CLAIMS

1. An aqueous beta-hydroxybutyric acid composition for oral delivery to increase blood ketone level in a subject, comprising:

water; and

beta-hydroxybutyric acid,

wherein the composition is free or substantially free of beta-hydroxybutyrate salts so as to contain less than 1% of beta-hydroxybutyrate salts by combined weight of the beta-hydroxybutyric acid and any beta-hydroxybutyrate salts.

2. The aqueous beta-hydroxybutyric acid composition of claim 1, wherein the composition is a dilute solution in which the beta-hydroxybutyric acid has a concentration of about 0.4% w/v to about 6% w/v, such as a concentration of about 0.6% w/v to about 5.5% w/v, or about 0.9% w/v to about 5% w/v, or about 1.2% w/v to about 4.5% w/v, or about 1.5% w/v to about 4% w/v.

~~3. The aqueous beta-hydroxybutyric acid composition of claim 2, wherein the beta-hydroxybutyric acid has a concentration of about 0.6% w/v to about 5.5% w/v, or about 0.9% w/v to about 5% w/v, or about 1.2% w/v to about 4.5% w/v, or about 1.5% w/v to about 4% w/v.~~

~~4.~~3. The aqueous beta-hydroxybutyric acid composition of ~~any one of~~ claim~~s~~ 1 or 2~~to 3~~, wherein about 4 oz. (about 120 ml) to about 16 oz. (about 475 ml) of the composition provides about 0.5 gram to about 25 grams of beta-hydroxybutyrate, such as about 0.75 gram to about 20 grams, or about 1 gram to about 15 grams, or about 1.5 grams to about 12 grams, or about 2 grams to about 10 grams, or about 0.5 gram to about 25 grams of beta-hydroxybutyrate.

~~5. The aqueous beta-hydroxybutyric acid composition of claim 4, wherein about 4 oz. (about 120 ml) to about 16 oz. (about 475 ml) of the composition provides about 0.75 gram to about 20 grams, or about 1 gram to about 15 grams, or about 1.5 grams to about 12 grams, or about 2 grams to about 10 grams 0.5 gram to about 25 grams of beta-hydroxybutyrate.~~

~~6.~~4. The aqueous beta-hydroxybutyric acid composition of ~~any one of~~ claim~~s~~ 1~~ to 5~~, wherein the composition is a concentrated solution in which the beta-hydroxybutyric acid has a concentration of about 6% w/v to about 60% w/v, such as a concentration of about 8% w/v to about 55% w/v, or about 10% w/v to about 50% w/v, or about 12.5% w/v to about 45% w/v, or about 15% w/v to about 40% w/v.

~~7. The aqueous beta-hydroxybutyric acid composition of claim 6, wherein the beta-hydroxybutyric acid has a concentration of about 8% w/v to about 55% w/v, or about 10% w/v to about 50% w/v, or about 12.5% w/v to about 45% w/v, or about 15% w/v to about 40% w/v.~~

~~8.~~5. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to ~~4~~7, wherein the composition contains less than 0.9%, or less than 0.8%, or less than 0.7%, or less than 0.6%, or less than 0.5%, or less than 0.4%, or less than 0.3%, or less than 0.2%, or less than 0.1% of beta-hydroxybutyrate salts by combined weight of the beta-hydroxybutyric acid and any beta-hydroxybutyrate salts.

~~9.~~6. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to ~~5~~8, wherein the beta-hydroxybutyric acid is a non-racemic mixture enriched with R-beta-hydroxybutyric acid and contains greater than 50% and less than 100% by enantiomeric equivalents of R-beta-hydroxybutyric acid and less than 50% and greater than 0% by enantiomeric equivalents of S-beta-hydroxybutyric acid.

~~10.~~7. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to ~~5~~9, wherein the beta-hydroxybutyric acid is a non-racemic mixture enriched with S-beta-hydroxybutyric acid and contains greater than 50% and less than 100% by enantiomeric equivalents of S-beta-hydroxybutyric acid and less than 50% and greater than 0% by enantiomeric equivalents of R-beta-hydroxybutyric acid.

~~11.~~8. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to ~~5~~10, wherein the beta-hydroxybutyric acid is a racemic mixture that contains 50% by enantiomeric equivalents of R-beta-hydroxybutyric acid and 50% by enantiomeric equivalents of S-beta-hydroxybutyric acid.

~~12.~~9. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to ~~5~~11, wherein the beta-hydroxybutyric acid is enantiomerically pure S-beta-hydroxybutyric acid and contains 100% by enantiomeric equivalents of S-beta-hydroxybutyric acid and 0% by enantiomeric equivalents of R-beta-hydroxybutyric acid.

~~13.~~10. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to ~~5~~12, wherein the beta-hydroxybutyric acid is enantiomerically pure R-beta-hydroxybutyric acid and contains 100% by enantiomeric equivalents of R-beta-hydroxybutyric acid and 0% by enantiomeric equivalents of S-beta-hydroxybutyric acid.

~~14.~~11. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to 10~~13~~, further comprising at least one additive selected from acetoacetic acid, 1,3-butanediol, beta-hydroxybutyrate esters, vitamins, minerals, central nervous system stimulants, edible acids, amino acids, muscle-promoting compounds, and cannabinoids.

~~15.~~12. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to 11~~14~~, wherein the composition is a gel and further comprises at least one gelling agent, preferably wherein the gelling agent is selected from gellan gum, pectin, agar, carrageenan, xanthan gum, alginate, starch, modified starch, gum Arabic, guar gum, locust bean gum, konjac, gum tragacanth, acacia gum, gum karaya, methyl cellulose, agar, pullulan, konjac, hydroxypropylmethyl cellulose, other cellulosic compounds, other polysaccharide gums, gelatin, collagen, casein, other proteins, silica fume, and milled chia seeds.

~~16. The aqueous beta-hydroxybutyric acid composition of claim 15, wherein the gelling agent is selected from gellan gum, pectin, agar, carrageenan, xanthan gum, alginate, starch, modified starch, gum Arabic, guar gum, locust bean gum, konjac, gum tragacanth, acacia gum, gum karaya, methyl cellulose, agar, pullulan, konjac, hydroxypropylmethyl cellulose, other cellulosic compounds, other polysaccharide gums, gelatin, collagen, casein, other proteins, silica fume, and milled chia seeds.~~

~~17.~~13. The aqueous beta-hydroxybutyric acid composition of any one of claims 1 to 12~~16~~, wherein the composition contains less water than is required to dissolve the beta-hydroxybutyric acid so as to be a suspension.

~~18.~~14. A beta-hydroxybutyric acid composition suitable for use in making an aqueous solution for oral delivery to increase blood ketone level in a subject, wherein the beta-hydroxybutyric acid composition comprises~~comprising~~:

beta-hydroxybutyric acid in solid or powder form dissolvable in water;

flavorant; and

stabilizer,

wherein the beta-hydroxybutyric acid composition is free or substantially free of beta-hydroxybutyrate salts so as to contain less than 1% of beta-hydroxybutyrate salts by combined weight of the beta-hydroxybutyric acid and any beta-hydroxybutyrate salts.

~~19.~~15. The beta-hydroxybutyric acid composition of claim 14~~18~~, further comprising at least one additive selected from the group consisting of acetoacetic acid, acetoacete, 1,3-butanediol, beta-hydroxybutyrate esters, vitamins, minerals, central

nervous system stimulants, nootropics, edible acids, amino acids, muscle-promoting compounds, and cannabinoids.

~~20.~~16. The beta-hydroxybutyric acid composition of claim 14~~18~~ or 15~~19~~, wherein the beta-hydroxybutyric acid composition is provided in one or more effervescent tablets, the beta-hydroxybutyric acid composition further comprising a bicarbonate or carbonate that reacts with acid to release carbon dioxide.

~~21.~~17. The beta-hydroxybutyric acid composition of claim 16~~20~~, wherein the beta-hydroxybutyric acid composition further comprises~~ing~~ one or more edible acids other than beta-hydroxybutyric acid.

~~22.~~18. A kit ~~for administering ketone bodies to a subject~~, comprising:

the beta-hydroxybutyric acid composition of any one of claims 1 to 17~~21~~;

a container in which the beta-hydroxybutyric acid composition is placed, wherein the container is selected from the group consisting of carton, box, can, jar, bag, pouch, bottle, jug, and keg; and

a measuring device configured to hold therein a unit dose, or fraction thereof, of the mixed salt composition in powder or solid form, wherein the measuring device is selected from the group consisting of packet, pouch, cup, scoop, syringe, dropper, spatula, and spoon, and wherein a unit dose of the beta-hydroxybutyric acid composition contains about 0.5 g to about 25 g of combined beta-hydroxybutyric acid and any optional beta-hydroxybutyrate compounds.

~~23.~~19. An aqueous beta-hydroxybutyric acid composition for oral delivery to increase blood ketone level in a subject, comprising:

water; and

beta-hydroxybutyric acid enriched with the S-enantiomer relative to the R-enantiomer,

wherein the composition is free or substantially free of beta-hydroxybutyrate salts so as to contain less than 4% of beta-hydroxybutyrate salts by combined weight of the beta-hydroxybutyric acid and any beta-hydroxybutyrate salts.

20. Use of a composition or kit according to any one of claims 1 to 19~~23~~ in the manufacture of a medicament for at last one of:

~~for~~ therapeutically or prophylactically treating obesity~~;~~.

suppressing appetite, promoting weight loss, promoting fat loss, or avoiding weight gain;

therapeutically or prophylactically treating high blood glucose or type II diabetes;

therapeutically or prophylactically treating insulin resistance;

reducing blood glucose level;

as a brain tonic for therapeutically or prophylactically treating brain disorders, reducing traumatic brain injury, or improving cognitive function;

enhancing athletic performance;

therapeutically or prophylactically treating metabolic dysfunction;

improving metabolic health;

therapeutically or prophylactically treating mitochondrial defect;

therapeutically or prophylactically treating neurological disorder;

promoting anti-aging effects;

reducing cancer;

reducing inflammation;

therapeutically or prophylactically treating epileptic seizer;

improving mood; or

increasing strength, increasing muscle mass, or improving body composition.

~~24. Use of a composition or kit according to any one of claims 1 to 23 for suppressing appetite, promoting weight loss, promoting fat loss, or avoiding weight gain.~~

~~25. Use of a composition or kit according to any one of claims 1 to 23 for therapeutically or prophylactically treating high blood glucose or type II diabetes.~~

~~26. Use of a composition or kit according to any one of claims 1 to 23 for therapeutically or prophylactically treating insulin resistance.~~

~~27. Use of a composition or kit according to any one of claims 1 to 23 for reducing blood glucose level.~~

~~28. Use of a composition or kit according to any one of claims 1 to 23 as a brain tonic for therapeutically or prophylactically treating brain disorders, reducing traumatic brain injury, or improving cognitive function.~~

~~29. Use of a composition or kit according to any one of claims 1 to 23 for enhancing athletic performance.~~

~~30. Use of a composition or kit according to any one of claims 1 to 23 for therapeutically or prophylactically treating metabolic dysfunction.~~

~~31. Use of a composition or kit according to any one of claims 1 to 23 for improving metabolic health.~~

~~32. Use of a composition or kit according to any one of claims 1 to 23 for therapeutically or prophylactically treating mitochondrial defect.~~

~~33. Use of a composition or kit according to any one of claims 1 to 23 for therapeutically or prophylactically treating neurological disorder.~~

~~34. Use of a composition or kit according to any one of claims 1 to 23 for promoting anti-aging effects.~~

~~35. Use of a composition or kit according to any one of claims 1 to 23 for reducing cancer.~~

~~36. Use of a composition or kit according to any one of claims 1 to 23 for reducing inflammation.~~

~~37. Use of a composition or kit according to any one of claims 1 to 23 for therapeutically or prophylactically treating epileptic seizer.~~

~~38. Use of a composition or kit according to any one of claims 1 to 23 for improving mood.~~

~~39. Use of a composition or kit according to any one of claims 1 to 23 for increasing strength, increasing muscle mass, or improving body composition.~~