CLAIMS

1. A composition for use in promoting and/or sustaining ketosis in a mammal, comprising:

a beta-hydroxybutyrate mixed salt in solid or powder form, the beta-hydroxybutyrate mixed salt being formed from at least four different cations and comprising:

10-70% by weight of sodium beta-hydroxybutyrate;

10-70% by weight of potassium beta-hydroxybutyrate;

10-70% by weight of calcium beta-hydroxybutyrate; and

10-70% by weight of magnesium beta-hydroxybutyrate.

2. The composition of claim 1, wherein the beta-hydroxybutyrate mixed salt comprises 10% to 30%, or 12% to 25%, or 14% to 22%, or 16% to 20%, or 18%, by weight, of sodium beta-hydroxybutyrate.

3. The composition of claim 1 or 2, wherein the beta-hydroxybutyrate mixed salt comprises 10% to 30%, or 12% to 25%, or 14% to 22%, or 16% to 20%, or 18%, by weight, of potassium beta-hydroxybutyrate.

4. The composition of any one of claims 1 to 3, wherein the beta-hydroxybutyrate mixed salt comprises 10% to 40%, or 12% to 35%, or 15% to 30%, or 18% to 25%, or 20% to 23%, by weight, of calcium beta-hydroxybutyrate.

5. The composition of any one of claims 1 to 4, wherein the beta-hydroxybutyrate mixed salt comprises 10% to 40%, or 12% to 35%, or 15% to 30%, or 18% to 25%, or 20% to 23%, by weight, of magnesium beta-hydroxybutyrate.

6. The composition of any one of claims 1 to 5, further comprising vitamin D_3.

7. The composition of claim 6, wherein the composition comprises 5 µg to 200 µg, or 10 µg to 100 µg, or 15 µg to 75 µg of vitamin D_3.

8. The composition of claim 6 or 7, wherein the composition comprises 200 IU to 8000 IU, or 400 IU to 4000 IU, or 600 IU to 3000 IU of vitamin D_3.

9. The composition of any one of claims 1 to 8, wherein the beta-hydroxybutyrate mixed salt further comprises at least one transition metal beta-hydroxybutyrate.

10. The composition of claim 9, wherein the beta-hydroxybutyrate mixed salt comprises 2% to 40%, or 3% to 30%, or 4% to 20%, or 5% to 15%, or 7% to 13%, by weight, of zinc beta-hydroxybutyrate.

11. The composition of claim 9 or 10, wherein the beta-hydroxybutyrate mixed salt comprises 2% to 40%, or 3% to 30%, or 4% to 20%, or 5% to 15%, or 7% to 13%, by weight, of iron beta-hydroxybutyrate.

12. The composition of any one of claims 1 to 11, wherein the sodium beta-hydroxybutyrate is included in an amount by weight no greater than the amount by weight of the potassium beta-hydroxybutyrate.

13. The composition of any one of claims 1 to 12, wherein the calcium beta-hydroxybutyrate and the magnesium beta-hydroxybutyrate are included in amounts so that the molar ratio of calcium ions to magnesium ions is no greater than 1.

14. The composition of any one of claims 1 to 13, further comprising at least one medium chain fatty acid, or a mono-, di- or triglyceride of the at least one medium chain fatty acid.

15. The composition of claim 14, wherein the at least one medium chain fatty acid has from 6 to 12 carbons, or from 8 to 10 carbons.

16. The composition of any one of claims 1 to 15, further comprising at least one beta hydroxybutyrate-amino acid salt.

17. The composition of claim 16, wherein the at least one beta hydroxybutyrate-amino acid salt includes at least one cationic amino acid or amino acid metabolite.

18. The composition of claim 17, wherein the at least one cationic amino acid or amino acid metabolite is selected arginine, lysine, leucine, iso-leucine, histidine, ornithine, citrulline, glutamine, or creatine.

19. The composition of any one of claims 1 to 18, wherein the beta-hydroxybutyrate mixed salt comprises a racemic mixture of DL-beta hydroxybutyrate.

20. The composition of any one of claims 1 to 18, wherein the beta-hydroxybutyrate mixed salt comprises isolated D-beta hydroxybutyrate or is enriched with D-beta hydroxybutyrate relative to L-beta hydroxybutyrate.

21. A composition for use in promoting or sustaining ketosis in a mammal, the composition comprising a plurality of salts formulated from at least four different cations and a single anion, wherein the single anion is beta-hydroxybutyrate, and wherein other anions are omitted from the plurality of salts, the cations being formulated so as to provide a biologically balanced set of cationic electrolytes upon administration to a mammal, the composition being provided in solid or powder form.

22. The composition of claim 21, wherein the at least four different cations comprise sodium, potassium, calcium, and magnesium, and wherein the molar ratio of sodium ions to potassium ions is no greater than 1, and wherein the molar ratio of calcium ions to magnesium ions is no greater than 1.

23. The composition of claim 21 or 22, further comprising one or more additional ingredients mixed with the plurality of salts and configured to lower the hygroscopicity of the composition.

24. A composition for use in promoting or sustaining ketosis in a mammal, the composition comprising:

a potassium beta-hydroxybutyrate salt;

a sodium beta-hydroxybutyrate salt included in an amount, by weight, that is no greater than an amount, by weight, of the potassium beta-hydroxybutyrate salt;

a magnesium beta-hydroxybutyrate salt; and

a calcium beta-hydroxybutyrate salt included in an amount, by weight, that is no greater than an amount, by weight, of the magnesium beta-hydroxybutyrate salt.

25. The composition of claim 24, further comprising at least transition metal beta-hydroxybutyrate, such as zinc beta-hydroxybutyrate and/or iron beta-hydroxybutyrate.

26. The composition of claim 24 or 25, further comprising at least one BHB-amino acid salt, such as a BHB-amino acid salt that includes BHB and at least one of arginine, lysine, leucine, iso-leucine, histidine, ornithine, citrulline, glutamine, or creatine.