What is claimed is:

1. A method for treating Parkinson's disease in a subject with an infusion of LD prodrug, said method comprising subcutaneously infusing into the subject an LD prodrug solution at such a rate that:

(a) the circulating plasma concentration of said LD prodrug during said infusion does not exceed 100 ng/mL; and

(b) a circulating plasma LD concentration greater than 400 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

2. The method of claim 1, wherein a circulating plasma LD concentration greater than 400 ng/mL is achieved within 60 minutes of the initiation of said infusion.

3. The method of claim 1, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration greater than 800 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

4. The method of claim 3, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration greater than 1,200 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

5. The method of claim 4, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration greater than 1,600 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

6. The method of claim 2, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration greater than 800 ng/mL is achieved within 60 minutes of the initiation of the infusion.

7. The method of claim 6, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration greater than 1,200 ng/mL is achieved within 60 minutes of the initiation of the infusion.

8. The method of claim 7, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration greater than 1,600 ng/mL is achieved within 60 minutes of the initiation of the infusion.

9. The method of claim 1, wherein said LD prodrug solution is subcutaneously infused at such a rate that the circulating plasma concentration of said LD prodrug during said infusion does not exceed 50 ng/mL.

10. The method of claim 9, wherein said LD prodrug solution is subcutaneously infused at such a rate that circulating plasma concentration of said LD prodrug during said infusion does not exceed 30 ng/mL.

11. The method of claim 10, wherein said LD prodrug solution is subcutaneously infused at such a rate that circulating plasma concentration of said LD prodrug during said infusion does not exceed 15 ng/mL.

12. The method of claim 1, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration less than 7,500 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

13. The method of claim 12, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration less than 5,000 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

14. The method of claim 13, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration less than 2,500 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

15. The method of claim 14, wherein said LD prodrug solution is subcutaneously infused at such a rate that a circulating plasma LD concentration less than 2,000 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

16. The method of claim 1, wherein the subject receives an average daily dose of less than 20 mL of said LD prodrug solution.

17. The method of claim 16, wherein the average daily dose is greater than 5 mL

18. The method of claim 17, wherein the average daily dose is 5-15 mL.

19. The method of claim 1, wherein during said infusion the circulating LD plasma concentration varies by less than +/- 20% from its mean for a period of at least 1 hour.

20. The method of claim 19, wherein during said infusion the circulating LD plasma concentration varies by less than +/- 10% from its mean for a period of at least 1 hour.

21. The method of claim 1, further comprising the administration of carbidopa or a carbidopa prodrug.

22. The method of claim 21, wherein said carbidopa or a carbidopa prodrug is administered orally or by infusion.

23. The method of claim 22, wherein said LD prodrug and said carbidopa or a carbidopa prodrug are coinfused as separate solutions.

24. The method of claim 22, wherein said LD prodrug and said carbidopa or a carbidopa prodrug are contained in a single solution and infused into said subject.

25. The method of claim 23 or 24, wherein said carbidopa or a carbidopa prodrug is administered in a systemically sub-therapeutic amount.

26. The method of claim 25, wherein said carbidopa or a carbidopa prodrug is administered in an amount sufficient to reduce swelling, inflammation, erythema, or nodule formation at the site of administration.

27. The method of claim 1, wherein said LD prodrug solution comprises a greater than 0.3M LD prodrug and is substantially free of precipitated solid LD when stored for 48 hours at about 25 °C.

28. The method of claim 1, wherein said LD prodrug solution comprises a greater than 0.3 M LD prodrug and is substantially free of precipitated solid LD both when stored for 48 hours at about 25 °C and when stored for 16 hours at 37 °C.

29. The method of claim 1, wherein the average daily, molar amount of infused LD prodrug is less than 1.6 times the average daily, molar amount of oral LD taken by the patient when not infusing the LD prodrug.

30. The method of claim 29, wherein the average daily, molar amount of infused LD prodrug is less than 1.2 times the average daily, molar amount of oral LD taken by the patient when not infusing the LD prodrug.

31. The method of claim 30, wherein the average daily, molar amount of infused LD prodrug is less than 1.0 times the average daily, molar amount of oral LD taken by the patient when not infusing the LD prodrug.

32. The method of claim 31, wherein the average daily, molar amount of infused LD prodrug is less than 0.8 times the average daily, molar amount of oral LD taken by the patient when not infusing the LD prodrug.

33. The method of claim 1, wherein said LD prodrug solution remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 3 months.

34. The method of claim 33, wherein said LD prodrug solution remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 12 months.

35. The method of any of claims 1-34, wherein said LD prodrug is selected from LDAs, LDEs, LDCs, LDSs, and salts thereof.

36. The method of claim 35, wherein said LD prodrug is LDEE, LDME, or a salt thereof.

37. The method of claim 36, wherein said LD prodrug solution has a pH of from 4.0 - 6.0 and comprises from 0.3M to 4.0M LDEE, or a salt thereof.

38. The method of claim 37, wherein said LD prodrug solution has a pH of from 4.0 – 5.5.

39. The method of claim 37, wherein said LD prodrug solution has a pH of 4.5 ± 0.3.

40. The method of claim 37, wherein said LD prodrug solution comprises a buffer comprising citrate, succinate, pyrophosphate, or phosphate.

41. The method of any of claims 27-40, wherein said LD prodrug solution is subcutaneously infused into the subject via one or more ambulatory infusion pumps.

42. The method of claim 41, wherein said LD prodrug solution is subcutaneously infused into the subject via two ambulatory infusion pumps.

43. The method of claim 41, wherein said one or more ambulatory infusion pumps comprise a two-compartment infusion pump.

44. The method of any of claims 1-43, further comprising the steps of:

(i) providing an aqueous solution comprising greater than 0.3M LD prodrug and having a pH of from 1.0 to 3.5, wherein less than 3% of the LD prodrug is hydrolyzed when stored at 5 ± 3 °C for a period of 6 months;

(ii) raising the pH of said solution to from 4.0 to 6.0 to form said LD prodrug solution and diluting the solution; and

(iii) infusing at least a portion of said LD prodrug solution into said subject.

45. The method of claim 44, comprising the step of providing a solution comprising greater than 0.3M LD prodrug and having a pH of 2.3 ± 0.7, and raising the pH of said solution to 4.8 ± 0.8 to form said LD prodrug solution.

46. The method of claim 44, wherein said pH is adjusted with a salt of citric acid; pyrophosphoric acid, succinic acid, or phosphoric acid.

47. The method of any of claims 1-46, wherein said method alleviates a motor or non-motor complication in a subject afflicted with Parkinson's disease.

48. The method of claim 47, wherein said motor or non-motor complication comprises tremor.

49. The method of claim 47, wherein said motor or non-motor complication comprises akinesia.

50. The method of claim 47, wherein said motor or non-motor complication comprises bradykinesia.

51. The method of claim 47, wherein said motor or non-motor complication comprises dyskinesia.

52. The method of claim 47, wherein said motor or non-motor complication comprises dystonia.

53. The method of claim 47, wherein said motor or non-motor complication comprises cognitive impairment.

54. The method of claim 47, wherein said motor or non-motor complication comprises disordered sleep.

55. The method of claim 1, wherein hyaluronidase is coinfused with said LD prodrug solution.

56. The method of claim 1, wherein an analgesic is coinfused with said LD prodrug solution, or wherein an analgesic is topically administered to said subject at the site of injection.

57. The method of claim 56, wherein said analgesic is selected from salicylic acid, or a salt thereof; indomethacin; ibuprofen; amiloride; diclofenac; and calcium salts.

58. The method of any one of claims 1-57, wherein said LD prodrug solution is infused proximate a large muscle at a depth between 5 mm and 15 mm below the epidermis of said subject.

59. The method of claim 58, wherein said large muscle is the diaphragm.

60. The method of claim 58, wherein said large muscle is selected from the trapezius, deltoid, pectoralis major, triceps brachii, biceps, gluteus maximus, sartorius, biceps femoris, rectus femoris, and gastrocnemius.

61. The method of any of claims 1-60, wherein said LD prodrug is subcutaneously infused into said subject at one or more infusion sites, wherein the infusion volume at each of said infusion sites is less than 20 mL over a 24 hour period and the amount of LD prodrug administered at each of said infusion sites is less than 10 millimoles over a 24 hour period.

62. The method of claim 61, wherein said LD prodrug is infused as an aqueous solution having a pH of between 4.0 and 6.0.

63. The method of claim 62, wherein said LD prodrug is LDEE, or a salt thereof.

64. The method of claim 63, wherein the infusion volume administered for at least one of said infusion sites is between 7-12 mL over a 24 hour period.

65. The method of claim 63, wherein the amount of LD prodrug administered for at least one of said infusion sites is between 0.4 – 0.6 millimoles over a 24 hour period.

66. The method of claim 62, wherein the pH of the aqueous solution is between 4.0-5.3.

67. A composition comprising:

(i) a first container comprising a sterile aqueous solution containing about 0.3 M to 4.0 M LDEE hydrochloride salt and having a pH of from 1.0 to 3.5, wherein less than 3% of the LDEE is hydrolyzed when said first container is stored at 5 ± 3 °C for a period of 6 months; and

(ii) a second container comprising a sterile base either dissolved in solution or as a solid, reconstitutable base,

wherein combining some or all of the contents of said first container and and some or all of the contents said second container forms a solution suitable for subcutaneous infusion into a subject, having a pH of 4.0-5.5, comprising greater than or equal to about 0.3 M LDEE, and substantially free of LD precipitate.

68. The composition of claim 67, wherein said sterile base comprises sodium citrate.

69. The composition of claim 67, wherein said first container remains substantially free of precipitated LD solids for at least 12 months when stored at about 4°C.

70. The composition of claim 67, wherein said solution suitable for subcutaneous infusion remains substantially free of precipitated solid LD for at least 48 hours when stored at about 25°C.

71. The composition of claim 70, wherein said solution suitable for subcutaneous infusion remains substantially free of precipitated solid LD for at least 24 hours when stored at about 37°C.

72. A method for treating Parkinson's disease in a subject, said method comprising:

(i) providing a first container comprising a sterile aqueous solution containing about 0.3M to 4.0M LDEE hydrochloride salt and having a pH of from 1.0 to 3.5, wherein less than 3% of the LDEE is hydrolyzed when said first container is stored at 5 ± 3 °C for a period of 3 months;

(ii) providing a second container comprising a sterile base either dissolved in solution or as a solid, reconstitutable base;

(iii) combining the contents of said first container and said second container form a solution suitable for subcutaneous infusion into a subject, having a pH of 4.0 – 5.0, comprising greater than or equal to about 0.3 M LDEE, and substantially free of LD precipitate; and

(iv) subcutaneously infusing into said subject said solution suitable for subcutaneous infusion.

73. The method of claim 72, wherein said sterile base comprises trisodium citrate.

74. A kit comprising:

(i) a first container comprising a sterile aqueous solution;

(ii) a second container comprising a sterile, dry, reconstitutable solid; and

(iii) instructions for combining the contents of the first container with the contents of the second container to form a solution suitable for subcutaneous infusion into a subject and for infusing said solution into a subject for the treatment of Parkinson's disease;

wherein said solid fully dissolves in said solution in less than 5 minutes at 25 °C; said infusible solution comprises LDEE, or a salt thereof, and has a pH of from 4.0 to 6.0; and less than 3% of the LDEE is hydrolyzed when said first container and said second container are stored at 5 ± 3 °C for a period of 3 months.

75. The kit of claim 74, wherein subsequent to storage of said first container and said second container at 5 ± 3 °C for a period of 3 months and then forming the infusible solution, said infusible solution remains substantially free of precipitated LD when kept at about 37°C for at least 24 hours.

76. The kit of claim 74, wherein said infusible solution has a pH of from 4.0 to 5.0.

77. The kit of claim 74, wherein the sterile aqueous solution comprises LDEE and the sterile dry solid comprises a base, wherein the LDEE concentration is from 0.3 M to 4.0M, the pH is from 1.0 to 3.5, said first container being substantially impermeable to oxygen and said first container comprising an atmosphere substantially free of oxygen.

78. The kit of claim 77, wherein the sterile aqueous solution comprises LDEE and the sterile dry solid comprises a base and wherein the infusible solution comprises LDEE•HCl.

79. The kit of claim 74, wherein said sterile, dry, reconstitutable solid comprises LDEE or a salt thereof.

80. A kit comprising:

(i) a first container comprising a sterile aqueous solution containing about 0.3 M to 4.0 M LDEE hydrochloride salt and having a pH of from 1.0 to 3.5, wherein less than 3% of the LDEE is hydrolyzed when said first container is stored at 5 ± 3 °C for a period of 6 months;

(ii) a second container comprising a sterile base either dissolved in solution or as a solid, reconstitutable base; and

(iii) instructions for combining the contents of the first container with the contents of the second container to form a solution suitable for subcutaneous infusion into a subject and infusing said solution into a subject for the treatment of Parkinson's disease.

81. The kit of claim 80, wherein said sterile base comprises sodium citrate.

82. A container substantially impermeable to oxygen, said container comprising an atmosphere substantially free of oxygen and comprising a sterile aqueous solution containing about 0.3 M to 4.0 M LDEE hydrochloride salt and having a pH of from 1.0 to 3.5, wherein less than 3% of the LDEE is hydrolyzed when said first container is stored at 5 ± 3 °C for a period of 6 months.

83. A pharmaceutical composition comprising an aqueous liquid containing greater than 0.3 M LD prodrug, or a salt thereof, wherein less than 3% of the LD prodrug is hydrolyzed when said pharmaceutical composition is stored at 5 ± 3 °C for a period of 6 months.

84. The pharmaceutical composition of claim 83, wherein said aqueous liquid has a pH of from 1.0 to 3.5.

85. The pharmaceutical composition of claim 84, wherein said aqueous liquid has a pH of 2.3 ± 0.7.

86. The pharmaceutical composition of claim 83, wherein said pharmaceutical composition contains 0.3 – 1.4 M LD prodrug, or a salt thereof.

87. The pharmaceutical composition of claim 83, wherein said pharmaceutical composition contains 1.4 – 4.0 M LD prodrug, or a salt thereof.

88. The pharmaceutical composition of any one of the claims 83-87, further comprising a pharmaceutically acceptable excipient.

89. The pharmaceutical composition of any one of the claims 83-87, further comprising a crystal growth inhibitor.

90. The pharmaceutical composition of any one of claims 83-87, wherein said pharmaceutical composition has a viscosity of between 1.2 cP and 2,000 cP.

91. The pharmaceutical composition of claim 64, wherein said pharmaceutical composition comprises hyaluronic acid.

92. The pharmaceutical composition of any one of claims 83-87, further comprising an antioxidant.

93. The pharmaceutical composition of any one of claims 83-87, wherein said pharmaceutical composition is substantially free of oxygen.

94. The pharmaceutical composition of any one of claims 83-87, wherein said pharmaceutical composition comprises a polycarboxylate.

95. The pharmaceutical composition of any one of claims 83-87, wherein said polycarboxylate is selected from hyaluronic acid, succinylated gelatin, poly(acrylic acid), poly(methacrylic acid), poly(glutamic acid), poly(aspartic acid), poly(maleic acid), poly(malic acid), and poly(fumaric acid).

96. The pharmaceutical composition of any one of claims 83-87, wherein said LD prodrug is an acid addition salt of hydrochloric acid, sulfuric acid, or phosphoric acid.

97. The pharmaceutical composition of any one of claims 83-87, wherein said pharmaceutical composition is supersaturated in LD.

98. The pharmaceutical composition of any one of claims 83-87, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 6 months when stored at about 4°C.

99. The pharmaceutical composition of claim 98, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 12 months when stored at about 4°C.

100. The pharmaceutical composition of claim 99, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 18 months when stored at about 4°C.

101. The pharmaceutical composition of claim 100, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 24 months when stored at about 4°C.

102. The pharmaceutical composition of any one of claims 83-87, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 3 months when stored at about 25°C.

103. The pharmaceutical composition of claim 102, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 6 months when stored at about 25°C.

104. The pharmaceutical composition of claim 103, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 12 months when stored at about 25°C.

105. The pharmaceutical composition of claim 104, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 18 months when stored at about 25°C.

106. The pharmaceutical composition of any of claims 83-87, wherein the solubility of LD in said solution is at least 5 g per liter at about 25°C.

107. The pharmaceutical composition of claim 106, wherein the solubility of LD in said solution is at least 10 g per liter at about 25°C.

108. The pharmaceutical composition of claim 107, wherein the solubility of LD in said solution is at least 15 g per liter at about 25°C.

109. A method for treating Parkinson's disease in a subject with an infusion of LD prodrug, said method comprising:

(i) providing a pharmaceutical composition of any of claims 83-108;

(ii) raising the pH of said pharmaceutical composition to from 4.0 to 6.0 to form an LD prodrug solution; and

(iii) within 48 hours of performing step (ii), infusing at least a portion of said LD prodrug solution into said subject in an amount sufficient to treat Parkinson's disease.

110. The method of claim 109, comprising raising the pH of said pharmaceutical composition to 4.8 ± 0.8 to form an LD prodrug solution.

111. A method for preparing an infusible LD prodrug solution comprising the steps of:

(i) providing an aqueous liquid containing greater than 0.3 M LD prodrug and a pH of from 1.0 to 3.5, or a salt thereof, wherein less than 3% of the LD prodrug is hydrolyzed when said pharmaceutical composition is stored at 5 ± 3 °C for a period of 6 months;

(ii) raising the pH of said an aqueous liquid to from 4.0 to 6.0 to form an infusible LD prodrug solution by combining said aqueous liquid with a base in either reconstitutable solid dosage form or in solution form; and

(iii) inserting the infusible LD prodrug solution into an infusion pump,

wherein said infusible LD prodrug solution remains substantially free of precipitated LD when kept at about 25°C for at least 24 hours.

112. The method of claim 111, wherein said aqueous liquid comprises a pharmaceutical composition of any of claims 83-108.

113. A composition comprising:

(i) a first container comprising a sterile aqueous solution containing about 0.3M to 4.0M LD prodrug and having a pH of from 1.0 to 3.5, wherein less than 3% of the LD prodrug is hydrolyzed when said first container is stored at 5 ± 3 °C for a period of 3 months; and

(ii) a second container comprising a sterile base either dissolved in solution or as a solid, reconstitutable base,

wherein the combined contents of said first container and said second container form a solution suitable for subcutaneous infusion into a subject, having a pH of from 4.0 to 6.0, comprising greater than or equal to about 0.3M LD prodrug, and substantially free of LD precipitate.

114. The composition of claim 113, wherein said first container comprises a pharmaceutical composition of any of claims 83-108.

115. A pharmaceutical composition suitable for infusion into a subject comprising an aqueous liquid containing greater than 0.3 M LD prodrug, or a salt thereof, wherein said pharmaceutical composition remains substantially free of LD precipitate for at least 24 hours when stored at about 37 °C.

116. The pharmaceutical composition of claim 115, wherein said aqueous liquid has a pH of from 4.0 to 6.0.

117. The pharmaceutical composition of claim 115, wherein said aqueous liquid has a pH of 4.5 ± 0.3.

118. The pharmaceutical composition of claim 115, wherein said pharmaceutical composition comprises from 0.3 to 1.4 M LD prodrug, or a salt thereof.

119. The pharmaceutical composition of claim 115, wherein said pharmaceutical composition comprises from 1.4 to 4.0 M LD prodrug, or a salt thereof.

120. The pharmaceutical composition of any one of the claims 115-119, further comprising a pharmaceutically acceptable excipient.

121. The pharmaceutical composition of any one of the claims 115-119, further comprising a crystal growth inhibitor.

122. The pharmaceutical composition of any one of claims 115-119, wherein said LD prodrug is a hydrochloride salt.

123. The pharmaceutical composition of any one of claims 115-119, wherein said pharmaceutical composition has a viscosity of between 1.2 cP and 2,000 cP.

124. The pharmaceutical composition of any one of claims 115-119, further comprising an antioxidant.

125. The pharmaceutical composition of any one of claims 115-119, wherein said pharmaceutical composition is substantially free of oxygen.

126. The pharmaceutical composition of any one of claims 115-119, wherein pharmaceutical composition comprises a polycarboxylate.

127. The pharmaceutical composition of claim 126, wherein said polycarboxylate is selected from hyaluronic acid, succinylated gelatin, poly(acrylic acid), poly(methacrylic acid), poly(glutamic acid), poly(aspartic acid), poly(maleic acid), poly(malic acid), and poly(fumaric acid).

128. The pharmaceutical composition of any one of claims 115-119, wherein said LD prodrug is an acid addition salt of sulfuric acid or phosphoric acid.

129. The pharmaceutical composition of any one of claims 115-119, wherein said pharmaceutical composition is supersaturated in LD.

130. The pharmaceutical composition of any one of claims 115-119, wherein said pharmaceutical composition remains substantially free of LD precipitate for at least 48 hours when stored at about 25 °C.

131. The pharmaceutical composition of any one of claims 115-119, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 3 months.

132. The pharmaceutical composition of claim 131, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 12 months.

133. The pharmaceutical composition of any of claims 115-119, wherein the solubility of LD in said solution is at least 5 g per liter at about 25°C.

134. The pharmaceutical composition of claim 133, wherein the solubility of LD in said solution is at least 10 g per liter at about 25°C.

135. The pharmaceutical composition of claim 134, wherein the solubility of LD in said solution is at least 15 g per liter at about 25°C.

136. A method for treating Parkinson's disease in a subject, said method comprising infusing into said subject a pharmaceutical composition of any of claims 115-135 in an amount sufficient to treat Parkinson's disease.

137. A stable pharmaceutical composition suitable for infusion into a subject comprising greater than 0.3 M LD prodrug, or a salt thereof, dissolved in a non-aqueous liquid, wherein said pharmaceutical composition remains substantially free of LD precipitate for at least 24 hours when stored at about 25 °C.

138. The pharmaceutical composition of claim 137, wherein said non-aqueous liquid comprises a lipid, an alcohol, N-methyl pyrrolidone, or a mixture thereof.

139. The pharmaceutical composition of claim 138, wherein said non-aqueous liquid comprises a lipid selected from a triglyceride, a cholesterol ester, sesame oil, castor oil, and cottonseed oil.

140. The pharmaceutical composition of claim 138, wherein said non-aqueous liquid comprises an alcohol selected from ethanol, glycerol, and propylene glycol.

141. A stable pharmaceutical composition suitable for infusion into a subject comprising greater than 0.3 M LD prodrug, or a salt thereof, dissolved in a liquid carrier comprising water and a lipid, wherein said pharmaceutical composition remains substantially free of LD precipitate for at least 24 hours when stored at about 25 °C.

142. The pharmaceutical composition of claim 141, wherein said liquid carrier comprises an emulsion.

143. The pharmaceutical composition of claim 141, wherein said liquid carrier comprises liposomes.

144. The pharmaceutical composition of any of claims 137-143, wherein said pharmaceutical composition comprises a fatty acid salt of said LD prodrug.

145. The pharmaceutical composition of any of claims 137-143, wherein said pharmaceutical composition has a viscosity of from 10 cP to 2,000 cP.

146. The pharmaceutical composition of any of claims 137-143, further comprising an antioxidant.

147. The pharmaceutical composition of any one of claims 137-146, wherein said pharmaceutical composition remains substantially free of LD precipitate for at least 48 hours when stored at about 25 °C.

148. The pharmaceutical composition of any one of claims 137-146, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 3 months.

149. The pharmaceutical composition of claim 148, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 12 months.

150. The pharmaceutical composition of any of claims 137-146, wherein the solubility of LD in said solution is at least 5 g per liter at about 25°C.

151. The pharmaceutical composition of claim 150, wherein the solubility of LD in said solution is at least 10 g per liter at about 25°C.

152. The pharmaceutical composition of claim 151, wherein the solubility of LD in said solution is at least 15 g per liter at about 25°C.

153. The pharmaceutical composition of any one of claims 137-152, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 6 months when stored at about 4°C.

154. The pharmaceutical composition of claim 153, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 12 months when stored at about 4°C.

155. The pharmaceutical composition of claim 154, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 18 months when stored at about 4°C.

156. The pharmaceutical composition of claim 155, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 24 months when stored at about 4°C.

157. The pharmaceutical composition of any one of claims 137-152, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 3 months when stored at about 25°C.

158. A method for treating Parkinson's disease in a subject, said method comprising infusing into said subject a pharmaceutical composition of any of claims 137-157 in an amount sufficient to treat Parkinson's disease.

159. A pharmaceutical composition comprising a liquid salt of levodopa methyl ester.

160. The pharmaceutical composition of claim 159, wherein said liquid salt is a fatty acid salt.

161. The pharmaceutical composition of claim 160 selected from levodopa methyl ester oleate, levodopa methyl ester octanoate, levodopa methyl ester alpha-linoleate, levodopa methyl ester eicosapentaenoate, levodopa methyl ester docosahexaenoate, levodopa methyl ester linoleate, levodopa methyl ester gamma linoleate, levodopa methyl ester palmitoleate, levodopa methyl ester dihomogamma linoleate, levodopa methyl ester arachidonate, levodopa methyl ester myristate, levodopa methyl ester palmitate, and levodopa methyl ester stearate.

162. A pharmaceutical composition comprising a liquid salt of an LDA.

163. The pharmaceutical composition of claim 162, wherein said liquid salt is a fatty acid salt.

164. The pharmaceutical composition of claim 163, wherein said liquid salt is a fatty acid salt selected from oleate, octanoate, alpha-linoleate, eicosapentaenoate, docosahexaenoate, linoleate, palmitoleate, gamma linoleate, dihomogamma linoleate, arachidonate, myristate, palmitate, and stearate salts, and mixtures thereof.

165. A pharmaceutical composition comprising a liquid salt of an LDE, wherein said salt is not levodopa ethyl ester oleate, levodopa ethyl ester ricinoleate, levodopa ethyl ester palmitate, or levodopa ethyl ester valerate.

166. The pharmaceutical composition of claim 165, wherein said liquid salt is a fatty acid salt.

167. The pharmaceutical composition of claim 166, wherein said liquid salt is a fatty acid salt selected from oleate, octanoate, alpha-linoleate, eicosapentaenoate, docosahexaenoate, linoleate, palmitoleate, gamma linoleate, dihomogamma linoleate, arachidonate, myristate, palmitate, and stearate salts, and mixtures thereof.

168. A stable pharmaceutical composition suitable for infusion into a subject comprising greater than 0.3 M LD prodrug fatty acid salt, wherein said pharmaceutical composition is substantially free of LD precipitate for at least 24 hours when stored at about 25 °C.

169. The pharmaceutical composition of claim 168, wherein said pharmaceutical composition is substantially free of LD precipitate for at least 48 hours when stored at about 25 °C.

170. The pharmaceutical composition of claim 168, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 3 months.

171. The pharmaceutical composition of claim 168, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 12 months.

172. The pharmaceutical composition of claim 168, comprising greater than 40% (w/w) carboxylate salt of an LD prodrug dissolved in a liquid carrier.

173. The pharmaceutical composition of claim 172, wherein said liquid carrier is a lipid, an alcohol, N-methyl pyrrolidone, or a mixture thereof.

174. The pharmaceutical composition of claim 173, wherein said liquid carrier comprises a lipid selected from a triglyceride, a cholesterol ester, sesame oil, castor oil, and cottonseed oil.

175. The pharmaceutical composition of claim 173, wherein said liquid carrier comprises an alcohol selected from ethanol, glycerol, and propylene glycol.

176. The pharmaceutical composition of claim 172, further comprising a liquid carrier comprising water and a lipid.

177. The pharmaceutical composition of claim 176, wherein said liquid carrier comprises an emulsion.

178. The pharmaceutical composition of claim 176, wherein said liquid carrier comprises liposomes.

179. The pharmaceutical composition of any of claims 159-178, further comprising an antioxidant.

180. The pharmaceutical composition of any of claims 159-178, wherein said pharmaceutical composition has a viscosity of from 10 cP to 2,000 cP.

181. The pharmaceutical composition of any one of claims 159-178, wherein said pharmaceutical composition remains substantially free of LD precipitate for at least 48 hours when stored at about 25 °C.

182. The pharmaceutical composition of any one of claims 159-178, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 3 months.

183. The pharmaceutical composition of claim 159, wherein said pharmaceutical composition remains substantially free of precipitated solid LD when thawed after being stored frozen for at least 12 months.

184. The pharmaceutical composition of any of claims 159-178, wherein the solubility of LD in said solution is at least 5 g per liter at about 25°C.

185. The pharmaceutical composition of claim 184, wherein the solubility of LD in said solution is at least 10 g per liter at about 25°C.

186. The pharmaceutical composition of claim 185, wherein the solubility of LD in said solution is at least 15 g per liter at about 25°C.

187. The pharmaceutical composition of any one of claims 159-178, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 6 months when stored at about 4°C.

188. The pharmaceutical composition of claim 187, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 12 months when stored at about 4°C.

189. The pharmaceutical composition of claim 188, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 18 months when stored at about 4°C.

190. The pharmaceutical composition of claim 189, wherein said pharmaceutical composition remains substantially free of precipitated solid LD for at least 24 months when stored at about 4°C.

191. A method for treating Parkinson's disease in a subject, said method comprising infusing into said subject a pharmaceutical composition of any of claims 159-190 in an amount sufficient to treat Parkinson's disease.

192. A method for treating Parkinson's disease in a subject, said method comprising infusing into said subject a pharmaceutical composition comprising levodopa ethyl ester oleate, levodopa ethyl ester ricinoleate, levodopa ethyl ester palmitate, or levodopa ethyl ester valerate in an amount sufficient to treat Parkinson's disease.

193. A stable pharmaceutical composition suitable for injection into a subject comprising an aqueous liquid with LD prodrug particles, or a salt thereof, suspended therein, said LD prodrug particles having an effective particle size of from 20 nm to 1.0 μm.

194. A method for treating Parkinson's disease in a subject, said method comprising infusing into said subject a pharmaceutical composition of claim 193 in an amount sufficient to treat Parkinson's disease.

195. The pharmaceutical composition of any of claims 83-108, 115-135, 137-157, 159-190, and 193, wherein said LD prodrug is selected from LDAs, LDEs, LDCs, LDSs, and salts thereof.

196. The pharmaceutical composition of claim 195, wherein said LD prodrug is LDEE, LDME, or a salt thereof.

197. A container comprising a pharmaceutical composition of any of claims 83-108, 115-135, 137-157, 159-190, and 193 and comprising an LD prodrug.

198. The container of claim 197, wherein said container comprises an atmosphere substantially free of oxygen.

199. A container comprising a material that is substantially impermeable to oxygen, said container containing a reconstitutable solid comprising an LD prodrug, or a salt thereof, wherein said container is substantially free of oxygen and wherein said reconstitutable solid, when reconstituted, is suitable for subcutaneous infusion.

200. A container comprising a material that is substantially impermeable to oxygen, said container containing liquid comprising an LD prodrug, or a salt thereof, wherein said container is substantially free of oxygen and wherein said liquid is suitable for subcutaneous infusion.

201. The container of claim 199 or 200, wherein said container further comprises a viscosity enhancing agent, an anti oxidant, and/or a preservative.

202. The container of claim 199 or 200, wherein said container further comprises from 0.5 to 4.0% (w/w) hyaluronic acid.

203. The container of claim 199 or 200, wherein said container further comprises ascorbic acid, or a salt thereof, or a phenol selected from m-cresol, methyl paraben, ethyl paraben, propyl paraben, or butyl paraben.

204. The container of any of claims 199-203, wherein said LD prodrug is an LDE, or a salt thereof.

205. The container of claim 204, wherein said LDE, or a salt thereof, is an acid addition salt of LDEE.

206. The container of claim 205, wherein said acid addition salt of LDEE is LDEE hydrochloride.

207. A method for treating Parkinson's disease in a subject, said method comprising:

(i) dissolving the contents of the container of any of claim 199-206 in buffered water to form an aqueous solution having a pH of from 4.0 to 6.0 and an LD prodrug concentration of from 0.3 M to 4.0 M; and

(ii) infusing said aqueous solution into said subject in an amount sufficient to treat Parkinson's disease.

208. The method of claim 207, wherein said aqueous solution has a pH of 4.5 ± 0.3.

209. The method of claim 207, wherein said buffered water comprises a pharmaceutically acceptable potassium and/or a sodium salt of a dibasic, tribasic or tetrabasic acid.

210. The method of claim 207, wherein said pH is adjusted with a salt of citric acid; pyrophosphoric acid, succinic acid, or phosphoric acid.

211. The method of claim 207, wherein said pH is adjusted with trisodium citrate, tetrasodium pyrophosphate, disodium succinate, or trisodium phosphate.

212. The method of any one of claims 207-211, wherein said LD prodrug is levodopa ethyl ester.

213. The method of claim 212, wherein said aqueous solution is substantially free of precipitated solids; has a pH of from 4.0 to 6.0, and comprises greater than 0.3 M levodopa ethyl ester.

214. The method of any of claims 72, 109, 136, 158, 191, 192, 194, or 207 wherein said method alleviates a motor or non-motor complication in a subject afflicted with Parkinson's disease.

215. The method of claim 214, wherein said motor or non-motor complication comprises tremor.

216. The method of claim 214, wherein said motor or non-motor complication comprises akinesia.

217. The method of claim 214, wherein said motor or non-motor complication comprises bradykinesia.

218. The method of claim 214, wherein said motor or non-motor complication comprises dyskinesia.

219. The method of claim 214, wherein said motor or non-motor complication comprises dystonia.

220. The method of claim 214, wherein said motor or non-motor complication comprises cognitive impairment.

221. The method of claim 214, wherein said motor or non-motor complication comprises disordered sleep.

222. The method of claim 214, further comprising the administration of an effective amount of an anti-emetic agent.

223. The method of claim 222, wherein said anti-emetic agent is selected from nicotine, lobeline sulfate, pipamazine, oxypendyl hydrochloride, ondansetron, buclizine hydrochloride, cyclizine hydrochloride, dimenhydrinate, scopolamine, metopimazine, and diphenidol hydrochloride.

224. The method of claim 214, further comprising the administration of an effective amount of carbidopa or carbidopa prodrug.

225. The method of claim 224, wherein said carbidopa or carbidopa prodrug is administered orally or by infusion.

226. The method of claim 214, wherein said pharmaceutical composition is administered by intramuscular infusion.

227. The method of claim 214, wherein said pharmaceutical composition is administered by subcutaneous infusion.

228. The method of claim 227, wherein said pharmaceutical composition is infused proximate a large muscle at a depth between 5 mm and 15 mm below the epidermis of said subject.

229. The method of claim 228, wherein said large muscle is the diaphragm.

230. The method of claim 228, wherein said large muscle is selected from the trapezius, deltoid, pectoralis major, triceps brachii, biceps, gluteus maximus, sartorius, biceps femoris, rectus femoris, and gastrocnemius.

231. The method of claim 226, wherein hyaluronidase is coinfused with said pharmaceutical composition.

232. The method of claim 226, wherein an analgesic is coinfused or wherein an analgesic is topically administered at or near the infused site.

233. The method of claim 232, wherein said analgesic is selected from salicylic acid, or a salt thereof; indomethacin; ibuprofen; amiloride; diclofenac; and calcium salts.

234. An ambulatory infusion pump system for the treatment of Parkinson's disease comprising:

(i) a pharmaceutical composition of any of claims 83-108, 115-135, 137-157, 159-190, and 193 in a drug reservoir; and

(ii) a cannula or needle in fluid communication with the drug reservoir for infusing said pharmaceutical composition into a subject.

235. The ambulatory infusion pump system of claim 234, wherein said pump system is a patch pump comprising an adhesive for adherence of the patch pump directly or indirectly to the skin of a subject.

236. The ambulatory infusion pump system of claim 234, further comprising software, memory, a data processing unit, and information input/output capability,

wherein the system is able to input, store and recall data comprising one or more of the subject's symptoms or drug responses related to Parkinson's disease, such symptoms selected from the group of tremor, hyperkinesia, dystonia, akinesia, bradykinesia, tremor, turning on, turning off, delayed time to on, and response failure.

237. The ambulatory infusion pump system of claim 234, further comprising software, memory, a data processing unit, and user input capability to input into the system information related to the ingestion of a meal, and the system thereafter adjusts the rate of infusion of the pharmaceutical composition.

238. The ambulatory infusion pump system of claim 237, wherein said pump system is programmed to increase the rate of infusion after a meal comprising protein.

239. The ambulatory infusion pump system of claim 234, further comprising software, memory, a data processing unit, and information input/output capability,

wherein the system is able to automatically increase the rate of infusion of the pharmaceutical composition, by a factor of two or more, at a preset time in the morning or after a period of at least four hours.

240. The ambulatory infusion pump system of claim 234, further comprising a data processing unit; and a motion sensor electrically connected to, or in RF communication with, the data processing unit to detect movement of the subject,

wherein the system recommends a change in the infusion rate in response to the data from the motion sensor.

241. An ambulatory pump system for the treatment of Parkinson's disease comprising:

(i) a first reservoir containing an acidic aqueous solution comprising from 0.3 M to 4.0 M LDEE, or a salt thereof;

(ii) a second reservoir containing a basic aqueous solution; and

(iii) a means for combining and a means for infusing said acidic aqueous solution and said basic aqueous solution into a subject.

242. The ambulatory infusion pump system of claim 241, wherein said first reservoir contains an aqueous solution having a pH of from 1.0 to 3.5, and said second reservoir contains a basic aqueous solution having a pH greater than 7.0.

243. The ambulatory infusion pump system of claim 241, wherein said acidic aqueous solution comprises a pharmaceutical composition of any of claims 83-108.

244. The ambulatory infusion pump system of claim 241, wherein said basic aqueous solution comprises a pharmaceutically acceptable potassium and/or a sodium salt of a dibasic, tribasic or tetrabasic acid.

245. The ambulatory infusion pump system of claim 241, wherein said basic aqueous solution comprises a salt of citric acid; pyrophosphoric acid, succinic acid, or phosphoric acid.

246. The ambulatory infusion pump system of claim 245, wherein said basic aqueous solution comprises trisodium citrate, tetrasodium pyrophosphate, disodium succinate, or trisodium phosphate.

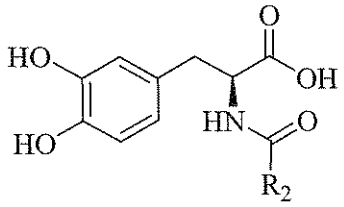
247. A kit comprising (i) a pharmaceutical composition of any of 83-108, 115-135, 137-157, 159-190, and 193; and (ii) instructions for administering the composition to a subject for the treatment of Parkinson's disease.

248. A method for using the pharmaceutical composition of any of 83-108, 115-135, 137-157, 159-190, and 193, said method comprising the step of visually inspecting the composition prior to use to determine whether said pharmaceutical composition is suitable for infusion into a subject, wherein a transparent solution is suitable for infusion and a colored or opaque solution is not suitable for infusion.

249. The method of claim 248, wherein said pharmaceutical composition is packed in a kit or container that is configured to permit visual inspection of the pharmaceutical composition.

250. A hydrolytically stable, oxidatively stable, pharmaceutical composition for reconstitution, comprising dry solid LDEE free base crystallites in a container comprising substantially no water and oxygen.

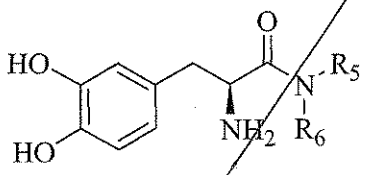
251. A compound of formula (II):



(II),

or a salt thereof, wherein R_2 is CH_2CH_3, $CH(OH)CH_3$, CH_2CH_2COOH, $CH_2CH_2CH_3$, benzenepropenyl, phenyl, or $(CHOH)_4CH_2OH$.

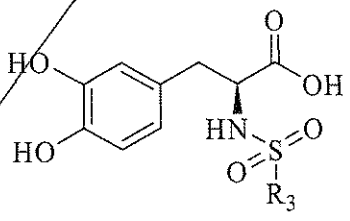
252. A compound of formula (III):



(III),

or a salt thereof, wherein R_5 is H or CH_3, and R_6 is CH_3, CH_2CH_3, $CH_2CH_2CH_3$, benzyl, 2-deoxy-2-glucosyl, or $CH_2CH_2NH_2$.

253. A compound of formula (IV):



(IV),

or a salt thereof, wherein R_3 is CH_3, or 4-methylbenzyl.

254. A pharmaceutical composition comprising an aqueous liquid containing an LD prodrug, or a salt thereof, and water, wherein the weight percent of water in said pharmaceutical composition is less than the weight percent of said LD prodrug, or a salt thereof.

255. A pharmaceutical composition comprising an aqueous liquid containing an LD prodrug, or a salt thereof, and water, wherein said aqueous liquid has a density greater than 1.15 g/mL at about 25 °C.

256. An infusible pharmaceutical composition comprising great than 0.25 M LD prodrug, or a salt thereof; greater than 0.05 M carbidopa prodrug, or a salt thereof, and water.

257. The method of any of claims 72, 109, 136, 158, 191, 192, 194, or 207 wherein said LD prodrug, or a salt thereof, is infused intragastrically, intraduodenally or intrajejunally through a tube of less than about 3 mm outer diameter and/or an internal diameter of less than 1 mm for a period of greater than or equal to about 12 hours.

258. The method of any of claims 72, 109, 136, 158, 191, 192, 194, or 207 wherein said LD prodrug, or a salt thereof, is infused simultaneously at two or more infusion sites.

259. The method of any of claims 72, 109, 136, 158, 191, 192, 194, or 207 wherein said LD prodrug, or a salt thereof, is co-infused with a vasoconstrictor.

260. The method of claim 259, wherein said vasoconstrictor is a corticosteroid vasoconstrictor or an adrenergic vasoconstrictor.

261. The method of claim 260, wherein said vasoconstrictor is dexamethasone.

262. An infusible pharmaceutical composition comprising great than 0.25 M LD prodrug, or a salt thereof; a corticosteroid vasoconstrictor, and water.

263. The infusible pharmaceutical composition of claim 262, wherein said corticosteroid vasoconstrictor is dexamethasone.

264. The infusible pharmaceutical composition of claim 263, wherein said pharmaceutical composition comprises between about 1 μg/mL and about 4 mg/mL dexamethasone.

What is claimed is:

1. Use of an LD prodrug, or a salt thereof, in the manufacture of a medicament for treating Parkinson's disease in a subject by subcutaneously infusing into the subject an LD prodrug solution of said said LD prodrug, or a salt thereof, at such a rate that:

(a) the circulating plasma concentration of said LD prodrug during said infusion does not exceed 100 ng/mL; and

(b) a circulating plasma LD concentration greater than 400 ng/mL is continuously maintained for a period of at least 8 hours during said infusion.

2. The use according to claim 1, wherein during said infusion the circulating LD plasma concentration varies by less than +/- 20% from its mean for a period of at least 1 hour.

3. A pharmaceutical composition comprising an aqueous LD prodrug solution, wherein said LD prodrug solution comprises a sterile aqueous solution containing about 0.3 M to 4.0 M LDEE hydrochloride salt and having a pH of from 1.0 to 3.5.

4. A container comprising a material that is substantially impermeable to oxygen, said container containing a reconstitutable solid comprising an LD prodrug, or a salt thereof, wherein said container is substantially free of oxygen and wherein said reconstitutable solid, when reconstituted, is suitable for subcutaneous infusion.

5. A pharmaceutical composition comprising an aqueous LD prodrug solution containing greater than 0.3 M LD prodrug, or a salt thereof, wherein said pharmaceutical composition is substantially free of precipitated solid LD when stored at 5 ± 3 °C for a period of 6 months, or at about 37 °C for a period of 24 hours, or when thawed after being stored frozen for at least 3 months.

6. The pharmaceutical composition of claim 5, wherein said pharmaceutical composition comprises a container, said container comprising a material that is substantially impermeable to oxygen and containing said aqueous liquid, wherein said container is substantially free of oxygen and wherein said aqueous liquid is suitable for subcutaneous infusion.

7. The pharmaceutical composition of claim 5 or 6, wherein said LD prodrug solution has a pH of from 4.0 - 6.0 or 4.0 ± 0.5.

8. The pharmaceutical composition of any of claims 5-7, wherein said LD prodrug is LDEE, LDME, or a salt thereof.

9. The pharmaceutical composition of claim 8, wherein said LD prodrug is a hydrochloride salt.

10. The pharmaceutical composition of any of claims 5-9, wherein said LD prodrug solution comprises a buffer comprising citrate, succinate, pyrophosphate, or phosphate.

11. The pharmaceutical composition of any of claims 5-10, wherein said pharmaceutical composition is substantially free of oxygen.

12. The pharmaceutical composition of any of claims 5-11, wherein said pharmaceutical composition is supersaturated in LD.

13. The pharmaceutical composition of any of claims 5-12, wherein the solubility of LD in said LD prodrug solution is at least 5 g per liter at about 25°C.

14. Use of a pharmaceutical composition of any of claims 5-13 in the manufacture of a medicament for treating Parkinson's disease in a subject by subcutaneously infusing into said subject said pharmaceutical composition in an amount sufficient to treat Parkinson's disease.

15. The use according to claims 1, 2 or 14, wherein said LD prodrug is subcutaneously infused at two or more infusion sites per day.

16. The use according to claims 1, 2, 14 or 15, wherein said LD prodrug is subcutaneously infused intermittently at one or more infusion sites.

17. Use of a pharmaceutical composition of any of claims 5-13 in the manufacture of a medicament for treating Parkinson's disease in a subject by administering to said subject said pharmaceutical composition in an amount sufficient to treat Parkinson's disease, wherein said pharmaceutical composition is administered intragastrically, intraduodenally or intrajejunally.

18. An ambulatory infusion pump system for the treatment of Parkinson's disease comprising:

(i) a pharmaceutical composition of any of claims 5-13 in a drug reservoir; and

(ii) at least one cannula or needle in fluid communication with the drug reservoir for infusing said pharmaceutical composition into a subject.