EXAMPLE IV

ON chelates are effective antiviral agents against chronic HBV infection in human patients.

[00136] Patients with pre-existing chronic HBV infection were subjected to once weekly administration of comparable molar doses of REP 2055 prepared as a simple sodium salt solution according to standard in the art as described above and REP 2139 prepared as a calcium chelate complex (prepared with 30mg of $CaCl_2$ for every 100mg of REP 2139 according to International application publication no. WO 2012/021985 and U.S. application publication no. 2012/0046348). The antiviral effects of the administration of the sodium salt NAP (REP 2055) with the calcium chelate NAP (REP 2139-Ca), when given in comparable molar doses using comparable dosing regimens were assessed by reductions in the levels of HBV surface antigen protein (HBsAg) in the blood (as measured by the Abbott Architect™ platform). The antiviral effects of REP 2055 and REP 2139-Ca are presented in Table 6.

Table 6

REP 2055 and REP 2139-Ca comparably clear serum HBsAg in patients with chronic HBV infection

NAP	Responder patient	Pretreatment serum HBsAg (mIU / ml*)	Serum HBsAg on treatment (mIU / ml*)
REP 2055	1	934	0.25
	2	1885.4	0.38
	3	384.1	0
	4	126645.07	0.03
	5	158180	0
	6	36996.00	7
	7	4762.5	43.7
REP 2139-Ca	1	70050	0.19
	2	13400	0
	3	3654.3	0.34
	4	47689.7	180.44
	5	107659.6	32.15
	6	58937.87	9.91
	7	17988.99	29.21
	8	125000	0.01
	9	1288.56	0.02

*as determined by the Abbott Architect™ quantitative test for HBsAg

32. The pharmaceutical formulation of claim 1, wherein the virus causing the infection is selected from the group consisting of: a member of the retroviridae, HIV-1, HIV-2, a member of the herpesviridae, HSV-1, HSV-2, cytomegalovirus, a member of the poxviridae, a member of the paramyxoviridae, respiratory syncytial virus, parainfluenza virus, a member of the bunyaviridae, hantavirus, a member of the filoviridae, Ebola virus, Marburg virus, a member of the flaviviridae, yellow fever virus, dengue virus, West Nile virus, hepatitis C virus, a member of the orthomyxoviridae, a member of the togaviridae, a member of the coronaviridae, a member of the rhabdoviridae, and a member of the arenaviridae.

33. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:2.

34. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:18.

35. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:11.

36. Use of an antiviral oligonucleotide chelate complex for the treatment of a viral infection.

37. Use of an anti-cholesterol oligonucleotide chelate complex for the treatment of hypercholesterolemia.

38. Use of an anti-triglyceride oligonucleotide chelate complex for the treatment of hypertriglyceridemia.

39. Use of an anti-Alzheimer's oligonucleotide chelate complex for the treatment of Alzheimer's disease.

40. Use of an anti-prion oligonucleotide chelate complex for the treatment of prion disease.

41. The use of any one of claims 36-40, wherein said oligonucleotide chelate complex is prepared with a divalent metal cation.

67. The use of claim 36, wherein the virus causing the infection is selected from the group consisting of: a member of the retroviridae, HIV-1, HIV-2, a member of the herpesviridae, HSV-1, HSV-2, cytomegalovirus, a member of the poxviridae, a member of the paramyxoviridae, respiratory syncytial virus, parainfluenza virus, a member of the bunyaviridae, hantavirus, a member of the filoviridae, Ebola virus, Marburg virus, a member of the flaviviridae, yellow fever virus, dengue virus, West Nile virus, hepatitis C virus, a member of the orthomyxoviridae, a member of the togaviridae, a member of the coronaviridae, a member of the rhabdoviridae, and a member of the arenaviridae.

68. The use of claim 36, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:2.

69. The use of claim 36, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:18.

70. The use of claim 36, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:11.

EXAMPLE IV

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[00136] Patients with pre-existing chronic HBV infection were subjected to once weekly administration of comparable molar doses of REP 2055 prepared as a simple sodium salt solution according to standard in the art as described above and REP 2139 prepared as a calcium chelate complex (prepared with 30mg of $CaCl_2$ for every 100mg of REP 2139 according to International application publication no. WO 2012/021985 and U.S. application publication no. 2012/0046348). The antiviral effects of the administration of the sodium salt NAP (REP 2055) with the calcium chelate NAP (REP 2139-Ca), when given in comparable molar doses using comparable dosing regimens were assessed by reductions in the levels of HBV surface antigen protein (HBsAg) in the blood (as measured by the Abbott Architect™ platform). The antiviral effects of REP 2055 and REP 2139-Ca are presented in Table 6.

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*as determined by the Abbott Architect™ quantitative test for HBsAg

32. The pharmaceutical formulation of claim 1, wherein the virus causing the infection is selected from the group consisting of: a member of the retroviridae, HIV-1, HIV-2, a member of the herpesviridae, HSV-1, HSV-2, cytomegalovirus, a member of the poxviridae, a member of the paramyxoviridae, respiratory syncytial virus, parainfluenza virus, a member of the bunyaviridae, hantavirus, a member of the filoviridae, Ebola virus, Marburg virus, a member of the flaviviridae, yellow fever virus, dengue virus, West Nile virus, hepatitis C virus, a member of the orthomyxoviridae, a member of the togaviridae, a member of the coronaviridae, a member of the rhabdoviridae, and a member of the arenaviridae.

33. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:2.

34. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:18.

35. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:11.

36. The pharmaceutical formulation of claim 1, wherein said oligonucleotide chelate complex comprises SEQ ID NO:21.

37. Use of an antiviral oligonucleotide chelate complex for the treatment of a viral infection.

38. Use of an anti-cholesterol oligonucleotide chelate complex for the treatment of hypercholesterolemia.

39. Use of an anti-triglyceride oligonucleotide chelate complex for the treatment of hypertriglyceridemia.

40. Use of an anti-Alzheimer’s oligonucleotide chelate complex for the treatment of Alzheimer’s disease.

41. Use of an anti-prion oligonucleotide chelate complex for the treatment of prion disease.

67. The use of claim 37, wherein the virus causing the infection is influenza.

68. The use of claim 37, wherein the virus causing the infection is selected from the group consisting of: a member of the retroviridae, HIV-1, HIV-2, a member of the herpesviridae, HSV-1, HSV-2, cytomegalovirus, a member of the poxviridae, a member of the paramyxoviridae, respiratory syncytial virus, parainfluenza virus, a member of the bunyaviridae, hantavirus, a member of the filoviridae, Ebola virus, Marburg virus, a member of the flaviviridae, yellow fever virus, dengue virus, West Nile virus, hepatitis C virus, a member of the orthomyxoviridae, a member of the togaviridae, a member of the coronaviridae, a member of the rhabdoviridae, and a member of the arenaviridae.

69. The use of claim 37, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:2.

70. The use of claim 37, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:18.

71. The use of claim 37, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:11.

72. The use of claim 37, wherein said oligonucleotide chelate complex comprises an oligonucleotide consisting of SEQ ID NO:21.