrotonyl-CoA carboxylase alpha subunit [EC:6.4.1.4]
methylglutaconyl-CoA hydratase [EC:4.2.1.18]
hydroxymethylglutaryl-CoA lyase [EC:4.1.3.4]
3-oxoacid CoA-transferase subunit A [EC:2.8.3.5]
acetyl-CoA C-acetyltransferase [EC:2.3.1.9]
leucyl-tRNA synthetase [EC:6.1.1.4]
branched-chain amino acid aminotransferase [EC:2.6.1.42]
2-oxoisovalerate dehydrogenase E1 component, alpha subunit [EC:1.2.4.4]
2-oxoisovalerate dehydrogenase E2 component (dihydrolipoyl transacylase) [EC:2.3.1.168]
dihydrolipoamide dehydrogenase [EC:1.8.1.4]
acyl-CoA dehydrogenase [EC:1.3.99.3]
enoyl-CoA hydratase [EC:4.2.1.17]
3-hydroxyisobutyryl-CoA hydrolase [EC:3.1.2.4]
3-hydroxyisobutyrate dehydrogenase [EC:1.1.1.31]
aldehyde dehydrogenase (NAD+) [EC:1.2.1.3]
methylmalonyl-CoA mutase [EC:5.4.99.2]
valyl-tRNA synthetase [EC:6.1.1.9]
saccharopine dehydrogenase (NAD+, L-lysine forming) [EC:1.5.1.7]
saccharopine dehydrogenase (NAD+, L-glutamate forming) [EC:1.5.1.9]
aminoadipate-semialdehyde dehydrogenase [EC:1.2.1.31]
2-aminoadipate transaminase [EC:2.6.1.39]
2-oxoglutarate dehydrogenase E1 component [EC:1.2.4.2]
2-oxoglutarate dehydrogenase E2 component (dihydrolipoamide succinyltransferase) [EC:2.3.1.61]
glutaryl-CoA dehydrogenase [EC:1.3.99.7]
enoyl-CoA hydratase [EC:4.2.1.17]
3-hydroxyacyl-CoA dehydrogenase [EC:1.1.1.35]
acetyl-CoA C-acetyltransferase [EC:2.3.1.9]
lysyl-tRNA synthetase, class II [EC:6.1.1.6]
S-adenosylmethionine synthetase [EC:2.5.1.6]
DNA (cytosine-5-)-methyltransferase [EC:2.1.1.37]
adenosylhomocysteinase [EC:3.3.1.1]
cystathionine beta-synthase [EC:4.2.1.22]
cystathionine gamma-lyase [EC:4.4.1.1]
2-oxobutanoate:ferredoxin 2-oxidoreductase (CoA-propanoylating) [EC:1.2.7.2]
ferredoxin:NAD+ oxidoreductase [EC:1.18.1.3]
propionyl-CoA carboxylase alpha chain [EC:6.4.1.3]
methylmalonyl-CoA epimerase [EC:5.1.99.1]

	methylmalonyl-CoA mutase [EC:5.4.99.2]
	methionyl-tRNA synthetase [EC:6.1.1.10]
	phenylalanine-4-hydroxylase [EC:1.14.16.1]
	phenylalanyl-tRNA synthetase beta chain [EC:6.1.1.20]
	pyrroline-5-carboxylate reductase [EC:1.5.1.2]
	1-pyrroline-5-carboxylate dehydrogenase [EC:1.5.1.12]
	prolyl-tRNA synthetase [EC:6.1.1.15]
	L-serine dehydratase [EC:4.3.1.17]
	seryl-tRNA synthetase [EC:6.1.1.11]
	threonine dehydratase [EC:4.3.1.19]
	2-oxobutanoate:ferredoxin 2-oxidoreductase (CoA-propanoylating) [EC:1.2.7.2]
	ferredoxin:NAD+ oxidoreductase [EC:1.18.1.3]
	propionyl-CoA carboxylase alpha chain [EC:6.4.1.3]
	methylmalonyl-CoA epimerase [EC:5.1.99.1]
	methylmalonyl-CoA mutase [EC:5.4.99.2]
	threonyl-tRNA synthetase [EC:6.1.1.3]
	tryptophan 2,3-dioxygenase [EC:1.13.11.11]
	arylformamidase [EC:3.5.1.9]
	kynurenine 3-monooxygenase [EC:1.14.13.9]
	kynureninase [EC:3.7.1.3]
	3-hydroxyanthranilate 3,4-dioxygenase [EC:1.13.11.6]
	aminocarboxymuconate-semialdehyde decarboxylase [EC:4.1.1.45]
	aminomuconate-semialdehyde dehydrogenase [EC:1.2.1.32]
	Oxidoreductases [EC:1.5.1.-]
	2-Oxoadipate:lipoamde 2-oxidoreductase(decarboxylating and acceptorsuccinylating) [EC:1.2.4.2]
	glutaryl-CoA dehydrogenase [EC:1.3.99.7]
	enoyl-CoA hydratase [EC:4.2.1.17]
	3-hydroxyacyl-CoA dehydrogenase [EC:1.1.1.35]
	acetyl-CoA C-acetyltransferase [EC:2.3.1.9]
	tryptophanyl-tRNA synthetase [EC:6.1.1.2]
	tyrosine aminotransferase [EC:2.6.1.5]
	4-hydroxyphenylpyruvate dioxygenase [EC:1.13.11.27]
	homogentisate 1,2-dioxygenase [EC:1.13.11.5]
	maleylacetoacetate isomerase [EC:5.2.1.2]
	fumarylacetoacetase [EC:3.7.1.2]
	tyrosyl-tRNA synthetase [EC:6.1.1.1]
Carbohydrate synthesis	UTP--glucose-1-phosphate uridylyltransferase [EC:2.7.7.9]
	glycogen(starch) synthase [EC:2.4.1.11]
	1,4-alpha-glucan branching enzyme [EC:2.4.1.18]
Purine biosynthesis	ribose-phosphate pyrophosphokinase [EC:2.7.6.1]
	amidophosphoribosyltransferase [EC:2.4.2.14]
	phosphoribosylamine--glycine ligase [EC:6.3.4.13]
	phosphoribosylglycinamide formyltransferase [EC:2.1.2.2]
	phosphoribosylformylglycinamidine synthase [EC:6.3.5.3]
	phosphoribosylformylglycinamidine cyclo-ligase [EC:6.3.3.1]
	phosphoribosylaminoimidazole carboxylase [EC:4.1.1.21]
	phosphoribosylaminoimidazole-succinocarboxamide synthase [EC:6.3.2.6]
	adenylosuccinate lyase [EC:4.3.2.2]
	phosphoribosylaminoimidazolecarboxamide formyltransferase [EC:2.1.2.3]
	IMP dehydrogenase [EC:1.1.1.205]
	GMP synthase (glutamine-hydrolysing) [EC:6.3.5.2]
	guanylate kinase [EC:2.7.4.8]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
	ribonucleoside-diphosphate reductase subunit M2 [EC:1.17.4.1]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
	adenylosuccinate synthase [EC:6.3.4.4]
	adenylosuccinate lyase [EC:4.3.2.2]
	adenylate kinase [EC:2.7.4.3]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
	ribonucleoside-diphosphate reductase subunit M2 [EC:1.17.4.1]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
Pyrimidine biosynthesis	carbamoyl-phosphate synthase [EC:6.3.5.5]
	aspartate carbamoyltransferase [EC:2.1.3.2]

	dihydroorotase [EC:3.5.2.3]
	dihydroorotate dehydrogenase [EC:1.3.5.2]
	orotate phosphoribosyltransferase [EC:2.4.2.10]
	orotidine-5'-phosphate decarboxylase [EC:4.1.1.23]
	cytidylate kinase [EC:2.7.4.14]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
	CTP synthase [EC:6.3.4.2]
	ribonucleoside-diphosphate reductase subunit M2 [EC:1.17.4.1]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
	ribonucleoside-diphosphate reductase subunit M2 [EC:1.17.4.1]
	dTMP kinase [EC:2.7.4.9]
	thymidylate synthase [EC:2.1.1.45]
	dTMP kinase [EC:2.7.4.9]
	nucleoside-diphosphate kinase [EC:2.7.4.6]
	DNA-directed RNA polymerase III subunit C31 [EC:2.7.7.6]
	DNA polymerase delta subunit 3
Lipid metabolism	acetyl-CoA carboxylase [EC:6.4.1.2]
	fatty acid synthase, animal type [EC:2.3.1.85]
	glycerol-3-phosphate O-acyltransferase [EC:2.3.1.15]
	1-acyl-sn-glycerol-3-phosphate acyltransferase [EC:2.3.1.51]
	phosphatidate phosphatase [EC:3.1.3.4]
	diacylglycerol O-acyltransferase 2-like protein 4 [EC:2.3.1.76]
	hydroxymethylglutaryl-CoA synthase [EC:2.3.3.10]
	3-hydroxy-3-methylglutaryl-CoA reductase [EC:1.1.1.34]
	mevalonate kinase [EC:2.7.1.36]
	phosphomevalonate kinase [EC:2.7.4.2]
	diphosphomevalonate decarboxylase [EC:4.1.1.33]
	isopentenyl-diphosphate delta-isomerase [EC:5.3.3.2]
	dimethylallyltranstransferase [EC:2.5.1.1]
	geranyltranstransferase [EC:2.5.1.10]
	farnesyl-diphosphate farnesyltransferase [EC:2.5.1.21]
	farnesyl-diphosphate farnesyltransferase [EC:2.5.1.21]
	squalene monooxygenase [EC:1.14.99.7]
	lanosterol synthase [EC:5.4.99.7]
	cytochrome P450, family 51, subfamily A (sterol 14-demethylase) [EC:1.14.13.70]
	delta14-sterol reductase [EC:1.3.1.70]
	methylsterol monooxygenase [EC:1.14.13.72]
	sterol-4alpha-carboxylate 3-dehydrogenase (decarboxylating) [EC:1.1.1.170]
	3-keto steroid reductase [EC:1.1.1.270]
	delta24-sterol reductase [EC:1.3.1.72]
	cholestenol delta-isomerase [EC:5.3.3.5]
	lathosterol oxidase [EC:1.14.21.6]
	7-dehydrocholesterol reductase [EC:1.3.1.21]
	sterol O-acyltransferase [EC:2.3.1.26]
	phosphatidate phosphatase [EC:3.1.3.4]
	diacylglycerol cholinephosphotransferase [EC:2.7.8.2]
	phosphatidylserine decarboxylase [EC:4.1.1.65]
	phosphatidylserine synthase 1 [EC:2.7.8.-]
	phosphatidate cytidylyltransferase [EC:2.7.7.41]
	CDP-diacylglycerol--inositol 3-phosphatidyltransferase [EC:2.7.8.11]
	serine palmitoyltransferase [EC:2.3.1.50]
	3-dehydrosphinganine reductase [EC:1.1.1.102]
	Acyl-CoA-dependent ceramide synthase [EC:2.3.1.24]
	sphingolipid delta-4 desaturase [EC:1.14.-.-]
	ceramide cholinephosphotransferase [EC:2.7.8.3]