CLAIMS

~~What is claimed is:~~

1. A pharmaceutical composition comprising;

an immediate release ~~(IR)~~ component, wherein the immediate release component comprises from ~~1.~~2.5 g of ~~γ-hydroxybutyrate-equivalents~~ γ-((*L*-valyl)oxy)butanoic acid to ~~4.0~~7 g of ~~γ-hydroxybutyrate-equivalents~~ γ-((*L*-valyl)oxy)butanoic acid; and

a modified release ~~(MR)~~ component, wherein the modified release component comprises from ~~3~~7 g of ~~γ-hydroxybutyrate-equivalents~~ γ-((*L*-valyl)oxy)butanoic acid to ~~9~~15 g of ~~γ-hydroxybutyrate-equivalents~~ γ-((*L*-valyl)oxy)butanoic acid.

~~2. The pharmaceutical composition of claim 1, wherein each of the immediate release component and the modified release component comprise 4-((*L*-valyl)oxy)butanoic acid.~~

~~3. The pharmaceutical composition of any one of claims 1 to 2, wherein the γ-hydroxybutyrate equivalents is in the form of γ-((*L*-valyl)oxy)butanoic acid.~~

~~4~~2. The pharmaceutical composition of ~~any one of~~ claim~~s 2 to 3~~1, wherein,

the immediate release component comprises from 10 wt% to 50 wt% of 4-((*L*-valyl)oxy)butanoic acid; and

the modified release component comprises from 50 wt% to 90 wt% of 4-((*L*-valyl)oxy)butanoic acid,

wherein wt% is based on the total weight of ~~compound (1)~~ 4-((*L*-valyl)oxy)butanoic acid in the pharmaceutical composition.

3. The pharmaceutical composition of claim 1 or 2, wherein the immediate release component comprises a solution suitable for oral administration.

4. The pharmaceutical composition of claim 1, wherein the pharmaceutical composition comprises a solution comprising the immediate release component; and

the modified release component comprises a suspension of modified release microparticles suspended in the solution; and

the pharmaceutical composition is suitable for oral administration.

~~5. The pharmaceutical composition of any one of claims 2 to 4, wherein,~~

~~the immediate release component comprises form 2 g to 7 g of 4-((*L*-valyl)oxy)butanoic acid; and~~

~~the modified release component comprises from 7 g to 15 g of 4 ((*L*-valyl)oxy)butanoic acid.~~

~~6. The pharmaceutical composition of any one of claims 1 to 5, wherein,~~

~~the immediate release component comprises form 1 g to 4 g of γ hydroxybutyrate equivalents; and~~

~~the modified release component comprises from 3.5 g to 8.5 g of γ hydroxybutyrate equivalents.~~

~~7. The pharmaceutical composition of any one of claims 1 to 6, wherein a weight ratio of the gm-equivalents γ hydroxybutyrate in the immediate release component to the gm-equivalents γ-hydroxybutyrate in the modified release component is from 1.5 to 3.5.~~

~~8~~5. The pharmaceutical composition of ~~any one of~~ claim~~s~~ 1 ~~to 7~~, wherein the immediate release component comprises a plurality of immediate release microparticles.

~~9~~6. The pharmaceutical composition of claim ~~8~~5, wherein the immediate release microparticles comprise greater than 90 wt% of 4-((*L*-valyl)oxy)butanoic acid~~,~~; ~~wherein~~and wt% is based on the total weight of the immediate release microparticles.

7. The pharmaceutical composition of claim 5, wherein the immediate release microparticles comprise:

from 95.0 wt% to 99.5 wt% of γ-((*L*-valyl)oxy)butanoic acid;

from 0.1 wt% to 2.0 wt% of a flow control agent; and

from 0.1 wt% to 1.0 wt% of a binder, wherein,

wt% is based on the total weight of the immediate release microparticles.

~~10~~8. The pharmaceutical composition of ~~any one of~~ claim~~s~~ ~~8 to 9~~5, wherein the immediate release microparticles have a volume mean diameter D(4,3) from 200 μm to 500 μm.

~~11. The pharmaceutical composition of any one of claims 1 to 10, wherein the immediate release component comprises a solution suitable for oral administration.~~

~~12. The pharmaceutical composition of any one of claims 1 to 11, wherein the modified release component comprises a plurality of modified release microparticles.~~

~~13. The pharmaceutical composition of any one of claims 1 to 12, wherein the modified release component comprises a suspension of modified release microparticles suitable for oral administration.~~

~~14~~9. The pharmaceutical composition of ~~any one of~~ claim~~s~~ 1~~2 to 13~~, wherein

the modified release component comprises modified release microparticles;

the modified release microparticles comprise a core and a modified release coating surrounding the core; and~~.~~

~~15. The pharmaceutical composition of claim 14, wherein~~ the core comprises greater than 90 wt% of 4-((*L*-valyl)oxy)butanoic acid ~~(1)~~, wherein wt% is based on the total weight of the core.

~~16. The pharmaceutical composition of claim 14, wherein the core comprises greater than 95 wt% of compound (1), wherein wt% is based on the total weight of the core.~~

~~17. The pharmaceutical composition of any one of claims 14 to 16, wherein the core comprises an immediate release macroparticle comprising compound (1).~~

~~18. The pharmaceutical composition of any one of claims 14 to 17, wherein the modified release coating comprises a plasticizer, a controlled release polymer, a pore former, and an anti-tacking agent.~~

1~~9~~0. The pharmaceutical composition of ~~any one of~~ claim~~s~~ ~~14 to 18~~9, wherein the modified release microparticles comprise from 10 wt% to 35 wt% of the modified release coating~~,~~; ~~wherein~~and wt% is based on the total weight of the modified release microparticles.

11. The pharmaceutical composition of claim 9, wherein,

the modified release microparticles have an average particle diameter from 150 µm to 350 µm; and

the average particle diameter is determined using laser diffraction or sieve analysis.

12. The pharmaceutical composition of claim 1, wherein

the immediate release component comprises immediate release microparticles; and

the modified release component comprises modified release microparticles.

20. The pharmaceutical composition of any one of claims 14 to 19, wherein the modified release microparticles comprise:

from 14 wt% to 20 wt% of the modified release coating;

from 20 wt% to 26 wt% of the modified release coating; or

from 25 wt% to 31 wt% of the modified release coating

wherein wt% is based on the total weight of the modified release microparticles.

21. The pharmaceutical composition of any one of claims 1 to 20, wherein,

the modified release component comprises modified release microparticles; and

the modified release microparticles are characterized by a dissolution profile in which from 70 wt% to 90 wt% of compound (1) is released into the dissolution media within 2 hours, from 85% to 100% within 4 hours, and greater than 95% within 6 hours, as determined using a USP Type 2 dissolution apparatus with a buffered solution at pH 4.5 at a temperature of 37 °C and a paddle speed of 75 rpm.

22. The pharmaceutical composition of any one of claims 1 to 20, wherein,

the modified release component comprises modified release microparticles; and

the modified release microparticles are characterized by a dissolution profile in which from 45% to 65% of compound (1) is released into the dissolution media within 2 hours, from 70% to 90% within 4 hours, from 80% to 100% within 6 hours, and greater than 90% within 8 hours, as determined using a USP Type 2 dissolution apparatus with a buffered solution at pH 4.5 at a temperature of 37 °C and a paddle speed of 75 rpm.

23. The pharmaceutical composition of any one of claims 1 to 20, wherein,

the modified release component comprises modified release microparticles; and

the modified release microparticles are characterized by a dissolution profile in which from 25 wt% to 45 wt% of compound (1) is released into the dissolution media within 2 hours, from 60% to 80% within 4 hours, from 70% to 90% within 6 hours, from 80% to 100% within 8 hours and greater than 90% within 12 hours, as determined using a USP Type 2 dissolution apparatus with a buffered solution at pH 4.5 at a temperature of 37 °C and a paddle speed of 75 rpm.

24. The pharmaceutical composition of any one of claims 1 to 23, wherein following oral administration of an IR component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ of from 0.35 hours to 0.55 hours, a mean T_{max} from 0.5 hours to 0.7 hours, a mean C_{max} from 16 µg/mL to 20 µg/mL, a mean AUC_{0-6} from 14 h×µg/mL to 18 h×µg/mL, an AUC_{0-inf} from 14 h×µg/mL to 18 h×µg/mL, and/or a CL/F of 480 L/h to 520 L/h.

25. The pharmaceutical composition of any one of claims 1 to 23, wherein following oral administration of an IR component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.45 hours to 0.85 hours, a mean T_{max} from 0.7 hours to 1.1 hours, a mean C_{max} from 75 µg/mL to 96 µg/mL, an AUC_{0-6} from 147 h×µg/mL to 187 h×µg/mL, an AUC_{0-inf} from 150 h×µg/mL to 190 h×µg/mL, and/or a CL/F from 38 L/h to 58 L/h.

26. The pharmaceutical composition of any one of claims 1 to 23, wherein following oral administration of an IR component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile is characterized by a C_{max} ratio from 3.9 to 5.9, and an AUC_{0-inf} ratio from 10.3 to 12.3.

27. The pharmaceutical composition of any one of claims 1 to 26, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 0.7 hours to 1.1 hours, a mean T_{max} from 1.1 hours to 1.5 hours, a mean C_{max} from 0.6 µg/mL to 1.0 µg/mL, a mean AUC_{0-6} from 13 h×µg/mL to 17 h×µg/mL, a mean AUC_{0-inf} from 13 h×µg/mL to 17 h×µg/mL, and/or a mean CL/F from 495 L/h to 535 L/h.

28. The pharmaceutical composition of any one of claims 1 to 26, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.65 hours to 1.05 hours, a mean T_{max} from 1.5 hours to 1.9 hours, a mean C_{max} from 32 µg/mL to 52 µg/mL, a mean AUC_{0-6} from 96 h×µg/mL to 136 h×µg/mL, a mean AUC_{0-inf} from 100 h×µg/mL to 140 h×µg/mL, and/or a mean CL/F from 62 L/h to 102 L/h.

29. The pharmaceutical composition of any one of claims 1 to 26, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile is characterized by a C_{max} ratio from 5.0 to 5.4, and AUC_{0-inf} ratio from 7.2 to 8.0, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the compound (1) value.

30. The pharmaceutical composition of any one of claims 1 to 26, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 0.6 hours to 1.0 hours, a mean T_{max} from 1.4 hours to 1.8 hours, a mean C_{max} from 3 µg/mL to 7

~~μg/mL, a mean AUC_{0-6} from 10 h×μg/mL to 14 h×μg/mL, a mean AUC_{0-inf} from 10 h×μg/mL to 14 h×μg/mL, and/or a mean CL/F from 620 L/h to 660 L/h.~~

~~31. The pharmaceutical composition of any one of claims 1 to 26, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.8 hours to 1.2 hours, a mean T_{max} from 2.1 hours to 2.5 hours, a mean C_{max} from 23 μg/mL to 27 μg/mL, a mean AUC_{0-6} from 63 h×μg/mL to 83 h×μg/mL, a mean AUC_{0-inf} from 66 h×μg/mL to 86 h×μg/mL, and/or a mean CL/F from 100 L/h to 140 L/h.~~

~~32. The pharmaceutical composition of any one of claims 1 to 31, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile is characterized by a C_{max} ratio from 4.5 to 5.3, and an AUC_{0-inf} ratio from 5.9 to 6.7, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the compound (1) value.~~

~~33. The pharmaceutical composition of any one of claims 1 to 32, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 0.8 hours to 1.2 hours, a mean T_{max} from 2.1 hours to 2.5 hours, a mean C_{max} from 3.5 μg/mL to 3.9 μg/mL, a mean AUC_{0-6} from 8 h×μg/mL to 12 h×μg/mL, a mean AUC_{0-inf} from 9 h×μg/mL to 13 h×μg/mL, and/or a mean CL/F from 695 L/h to 735 L/h.~~

~~34. The pharmaceutical composition of any one of claims 1 to 26, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 1.3 hours to 1.7 hours, a mean T_{max} from 2.8 hours to 3.2 hours, a mean C_{max} from 14 μg/mL to 18 μg/mL, a mean AUC_{0-6} from 45 h×μg/mL to 53 h×μg/mL, a mean AUC_{0-inf} from 51 h×μg/mL to 59 h×μg/mL, and/or a mean CL/F from 136 L/h to 156 L/h.~~

~~35. The pharmaceutical composition of any one of claims 1 to 34, wherein following oral administration of a modified release component comprising 7.25 g of compound (1) to a population of fasted, healthy subjects a pharmacokinetic profile is characterized by a C_{max} ratio from 4.0 to 4.8, and an AUC_{0-inf} ratio from 4.8 to 5.6, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the compound (1) value.~~

~~36. The pharmaceutical composition of any one of claims 1 to 35, wherein,~~

~~the immediate release component comprises from 2 g to 8 g of compound (1); and~~

~~the modified release component comprises form 8 g to 16 g of compound (1).~~

~~37. The pharmaceutical composition of any one of claims 1 to 36, wherein,~~

~~the immediate release component comprises from 20 wt% to 40 wt% of compound (1); and~~

~~the modified release component comprises form 60 wt% to 80 wt% of compound (1),~~

~~wherein wt% is based on the total weight of compound (1).~~

1~~3~~8. The pharmaceutical composition of ~~any one of~~ claim~~s~~ 1 ~~to 37~~, wherein a weight ratio of ~~compound (1)~~γ-((*L*-valyl)oxy)butanoic acid in the immediate release component to ~~compound (1)~~γ-((*L*-valyl)oxy)butanoic acid in the modified release component is from 1:2 to 1:3.

14. The pharmaceutical composition of claim 1, wherein,

the immediate release component comprises from 20 wt% to 40 wt% of γ-((*L*-valyl)oxy)butanoic acid; and

the modified release component comprises form 60 wt% to 80 wt% of γ-((*L*-valyl)oxy)butanoic acid; and

wt% is based on the total weight of γ-((*L*-valyl)oxy)butanoic acid.

15. Use of a pharmaceutical composition of any one of claims 1 to 14 in the preparation of medicament for treating narcolepsy, excessive daytime sleepiness, cataplexy, excessive daytime sleepiness associated with narcolepsy, excessive daytime sleepiness associated with Parkinson's disease, excessive daytime sleepiness associated with multiple sclerosis, cataplexy associated with narcolepsy, fatigue, fatigue associated with Parkinson's diseases, fatigue associated with multiple sclerosis, or fibromyalgia.

~~39. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:~~

~~an IR component comprising 4.5 g of compound (1); and~~

~~a modified release component comprising 10 g of compound (1) to a population of fasted, healthy subjects,~~

~~the pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 0.6 hours to 0.8 hours, a mean T_{max} from 0.5 hours to 0.7 hours, a mean C_{max} from 10 μg/mL to 30 μg/mL, a mean AUC_{0-6} from 20 h×μg/mL to 40 h×μg/mL, a mean AUC_{0-inf} from 20 h×μg/mL to 40 h×μg/mL, and/or a mean CL/F from 440 L/h to 540 L/h.~~

40. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and a

a modified release component comprising 10 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.6 hours to 0.8 hours, a mean T_{max} from 1.6 hours to 2.0 hours, a mean C_{max} from 80 µg/mL to 120 µg/mL, a mean AUC_{0-6} from 340 h×µg/mL to 420 h×µg/mL, a mean AUC_{0-inf} from 360 h×µg/mL to 440 h×µg/mL, and/or a mean CL/F from 360 L/h to 440 L/h.

41. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 10 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile is characterized by a C_{max} ratio from 4.5 to 6.5, and an AUC_{0-inf} ratio from 11.5 to 15.5, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the corresponding compound (1) value.

42. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 10 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 0.7 hours to 1.1 hours, a mean T_{max} from 0.7 hours to 0.9 hours, a mean C_{max} from 15 µg/mL to 19 µg/mL, a mean AUC_{0-6} from 22 h×µg/mL to 30 h×µg/mL, a mean AUC_{0-inf} from 22 h×µg/mL to 30 h×µg/mL, and/or a mean CL/F of 530 L/h to 610 L/h.

43. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 10 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.8 hours to 1.0 hours, a mean T_{max} from 1.1 hours to 1.5 hours, a mean C_{max} from 65 µg/mL to 85

μg/mL, a mean AUC_{0-6} from 290 h×μg/mL to 330 h×μg/mL, a mean AUC_{0-inf} from 320 h×μg/mL to 360 h×μg/mL, and/or a mean CL/F from 505 L/h to 545 L/h.

44. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 10 g of compound (1) to a population of fasted, healthy subjects, the pharmacokinetic profile is characterized by a C_{max} ratio from 4.7 to 5.1, and an AUC_{0-inf} ratio from 11 to 15, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the corresponding compound (1) value.

45. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 13.5 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 1.0 hours to 1.2 hours, a mean T_{max} from 0.9 hours to 1.1 hours, a mean C_{max} from 15 μg/mL to 23 μg/mL, a mean AUC_{0-6} from 28 h×μg/mL to 36 h×μg/mL, a mean AUC_{0-inf} from 30 h×μg/mL to 38 h×μg/mL, and/or a mean CL/F from 550 L/h to 590 L/h.

46. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 13.5 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.9 hours to 1.1 hours, a mean T_{max} from 1.5 hours to 1.9 hours, a mean C_{max} from 85 μg/mL to 105 μg/mL, a mean AUC_{0-6} from 314 h×μg/mL to 354 h×μg/mL, a mean AUC_{0-inf} from 370 h×μg/mL to 410 h×μg/mL, and/or a mean CL/F from 45 L/h to 65 L/h.

47. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 4.5 g of compound (1); and

a modified release component comprising 13.5 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile is characterized by a C_{max} ratio from 5.0 to 5.6, and an $AUC_{0\text{-}inf}$ ratio from 10 to 14, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the corresponding compound (1) value.

48. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 6 g of compound (1); and

a modified release component comprising 12 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of compound (1) is characterized by a mean $t_{1/2}$ from 1.0 hours to 1.2 hours, a mean T_{max} from 1.0 hours to 1.2 hours, a mean C_{max} from 17 µg/mL to 21 µg/mL, a mean $AUC_{0\text{-}6}$ from 29 h×µg/mL to 33 h×µg/mL, a mean $AUC_{0\text{-}inf}$ from 32 h×µg/mL to 36 h×µg/mL, and/or a mean CL/F from 535 L/h to 575 L/h.

49. The pharmaceutical composition of any one of claims 1 to 38, wherein following oral administration of a combined release formulation comprising:

an IR component comprising 6 g of compound (1); and

a modified release component comprising 12 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean $t_{1/2}$ from 0.8 hours to 1.0 hours, a mean T_{max} from 2.0 hours to 2.4 hours, a mean C_{max} from 88 µg/mL to 96 µg/mL, a mean $AUC_{0\text{-}6}$ from 310 h×µg/mL to 350 h×µg/mL, a mean $AUC_{0\text{-}inf}$ h×µg/mL from 380 h×µg/mL to 420 h×µg/mL, and/or a mean CL/F from 51 L/h to 59 L/h.

50. The pharmaceutical composition of any one of claims 1 to 49, wherein following oral administration of a combined release formulation comprising:

an IR formulation comprising 6 g of compound (1); and

a modified release component comprising 12 g of compound (1) to a population of fasted, healthy subjects,

the pharmacokinetic profile is characterized by a C_{max} ratio from 4 to 8, and an $AUC_{0\text{-}inf}$ ratio from 10 to 14, where the ratio refers to the ratio of the γ-hydroxybutyrate value to the corresponding compound (1) value.

51. The pharmaceutical composition of any one of claims 1 to 50, wherein, at 6 hours following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects, the concentration of γ-hydroxybutyrate in the plasma of the subjects is less than 15 µg/mL, less than 10 µg/mL, or less than 5 µg/mL.

52. The pharmaceutical composition of any one of claims 1 to 51, wherein following oral administration of a pharmaceutical composition comprising from 10 g to 20 g of compound (1) to a population of fasted, healthy subjects, the γ-hydroxybutyrate concentration in the plasma of the subjects is greater than the sum of: (a) the AUC_{inf} of γ hydroxybutyrate following oral administration of the immediate release component; and (b) the AUC_{inf} of γ hydroxybutyrate following oral administration of the modified release component to the population of fasted, healthy subjects.

53. The pharmaceutical composition of any one of claims 1 to 52, wherein between 6 hours and 8 hours following oral administration of a pharmaceutical composition comprising from 10 g to 20 g of compound (1) to a population of fasted, healthy subjects, the γ hydroxybutyrate concentration in the plasma of the subjects is greater than the sum of: (a) the γ-hydroxybutyrate concentration between 6 hours and 8 hours following oral administration of the immediate release component; and (b) the γ hydroxybutyrate concentration between 6 hours and 8 hours following oral administration of the modified release component to the population of fasted, healthy subjects.

54. The pharmaceutical composition of any one of claims 1 to 53, wherein following oral administration of a pharmaceutical composition comprising from 10 g to 20 g of compound (1) to a population of healthy, fasted subjects, concentration from 6 hours to 8 hours following administration is greater than the concentration of γ-hydroxybutyrate in the plasma of the subjects following administration of the modified release component alone.

55. The pharmaceutical composition of any one of claims 1 to 54, wherein the mean γ-hydroxybutyrate AUC_{0-inf} following oral administration of the immediate release component and the modified release component to a population of fasted, healthy subjects is greater the sum of the mean γ hydroxybutyrate AUC_{0-inf} following oral administration of the immediate release component alone, and the mean γ hydroxybutyrate AUC_{0-inf} following oral administration of the modified release component alone.

56. The pharmaceutical composition of any one of claims 1 to 55, wherein the mean compound (1) AUC_{0-inf} following oral administration of the immediate release component and the modified release component to a population of subjects is substantially the same as than the sum of the mean compound (1) AUC_{0-inf} following oral administration of the immediate release component alone, and the mean compound (1) AUC_{0-inf} following oral administration of the modified release component alone.

57. The pharmaceutical composition of any one of claims 1 to 56, wherein the mean γ-hydroxybutyrate AUC_{0-inf} following oral administration of a pharmaceutical composition comprising

~~an immediate release component comprising 4.52 g of compound (1) and a modified release component comprising 10 gm compound (1) to a population of fasted, healthy subjects is greater than the sum of the mean γ-hydroxybutyrate AUC_{0-inf} following oral administration of an immediate release component comprising 7.25 g of compound (1) alone, and the mean γ- hydroxybutyrate AUC_{0-inf} following oral administration of a modified release component comprising 7.25 g of compound (1) alone.~~

~~58. The pharmaceutical composition of any one of claims 1 to 57, wherein the mean compound (1) AUC_{0-inf} following oral administration of a pharmaceutical composition comprising an immediate release component comprising 4.52 g of compound (1) and a modified release component comprising 10 gm compound (1) to a population of fasted, healthy subjects is substantially the same as than the sum of the mean compound (1) AUC_{0-inf} following oral administration of an immediate release component comprising 7.25 g of compound (1) alone, and the mean compound (1) AUC_{0-inf} following oral administration of a modified release component comprising 7.25 g of compound (1) alone.~~

~~59. The pharmaceutical composition of any one of claims 1 to 58, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean T_{max} of less than 2.4 hours.~~

~~60. The pharmaceutical composition of any one of claims 1 to 59, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean T_{max} from 1.4 hours to 2.4 hours.~~

~~61. The pharmaceutical composition of any one of claims 1 to 60, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean C_{max} of less than 100 µg/mL.~~

~~62. The pharmaceutical composition of any one of claims 1 to 61, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean C_{max} from 75 µg/mL to 105 µg/mL.~~

~~63. The pharmaceutical composition of any one of claims 1 to 62, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean $AUC_{0\text{-}6h}$ of greater than 250 h×μg/mL.~~

~~64. The pharmaceutical composition of any one of claims 1 to 63, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean C_6 of less than 36 μg/mL.~~

~~65. The pharmaceutical composition of any one of claims 1 to 64, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean C_6 of from 18 μg/mL to 36 μg/mL.~~

~~66. The pharmaceutical composition of any one of claims 1 to 65, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean C_8 of from 4 μg/mL to 20 μg/mL.~~

~~67. The pharmaceutical composition of any one of claims 1 to 66, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a mean C_{10h} of less than 10 μg/mL.~~

~~68. The pharmaceutical composition of any one of claims 1 to 67, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a plasma γ-hydroxybutyrate concentration greater than 10 μg/mL for from 5 hours to 7 hours.~~

~~69. The pharmaceutical composition of any one of claims 1 to 68, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a plasma γ-hydroxybutyrate concentration from 10 μg/mL to 30 μg/mL for from 5 hours to 7 hours.~~

~~70. The pharmaceutical composition of any one of claims 1 to 69, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a C_{max}/C_{5h} ratio of less than 4.~~

~~71. The pharmaceutical composition of any one of claims 1 to 70, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a C_{max}/C_{5h} ratio of from 1.5 to 4.~~

~~72. The pharmaceutical composition of any one of claims 1 to 71, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a C_{max}/C_{6h} ratio of greater than 2.~~

~~73. The pharmaceutical composition of any one of claims 1 to 72, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a C_{max}/C_{6h} ratio of from 2 to 10.~~

~~74. The pharmaceutical composition of any one of claims 1 to 73, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a C_{max}/C_{8h} ratio of greater than 5.~~

~~75. The pharmaceutical composition of any one of claims 1 to 74, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a C_{max}/C_{6h} ratio of from 5 to 20.~~

~~76. The pharmaceutical composition of any one of claims 1 to 75, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a AUC_{0-8h}/AUC_{inf} ratio of greater than 0.6.~~

~~77. The pharmaceutical composition of any one of claims 1 to 76, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by a AUC_{0-8h}/AUC_{inf} ratio of from 0.6 to 1.2.~~

78. The pharmaceutical composition of any one of claims 1 to 77, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by an AUC_{inf} of greater than 250 h×μg/mL.

79. The pharmaceutical composition of any one of claims 1 to 78, wherein following oral administration of the pharmaceutical composition to a population of fasted, healthy subjects the plasma γ-hydroxybutyrate pharmacokinetic profile is characterized by an AUC_{inf} from 250 h×μg/mL to 450 h×μg/mL.

80. The pharmaceutical composition of any one of claims 1 to 79, wherein the pharmaceutical composition can comprise 14.5 g of compound (1) corresponding to 9 g γ-hydroxybutyrate equivalents, with 4.5 g of compound (1) in the immediate release component and 10 g compound (1) in the modified release component.

81. The pharmaceutical composition of claim 80, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean T_{max} from 2.0 hours to 3.2 hours.

82. The pharmaceutical composition of any one of claims 80 to 81, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean C_{max} from 94 μg/mL to 114 μg/mL.

83. The pharmaceutical composition of any one of claims 80 to 82, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean AUC_{inf} from 430 hr×μg/mL to 490 hr×μg/mL.

84. The pharmaceutical composition of any one of claims 80 to 83, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean AUC_{0-6} from 360 hr×μg/mL to 420 hr×μg/mL.

85. The pharmaceutical composition of any one of claims 80 to 84, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean C_6 from 25 μg/mL to 55 μg/mL.

86. The pharmaceutical composition of any one of claims 80 to 85, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean C_8 from 5 μg/mL to 15 μg/mL.

87. The pharmaceutical composition of any one of claims 80 to 86, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean C_{10} less than 5 μg/mL.

88. The pharmaceutical composition of any one of claims 80 to 87, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean C_{max}/C_8 ratio from 9 to 11.

89. The pharmaceutical composition of any one of claims 80 to 88, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by a mean T_{max} from 2.0 hours to 3.2 hours, a mean C_{max} from 94 μg/mL to 114 μg/mL, a mean AUC_{inf} from 430 hr×μg/mL to 490 hr×μg/mL, a mean AUC_{0-6} from 360 hr×μg/mL to 420 hr×μg/mL, a mean C_6 from 25 μg/mL to 55 μg/mL, a mean C_8 from 5 μg/mL to 15 μg/mL, a mean C_{10} less than 5 μg/mL, and/or a mean C_{max}/C_8 ratio from 9 to 11.

90. The pharmaceutical composition of any one of claims 80 to 89, wherein following oral administration of the pharmaceutical composition comprising 4.5 g of compound (1) in an IR component and 10 g of compound (1) in an MR component to a population of fasted, healthy subjects a pharmacokinetic profile of γ-hydroxybutyrate is characterized by plasma γ-hydroxybutyrate greater than 25 μg /mL for at least 4 hours.

91. A method of treating fatigue or excessive daytime sleepiness associated with narcolepsy in a patient comprising orally administering to a patient in need of such treatment a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 90.

92. A method of treating narcolepsy, excessive daytime sleepiness, cataplexy, excessive daytime sleepiness associated with narcolepsy, excessive daytime sleepiness associated with Parkinson's disease, excessive daytime sleepiness associated with multiple sclerosis, cataplexy associated with narcolepsy, fatigue, fatigue associated with Parkinson's diseases, fatigue associated with multiple sclerosis, or fibromyalgia in a patient comprising orally administering to a patient in need of such treatment a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 89.

93. A method of treating a symptom associated with narcolepsy, excessive daytime sleepiness, cataplexy, excessive daytime sleepiness associated with narcolepsy, excessive daytime sleepiness associated with Parkinson's disease, excessive daytime sleepiness associated with multiple sclerosis, cataplexy associated with narcolepsy, fatigue, fatigue associated with Parkinson's diseases, fatigue associated with multiple sclerosis, or fibromyalgia in a patient comprising orally administering to a patient in need of such treatment a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 90.

94. A method of treating REM sleep behavior disorder, spasmodic dystonia, schizophrenia, insomnia, insomnia associated with schizophrenia, idiopathic hypersomnia, chronic fatigue syndrome, cluster headache, Alzheimer's disease, essential tremor, post traumatic stress syndrome, insomnia associated with post traumatic stress syndrome, or anxiety in a patient comprising orally administering to a patient in need of such treatment a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 90.

95. A method of treating a symptom associated with REM sleep behavior disorder, spasmodic dystonia, schizophrenia, insomnia, insomnia associated with schizophrenia, idiopathic hypersomnia, chronic fatigue syndrome, cluster headache, Alzheimer's disease, essential tremor, post-traumatic stress syndrome, insomnia associated with post traumatic stress syndrome, or anxiety in a patient comprising orally administering to a patient in need of such treatment a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 90.

96. A method of treating a sleep disorder associated with a bacterial infection in a patient comprising orally administering to a patient in need of such treatment, a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 90.

97. The method of claim 96, wherein the bacterial infection is a COVID-19 infection.

98. A method of enhancing cognitive function in a patent having a neurological disorder comprising orally administering to a patient in need of such treatment, a therapeutically effective amount of the pharmaceutical composition of any one of claims 1 to 90.

99. The method of any one of claims 92 to 98, wherein administering comprises administering QD.

100. The method of any one of claims 91 to 98, wherein administering comprises administering BID.

101. The method of any one of claims 91 to 98, wherein administering comprising administering once nightly.

102. A kit comprising the pharmaceutical composition of any one of claims 1 to 90.