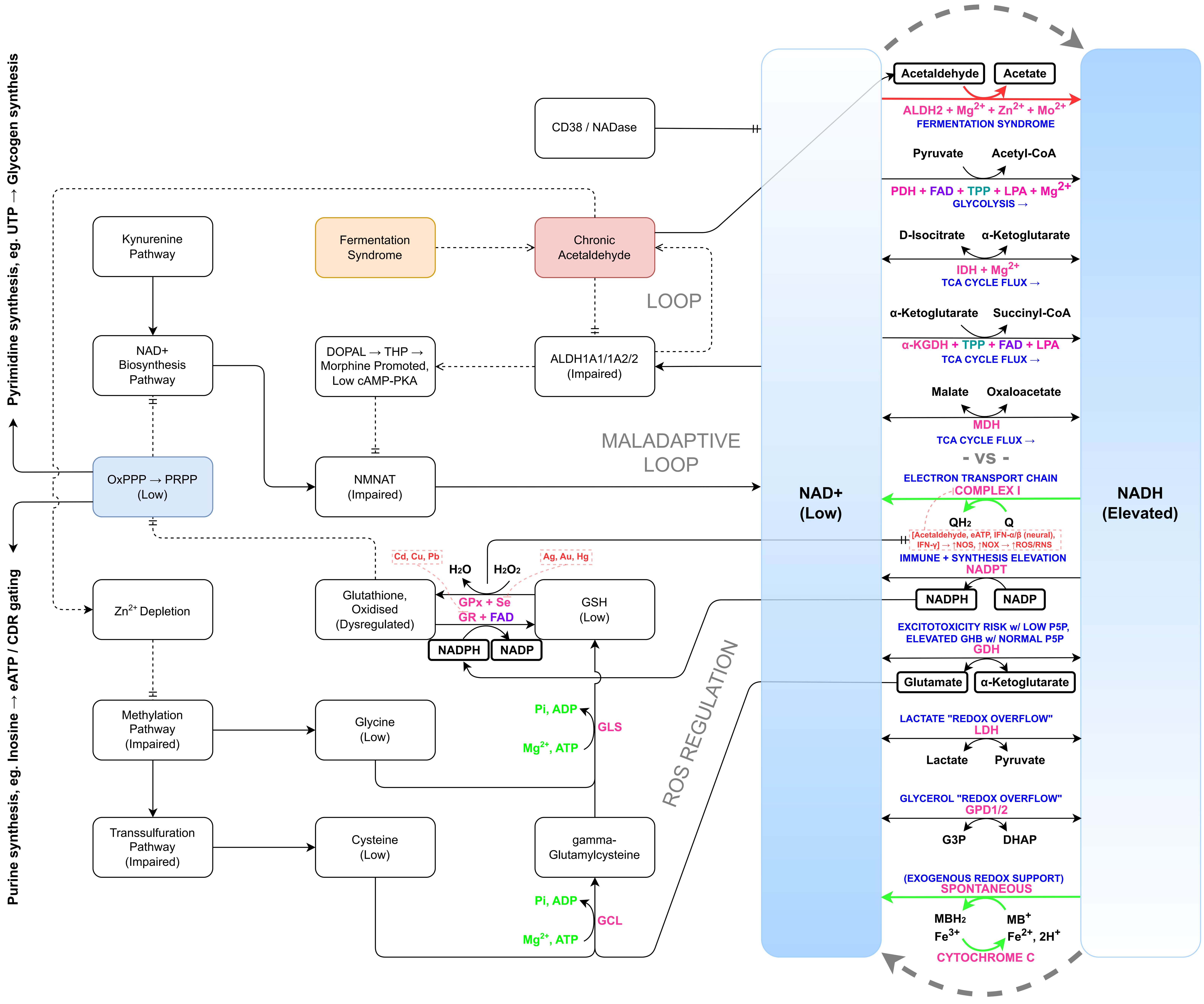

Description

Acetaldehyde, glycolysis, TCA cycle flux and other mitochondrial matrix NADH generators (not shown - see Figure 17) decrease the mitochondrial NAD+ pool and increase NADH pool sizes.

Complex I (NADH Dehydrogenase) normally balances this NAD+:NADH redox, however is inhibited by reactive oxygen and nitrogen species, primarily generated by uncoupled NOS and NOX activity - promoted by interferon signalling cascades and acetaldehyde directly.

Where Complex I is inhibited, GDH and NADPT activity is increased by the NADH pool elevation, further increasing glutamate and the NADPH pool, promoting regulatory glutathione peroxidase and other synthesis activities.

Methylene blue concentrates in the mitochondrial matrix, providing a narrow therapeutic window for creating a parallel electron pathway to Cytochrome c and NAD+ redox support.

Ag - Silver
α-KGDH - Alpha-Ketoglutarate Dehydrogenase
ALDH - Aldehyde Dehydrogenase
ADP - Adenosine Diphosphate
ATP - Adenosine Triphosphate
Au - Gold
cAMP-PKA - Cyclic Adenosine Monophosphate - Protein Kinase A
Cd - Cadmium
CD38 - Cluster of Differentiation 38 (NAD^+ glycohydrolase)
CDR - Cell Danger Response
COMPLEX I - NADH:Ubiquinone Oxidoreductase
DHAP - Dihydroxyacetone Phosphate
DOPAL - 3,4-Dihydroxyphenylacetaldehyde
eATP - Extracellular Adenosine Triphosphate
FAD - Flavin Adenine Dinucleotide
G3P - Glycerol 3-Phosphate
GCL - Glutamate-Cysteine Ligase
GLS - Glutathione Synthase
GPD - Glycerol-3-Phosphate Dehydrogenase
GPx - Glutathione Peroxidase
GR - Glutathione Reductase
GDH - Glutamate Dehydrogenase
GHB - gamma-Hydroxybutyrate
GSH - Glutathione, Reduced
GSSG - Glutathione, Oxidised (Disulfide)
H_2O - Water
H_2O_2 - Hydrogen Peroxide
Hg - Mercury
IDH - Isocitrate Dehydrogenase
IFN - Interferon
LDH - Lactate Dehydrogenase
LPA - Lipoamide
MB^+ - Methylene Blue
MBH_2 - Leucomethylene Blue
MDH - Malate Dehydrogenase
Mo^{2+} - Molybdenum Ion
Mg^{2+} - Magnesium Ion
NAD^+ - Nicotinamide Adenine Dinucleotide (oxidised)
NADH - Nicotinamide Adenine Dinucleotide (reduced)
NADP - Nicotinamide Adenine Dinucleotide Phosphate (oxidised)
NADPH - Nicotinamide Adenine Dinucleotide Phosphate (reduced)
NADPT - NAD(P) Transhydrogenase
NMNAT - Nicotinamide Mononucleotide Adenylyltransferase
NOS - Nitric Oxide Synthase
NOX - NADPH Oxidase
OxPPP - Oxidative Pentose Phosphate Pathway
Pb - Lead
P5P - Pyridoxal 5-Phosphate
PDH - Pyruvate Dehydrogenase
P_i - Inorganic Phosphate
PRPP - 5-Phosphoribosyl-1-Pyrophosphate
Q - Ubiquinone
QH_2 - Ubiquinol
ROS - Reactive Oxygen Species
RNS - Reactive Nitrogen Species
Se - Selenium
TCA - Tricitric Acid
THP - Tetrahydropapaveroline
TPP - Thiamine Pyrophosphate
UTP - Uridine Triphosphate
Zn^{2+} - Zinc Ion

Connector Key:

Path ————→
Promoted - - - - - - →
Inhibited - - - - - - ⊣

v0.56

Figure 14. Pathway Diagram: A simplified overview of mitochondrial NAD+:NADH deficiency.

ME/CFS: Correcting Chronic Mitochondrial Dysfunction

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