2-HG - 2-Hydroxyglutarate
3-PHP - 3-Phosphate Hydroxypyruvate
3-Pser - 3-Phosphoserine
4AB - 4-Aminobutyrate
4ABT - 4-Aminobutyrate Transaminase
4-HB - 4-Hydroxybenzoic Acid
4-HBA - 4-Hydroxybenzaldehyde
4Fe-4S - Tetrakis(μ3-sulfido)tetrairon Cluster
4-HCA - 4-Hydroxycinnamic Acid
4-MeI - 4-Methylimidazole
4-MeIA - 4-Methylimidazole Acetate
4-MeIAA - Methylimidazole Acetaldehyde
4-MeIAse - 4-Methylimidazole Acetate Hydrolase
5-HIAA - 5-Hydroxyindoleacetic acid
5-MTHF - 5-Methyltetrahydrofolate
5,10-MTHF - 5,10-MethyleneTetraHydroFolate
AA - Amino Acids
AAA - Acetoacetic Acid
AAC - Acetoacetyl-CoA
AAD - Acetoacetate Decarboxylase
AADC - Aromatic L-Amino Acid Decarboxylase
AAO - L-Amino-Acid Oxidase
AC - Aconitase
ACC - Acetyl-CoA Carboxylase
ACMS - 2-Amino-3-Carboxymuconic-6-Semialdehyde Acid
A-CoA - Acetyl-CoA
AChE - Acetylcholinesterase
ACS - Acetyl-CoA Synthetase
ACTH - Adrenocorticotropic Hormone
ADC - Arginine Decarboxylase
ADK - Adenylate Kinase (Myokinase)
ADH - Alcohol Dehydrogenase
ADHFE - Hydroxyacid-Oxoacid Transhydrogenase
AdoCbl - Adenosylcobalamin
ADP - Adenosine Diphosphate
ADSL - Adenylsuccinate lyase
ADSS - Adenylosuccinate Synthetase
AFMID - Kynurenine Formamidase
AGAT - Arginine:Glycine Amidinotransferase
AGXT - Alanine-Glyoxylate Aminotransferase
α-KB - α-Ketobutyrate
α-KG - α-Ketoglutarate
α-KGDH - alpha-Ketoglutarate Dehydrogenase
Ala - Alanine
ALD - Aldolase
ALDH - Aldehyde Dehydrogenase
ALP - Alkaline Phosphatase
ALT - Alanine Aminotransferase
AMP - Adenosine Monophosphate
AMPD - AMP Deaminase
AMPK - AMP-activated Protein Kinase
ARG1 - Arginase
AGS - Agmatinase
AR - Aldose Reductase
AO - Aldehyde Oxidase
APS - Adenosine-5'-Phosphosulfate
APSK - APS Kinase
ASA - Argininosuccinate
ASDC - Aspartate Decarboxylase
ASL - Arginino Succinase
Asp - Aspartate
ASS - Argininosuccinate Synthetase
AST - Aspartate Aminotransferase
ASMT - Acetylserotonin O-Methyltransferase
ATP - Adenosine Triphosphate
BH_2 - Dihydrobiopterin
BH_4 - Tetrahydrobiopterin
BHB - β-hydroxybutyric Acid
BHMT - Betaine-Homocysteine S-methyltransferase
BPG - Biphosphoglycerate
BPGM - BPG Mutase
BPGP - 2,3 BPG Phosphatase
Br - Bromine
Ca - Calcium
CAD - cis-Aconitate Decarboxylase
cAMP - Cyclic Adenosine Monophosphate
CAT - Catalase
CBS - Cystathionine B-Synthase
CSAD - Cysteine Sulfinic Acid Decarboxylase
CDO - Cysteamine Dioxygenase
CDP - Cytidine 5'-Diphosphate
CK - Creatine Kinase
CGL - Cystathionine gamma-Lyase
CHaT - Choline Acetyltransferase
CHDH - Choline Dehydrogenase
Cl - Chloride
CN - Carnosine Synthase
CNase - Carnosinase
CNMT - Carnosine N-Methyl Transferase
CNDP - Cytosolic Non-Specific Dipeptidase
CO_2 - Carbon Dioxide
Co - Cobalt
CoA - Coenzyme A
CoAH - CoA Hydrolase
COMT - Catechol O-methyltrans
CPS1 - Carbamoyl Phosphate Synthase1
CR - Carbonyl Reductase
Cr - Chromium
Cre - Creatine
CRH - Corticotrophin-Releasing Hormone
CS - Citrate Synthase
CSE - Cystathionase
CTP - Cytidine 5'-Triphosphate
Cu - Copper
CYP - Cytochrome P450 monooxygenase
DAT - Dopamine Transporter
DAO - Diamine Oxidase
DBH - Dopamine Beta Hydroxylase
DHBA - 3,4-Dihydroxybenzeneacetic Acid
DHF - Dihydrofolate
DHFR - Dihydrofolate Reductase
DHI - 5,6-Dihydroxyindole
DHICA - 5,6-Dihydroxyindole-2-Carboxylic Acid
DHMA - 3,4-Dihydroxymandelaldehyde
DHMC - 3,4-Dihydroxymandelic Acid
DMG - Dimethylglycine
DMGDH - DMG Dehydrogenase
DOPAC - 3,4-Dihydroxyphenylacetic Acid
DOPAL - 3,4-Dihydroxyphenylacetaldehyde
DPCK - DephosphoCoA Kinase
DT - L-Dopachrome Tautomerase
dTMP - Thymidine Monophosphate
dUMP - Deoxyuridine Monophosphate
ENO - Enolase
ENPP - Ectonucleotide Pyrophosphatase/Phosphodiesterase
F1,6BP - Fructose 1,6-Bisphosphate
F2,6BP - Fructose 2,6-Bisphosphate
FAA - 4-Fumarylacetoacetic Acid
FAAS - Fumarylacetoacetase
FAD - Adeflavin
FADS - FAD Synthetase
FBPase - Fructose 1,6-Bisphosphatase
FBPase2 - Fructose 2,6-Bisphosphatase
Fe - Ferritin
FIGLU - Formimidoylglutamic Acid
FIGLU-THF - Formiminoglutamate-THF
FMN - Flavin Mononucleotide
FMO - Flavin Monooxygenase
FOLH - Folate Hydrotase
FS - Fumarase
FT - Formiminotransferase
FTCD - Formiminotransferase Cyclodeaminase
G6Pase - Glucose 6-Phosphotase
GABA - Gamma-Aminobutyric Acid
GAD - Glutamate Decarboxylase
GADL - Glutamate Decarboxylase Like
GAG - Glycosaminoglycan
GAMT - S-Adenosylmethionine:Guanidinoacetate Methyltransferase
GAPDH - Glyceraldehyde 3-Phosphate Dehydrogenase
GAT - Guanidinoacetate
γBBH - γ-Butyrobetaine Hydroxylase
GCA - γ-Glutamylcysteine Synthase
GCH1 - GTP Cyclohydrolase I
GDP - Guanosine Diphosphate
GDH - Glutamate Dehydrogenase
GFAT - Glutamine:Fructose-6P Amidotransferase
GHB - γ-Hydroxybutyrate
GK - Glucokinase
GlcNAc - N-Acetylglucosamine
GlcNAc-1-P - GlcNAc 1-Phosphate
GlcNAc-6-P - GlcNAc 6-Phosphate
GLN - Glutaminase
GLS - Glutathione Synthase
GLSH - Glutamate Dehydrogenase
GLYP - Glycogen Phosphorylase
GLYS - Glycogen Synthase
Glut - Glutamate
GOR - Glyoxylate Reductase
GOX - Glycolate Oxidase
GPX - Glutathione Peroxidase
GR - Glutathione Reductase
GS - Glutamine Synthetase
GSA - Glutamate-5-Semialdehyde
GSH - Glutathione, reduced
GSSG - Glutathione disulfide (oxidised)
GTP - Guanosine Triphosphate
GTase - Glycosyltransferases
H - Hydrogen
H_2O - Water
H_2O_2 - Hydrogen Peroxide
H2S - Hydrogen Sulfide
H2NTP - 7,8-Dihydroneopterin Triphosphate
HAAO - 3-Hydroxyanthranilic Acid Dioxygenase
HAL - Histidine Ammonia-Lyase
HAS - Hyaluronic Acid Synthase
HBDH - Hydroxybutyrate Dehydrogenase
HCO_3 - Bicarbonate
HDG - Homogentisate 1,2-dioxygenase
HK - Hexokinase
HIF - Hypoxia-Inducible Factor
HGA - Homogentisic Acid
HMPAL - 3-Methoxy-4-Hydroxyphenylacetaldehyde
HOGA - 4-Hydroxy-2-Ketoglutarate Aldolase
HPLA - Hydroxyphenyllactic Acid
HPPA - 4-Hydroxyphenylpyruvic Acid
HPD - 4-Hydroxyphenylpyruvate Dioxygenase
HT - Histidine Transaminase
HTMLA - β-hydroxy-ε-N-trimethyllysine aldolase
HTDH - Hypotaurine Dehydrogenase
HVA - Homovanillic Acid
HYPDH - 4-Hydroxyproline Dehydrogenase

I - Iodine
IAA - Imidazole Acetaldehyde
IAcA - Imidazole Acetic Acid
IAL - Imidazoleacetaldehyde
ICL - Isocitrate Lyase
IDH - Isocitrate Dehydrogenase
IDO - Indoleamine 2,3-Dioxygenase
IFN - Interferon
IMP - Inosinic Acid
IQ - Indole-5,6-Quinone
K - Potassium
KAT - Kynurenine Aminotransferase
KMO - Kynurenine 3-Monooxygenase
KYNU - Kynureninase
LDH - Lactate Dehydrogenase
LPA - Lipoamide
LPH4 - Lactoyl-PH4
MAA - Maleylacetoacetate
MAAI - Maleylacetoacetate Isomerase
MAS - Malate Synthase
MAO - Monoamine Oxidase
MDH - Malate Dehydrogenase
ME1 - NADP-dependent Malic Enzyme
MeCBL - Methylcobalamin
Mg - Magnesium
MHPG - 3-Methoxy-4-Hydroxyphenylglycol
MIF - Macrophage Migration Inhibitory Factor
MMC-M - MethylMalonyl-CoA Mutase
MMC-R - MethylMalonyl-CoA Racemase
MMP - Matrix Metalloproteinase
Mn - Manganese
Mo - Molybdenum
MS - Methionine Synthase
MTA - 5'-Methylthioadenosine
MTHFR - Methylenetetrahydrofolate Reductase
MTR - 3-Methoxytyramine
Na - Sodium
NAD - Nicotinamide Adenine Dinucleotide
NADK - NAD Kinase
NADPT - NAD(P)+ Transhydrogenase
NADSYN - NAD Synthetase
NAGK - N-Acetylglucosamine Kinase
NAMPT - Nicotinamide Phosphoribosyltransferase
NAPRT - Nicotinate Phosphoribosyltransferase
N-AS - N-Acetylspermine
N-ASD - N-Acetylspermidine
NCS - Norcoclaurine Synthase
NDPK - Nucleoside Diphosphokinase
NET - Norepinephrine Transporter
NH_3 - Ammonia
NMNAT - Nicotinamide Mononucleotide Adenylyltransferase
NO - Nitric Oxide
NOS - Endothelial Nitric Oxide Synthase
O_2 - Oxygen
OAA - Oxaloacetate
OAT - Ornothine Aminotransferase
ODC - Ornithine Decarboxylase
OH-ENP - 4-Hydroxy-Enol-Phenylpyruvate
OH-Glut - 4-Hydroxyglutamate
OH-GlutSA - 4-Hydroxyglutamate Semialdehyde
OH-KG - 4-Hydroxy-2-Ketoglutarate
OH-P5C - Pyrroline Hydroxycarboxylate
OH-PH4 - 1-Hydroxy-2-Oxopropyl Tetrahydropterin
OTC - Ornithine Transcarbamoylase
OXH - Oxaloacetase
P5C - Pyrroline-5-Carboxylate
P5CR - P5C Reductase
P5P - Pyridoxal 5'-Phosphate
PAL - Pyruvaldehyde
PAGM - Phosphoacetylglucosamine Mutase
PAH - Phenylalanine Hydroxylase
PAK - Pantetheine Kinase
PAMOAT - Pyridoxamine:Oxaloacetate Aminotransferase
PAO - Polyamine Oxidase
PAP - Adenosine 3',5'-Diphosphate
PAPS - 3'-Phosphoadenosine-5'-Phosphosulfate
PATK - Panthenate Kinase
PC - Phosphocreatine
PCB - Pyruvate Carboxylase
PCC - Propionyl-CoA Carboxylase
PDH - Pyruvate Dehydrogenase
PEPC - Phosphoenolpyruvate Carboxylase
PEPCK - Phosphoenolpyruvate Carboxykinase
PFK-1 - Phosphofructokinase
PFK-2 - 6-Phosphofructo-2-Kinase
PGAM - Phosphoglycerate Mutase
PGI - Phosphoglucose Isomerase
PGK - Phosphoglycerate Kinase
PGM - Phosphoglucomutase
PHCDH - Pyrroline-3-hydroxy-5-carboxylate Dehydrogenase
PHD - Prolyl Hydroxylase
PHGDH - Phosphoglycerate Dehydrogenase
PHT - Phenylpyruvate Tautomerase
P_i - Phosphate
PK - Pyridoxal Kinase
PKM - Pyruvate Kinase
PKA - Protein Kinase A
PLD - Prolidase
PMP - Pyridoxamine 5'-Phosphate
PNMT - Phenylethanolamine N-Methyltransferase
PNPO - Pyridoxine 5'-Phosphate Oxidase
PPP - Pyridoxal Phosphate Phosphatase
PP_i - Pyrophosphate
PPCDC - Phosphopantothenoylcysteine Decarboxylase
PPCS - Phosphopantothenoylcysteine Synthetase
PQQ - Pyrroloquinoline Quinone
PRODH - Proline Dehydrogenase
PRPP - 5-Phosphoribosyl-1-Pyrophosphate
PSP - Protein Synthesis Pathway
PS - Phosphatidyl Serine
PSAT - Phosphoserine Aminotransferase
PSPH - Phosphoserine Phosphatase
PSS - Phosphatidylserine Synthase
PTP - 6-Pyruvoyl-Tetrahydropterin
PTPS - 6-Pyruvoyl-tetrahydropterin Synthase
Pyr - Pyruvate
Q - Ubiquinone (Coenzyme Q10)
Q_2 - Ubiquinol (Reduced Coenzyme Q10)
Qu - Queuine
Qus - Queuosine
QRPT - Quinolinate Phosphorybosyltransferase
RK - Riboflavin Kinase
ROS - Reactive Oxygen Species
SADH - Sarcosine Dehydrogenase
SAH - S-Adenosyl-L-Homocysteine
SAMe - S-Adenosylmethionine
SAMeA - S-Adenosylmethionamine
SAMeD - S-Adenosylmethionine Decarboxylase
SAMeS - S-Adenosylmethionine Synthase
SAT - Serotonin N-Acetyltransferase
SCOT - Succinyl-CoA:3-ketoacid CoA Transferase
SCS - Succinyl-CoA Synthetase
SDH - Succinate Dehydrogenase
Se - Selenium
SHMT - Serine Hydroxymethyltransferase
Si - Silicon
SLC - Solute Carrier
SPDS - Spermidine Synthase
SPOX - Spermine Oxidase
SPS - Spermine Synthase
SQR - Sulfide Quinone Oxidoreductase
SR - Sepiapterin Reductase
SSAL - Succinic Semialdehyde
SSAT1 - Spermidine/Spermine-N1-Acetyltransferase
Succ - Succinate
SUOX - Sulfite Oxidase
T3 - Triiodothyronine
TA - Tyrosinase
TAT - Tyrosine Aminotransferase
TGF - Transforming Growth Factor
TGT - tRNA Guanine Transglycosylase
TH - Tyrosine Hydroxylase
THF - Tetrahydrofolate
THL - Thiolase
THP - Tetrahydropapaveroline
TMLH - Trimethyllysine Hydroxylase
TNF - Tumour Necrosis Factor
TPH - Tryptophan Hydroxylase
TPI - Triose Phosphate Isomerase
TPP - Thiamine Pyrophosphate
TPQ - Topaquinone
TS - Thymidylate Synthase
TST - Thiosulfate Sulfurtransferase
UDP - Uridine Diphosphate
UROC - Urocanase
UGPase - UDP-Glucose Pyrophosphorylase
UGAPase - UDP-GlcNAc Pyrophosphorylase
UTP - Uridine Triphosphate
V - Vanadium
Vit C - Ascorbic Acid
Vit E - Tocopherols, Tocotrienols
VMA - Vanillylmandelic Acid
VMAT - Vesicular Monoamine Transporter
VNN - Vanin-1 (Pantetheinase)
Zn - Zinc

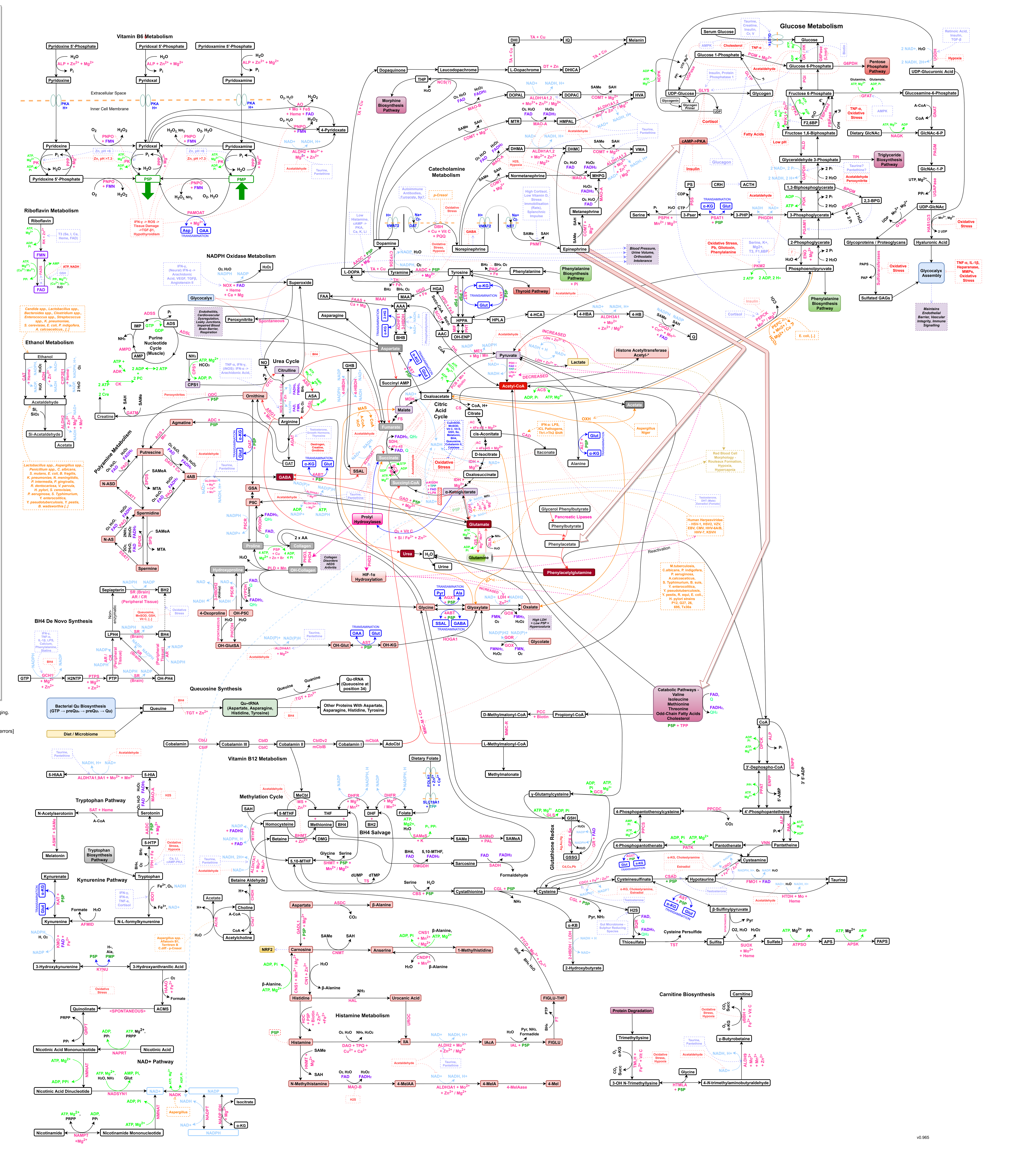

Figure 1. Pathway Diagram: The role of mitochondrial dysfunction in chronic disease and aging.

ME/CFS: Correcting Chronic Mitochondrial Dysfunction

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