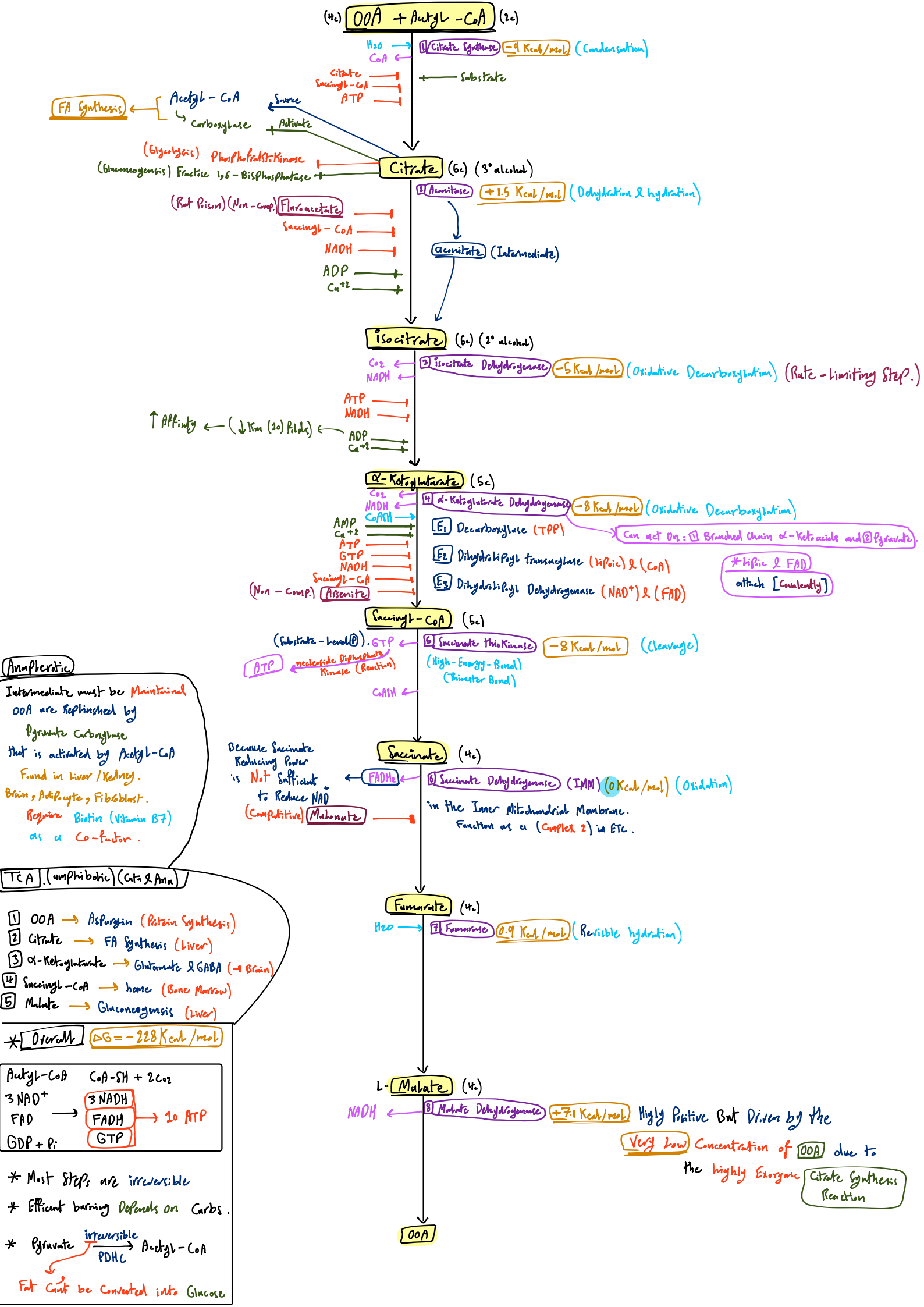
(4c) OOA + Acetyl-CoA (2c)
H2O
CoA
1 Citrate Synthase
-9 Kcal/mol
(Condensation)
Substrate
Citrate
Succinyl-CoA
ATP
FA Synthesis
Acetyl-CoA
Carboxylase
Source
Activate
(Glycolysis) Phosphofructokinase
(Gluconeogenesis) Fructose 1,6-BisPhosphatase
Citrate (6c) (3° alcohol)
(Rat Poison) (Non-Comp.) Fluoroacetate
2 Aconitase
+1.5 Kcal/mol
(Dehydration & hydration)
Succinyl-CoA
NADH
ADP
Ca+2
Aconitate (Intermediate)
Isocitrate (6c) (2° alcohol)
CO2
NADH
3 Isocitrate Dehydrogenase
-5 Kcal/mol
(Oxidative Decarboxylation)
(Rate-limiting Step.)
ATP
NADH
ADP
Ca+2
↑ Affinity ← (↓ Km (2o) Pilots)
α-Ketoglutarate (5c)
CO2
NADH
CoASH
AMP
Ca+2
ATP
GTP
NADH
Succinyl-CoA
(Non-Comp.) Arsenite
4 α-Ketoglutarate Dehydrogenase
-8 Kcal/mol
(Oxidative Decarboxylation)
E1 Decarboxylase (TPP)
E2 Dihydrolipoyl transacylase (lipoic) & (CoA)
E3 Dihydrolipoyl Dehydrogenase (NAD+) & (FAD)
Can act On: 1 Branched chain α-Keto acids and 2 Pyruvate.
*lipoic & FAD attach [Covalently]
Succinyl-CoA (5c)
(Substrate-Level P). GTP
ATP
Nucleoside Diphosphate Kinase (Reaction)
5 Succinate thioKinase
-8 Kcal/mol
(Cleavage)
(High-Energy-Bond)
(Thioester Bond)
CoASH
Succinate (4c)
Because Succinate Reducing Power is Not Sufficient to Reduce NAD
FADH2
(Competitive) Malonate
6 Succinate Dehydrogenase (IMM) (0 Kcal/mol) (Oxidation)
in the Inner Mitochondrial Membrane.
Function as a (Complex 2) in ETC.
Fumarate (4c)
H2O
7 Fumarase
0.9 Kcal/mol
(Revisible hydration)
L-Malate (4c)
NADH
8 Malate Dehydrogenase
+7.1 Kcal/mol
Highly Positive But Driven by the Very Low Concentration of OOA due to the highly Exergonic Citrate Synthesis Reaction
OOA
Amphiboric
(Cata & Ana)
1 OOA → Asparagin (Protein Synthesis)
2 Citrate → FA Synthesis (Liver)
3 α-Ketoglutarate → Glutamate & GABA (→ Brain)
4 Succinyl-CoA → heme (Bone Marrow)
5 Malate → Gluconeogenesis (Liver)
Anaplerotic
Intermediate must be Maintained
OOA are Replinished by
Pyruvate Carboxylase
that is activated by Acetyl-CoA
Found in Liver / Kidney.
Brain, Adipocyte, Fibroblast.
Require Biotin (Vitamin B7)
as a Co-factor.
TCA
* Overall ΔG = -228 Kcal/mol
Acetyl-CoA
3 NAD+
FAD
GDP + Pi
CoA-SH + 2 CO2
3 NADH
FADH
GTP
→ 10 ATP
* Most Steps are irreversible
* Efficient burning Depends on Carbs.
* Pyruvate → (irreversible PDHC) → Acetyl-CoA
Fat Can't be Converted into Glucose