What is claimed is:

1. An aptamer comprised of the sequence BAZGRGGRSZWGGGGZZWADCCGZZRZG (SEQ ID NO: 45) or a fragment thereof,
wherein
B is selected from a C, G or Z;
R is independently selected from an A or G;
S is selected from a C or G;
W is independently selected from a Z or T;
D is selected from an A, G or Z; and
Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included.

2. The aptamer of claim 1, wherein the aptamer binds to β-NGF.

3. The aptamer of claim 2, wherein the aptamer inhibits the function of β-NGF.

4. The aptamer of claim 2, wherein said aptamer has the ability to modulate the binding of β-NGF to its one or more of its cellular receptors.

5. The aptamer of claim 4 wherein said cellular receptor is selected from p75 or TrkA.

6. The aptamer of claim 2, wherein the aptamer comprises a K_d for β-NGF of 30 nM or less.

7. The aptamer of claim 1, wherein said modified pyrimidine is a C-5 modified pyrimidine.

8. The aptamer of claim 7, wherein the C-5 modified pyrimidine is selected from the group consisting of Figure 10.

9. The aptamer of claim 7, wherein the C-5 modified pyrimidine is selected from the group consisting of 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU), 5-(N-isobutylcarboxyamide)-2'-deoxyuridine (iBudU), 5-(N-tryptaminocarboxyamide)-2'-deoxyuridine (TrpdU) and 5-(N-naphthylmethylcarboxyamide)-2'-deoxyuridine (NapdU).

10. The aptamer of claim 7, wherein the C-5 modified pyrimidine is 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU).

11. The aptamer of claim 1, wherein said aptamer includes at least one nucleotide insertion (N) and has the following sequence:

BAZGRGGRSN$_{(0-1)}$ZWGGGGN$_{(0-1)}$ZZWADCCGZZRZG (SEQ ID NO:154)

wherein N is independently selected from any naturally occurring or modified nucleotide.

12. An aptamer comprised of the sequence BAZGRGGRSZZGGGGZZZADCCGZZRZG (SEQ. ID. NO: 3), or a fragment thereof,

wherein

B is selected from a C, G or Z;

R is independently selected from an A or G;

S is selected from a C or G;

D is selected from an A, G or Z; and

Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included.

13. The aptamer of claim 12, wherein the aptamer binds to β-NGF.

14. The aptamer of claim 13, wherein the aptamer inhibits the function of β-NGF.

15. The aptamer of claim 13, wherein said aptamer has the ability to modulate the binding of β-NGF to its one or more of its cellular receptors.

16. The aptamer of claim 15 wherein said cellular receptor is selected from p75 or TrkA.

17. The aptamer of claim 13, wherein the aptamer comprises a K_d for β-NGF of 30 nM or less.

18. The aptamer of claim 12, wherein said modified pyrimidine is a C-5 modified pyrimidine.

19. The aptamer of claim 18, wherein the C-5 modified pyrimidine is selected from the group consisting of Figure 10.

20. The aptamer of claim 18, wherein the C-5 modified pyrimidine is selected from the group consisting of 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU), 5-(N-isobutylcarboxyamide)-2'-deoxyuridine (iBudU), 5-(N-tryptaminocarboxyamide)-2'-deoxyuridine (TrpdU) and 5-(N-naphthylmethylcarboxyamide)-2'-deoxyuridine (NapdU).

21. The aptamer of claim 18, wherein the C-5 modified pyrimidine is 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU).

22. The aptamer of claim 18, wherein said aptamer includes at least one nucleotide insertion (N) and has the following sequence:

BAZGRGGRS$\mathbf{N}_{(0-1)}$ZZGGGGG$\mathbf{N}_{(0-1)}$ZZZADCCGZZRZG (SEQ ID NO: 155)

wherein N is independently selected from any naturally occurring or modified nucleotide.

23. An aptamer that binds to β-NGF comprising a sequence selected from the group consisting of SEQ. ID. NOS: 1, 2, 9-44 and 149.

24. The aptamer of claim 23, wherein the aptamer inhibits the function of β-NGF.

25. The aptamer of claim 23, wherein said aptamer has the ability to modulate the binding of β-NGF to its one or more of its cellular receptors.

26. The aptamer of claim 25, wherein said cellular receptor is selected from p75 or TrkA.

27. The aptamer of claim 26, wherein the sequence is selected from the group consisting of at least about 90% identity, at least about 91% identity, at least about 92% identity, at least about 93% identity, at least about 94% identity, and at least about 95% identity.

28. A method for treating, preventing or ameliorating a disease mediated by β-NGF comprising administering to a subject in need thereof a therapeutically effective dose of an

aptamer that binds to β-NGF comprised of the sequence BAZGRGGRSZWGGGGZZWADCCGZZRZG (SEQ ID NO: 45) or a fragment thereof, wherein

B is selected from a C, G or Z;

R is independently selected from an A or G;

S is selected from a C or G;

W is independently selected from a Z or T;

D is selected from an A, G or Z; and

Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included.

29. The method of claim 28, wherein said modified pyrimidine is a C-5 modified pyrimidine.

30. The method of claim 29, wherein the C-5 modified pyrimidine is selected from the group consisting of Figure 10.

31. The method of claim 29, wherein the C-5 modified pyrimidine is selected from the group consisting of 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU), 5-(N-isobutylcarboxyamide)-2'-deoxyuridine (iBudU), 5-(N-tryptaminocarboxyamide)-2'-deoxyuridine (TrpdU) and 5-(N-naphthylmethylcarboxyamide)-2'-deoxyuridine (NapdU).

32. The method of claim 29, wherein the C-5 modified pyrimidine is 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU).

33. The method of claim 28, wherein the β-NGF mediated disease or condition is one in which β-NGF activity may directly or indirectly lead to pruritus at some stage in the disease process.

34. The method of claim 33, wherein the disease or condition is dermatitis or eczema.

35. The method of claim 34, wherein the dermatitis is atopic dermatitis.

36. The method of claim 28, wherein the aptamer is selected from the group consisting of SEQ ID NOS: 1, 2, 9-44 and 149.

37. The method of claim 36, wherein the sequence is selected from the group consisting of at least about 90% identity, at least about 91% identity, at least about 92% identity, at least about 93% identity, at least about 94% identity, and at least about 95% identity.

38. The method of claim 28, wherein said administration is topical.

39. The method of claim 28, wherein the aptamer is administered at a dose in the range of about 1 μg to about 100 mg/kg body weight per day.

40. The method of claim 28, wherein the aptamer is administered in combination with another agent used in the treatment of pruritus.

41. The method of claim 28, wherein said aptamer includes at least one nucleotide insertion (N) and has the following sequence:

$BAZGRGGRSN_{(0-1)}ZWGGGGN_{(0-1)}ZZWADCCGZZRZG$ (SEQ ID NO: 154)

wherein N is independently selected from any naturally occurring or modified nucleotide.

42. A method for treating, preventing or ameliorating a disease mediated by β-NGF comprising administering to a subject in need thereof a therapeutically effective dose of an aptamer that binds to β-NGF comprised of the sequence BAZGRGGRSZZGGGGZZZADCCGZZRZG (SEQ ID NO: 3), or a fragment thereof, wherein

B is selected from a C, G or Z;

R is independently selected from an A or G;

S is selected from a C or G;

D is selected from an A, G or Z; and

Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included.

43. The method of claim 42, wherein said modified pyrimidine is a C-5 modified pyrimidine.

44. The method of claim 43, wherein the C-5 modified pyrimidine is selected from the group consisting of Figure 10.

45. The method of claim 43, wherein the C-5 modified pyrimidine is selected from the group consisting of 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU), 5-(N-isobutylcarboxyamide)-2'-deoxyuridine (iBudU), 5-(N-tryptaminocarboxyamide)-2'-deoxyuridine (TrpdU) and 5-(N-naphthylmethylcarboxyamide)-2'-deoxyuridine (NapdU).

46. The method of claim 43, wherein the C-5 modified pyrimidine is 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU).

47. The method of claim 42, wherein the β-NGF mediated disease or condition is one in which β-NGF activity may directly or indirectly lead to pruritus at some stage in the disease process.

48. The method of claim 47, wherein the disease or condition is dermatitis or eczema.

49. The method of claim 48, wherein the dermatitis is atopic dermatitis.

50. The method of claim 42, wherein said administration is topical.

51. The method of claim 42, wherein the aptamer is administered at a dose in the range of about 1 μg to about 100 mg/kg body weight per day.

52. The method of claim 42, wherein the aptamer is administered in combination with another agent used in the treatment of pruritus.

53. The method of claim 42, wherein said aptamer includes at least one nucleotide insertion (N) and has the following sequence:

BAZGRGGRSN$_{(0-1)}$ZZGGGGN$_{(0-1)}$ZZZADCCGZZRZG (SEQ ID NO: 155)

wherein N is independently selected from any naturally occurring or modified nucleotide.

54. A pharmaceutical composition comprising an aptamer to β-NGF comprised of the sequence BAZGRGGRSZWGGGGZZWADCCGZZRZG (SEQ. ID. NO: 45), or a pharmaceutically acceptable salt thereof or a fragment thereof:
wherein
B is selected from a C, G or Z;
R is independently selected from an A or G;
S is selected from a C or G;
W is independently selected from a Z or T;
D is selected from an A, G or Z; and
Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included and a pharmaceutically acceptable carrier or excipient.

55. The composition of claim 54, further comprising a diluent, antimicrobial agent, a binding agent, a filler, a wetting agent, a suspending agent, an emollient, and an emulsifying agent.

56. The composition of claim 55, wherein said formulation is a topical formulation selected from the group consisting of a cream, a lotion, an ointment, a gel, an impregnated dressing, an aerosol, a medicated powder, a medicated adhesive, and a foam.

57. A pharmaceutical composition comprising an aptamer to β-NGF comprised of the sequence BAZGRGGRSZZGGGGZZZADCCGZZRZG (SEQ ID NO: 3), or a pharmaceutically acceptable salt thereof or a fragment thereof:
wherein
B is selected from a C, G or Z;
R is independently selected from an A or G;
S is selected from a C or G;
D is selected from an A, G or Z; and
Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included and a pharmaceutically acceptable carrier or excipient.

58. The composition of claim 57, further comprising a diluent, antimicrobial agent, a binding agent, a filler, a wetting agent, a suspending agent, an emollient, and an emulsifying agent.

59. The composition of claim 58, wherein said formulation is a topical formulation selected from the group consisting of a cream, a lotion, an ointment, a gel, an impregnated dressing, an aerosol, a medicated powder, a medicated adhesive, and a foam.

60. The aptamer of claim1, wherein the aptamer is a dimer comprising two components, and wherein said two components are linked.

61. The aptamer of claim 19, wherein said two components are linked by a hydrocarbon linker.

62. An aptamer comprised of the sequence BAZGRGGRSZWGGGGZZWADCCGZZRZG (SEQ ID NO: 45) or a fragment thereof,
wherein
B is selected from any nucleotide other than A;
R is independently selected from an A or G;
S is selected from a C or G;
W is independently selected from a Z or T;
D is selected from an A, G or Z; and
Z is independently selected from a modified pyrimidine, and wherein non-specific nucleotide insertions may be included.

63. A pharmaceutical agent comprising an aptamer of any one of claims 1 to 27 as an active agent.

64. The pharmaceutical agent of claim 63 for treating, preventing or ameliorating a disease mediated by β-NGF comprising an aptamer.

65. The pharmaceutical agent of claim 64, wherein the β-NGF mediated disease or condition is one in which β-NGF activity may directly or indirectly lead to pruritus at some stage in the disease process.

66. The pharmaceutical agent of claim 63 or 65, wherein the disease or condition is dermatitis or eczema.

67. The pharmaceutical agent of claim 66, wherein the dermatitis is atopic dermatitis.

68. Use of an aptamer of any one of claims 1 to 27 for the production of a pharmaceutical agent.

69. The use of claims 68, wherein the pharmaceutical agent is an agent for treating, preventing or ameliorating a disease mediated by β-NGF comprising an aptamer.

70. The use of claim 69, wherein the β-NGF mediated disease or condition is one in which β-NGF activity may directly or indirectly lead to pruritus at some stage in the disease process.

71. The use of claim 68 or 70, wherein the disease or condition is dermatitis or eczema.

72. The use of claim 71, wherein the dermatitis is atopic dermatitis.

73. The aptamer of claims 1 to 27 for use in treating, preventing or ameliorating a disease mediated by β-NGF comprising an aptamer.

74. The aptamer of claim 73, wherein the β-NGF mediated disease or condition is one in which β-NGF activity may directly or indirectly lead to pruritus at some stage in the disease process.

75. The aptamer of claim 74, wherein the disease or condition is dermatitis or eczema.

76. The aptamer of claim 75, wherein the dermatitis is atopic dermatitis.

77. The composition of any one of claims 54 to 59 for treating, preventing or ameliorating a disease mediated by β-NGF.

78. The composition of claim 77, wherein the β-NGF mediated disease or condition is one in which β-NGF activity may directly or indirectly lead to pruritus at some stage in the disease process.

79. The composition of claim 78, wherein the disease or condition is dermatitis or eczema.

80. The composition of claim 79, wherein the dermatitis is atopic dermatitis.

81. The composition of any of claims 54 to 59 for treating, preventing or ameliorating a disease or condition is dermatitis or eczema.

82. The composition of claim 81, wherein the dermatitis is atopic dermatitis.

Claims

1. An aptamer comprised of the sequence

BAZGRGGRS$N_{(0-1)}$ZWGGGGN$_{(0-1)}$ZZWADCCGZZRZG (SEQ ID NO:154)

wherein

B is selected from a C, G or Z;

R is independently selected from an A or G;

S is selected from a C or G;

W is independently selected from a Z or T;

D is selected from an A, G or Z;

N is independently selected from any naturally occurring or modified nucleotide and

Z is independently selected from a modified pyrimidine.

2. The aptamer of claim 1, wherein the aptamer binds to β-NGF.

3. The aptamer of claim 2, wherein the aptamer inhibits the function of β-NGF.

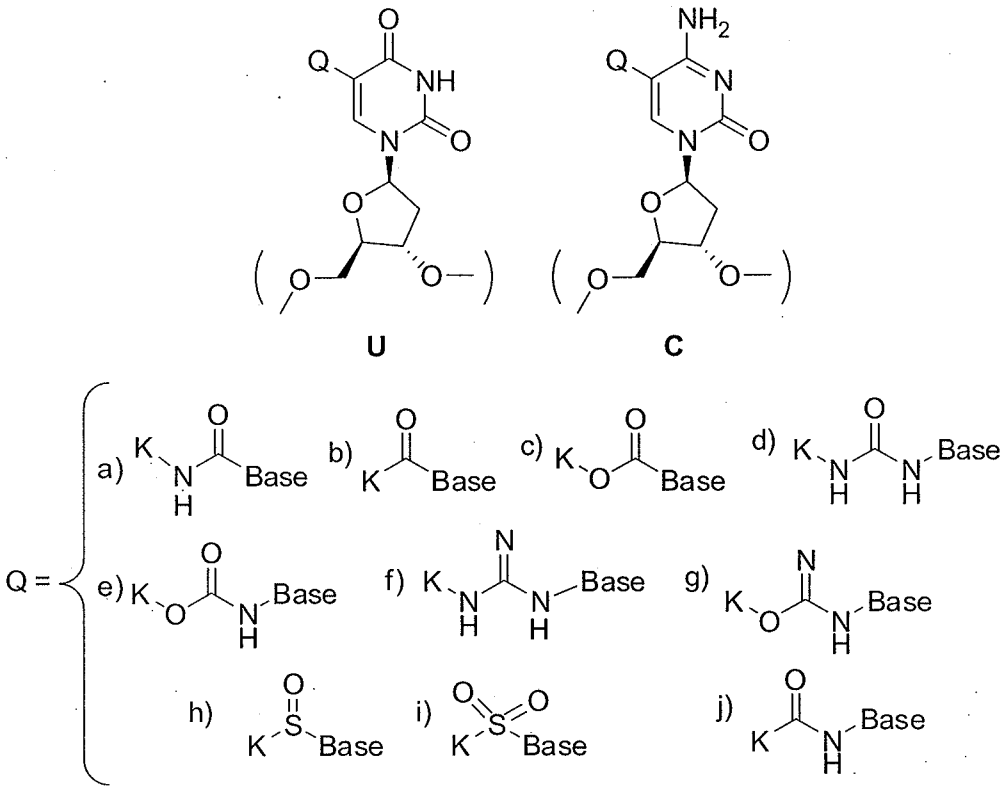
4. The aptamer of claim 2, wherein said aptamer has the ability to modulate the binding of β-NGF to its one or more of its cellular receptors.

5. The aptamer of claim 4 wherein said cellular receptor is selected from p75 or TrkA.

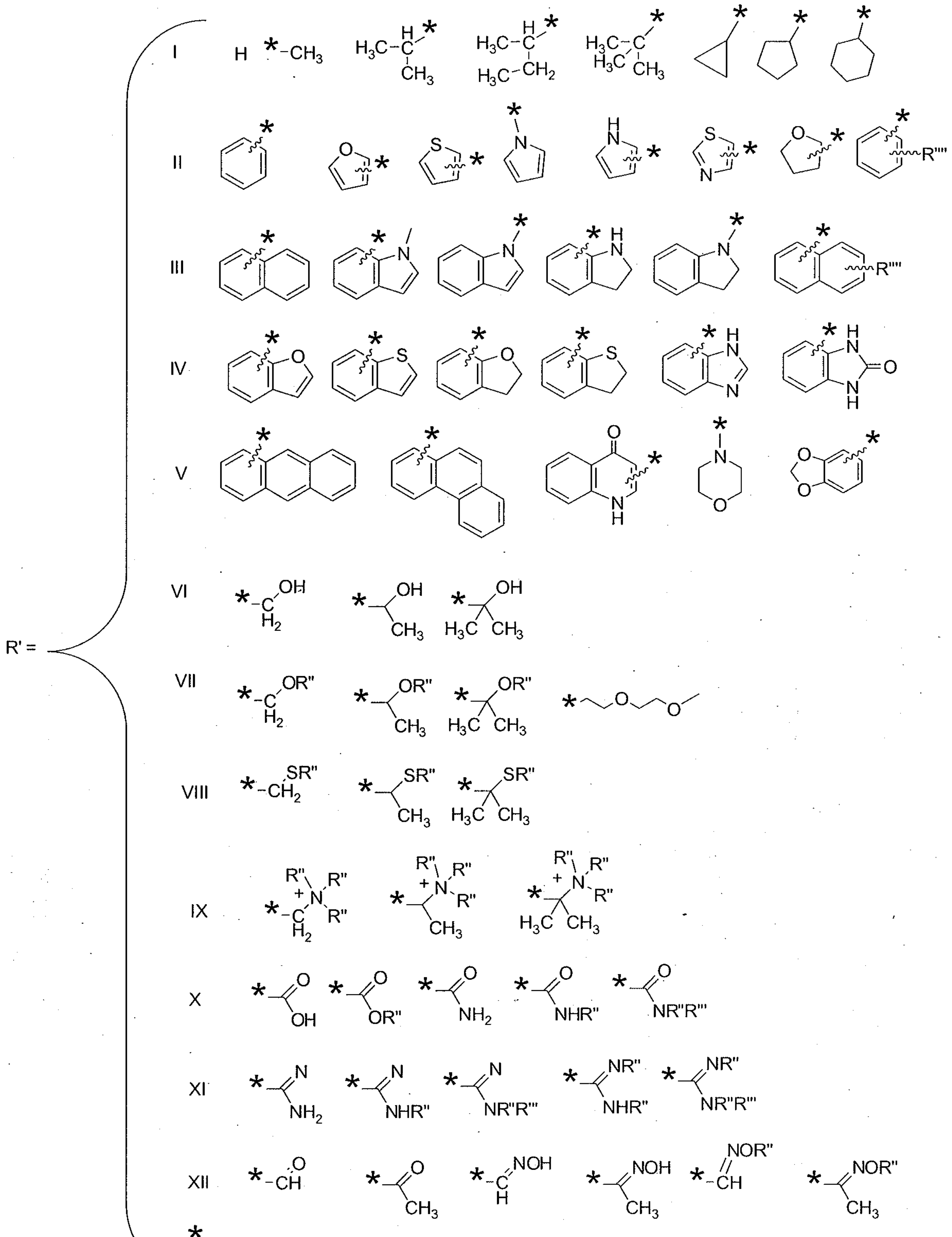
6. The aptamer of claim 2, wherein the aptamer comprises a K_d for β-NGF of 30 nM or less.

7. The aptamer of claim 1, wherein said modified pyrimidine is a C-5 modified pyrimidine.

8. The aptamer of claim 7, wherein the C-5 modified pyrimidine is selected from the group consisting of the following compounds:



Base = Uridine (U) or Cytidine(C) (attachment is to the 5-position)
K = R' group plus $(CH_2)_n$ connecting group, where n = 0-3



* Denotes point of attachment of the R' group to $(CH_2)_n$ connecting group

wherein

R"" is selected from the group consisting of a branched or linear lower alkyl (C1-C20); halogen (F, Cl, Br, I); nitrile (CN); boronic acid (BO_2H_2); carboxylic acid (COOH); carboxylic acid ester (COOR"); primary amide ($CONH_2$); secondary amide (CONHR"); tertiary amide (CONR"R'"); sulfonamide (SO_2NH_2); N-alkylsulfonamide (SONHR");

wherein

R", R'" are independently selected from a group consisting of a branched or linear lower alkyl (C1-C2)); phenyl (C_6H_5); an R"" substituted phenyl ring (R""C_6H_4); wherein R"" is defined above; a carboxylic acid (COOH); a carboxylic acid ester (COOR""); wherein R"" is a branched or linear lower alkyl (C1-C20); and cycloalkyl; wherein R" = R'" = (CH_2)n; and

wherein n =2-10.

9. The aptamer of claim 7, wherein the C-5 modified pyrimidine is selected from the group consisting of 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU), 5-(N-isobutylcarboxyamide)-2'-deoxyuridine (iBudU), 5-(N-tryptaminocarboxyamide)-2'-deoxyuridine (TrpdU) and 5-(N-naphthylmethylcarboxyamide)-2'-deoxyuridine (NapdU).

10. The aptamer of claim 7, wherein the C-5 modified pyrimidine is 5-(N-benzylcarboxyamide)-2'-deoxyuridine (BndU).

11. The aptamer of claim 1, wherein said aptamer has the following sequence: BAZGRGGRSZWGGGGZZWADCCGZZRZG (SEQ ID NO: 45).

12. An aptamer comprised of the sequence BAZGRGGRSZZGGGGZZZADCCGZZRZG (SEQ. ID. NO: 3),
wherein
B is selected from a C, G or Z;
R is independently selected from an A or G;
S is selected from a C or G;
D is selected from an A, G or Z; and
Z is independently selected from a modified pyrimidine.

13. An aptamer that binds to β-NGF comprising a sequence selected from the group consisting of SEQ. ID. NOS: 1, 2, 9-44 and 149.

14. The aptamer of claim 13, wherein the aptamer inhibits the function of β-NGF.

15. The aptamer of claim 13, wherein said aptamer has the ability to modulate the binding of β-NGF to its one or more of its cellular receptors.

16. The aptamer of claim 15, wherein said cellular receptor is selected from p75 or TrkA.

17. The aptamer of claim 16, wherein the sequence has at least about 90% identity, at least about 91% identity, at least about 92% identity, at least about 93% identity, at least about 94% identity, and at least about 95% identity.