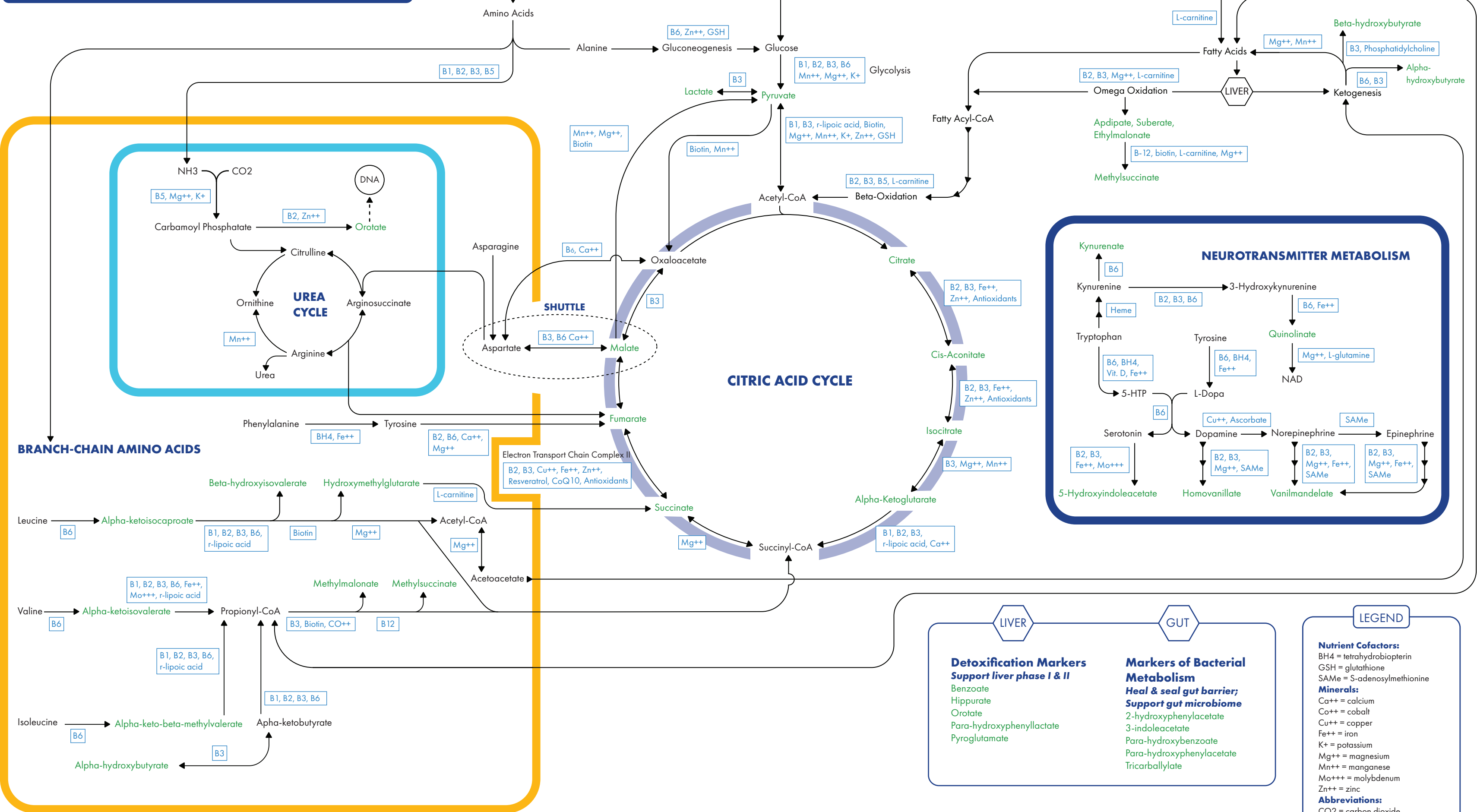


# ORGANIC ACIDS IN CENTRAL ENERGY PATHWAYS



**LIVER**

**Detoxification Markers**  
*Support liver phase I & II*

- Benzoate
- Hippurate
- Orotate
- Para-hydroxyphenyllactate
- Pyroglutamate

**GUT**

**Markers of Bacterial Metabolism**  
*Heal & seal gut barrier; Support gut microbiome*

- 2-hydroxyphenylacetate
- 3-indoleacetate
- Para-hydroxybenzoate
- Para-hydroxyphenylacetate
- Tricarballicylate

**LEGEND**

**Nutrient Cofactors:**  
 BH4 = tetrahydrobiopterin  
 GSH = glutathione  
 SAMe = S-adenosylmethionine

**Minerals:**  
 Ca++ = calcium  
 Co++ = cobalt  
 Cu++ = copper  
 Fe++ = iron  
 K+ = potassium  
 Mg++ = magnesium  
 Mn++ = manganese  
 Mo+++ = molybdenum  
 Zn++ = zinc

**Abbreviations:**  
 CO2 = carbon dioxide  
 NH3 = ammonia

Disclaimer: The nutritional and pathway information presented in this chart is intended for educational purposes only, and not meant to act as a prescription or medical advice. The information presented has been obtained from online resources including the Small Molecule Pathway Database <https://smpdb.ca/>, the Kyoto Encyclopedia of Genes and Genomes <https://www.genome.jp/kegg/pathway.html> and UniProt <https://www.uniprot.org/uniprot/> as of April 1st, 2020.