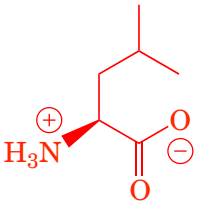
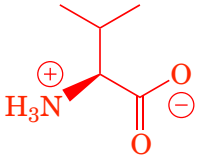
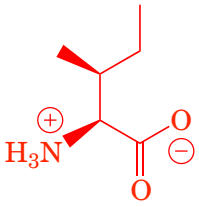
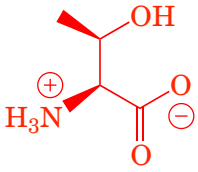
Amino Acid Breakdown


Leucine

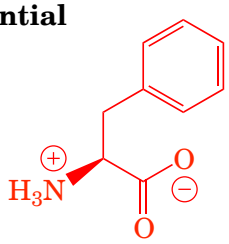

Valine

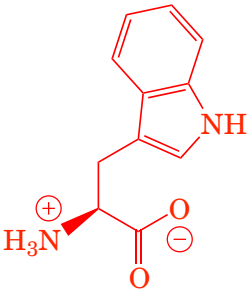

Isoleucine

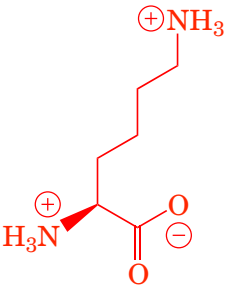

Threonine


Methionine

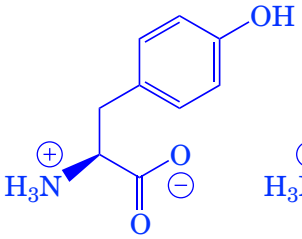
Nutritionally Essential

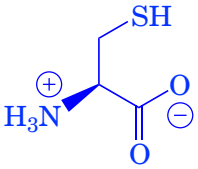

Phenylalanine

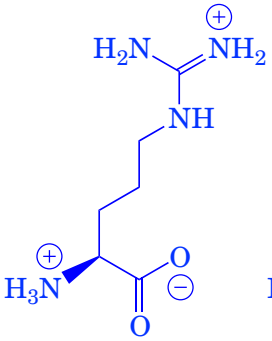

Tryptophan

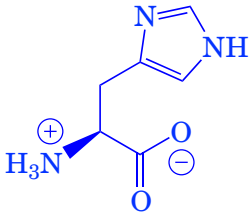

Lysine

Conditionally Nutritionally Essential

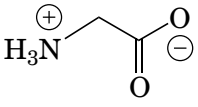

Tyrosine

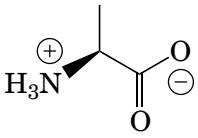

Cysteine

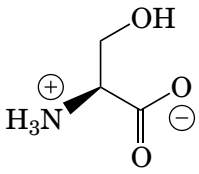

Arginine

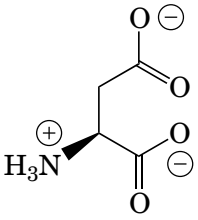

Histidine

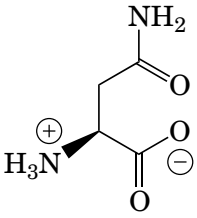
Nutritionally Non-essential

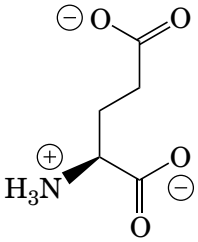

Glycine

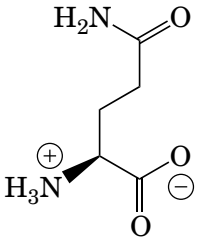

Alanine

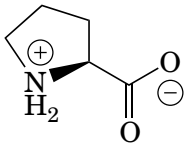

Serine


Aspartate

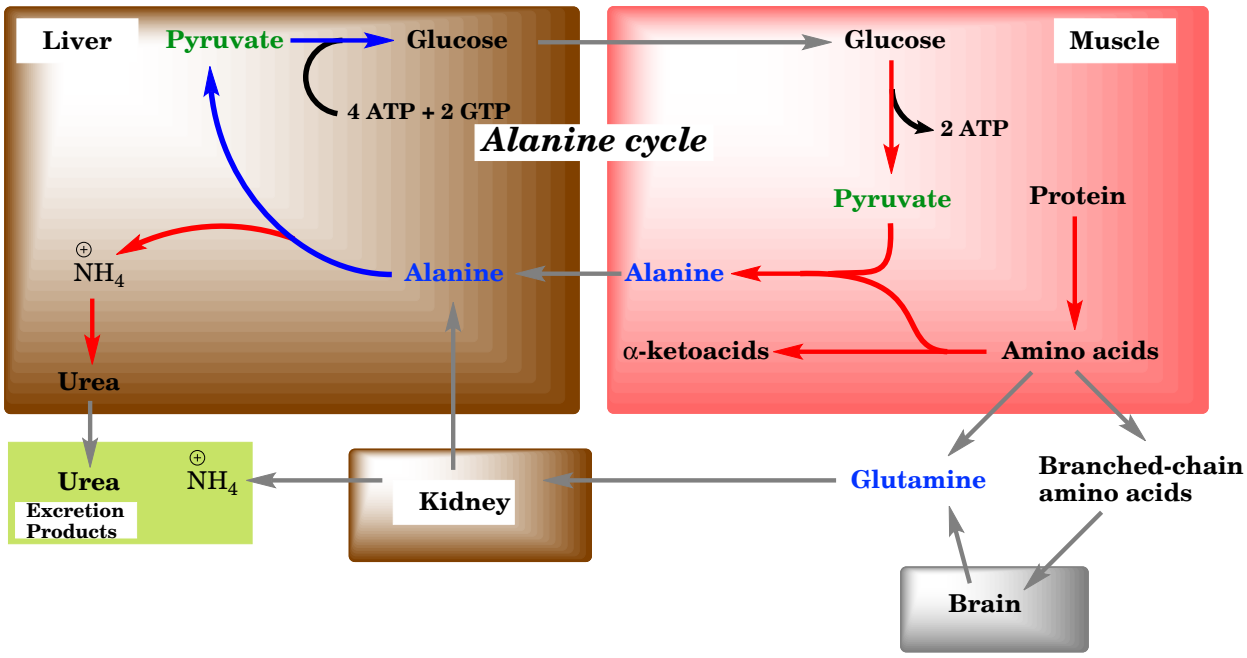

Asparagine


Glutamate

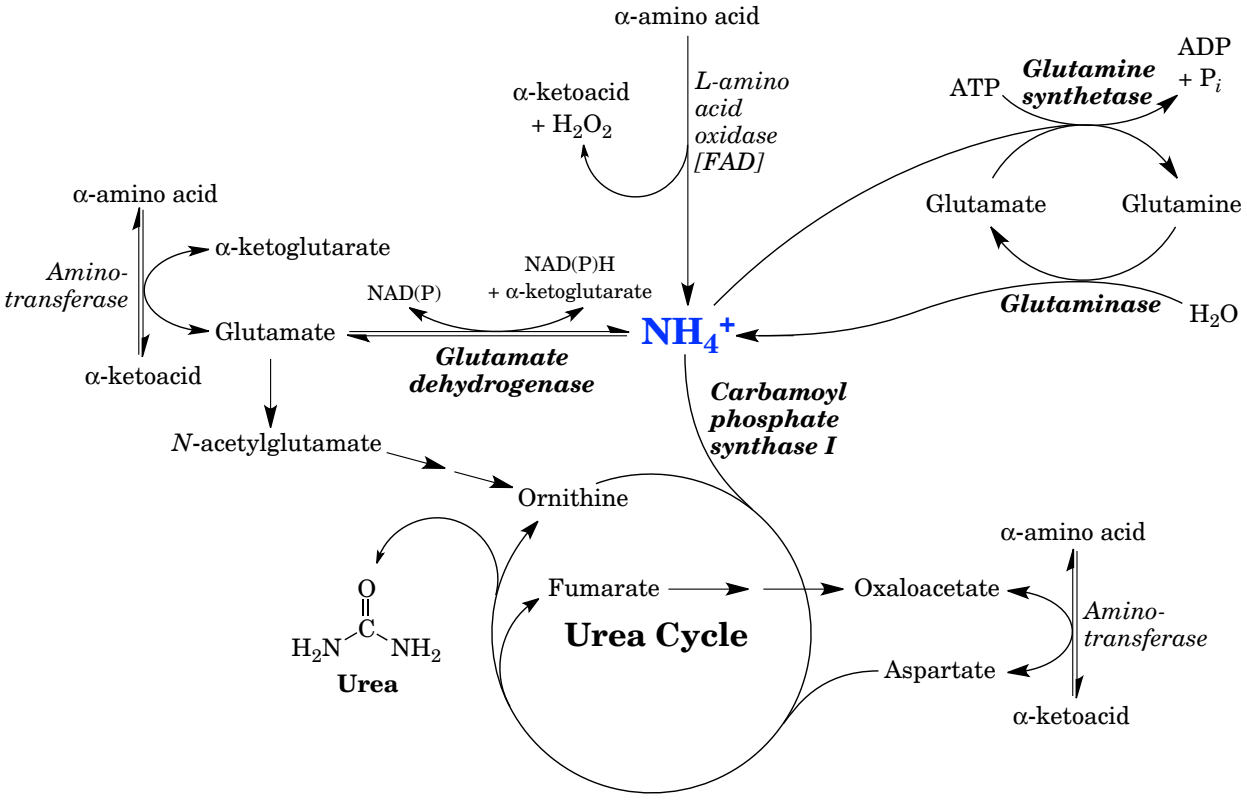

Glutamine


Proline

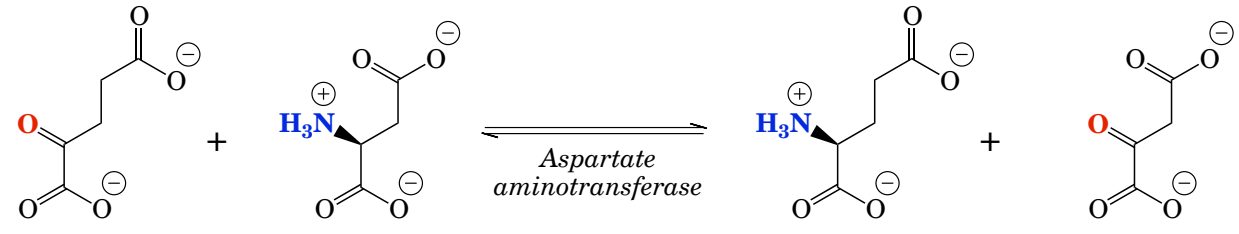
Alanine Cycle



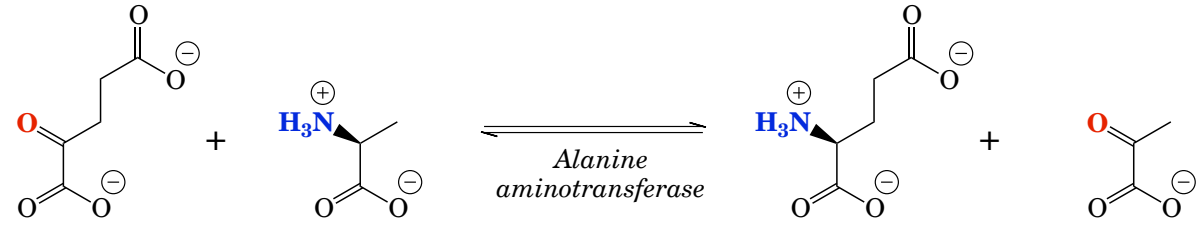
Overview of Nitrogen Flow



Aminotransferases

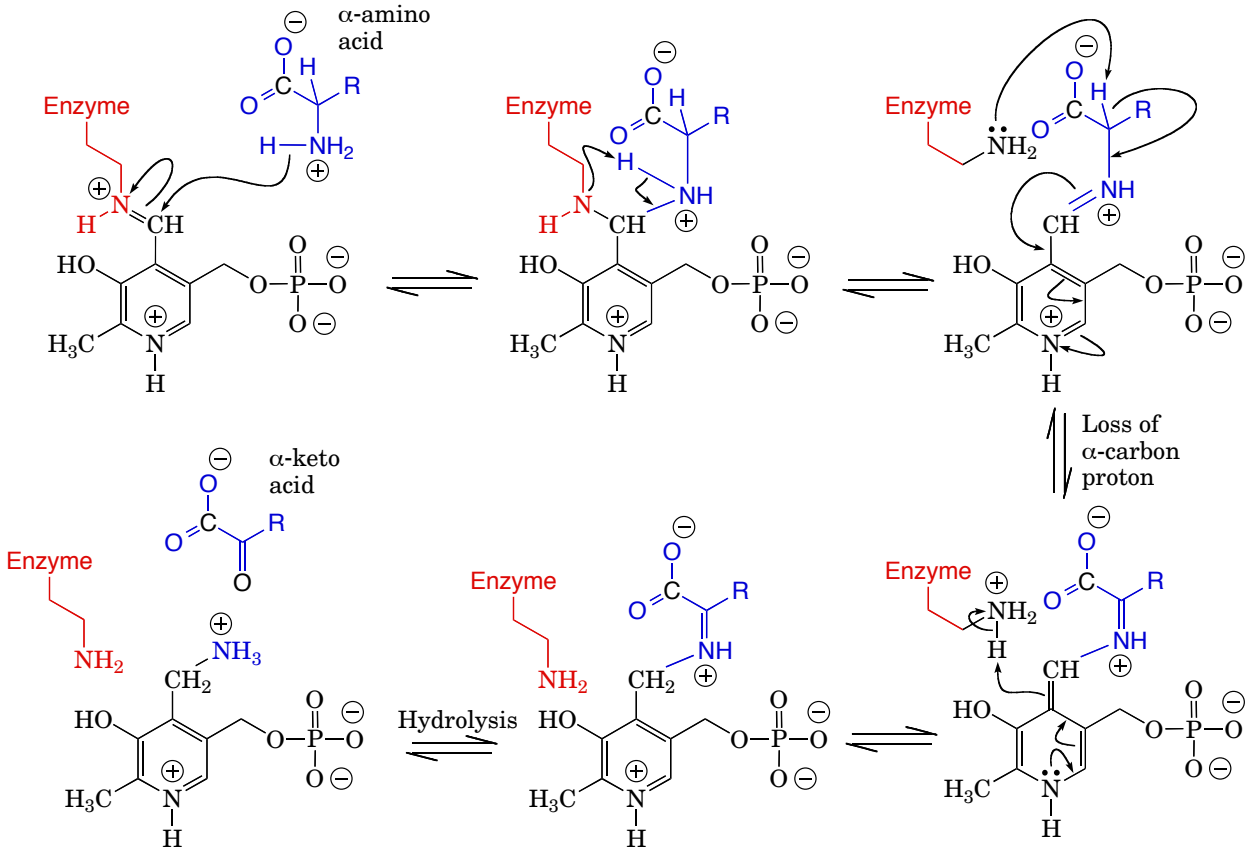


α-Ketoglutarate Aspartate Glutamate Oxaloacetate

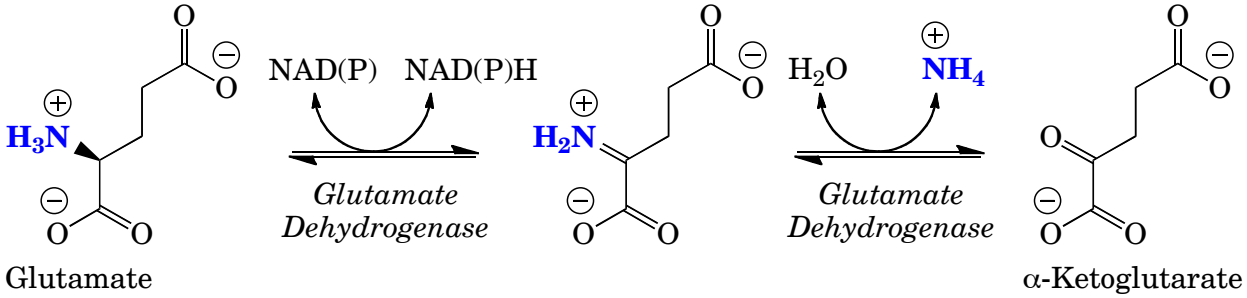


α-Ketoglutarate Alanine Glutamate Pyruvate

SGOT (Serum Glutamate Oxaloacetate Transaminase) = AST (Aspartate aminotransferase)
SGPT (Serum Glutamate Pyruvate Transaminase) = ALT (Alanine aminotransferase)



Glutamate Dehydrogenase



Glutamate + NAD ⇌ α-ketoglutarate + NADH

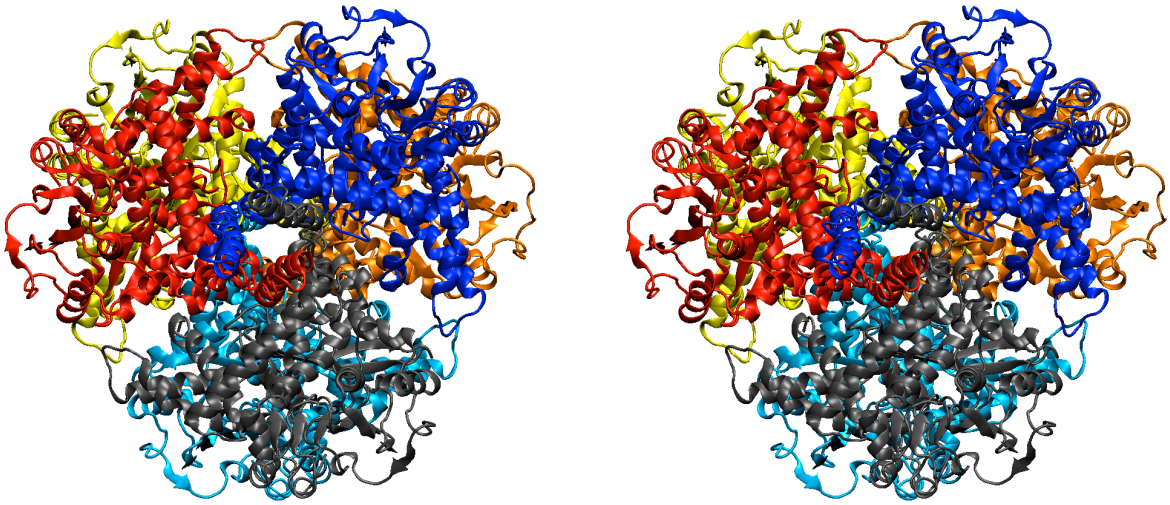
$\Delta G'^{\circ}$ = +30 kJ/mol

Regulators:
Inhibitors: NADH, GTP

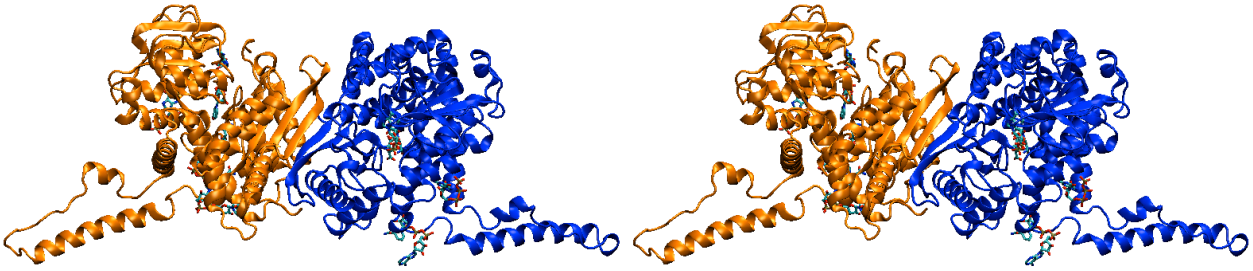
Activators: NAD, leucine, ADP

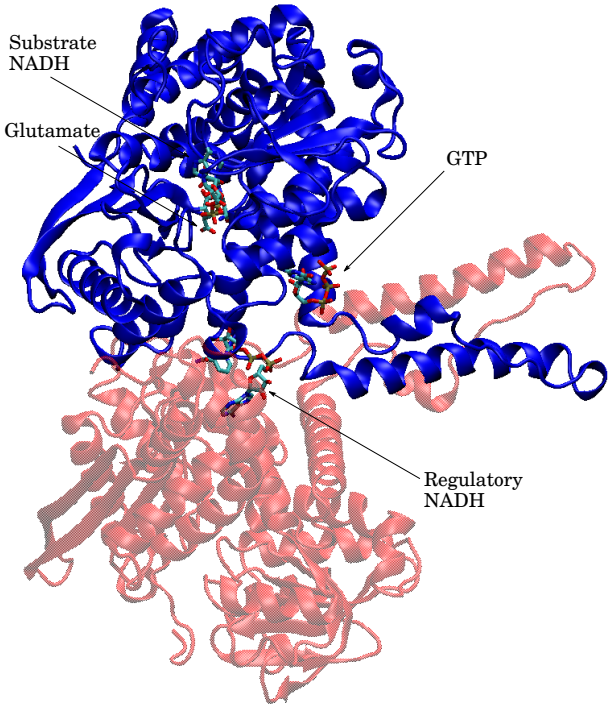
Hyperinsulinemia/Hyperammonemia mutations

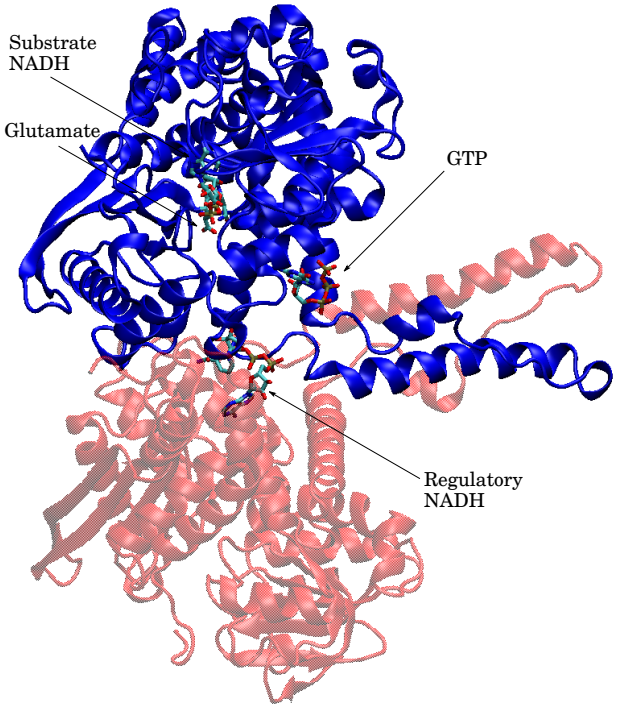
Bovine Glutamate Dehydrogenase (PDB ID 3MW9)



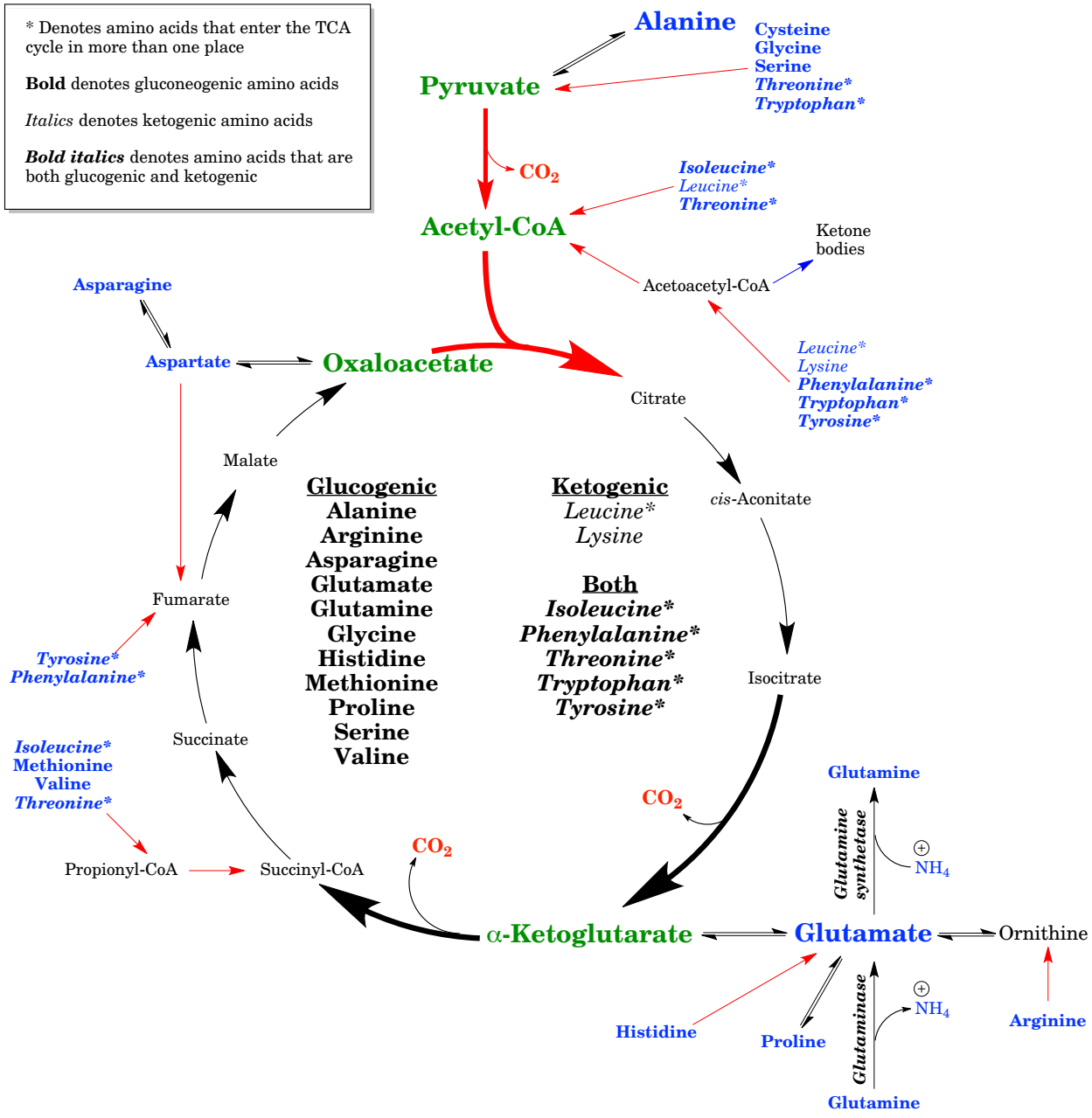
Bovine Glutamate Dehydrogenase (PDB ID 3MW9)



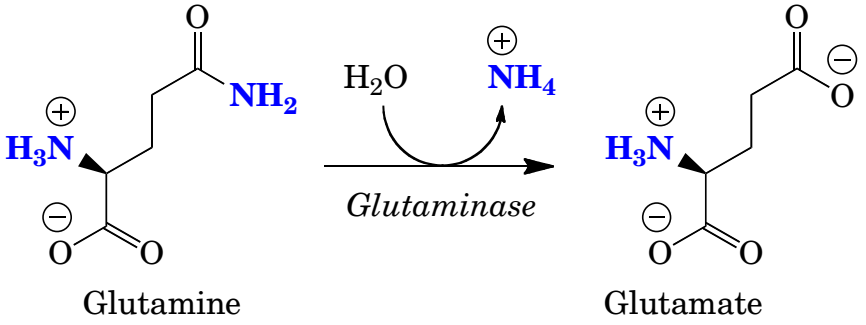


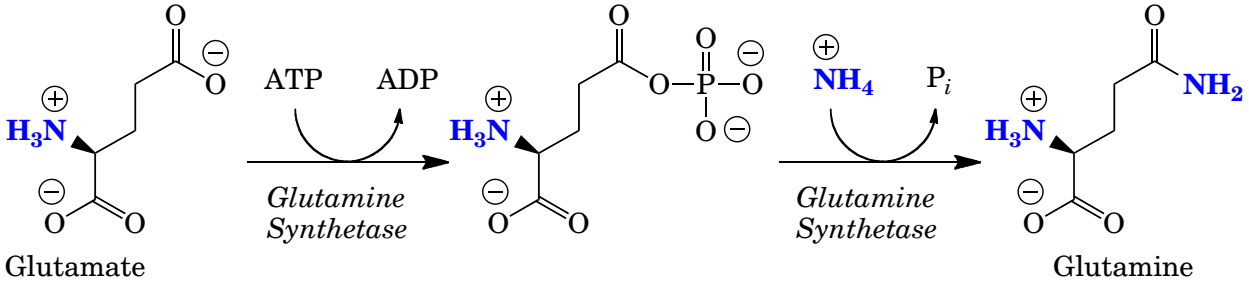


Overview of Amino Acid Breakdown

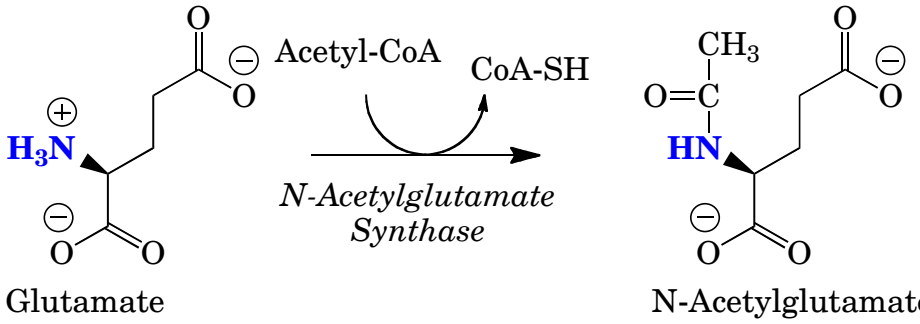


Glutamine Metabolism

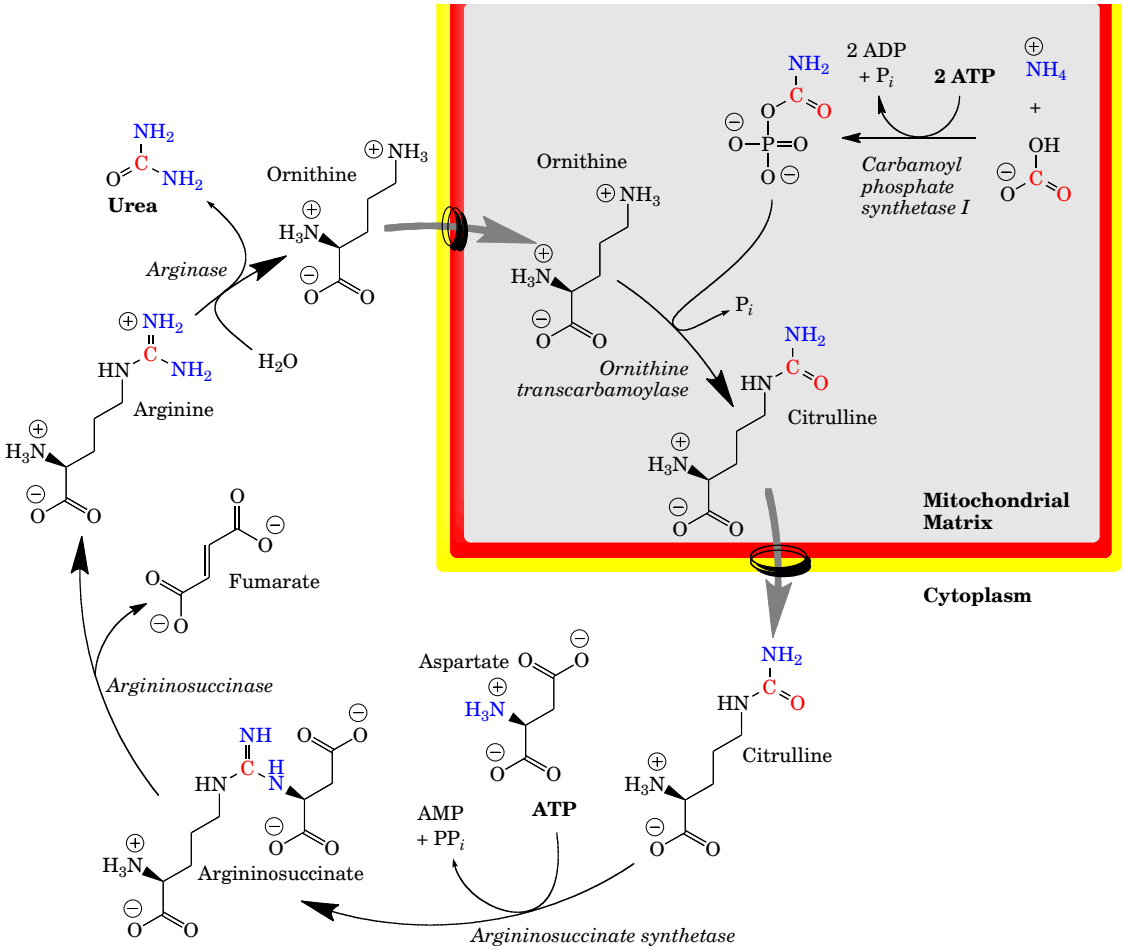


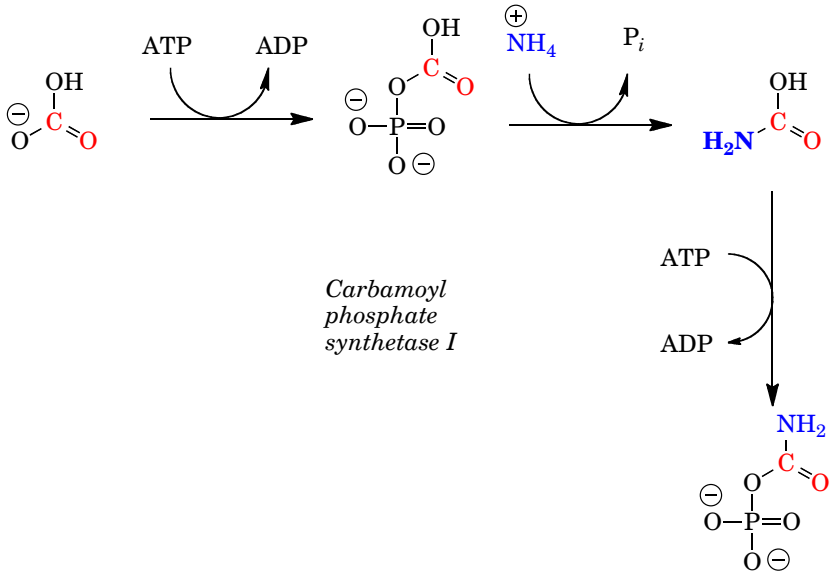


N-Acetylglutamate

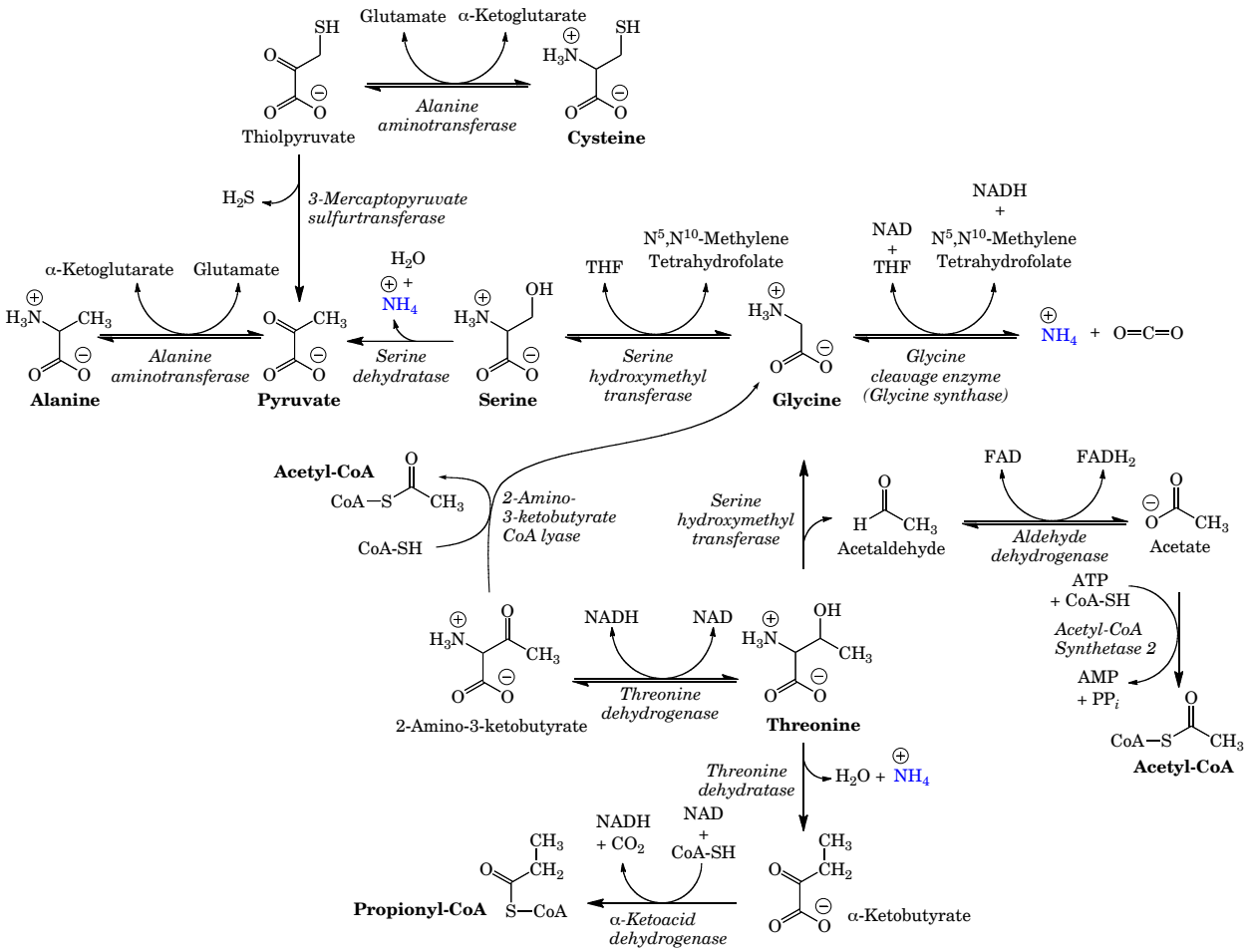


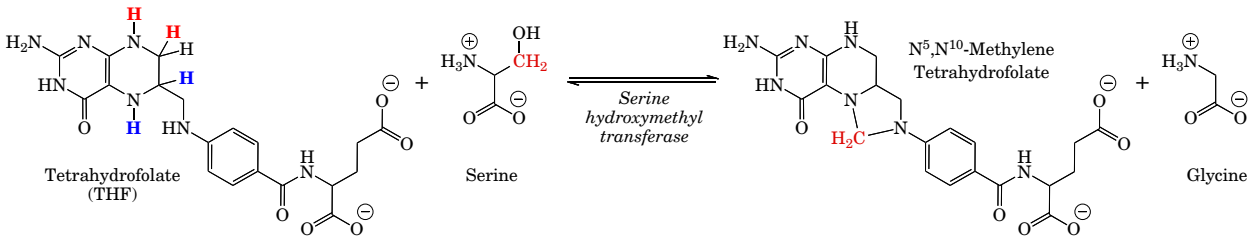
Urea Cycle


Urea
Ornithine
Arginase
H2O
Arginine
Fumarate
Argininosuccinase
Argininosuccinate
Aspartate
ATP
AMP + PPi
Argininosuccinate synthetase
Citrulline
Ornithine transcarbamoylase
Pi
Citrulline
2 ADP + Pi
2 ATP
Carbamoyl phosphate synthetase I
NH4 +
Mitochondrial Matrix
Cytoplasm

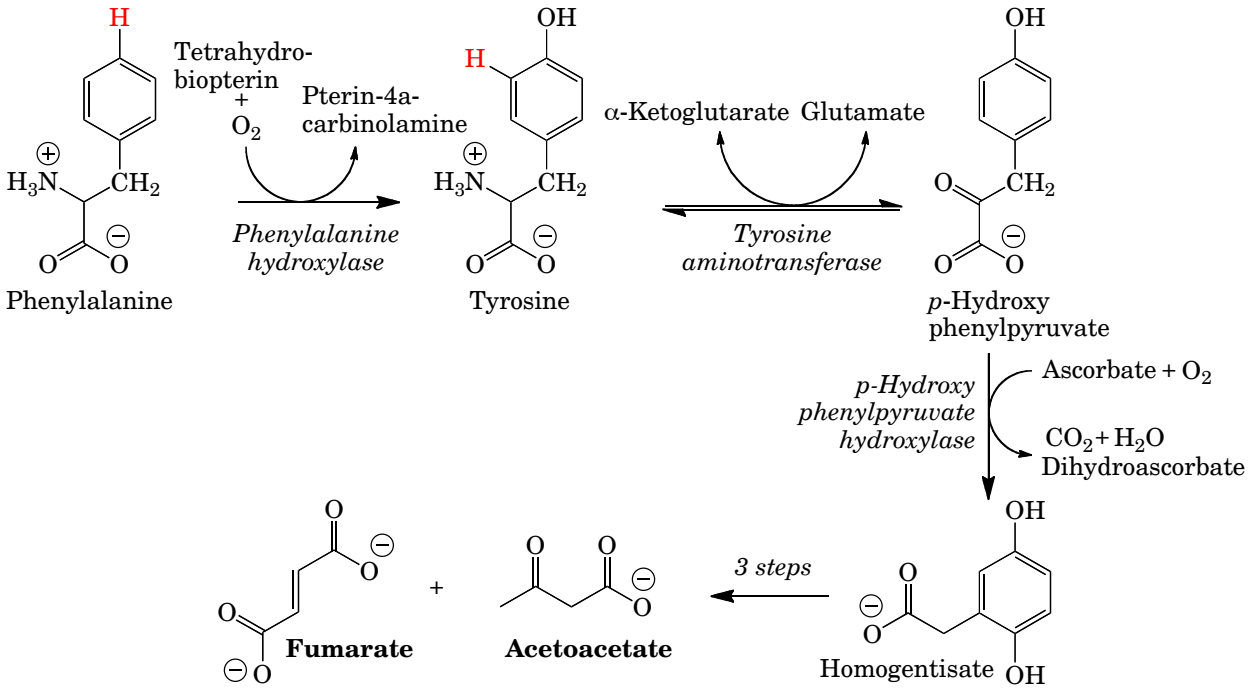

ATP
ADP
NH4
Pi
H2N
Carbamoyl phosphate synthetase I
ATP
ADP

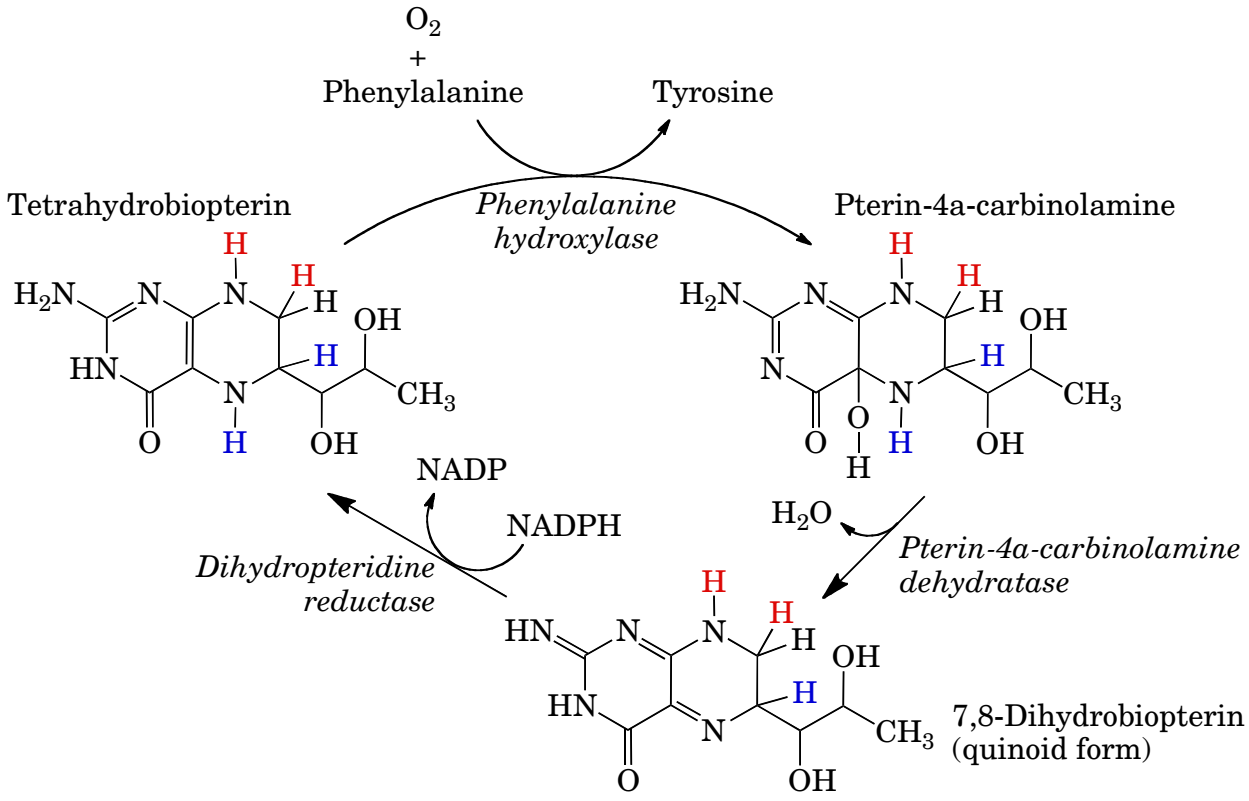
Metabolism of Small Side-chain Amino Acids (Glycine, Serine, Cysteine, and Threonine)



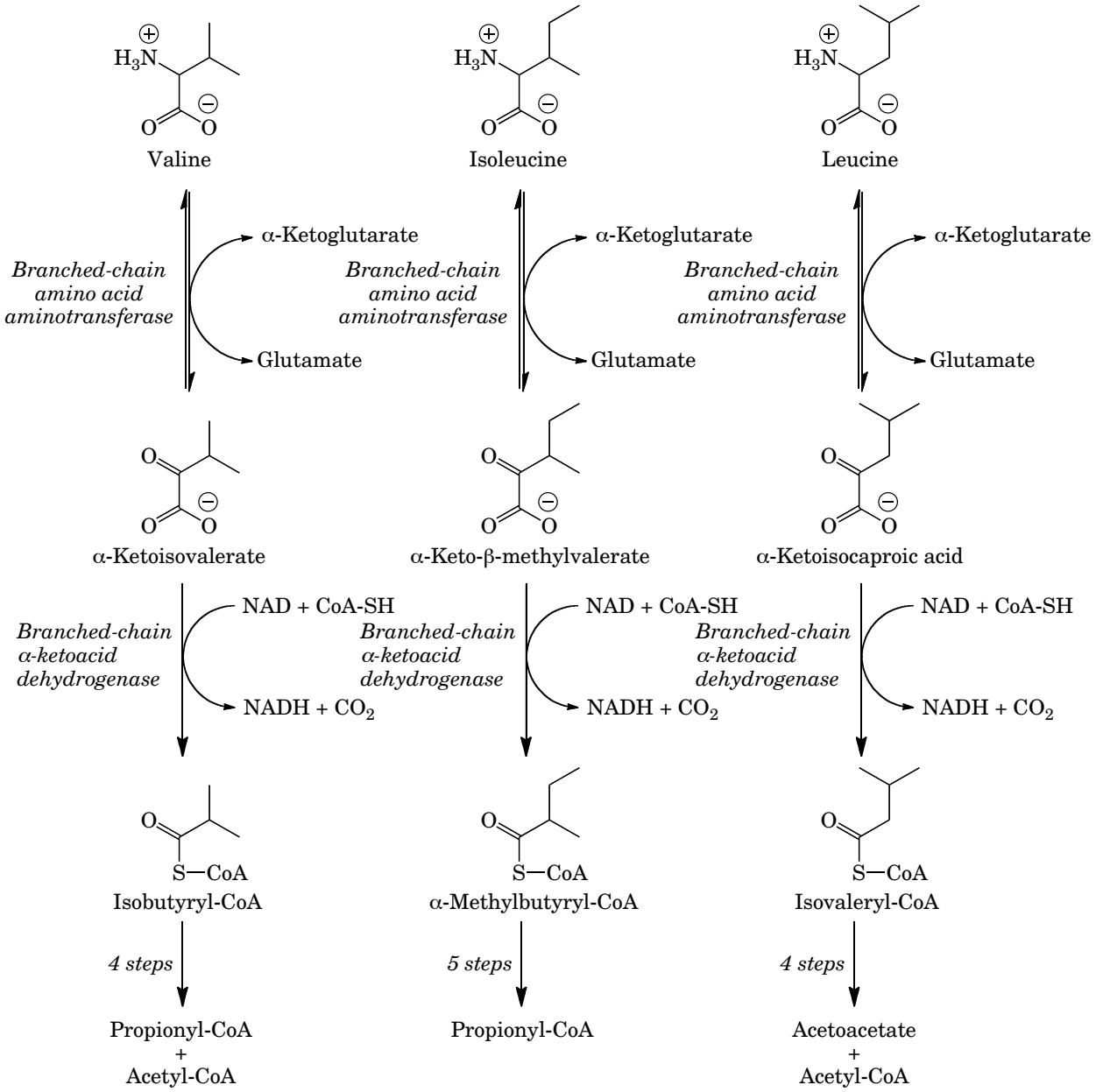


Metabolism of Phenylalanine and Tyrosine

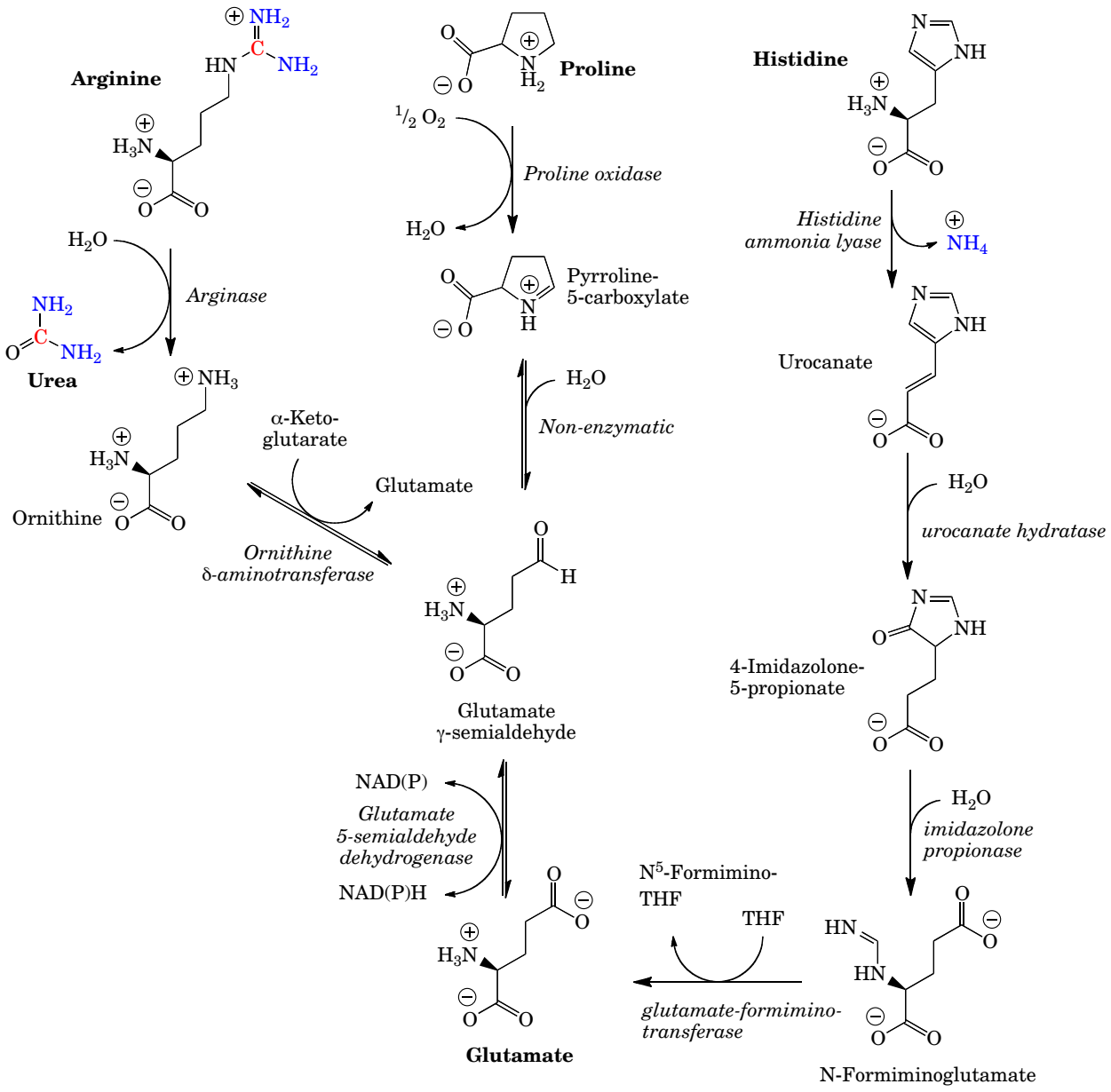




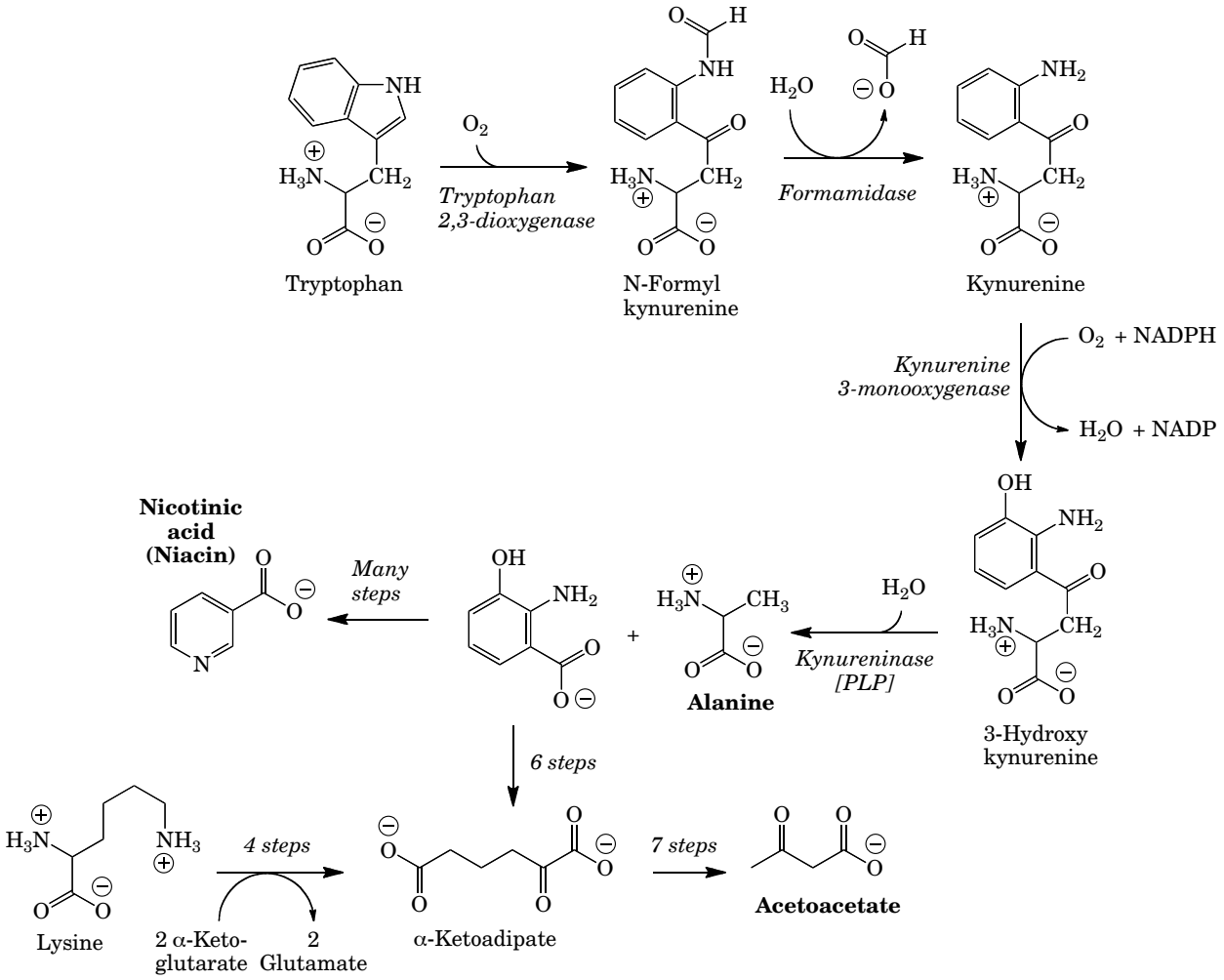
Branched-chain Amino Acids



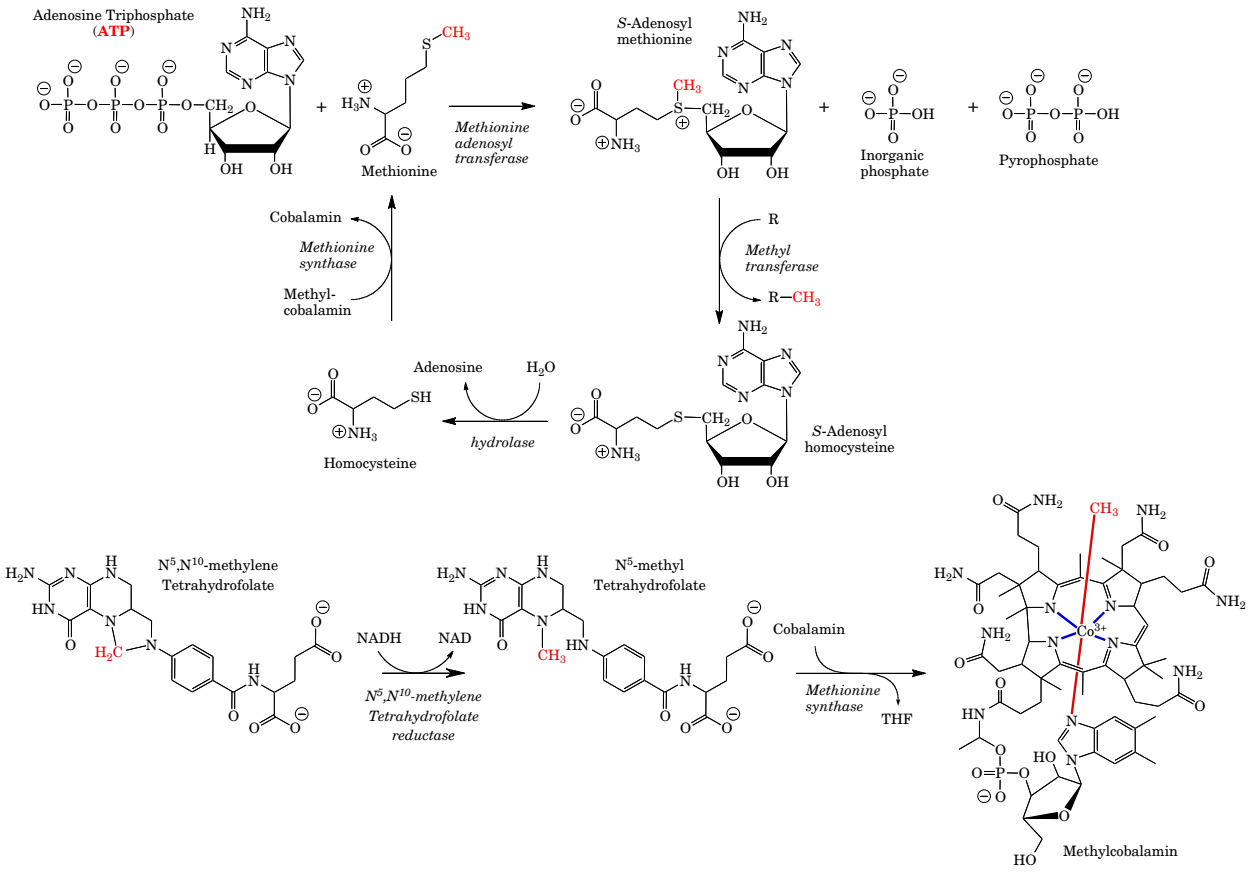
Arginine, Proline, and Histidine Conversion to Glutamate



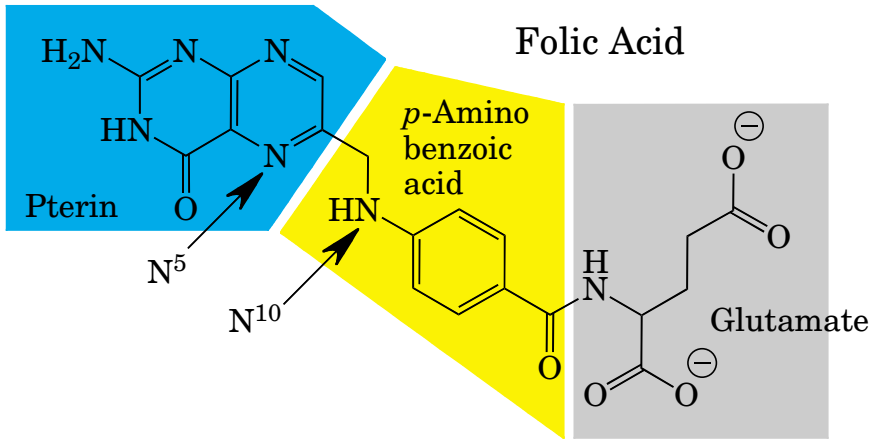
Tryptophan and Lysine

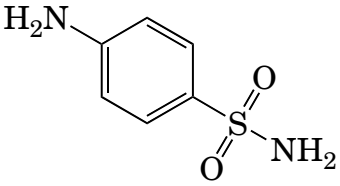


Methionine and S-Adenosylmethionine

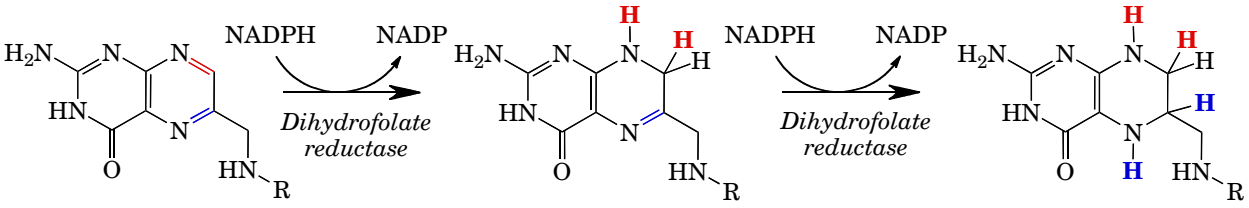


Folic Acid

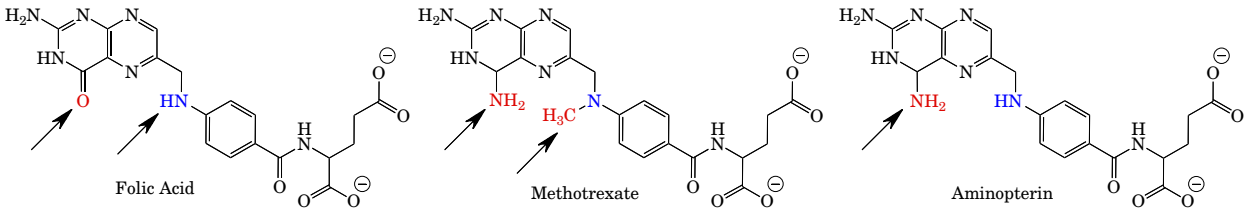


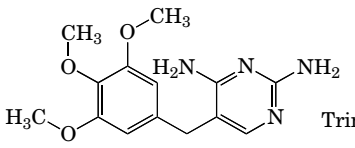


Sulfanilamide



Folic Acid | Dihydrofolate | Tetrahydrofolate (THF)





Trimethoprim

Folic Acid Metabolism