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(54) **Title:** MODULATORS OF GROWTH HORMONE RECEPTOR

(57) **Abstract:** The present embodiments provide methods, compounds, and compositions for treating, preventing, ameliorating a disease associated with excess growth hormone using antisense compounds oligonucleotides targeted to growth hormone receptor (GHR).



MODULATORS OF GROWTH HORMONE RECEPTOR

Field

5 The present embodiments provide methods, compounds, and compositions for treating, preventing, or ameliorating a disease associated with excess growth hormone using antisense compounds or oligonucleotides targeted to growth hormone receptor (GHR).

Sequence Listing

10 The present application is being filed along with a Sequence Listing in electronic format. The Sequence Listing is provided as a file entitled BIOL0226WOSEQ_ST25.txt, created on June 30, 2014, which is 1028 Kb in size. The information in the electronic format of the sequence listing is incorporated herein by reference in its entirety.

Background

15 Growth hormone is produced in the pituitary and secreted into the bloodstream where it binds to growth hormone receptor (GHR) on many cell types, causing production of insulin-like growth factor-1 (IGF-1). IGF-1 is produced mainly in the liver, but also in adipose tissue and the kidney, and secreted into the bloodstream. Several disorders, such as acromegaly and gigantism, are associated with elevated growth hormone levels and/or elevated IGF-I levels in plasma and/or tissues.

20 Excessive production of growth hormone can lead to diseases such as acromegaly or gigantism. Acromegaly and gigantism are associated with excess growth hormone, often caused by a pituitary tumor, and affects 40-50 per million people worldwide with about 15,000 patients in each of the US and Europe and an annual incidence of about 4-5 per million people. Acromegaly and gigantism are initially characterized by abnormal growth of the hands and feet and bony changes in the facial features. Many of the growth related outcomes are mediated by elevated levels of serum IGF-1.

25 Summary

 Embodiments provided herein relate to methods, compounds, and compositions for treating, preventing, or ameliorating a disease associated with excess growth hormone. Several embodiments provided herein are drawn to antisense compounds or oligonucleotides targeted to growth hormone receptor (GHR). Several embodiments are directed to treatment, prevention, or amelioration of acromegaly with
30 antisense compounds or oligonucleotides targeted to growth hormone receptor (GHR).

Detailed Description

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention, as claimed. Herein, the use of the singular includes the plural unless specifically stated otherwise. As used herein, the use of “or” means “and/or” unless stated otherwise. Furthermore, the use of the term “including” as well as other forms, such as “includes” and “included”, is not limiting. Also, terms such as “element” or “component” encompass both elements and components comprising one unit and elements and components that comprise more than one subunit, unless specifically stated otherwise.

The section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described. All documents, or portions of documents, cited in this application, including, but not limited to, patents, patent applications, articles, books, and treatises, are hereby expressly incorporated by reference for the portions of the document discussed herein, as well as in their entirety.

Unless otherwise indicated, the following terms have the following meanings:

“2’-O-methoxyethyl” (also 2’-MOE and 2’-O(CH₂)₂-OCH₃) refers to an O-methoxy-ethyl modification at the 2’ position of a furanose ring. A 2’-O-methoxyethyl modified sugar is a modified sugar.

“2’-MOE nucleoside” (also 2’-O-methoxyethyl nucleoside) means a nucleoside comprising a 2’-MOE modified sugar moiety.

“2’-substituted nucleoside” means a nucleoside comprising a substituent at the 2’-position of the furanosyl ring other than H or OH. In certain embodiments, 2’ substituted nucleosides include nucleosides with bicyclic sugar modifications.

“3’ target site” refers to the nucleotide of a target nucleic acid which is complementary to the 3’-most nucleotide of a particular antisense compound.

“5’ target site” refers to the nucleotide of a target nucleic acid which is complementary to the 5’-most nucleotide of a particular antisense compound.

“5-methylcytosine” means a cytosine modified with a methyl group attached to the 5 position. A 5-methylcytosine is a modified nucleobase.

“About” means within $\pm 10\%$ of a value. For example, if it is stated, “the compounds affected at least about 70% inhibition of GHR”, it is implied that GHR levels are inhibited within a range of 60% and 80%.

“Administration” or “administering” refers to routes of introducing an antisense compound provided herein to a subject to perform its intended function. An example of a route of administration that can be used

includes, but is not limited to parenteral administration, such as subcutaneous, intravenous, or intramuscular injection or infusion.

“Amelioration” refers to a lessening of at least one indicator, sign, or symptom of an associated disease, disorder, or condition. In certain embodiments, amelioration includes a delay or slowing in the progression of one or more indicators of a condition or disease. The severity of indicators may be determined by subjective or objective measures, which are known to those skilled in the art.

“Animal” refers to a human or non-human animal, including, but not limited to, mice, rats, rabbits, dogs, cats, pigs, and non-human primates, including, but not limited to, monkeys and chimpanzees.

“Antisense activity” means any detectable or measurable activity attributable to the hybridization of an antisense compound to its target nucleic acid. In certain embodiments, antisense activity is a decrease in the amount or expression of a target nucleic acid or protein encoded by such target nucleic acid.

“Antisense compound” means an oligomeric compound that is capable of undergoing hybridization to a target nucleic acid through hydrogen bonding. Examples of antisense compounds include single-stranded and double-stranded compounds, such as, antisense oligonucleotides, siRNAs, shRNAs, ssRNAs, and occupancy-based compounds.

“Antisense inhibition” means reduction of target nucleic acid levels in the presence of an antisense compound complementary to a target nucleic acid compared to target nucleic acid levels in the absence of the antisense compound.

“Antisense mechanisms” are all those mechanisms involving hybridization of a compound with target nucleic acid, wherein the outcome or effect of the hybridization is either target degradation or target occupancy with concomitant stalling of the cellular machinery involving, for example, transcription or splicing.

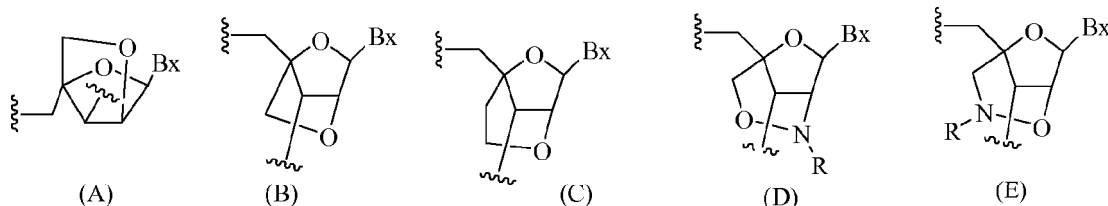
“Antisense oligonucleotide” means a single-stranded oligonucleotide having a nucleobase sequence that permits hybridization to a corresponding region or segment of a target nucleic acid.

“Base complementarity” refers to the capacity for the precise base pairing of nucleobases of an antisense oligonucleotide with corresponding nucleobases in a target nucleic acid (i.e., hybridization), and is mediated by Watson-Crick, Hoogsteen or reversed Hoogsteen hydrogen binding between corresponding nucleobases.

“Bicyclic sugar moiety” means a modified sugar moiety comprising a 4 to 7 membered ring (including but not limited to a furanosyl) comprising a bridge connecting two atoms of the 4 to 7 membered ring to form a second ring, resulting in a bicyclic structure. In certain embodiments, the 4 to 7 membered

ring is a sugar ring. In certain embodiments the 4 to 7 membered ring is a furanosyl. In certain such embodiments, the bridge connects the 2'-carbon and the 4'-carbon of the furanosyl.

"Bicyclic nucleic acid" or "BNA" or "BNA nucleosides" means nucleic acid monomers having a bridge connecting two carbon atoms between the 4' and 2' position of the nucleoside sugar unit, thereby forming a bicyclic sugar. Examples of such bicyclic sugar include, but are not limited to A) α -L-Methyleneoxy (4'-CH₂-O-2') LNA, (B) β -D-Methyleneoxy (4'-CH₂-O-2') LNA, (C) Ethyleneoxy (4'-(CH₂)₂-O-2') LNA, (D) Aminoxy (4'-CH₂-O-N(R)-2') LNA and (E) Oxyamino (4'-CH₂-N(R)-O-2') LNA, as depicted below.



As used herein, LNA compounds include, but are not limited to, compounds having at least one bridge between the 4' and the 2' position of the sugar wherein each of the bridges independently comprises 1 or from 2 to 4 linked groups independently selected from $-\text{C}(\text{R}_1)(\text{R}_2)_n-$, $-\text{C}(\text{R}_1)=\text{C}(\text{R}_2)-$, $-\text{C}(\text{R}_1)=\text{N}-$, $-\text{C}(=\text{NR}_1)-$, $-\text{C}(=\text{O})-$, $-\text{C}(=\text{S})-$, $-\text{O}-$, $-\text{Si}(\text{R}_1)_2-$, $-\text{S}(=\text{O})_x-$ and $-\text{N}(\text{R}_1)-$; wherein: x is 0, 1, or 2; n is 1, 2, 3, or 4; each R_1 and R_2 is, independently, H, a protecting group, hydroxyl, C_1 - C_{12} alkyl, substituted C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl, substituted C_2 - C_{12} alkenyl, C_2 - C_{12} alkynyl, substituted C_2 - C_{12} alkynyl, C_5 - C_{20} aryl, substituted C_5 - C_{20} aryl, a heterocycle radical, a substituted heterocycle radical, heteroaryl, substituted heteroaryl, C_5 - C_7 alicyclic radical, substituted C_5 - C_7 alicyclic radical, halogen, OJ_1 , NJ_1J_2 , SJ_1 , N_3 , COOJ_1 , acyl ($\text{C}(=\text{O})-\text{H}$), substituted acyl, CN, sulfonyl ($\text{S}(=\text{O})_2-\text{J}_1$), or sulfoxyl ($\text{S}(=\text{O})-\text{J}_1$); and each J_1 and J_2 is, independently, H, C_1 - C_{12} alkyl, substituted C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl, substituted C_2 - C_{12} alkenyl, C_2 - C_{12} alkynyl, substituted C_2 - C_{12} alkynyl, C_5 - C_{20} aryl, substituted C_5 - C_{20} aryl, acyl ($\text{C}(=\text{O})-\text{H}$), substituted acyl, a heterocycle radical, a substituted heterocycle radical, C_1 - C_{12} aminoalkyl, substituted C_1 - C_{12} aminoalkyl or a protecting group.

Examples of 4'-2' bridging groups encompassed within the definition of LNA include, but are not limited to one of formulae: $-\text{C}(\text{R}_1)(\text{R}_2)_n-$, $-\text{C}(\text{R}_1)(\text{R}_2)_n-\text{O}-$, $-\text{C}(\text{R}_1\text{R}_2)-\text{N}(\text{R}_1)-\text{O}-$ or $-\text{C}(\text{R}_1\text{R}_2)-\text{O}-\text{N}(\text{R}_1)-$. Furthermore, other bridging groups encompassed with the definition of LNA are 4'-CH₂-2', 4'-(CH₂)₂-2', 4'-(CH₂)₃-2', 4'-CH₂-O-2', 4'-(CH₂)₂-O-2', 4'-CH₂-O-N(R₁)-2' and 4'-CH₂-N(R₁)-O-2' bridges, wherein each R_1 and R_2 is, independently, H, a protecting group or C_1 - C_{12} alkyl.

Also included within the definition of LNA according to the invention are LNAs in which the 2'-hydroxyl group of the ribosyl sugar ring is connected to the 4' carbon atom of the sugar ring, thereby forming a methyleneoxy (4'-CH₂-O-2') bridge to form the bicyclic sugar moiety. The bridge can also be a methylene

(-CH₂-) group connecting the 2' oxygen atom and the 4' carbon atom, for which the term methyleneoxy (4'-CH₂-O-2') LNA is used. Furthermore; in the case of the bicyclic sugar moiety having an ethylene bridging group in this position, the term ethyleneoxy (4'-CH₂CH₂-O-2') LNA is used. α -L- methyleneoxy (4'-CH₂-O-2'), an isomer of methyleneoxy (4'-CH₂-O-2') LNA is also encompassed within the definition of LNA, as used herein.

"Cap structure" or "terminal cap moiety" means chemical modifications, which have been incorporated at either terminus of an antisense compound.

"cEt" or "constrained ethyl" means a bicyclic sugar moiety comprising a bridge connecting the 4'-carbon and the 2'-carbon, wherein the bridge has the formula: 4'-CH(CH₃)-O-2'.

"Constrained ethyl nucleoside" (also cEt nucleoside) means a nucleoside comprising a bicyclic sugar moiety comprising a 4'-CH(CH₃)-O-2' bridge.

"Chemically distinct region" refers to a region of an antisense compound that is in some way chemically different than another region of the same antisense compound. For example, a region having 2'-O-methoxyethyl nucleotides is chemically distinct from a region having nucleotides without 2'-O-methoxyethyl modifications.

"Chimeric antisense compounds" means antisense compounds that have at least 2 chemically distinct regions, each position having a plurality of subunits.

"Complementarity" means the capacity for pairing between nucleobases of a first nucleic acid and a second nucleic acid.

"Comprise," "comprises" and "comprising" will be understood to imply the inclusion of a stated step or element or group of steps or elements but not the exclusion of any other step or element or group of steps or elements.

"Contiguous nucleobases" means nucleobases immediately adjacent to each other.

"Deoxyribonucleotide" means a nucleotide having a hydrogen at the 2' position of the sugar portion of the nucleotide. Deoxyribonucleotides may be modified with any of a variety of substituents.

"Designing" or "Designed to" refer to the process of designing an oligomeric compound that specifically hybridizes with a selected nucleic acid molecule.

"Effective amount" means the amount of active pharmaceutical agent sufficient to effectuate a desired physiological outcome in an individual in need of the agent. The effective amount may vary among individuals depending on the health and physical condition of the individual to be treated, the taxonomic group of the individuals to be treated, the formulation of the composition, assessment of the individual's medical condition, and other relevant factors.

“Efficacy” means the ability to produce a desired effect.

“Expression” includes all the functions by which a gene’s coded information is converted into structures present and operating in a cell. Such structures include, but are not limited to the products of transcription and translation.

5 “Fully complementary” or “100% complementary” means each nucleobase of a first nucleic acid has a complementary nucleobase in a second nucleic acid. In certain embodiments, a first nucleic acid is an antisense compound and a target nucleic acid is a second nucleic acid.

10 “Gapmer” means a chimeric antisense compound in which an internal region having a plurality of nucleosides that support RNase H cleavage is positioned between external regions having one or more nucleosides, wherein the nucleosides comprising the internal region are chemically distinct from the nucleoside or nucleosides comprising the external regions. The internal region may be referred to as the “gap” and the external regions may be referred to as the “wings.”

15 “Growth Hormone Receptor (GHR)” means any nucleic acid or protein of GHR. “GHR nucleic acid” means any nucleic acid encoding GHR. For example, in certain embodiments, a GHR nucleic acid includes a DNA sequence encoding GHR, an RNA sequence transcribed from DNA encoding GHR (including genomic DNA comprising introns and exons), including a non-protein encoding (*i.e.* non-coding) RNA sequence, and an mRNA sequence encoding GHR. “GHR mRNA” means an mRNA encoding a GHR protein.

20 “GHR specific inhibitor” refers to any agent capable of specifically inhibiting GHR RNA and/or GHR protein expression or activity at the molecular level. For example, GHR specific inhibitors include nucleic acids (including antisense compounds), peptides, antibodies, small molecules, and other agents capable of inhibiting the expression of GHR RNA and/or GHR protein.

25 “Hybridization” means the annealing of complementary nucleic acid molecules. In certain embodiments, complementary nucleic acid molecules include, but are not limited to, an antisense compound and a nucleic acid target. In certain embodiments, complementary nucleic acid molecules include, but are not limited to, an antisense oligonucleotide and a nucleic acid target.

30 “Identifying an animal having, or at risk for having, a disease, disorder and/or condition” means identifying an animal having been diagnosed with the disease, disorder and/or condition or identifying an animal predisposed to develop the disease, disorder and/or condition. Such identification may be accomplished by any method including evaluating an individual’s medical history and standard clinical tests or assessments.

“Immediately adjacent” means there are no intervening elements between the immediately adjacent elements.

“Individual” means a human or non-human animal selected for treatment or therapy.

5 “Inhibiting the expression or activity” refers to a reduction, blockade of the expression or activity and does not necessarily indicate a total elimination of expression or activity.

“Internucleoside linkage” refers to the chemical bond between nucleosides.

“Lengthened” antisense oligonucleotides are those that have one or more additional nucleosides relative to an antisense oligonucleotide disclosed herein.

10 “Linked deoxynucleoside” means a nucleic acid base (A, G, C, T, U) substituted by deoxyribose linked by a phosphate ester to form a nucleotide.

“Linked nucleosides” means adjacent nucleosides linked together by an internucleoside linkage.

“Mismatch” or “non-complementary nucleobase” refers to the case when a nucleobase of a first nucleic acid is not capable of pairing with the corresponding nucleobase of a second or target nucleic acid.

15 “Modified internucleoside linkage” refers to a substitution or any change from a naturally occurring internucleoside bond (i.e. a phosphodiester internucleoside bond).

“Modified nucleobase” means any nucleobase other than adenine, cytosine, guanine, thymidine, or uracil. An “unmodified nucleobase” means the purine bases adenine (A) and guanine (G), and the pyrimidine bases thymine (T), cytosine (C) and uracil (U).

20 “Modified nucleoside” means a nucleoside having, independently, a modified sugar moiety and/or modified nucleobase.

“Modified nucleotide” means a nucleotide having, independently, a modified sugar moiety, modified internucleoside linkage, or modified nucleobase.

“Modified oligonucleotide” means an oligonucleotide comprising at least one modified internucleoside linkage, a modified sugar, and/or a modified nucleobase.

25 “Modified sugar” means substitution and/or any change from a natural sugar moiety.

“Modulating” refers to changing or adjusting a feature in a cell, tissue, organ or organism. For example, modulating GHR mRNA can mean to increase or decrease the level of GHR mRNA and/or GHR protein in a cell, tissue, organ or organism. A “modulator” effects the change in the cell, tissue, organ or organism. For example, a GHR antisense compound can be a modulator that decreases the amount of GHR mRNA and/or GHR protein in a cell, tissue, organ or organism.

30

“Monomer” refers to a single unit of an oligomer. Monomers include, but are not limited to, nucleosides and nucleotides, whether naturally occurring or modified.

“Motif” means the pattern of unmodified and modified nucleosides in an antisense compound.

“Natural sugar moiety” means a sugar moiety found in DNA (2'-H) or RNA (2'-OH).

5 “Naturally occurring internucleoside linkage” means a 3' to 5' phosphodiester linkage.

“Non-complementary nucleobase” refers to a pair of nucleobases that do not form hydrogen bonds with one another or otherwise support hybridization.

“Nucleic acid” refers to molecules composed of monomeric nucleotides. A nucleic acid includes, but is not limited to, ribonucleic acids (RNA), deoxyribonucleic acids (DNA), single-stranded nucleic acids, and double-stranded nucleic acids.

“Nucleobase” means a heterocyclic moiety capable of pairing with a base of another nucleic acid.

“Nucleobase complementarity” refers to a nucleobase that is capable of base pairing with another nucleobase. For example, in DNA, adenine (A) is complementary to thymine (T). For example, in RNA, adenine (A) is complementary to uracil (U). In certain embodiments, complementary nucleobase refers to a nucleobase of an antisense compound that is capable of base pairing with a nucleobase of its target nucleic acid. For example, if a nucleobase at a certain position of an antisense compound is capable of hydrogen bonding with a nucleobase at a certain position of a target nucleic acid, then the position of hydrogen bonding between the oligonucleotide and the target nucleic acid is considered to be complementary at that nucleobase pair.

20 “Nucleobase sequence” means the order of contiguous nucleobases independent of any sugar, linkage, and/or nucleobase modification.

“Nucleoside” means a nucleobase linked to a sugar.

“Nucleoside mimetic” includes those structures used to replace the sugar or the sugar and the base and not necessarily the linkage at one or more positions of an oligomeric compound such as for example nucleoside mimetics having morpholino, cyclohexenyl, cyclohexyl, tetrahydropyranyl, bicyclo or tricyclo sugar mimetics, *e.g.*, non furanose sugar units. Nucleotide mimetic includes those structures used to replace the nucleoside and the linkage at one or more positions of an oligomeric compound such as for example peptide nucleic acids or morpholinos (morpholinos linked by -N(H)-C(=O)-O- or other non-phosphodiester linkage). Sugar surrogate overlaps with the slightly broader term nucleoside mimetic but is intended to indicate replacement of the sugar unit (furanose ring) only. The tetrahydropyranyl rings provided herein are illustrative of an example of a sugar surrogate wherein the furanose sugar group has been replaced with a tetrahydropyranyl ring system. “Mimetic” refers to groups that are substituted for a sugar, a nucleobase, and/

or internucleoside linkage. Generally, a mimetic is used in place of the sugar or sugar-internucleoside linkage combination, and the nucleobase is maintained for hybridization to a selected target.

“Nucleotide” means a nucleoside having a phosphate group covalently linked to the sugar portion of the nucleoside.

5 “Oligomeric compound” means a polymer of linked monomeric subunits which is capable of hybridizing to at least a region of a nucleic acid molecule.

“Oligonucleoside” means an oligonucleotide in which the internucleoside linkages do not contain a phosphorus atom.

10 “Oligonucleotide” means a polymer of linked nucleosides each of which can be modified or unmodified, independent one from another.

“Parenteral administration” means administration through injection or infusion. Parenteral administration includes subcutaneous administration, intravenous administration, intramuscular administration, intraarterial administration, intraperitoneal administration, or intracranial administration, e.g. intrathecal or intracerebroventricular administration.

15 “Pharmaceutical composition” means a mixture of substances suitable for administering to an individual. For example, a pharmaceutical composition may comprise one or more active pharmaceutical agents and a sterile aqueous solution.

20 “Pharmaceutically acceptable salts” means physiologically and pharmaceutically acceptable salts of antisense compounds, i.e., salts that retain the desired biological activity of the parent oligonucleotide and do not impart undesired toxicological effects thereto.

“Phosphorothioate linkage” means a linkage between nucleosides where the phosphodiester bond is modified by replacing one of the non-bridging oxygen atoms with a sulfur atom. A phosphorothioate linkage is a modified internucleoside linkage.

25 “Portion” means a defined number of contiguous (i.e., linked) nucleobases of a nucleic acid. In certain embodiments, a portion is a defined number of contiguous nucleobases of a target nucleic acid. In certain embodiments, a portion is a defined number of contiguous nucleobases of an antisense compound

“Prevent” refers to delaying or forestalling the onset, development or progression of a disease, disorder, or condition for a period of time from minutes to indefinitely. Prevent also means reducing the risk of developing a disease, disorder, or condition.

30 “Prophylactically effective amount” refers to an amount of a pharmaceutical agent that provides a prophylactic or preventative benefit to an animal.

“Region” is defined as a portion of the target nucleic acid having at least one identifiable structure, function, or characteristic.

“Ribonucleotide” means a nucleotide having a hydroxy at the 2’ position of the sugar portion of the nucleotide. Ribonucleotides may be modified with any of a variety of substituents.

5 “Segments” are defined as smaller or sub-portions of regions within a target nucleic acid.

“Side effects” means physiological disease and/or conditions attributable to a treatment other than the desired effects. In certain embodiments, side effects include injection site reactions, liver function test abnormalities, renal function abnormalities, liver toxicity, renal toxicity, central nervous system abnormalities, myopathies, and malaise. For example, increased aminotransferase levels in serum may
10 indicate liver toxicity or liver function abnormality. For example, increased bilirubin may indicate liver toxicity or liver function abnormality.

“Sites,” as used herein, are defined as unique nucleobase positions within a target nucleic acid.

“Slows progression” means decrease in the development of the said disease.

“Specifically hybridizable” refers to an antisense compound having a sufficient degree of
15 complementarity between an antisense oligonucleotide and a target nucleic acid to induce a desired effect, while exhibiting minimal or no effects on non-target nucleic acids under conditions in which specific binding is desired, i.e., under physiological conditions in the case of *in vivo* assays and therapeutic treatments. “Stringent hybridization conditions” or “stringent conditions” refer to conditions under which an oligomeric compound will hybridize to its target sequence, but to a minimal number of other sequences.

20 “Subject” means a human or non-human animal selected for treatment or therapy.

“Target” refers to a protein, the modulation of which is desired.

“Target gene” refers to a gene encoding a target.

“Targeting” means the process of design and selection of an antisense compound that will specifically hybridize to a target nucleic acid and induce a desired effect.

25 “Target nucleic acid,” “target RNA,” “target RNA transcript” and “nucleic acid target” all mean a nucleic acid capable of being targeted by antisense compounds.

“Target region” means a portion of a target nucleic acid to which one or more antisense compounds is targeted.

“Target segment” means the sequence of nucleotides of a target nucleic acid to which an antisense compound is targeted. “5’ target site” refers to the 5’-most nucleotide of a target segment. “3’ target site” refers to the 3’-most nucleotide of a target segment.

“Therapeutically effective amount” means an amount of a pharmaceutical agent that provides a therapeutic benefit to an individual.

“Treat” refers to administering a pharmaceutical composition to an animal in order to effect an alteration or improvement of a disease, disorder, or condition in the animal. In certain embodiments, one or more pharmaceutical compositions can be administered to the animal.

“Unmodified” nucleobases mean the purine bases adenine (A) and guanine (G), and the pyrimidine bases thymine (T), cytosine (C) and uracil (U).

“Unmodified nucleotide” means a nucleotide composed of naturally occurring nucleobases, sugar moieties, and internucleoside linkages. In certain embodiments, an unmodified nucleotide is an RNA nucleotide (i.e. β -D-ribonucleosides) or a DNA nucleotide (i.e. β -D-deoxyribonucleoside).

Certain Embodiments

Certain embodiments provide methods, compounds and compositions for inhibiting growth hormone receptor (GHR) expression.

Certain embodiments provide antisense compounds targeted to a GHR nucleic acid. In certain embodiments, the GHR nucleic acid has the sequence set forth in GENBANK Accession No. NM_000163.4 (incorporated herein as SEQ ID NO: 1), GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000 (incorporated herein as SEQ ID NO: 2), GENBANK Accession No. X06562.1 (incorporated herein as SEQ ID NO: 3), GENBANK Accession No. DR006395.1 (incorporated herein as SEQ ID NO: 4), GENBANK Accession No. DB052048.1 (incorporated herein as SEQ ID NO: 5), GENBANK Accession No. AF230800.1 (incorporated herein as SEQ ID NO: 6), the complement of GENBANK Accession No. AA398260.1 (incorporated herein as SEQ ID NO: 7), GENBANK Accession No. BC136496.1 (incorporated herein as SEQ ID NO: 8), GENBANK Accession No. NM_001242399.2 (incorporated herein as SEQ ID NO: 9), GENBANK Accession No. NM_001242400.2 (incorporated herein as SEQ ID NO: 10), GENBANK Accession No. NM_001242401.3 (incorporated herein as SEQ ID NO: 11), GENBANK Accession No. NM_001242402.2 (incorporated herein as SEQ ID NO: 12), GENBANK Accession No. NM_001242403.2 (incorporated herein as SEQ ID NO: 13), GENBANK Accession No. NM_001242404.2 (incorporated herein as SEQ ID NO: 14), GENBANK Accession No. NM_001242405.2 (incorporated herein as SEQ ID NO: 15), GENBANK Accession No. NM_001242406.2 (incorporated herein as SEQ ID NO: 16), GENBANK Accession No. NM_001242460.1 (incorporated herein as SEQ ID NO: 17),

GENBANK Accession NM_001242461.1 (incorporated herein as SEQ ID NO: 18), or GENBANK Accession No. NM_001242462.1 (incorporated herein as SEQ ID NO: 19).

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to 30 linked nucleosides and having a nucleobase sequence comprising at least 8 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 20-2295.

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to 30 linked nucleosides complementary within nucleotides 30-51, 63-82, 103-118, 143-159, 164-197, 206-259, 361-388, 554-585, 625-700, 736-776, 862-887, 923-973, 978-996, 1127-1142, 1170-1195, 1317-1347, 1360-1383, 1418-1449, 1492-1507, 1524-1548, 1597-1634, 1641-1660, 1683-1698, 1744-1768, 1827-1860, 1949-2002, 2072-2092, 2095-2110, 2306-2321, 2665-2683, 2685-2719, 2739-2770, 2859-2880, 2941-2960, 2963-2978, 3037-3052, 3205-3252, 3306-3332, 3371-3386, 3518-3542, 3975-3990, 4041-4087, 4418-4446, 4528-4546, 7231-7246, 7570-7585, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 11020-11035, 11793-11808, 12214-12229, 12474-12489, 12905-12920, 13400-13415, 13717-13732, 14149-14164, 14540-14555, 15264-15279, 15849-15864, 16530-16545, 17377-17392, 17581-17596, 17943-17958, 18353-18368, 18636-18651, 19256-19271, 19814-19829, 20365-20380, 20979-20994, 21566-21581, 22150-22165, 22803-22818, 29049-29064, 29554-29569, 30245-30260, 30550-30565, 30915-30930, 31468-31483, 32366-32381, 32897-32912, 33187-33202, 33780-33795, 34407-34422, 34846-34861, 35669-35684, 36312-36327, 36812-36827, 37504-37519, 38841-38856, 40250-40265, 40706-40721, 40922-40937, 41424-41439, 41999-42014, 42481-42496, 42700-42715, 43291-43306, 43500-43515, 43947-43962, 44448-44463, 45162-45177, 46010-46025, 46476-46491, 47447-47462, 47752-47767, 48001-48016, 48423-48438, 50195-50210, 50470-50485, 51104-51119, 51756-51771, 52015-52030, 52230-52245, 52588-52603, 53532-53547, or 54645-54660 of SEQ ID NO: 1, wherein said modified oligonucleotide is at least 90% complementary to SEQ ID NO: 1.

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to 30 linked nucleosides having a nucleobase sequence comprising a portion of at least 8 contiguous nucleobases 100% complementary to an equal length portion of nucleobases 30-51, 63-82, 103-118, 143-159, 164-197, 206-259, 361-388, 554-585, 625-700, 736-776, 862-887, 923-973, 978-996, 1127-1142, 1170-1195, 1317-1347, 1360-1383, 1418-1449, 1492-1507, 1524-1548, 1597-1634, 1641-1660, 1683-1698, 1744-1768, 1827-1860, 1949-2002, 2072-2092, 2095-2110, 2306-2321, 2665-2683, 2685-2719, 2739-2770, 2859-2880, 2941-2960, 2963-2978, 3037-3052, 3205-3252, 3306-3332, 3371-3386, 3518-3542, 3975-3990, 4041-4087, 4418-4446, 4528-4546, 7231-7246, 7570-7585, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 11020-11035, 11793-11808, 12214-12229, 12474-12489, 12905-12920, 13400-13415, 13717-13732, 14149-14164, 14540-14555, 15264-15279, 15849-15864, 16530-16545, 17377-17392, 17581-17596, 17943-17958, 18353-18368, 18636-18651, 19256-19271, 19814-19829, 20365-20380, 20979-20994, 21566-21581, 22150-22165, 22803-22818, 29049-29064, 29554-29569, 30245-30260, 30550-30565, 30915-30930, 31468-

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Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to 30 linked nucleosides complementary within nucleotides 2571-2586, 2867-3059, 3097-3116, 3341-3695, 4024-4039, 4446-4894, 5392-5817, 6128-6265, 6499-6890, 7231-7246, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 10660-10679, 11020-11035, 11793-12229, 12469-12920, 13351-13415, 13717-13732, 14149-14164, 14361-14555, 14965-15279, 15849-16001, 16253-16272, 16447-16545, 17130-17149, 17377-17669, 17927-17958, 18353-18368, 18636-18773, 19661-19918, 20288-20470, 20979-20994, 21215-21606, 21820-21837, 22150-22165, 22518-22536, 22803-22818, 26494-26522, 29049-29069, 29323-29489, 30550-30565, 30915-31191, 31468-31483, 32363-32382, 32827-33202, 33635-33795, 34138-34157, 34407-34422, 34845-34864, 35466-35485, 35669-35684, 36023-36042, 36266-36327, 36721-36827, 37032-37130, 37276-37295, 37504-37675, 38094-38118, 38841-38856, 39716-40538, 40706-40937, 41164-41183, 41342-41439, 42141-42164, 42700-42760, 43173-43537, 43765-46025, 46476-46532, 48423-48438, 50072-50210, 50470-50485, 50719-51234, 51747-51797, 52015-52143, 52230-52245, 52573-52652, 53466-54660, 54886-54901, 63751-64662, 64882-65099, 65363-65378, 65600-65615, 65988-66183, 66566-66581, 66978-67080, 67251-67270, 67662-67929, 68727-68742, 69203-69242, 69565-69620, 69889-70145, 70352-70584, 70925-71071, 71314-71329, 71617-71769, 72107-72241, 72584-72670, 73061-73076, 73350-73369, 73689-73723, 74107-74131, 74317-74557, 74947-75009, 75192-75207, 75979-76066, 76410-77095, 77292-77307, 77638-77869, 78122-78326, 79006-79021, 79478-79505, 80277-80292, 80575-80939, 81207-81222, 81524-81543, 81761-81776, 82233-82248, 82738-83198, 83330-83416, 83884-84063, 84381-85964, 86220-86392, 86554-86655, 86901-86920, 87181-87262, 88063-88082, 88293-88308, 88605-88967, 89160-89175, 89940-90255, 90473-90528, 91073-91088, 91273-91292, 91647-91662, 91930-92126, 92356-92371, 93190-93443, 93762-94111, 94374-94389, 94581-94653, 94839-94858, 95292-95583, 95829-95844, 96137-96503, 96793-97013, 97539-97554, 97800-97889, 98132-98151, 98624-98672, 98810-99115, 99258-99273, 99478-99503, 99791-99858, 100281-100300, 100406-100421, 100742-100828, 101080-101103, 101242-101320, 101788-101906, 102549-102568, 103566-103625, 104067-104086, 104277-104858, 105255-105274, 106147-106364, 106632-106647, 106964-107735, 108514-108788, 109336-109505, 109849-109864, 110403-110442, 110701-110974, 111203-111322, 112030-112049, 112499-112514, 112842-112861, 113028-113056, 113646-113665, 113896-113911, 114446-114465, 115087-115106, 119269-119284, 119659-119703, 120376-120497, 120738-120845, 121209-121228, 121823-122013, 122180-122199, 122588-122770,

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Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to 30 linked nucleosides having a nucleobase sequence comprising a portion of at least 8 contiguous nucleobases 100% complementary to an equal length portion of nucleobases 2571-2586, 2867-3059, 3097-3116, 3341-3695, 4024-4039, 4446-4894, 5392-5817, 6128-6265, 6499-6890, 7231-7246, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 10660-10679, 11020-11035, 11793-12229, 12469-12920, 13351-13415, 13717-13732, 14149-14164, 14361-14555, 14965-15279, 15849-16001, 16253-16272, 16447-16545, 17130-17149, 17377-17669, 17927-17958, 18353-18368, 18636-18773, 19661-19918, 20288-20470, 20979-20994, 21215-21606, 21820-21837, 22150-22165, 22518-22536, 22803-22818, 26494-26522, 29049-29069, 29323-29489, 30550-30565, 30915-31191, 31468-31483, 32363-32382, 32827-33202, 33635-33795, 34138-34157, 34407-34422, 34845-34864, 35466-35485, 35669-35684, 36023-36042, 36266-36327, 36721-36827, 37032-37130, 37276-37295, 37504-37675, 38094-38118, 38841-38856, 39716-40538, 40706-40937, 41164-41183, 41342-41439, 42141-42164, 42700-42760, 43173-43537, 43765-46025, 46476-46532, 48423-48438, 50072-50210, 50470-50485, 50719-51234, 51747-51797, 52015-52143, 52230-52245, 52573-52652, 53466-54660, 54886-54901, 63751-64662, 64882-65099, 65363-65378, 65600-65615, 65988-66183, 66566-66581, 66978-67080, 67251-67270, 67662-67929, 68727-68742, 69203-69242, 69565-69620, 69889-70145, 70352-70584, 70925-71071, 71314-71329, 71617-71769, 72107-72241, 72584-72670, 73061-73076, 73350-73369, 73689-73723, 74107-74131, 74317-74557, 74947-75009, 75192-75207, 75979-76066, 76410-77095, 77292-77307, 77638-77869, 78122-78326, 79006-79021, 79478-79505, 80277-80292, 80575-80939, 81207-81222, 81524-81543, 81761-81776, 82233-82248, 82738-83198, 83330-83416, 83884-84063, 84381-85964, 86220-86392, 86554-86655, 86901-86920, 87181-87262, 88063-88082, 88293-88308, 88605-88967, 89160-89175, 89940-90255, 90473-90528, 91073-91088, 91273-91292, 91647-91662, 91930-92126, 92356-92371, 93190-93443, 93762-94111, 94374-94389, 94581-94653, 94839-94858, 95292-95583, 95829-95844, 96137-96503, 96793-97013, 97539-97554, 97800-97889, 98132-98151, 98624-98672, 98810-99115, 99258-99273, 99478-99503, 99791-99858, 100281-100300, 100406-100421, 100742-100828, 101080-101103, 101242-101320, 101788-101906, 102549-102568, 103566-103625, 104067-104086, 104277-104858, 105255-105274, 106147-106364, 106632-106647, 106964-107735, 108514-108788, 109336-109505, 109849-109864, 110403-110442, 110701-110974, 111203-111322, 112030-112049, 112499-112514, 112842-

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297012, 297587-298115, 298161-298418, 298489-298738, 299082-299187, 299276-299669, 299723-
299749, 299788-300504, or 300835-301295 of SEQ ID NO: 2, wherein the nucleobase sequence of the
10 modified oligonucleotide is complementary to SEQ ID NO: 2. In certain aspects, the compound comprises a
modified oligonucleotide consisting of 10 to 30 linked nucleosides complementary within nucleotides
155594-155613, 72107-72126, 153921-153940, 159252-159267, 213425-213440, 153004-153019, 155597-
155612, 248233-248248 of SEQ ID NO: 2.

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to
15 30 linked nucleosides and having a nucleobase sequence comprising the nucleobase sequence of any one of
SEQ ID NOs: 20-2295.

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of the
nucleobase sequence of any one of SEQ ID NOs: 20-2295.

In certain embodiments, an antisense compound or oligonucleotide targeted to a growth hormone
20 receptor nucleic acid is complementary within the following nucleotide regions of SEQ ID NO: 1: 30-51, 63-
82, 103-118, 143-159, 164-197, 206-259, 361-388, 554-585, 625-700, 736-776, 862-887, 923-973, 978-996,
1127-1142, 1170-1195, 1317-1347, 1360-1383, 1418-1449, 1492-1507, 1524-1548, 1597-1634, 1641-1660,
1683-1698, 1744-1768, 1827-1860, 1949-2002, 2072-2092, 2095-2110, 2306-2321, 2665-2683, 2685-2719,
2739-2770, 2859-2880, 2941-2960, 2963-2978, 3037-3052, 3205-3252, 3306-3332, 3371-3386, 3518-3542,
25 3975-3990, 4041-4087, 4418-4446, 4528-4546, 7231-7246, 7570-7585, 8395-8410, 9153-9168, 9554-9569,
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30 30915-30930, 31468-31483, 32366-32381, 32897-32912, 33187-33202, 33780-33795, 34407-34422, 34846-
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In certain embodiments, an antisense compound or oligonucleotide targeted to a growth hormone receptor nucleic acid target the following nucleotide regions of SEQ ID NO: 1: 30-51, 63-82, 103-118, 143-159, 164-197, 206-259, 361-388, 554-585, 625-700, 736-776, 862-887, 923-973, 978-996, 1127-1142, 1170-1195, 1317-1347, 1360-1383, 1418-1449, 1492-1507, 1524-1548, 1597-1634, 1641-1660, 1683-1698, 1744-1768, 1827-1860, 1949-2002, 2072-2092, 2095-2110, 2306-2321, 2665-2683, 2685-2719, 2739-2770, 2859-2880, 2941-2960, 2963-2978, 3037-3052, 3205-3252, 3306-3332, 3371-3386, 3518-3542, 3975-3990, 4041-4087, 4418-4446, 4528-4546, 7231-7246, 7570-7585, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 11020-11035, 11793-11808, 12214-12229, 12474-12489, 12905-12920, 13400-13415, 13717-13732, 14149-14164, 14540-14555, 15264-15279, 15849-15864, 16530-16545, 17377-17392, 17581-17596, 17943-17958, 18353-18368, 18636-18651, 19256-19271, 19814-19829, 20365-20380, 20979-20994, 21566-21581, 22150-22165, 22803-22818, 29049-29064, 29554-29569, 30245-30260, 30550-30565, 30915-30930, 31468-31483, 32366-32381, 32897-32912, 33187-33202, 33780-33795, 34407-34422, 34846-34861, 35669-35684, 36312-36327, 36812-36827, 37504-37519, 38841-38856, 40250-40265, 40706-40721, 40922-40937, 41424-41439, 41999-42014, 42481-42496, 42700-42715, 43291-43306, 43500-43515, 43947-43962, 44448-44463, 45162-45177, 46010-46025, 46476-46491, 47447-47462, 47752-47767, 48001-48016, 48423-48438, 50195-50210, 50470-50485, 51104-51119, 51756-51771, 52015-52030, 52230-52245, 52588-52603, 53532-53547, or 54645-54660.

In certain embodiments, antisense compounds or oligonucleotides target a region of a growth hormone receptor nucleic acid. In certain embodiments, such compounds or oligonucleotides targeted to a region of a GHR nucleic acid have a contiguous nucleobase portion that is complementary to an equal length nucleobase portion of the region. For example, the portion can be at least an 8, 9, 10, 11, 12, 13, 14, 15, or 16 contiguous nucleobases portion complementary to an equal length portion of a region recited herein. In certain embodiments, such compounds or oligonucleotide target the following nucleotide regions of SEQ ID NO: 1: 30-51, 63-82, 103-118, 143-159, 164-197, 206-259, 361-388, 554-585, 625-700, 736-776, 862-887, 923-973, 978-996, 1127-1142, 1170-1195, 1317-1347, 1360-1383, 1418-1449, 1492-1507, 1524-1548, 1597-1634, 1641-1660, 1683-1698, 1744-1768, 1827-1860, 1949-2002, 2072-2092, 2095-2110, 2306-2321, 2665-2683, 2685-2719, 2739-2770, 2859-2880, 2941-2960, 2963-2978, 3037-3052, 3205-3252, 3306-3332, 3371-3386, 3518-3542, 3975-3990, 4041-4087, 4418-4446, 4528-4546, 7231-7246, 7570-7585, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 11020-11035, 11793-11808, 12214-12229, 12474-12489, 12905-12920, 13400-13415, 13717-13732, 14149-14164, 14540-14555, 15264-15279, 15849-15864, 16530-16545, 17377-17392, 17581-17596, 17943-17958, 18353-18368, 18636-18651, 19256-19271, 19814-19829, 20365-20380, 20979-20994, 21566-21581, 22150-22165, 22803-22818, 29049-29064, 29554-29569, 30245-30260, 30550-30565, 30915-30930, 31468-31483, 32366-32381, 32897-32912, 33187-33202, 33780-33795,

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In certain embodiments, an antisense compound or oligonucleotide targeted to a growth hormone receptor nucleic acid is complementary within the following nucleotide regions of SEQ ID NO: 2: 2571-2586, 2867-3059, 3097-3116, 3341-3695, 4024-4039, 4446-4894, 5392-5817, 6128-6265, 6499-6890, 7231-7246, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 10660-10679, 11020-11035, 11793-12229, 12469-12920, 13351-13415, 13717-13732, 14149-14164, 14361-14555, 14965-15279, 15849-16001, 16253-16272, 16447-16545, 17130-17149, 17377-17669, 17927-17958, 18353-18368, 18636-18773, 19661-19918, 20288-20470, 20979-20994, 21215-21606, 21820-21837, 22150-22165, 22518-22536, 22803-22818, 26494-26522, 29049-29069, 29323-29489, 30550-30565, 30915-31191, 31468-31483, 32363-32382, 32827-33202, 33635-33795, 34138-34157, 34407-34422, 34845-34864, 35466-35485, 35669-35684, 36023-36042, 36266-36327, 36721-36827, 37032-37130, 37276-37295, 37504-37675, 38094-38118, 38841-38856, 39716-40538, 40706-40937, 41164-41183, 41342-41439, 42141-42164, 42700-42760, 43173-43537, 43765-46025, 46476-46532, 48423-48438, 50072-50210, 50470-50485, 50719-51234, 51747-51797, 52015-52143, 52230-52245, 52573-52652, 53466-54660, 54886-54901, 63751-64662, 64882-65099, 65363-65378, 65600-65615, 65988-66183, 66566-66581, 66978-67080, 67251-67270, 67662-67929, 68727-68742, 69203-69242, 69565-69620, 69889-70145, 70352-70584, 70925-71071, 71314-71329, 71617-71769, 72107-72241, 72584-72670, 73061-73076, 73350-73369, 73689-73723, 74107-74131, 74317-74557, 74947-75009, 75192-75207, 75979-76066, 76410-77095, 77292-77307, 77638-77869, 78122-78326, 79006-79021, 79478-79505, 80277-80292, 80575-80939, 81207-81222, 81524-81543, 81761-81776, 82233-82248, 82738-83198, 83330-83416, 83884-84063, 84381-85964, 86220-86392, 86554-86655, 86901-86920, 87181-87262, 88063-88082, 88293-88308, 88605-88967, 89160-89175, 89940-90255, 90473-90528, 91073-91088, 91273-91292, 91647-91662, 91930-92126, 92356-92371, 93190-93443, 93762-94111, 94374-94389, 94581-94653, 94839-94858, 95292-95583, 95829-95844, 96137-96503, 96793-97013, 97539-97554, 97800-97889, 98132-98151, 98624-98672, 98810-99115, 99258-99273, 99478-99503, 99791-99858, 100281-100300, 100406-100421, 100742-100828, 101080-101103, 101242-101320, 101788-101906, 102549-102568, 103566-103625, 104067-104086, 104277-104858, 105255-105274, 106147-106364, 106632-106647, 106964-107735, 108514-108788, 109336-109505, 109849-109864, 110403-110442, 110701-110974, 111203-111322, 112030-112049, 112499-112514, 112842-112861, 113028-113056, 113646-113665, 113896-113911, 114446-114465, 115087-115106, 119269-119284, 119659-119703, 120376-120497, 120738-120845, 121209-121228, 121823-122013, 122180-122199, 122588-122770, 123031-123050, 123152-123167, 123671-124055, 124413-124608, 125178-125197, 125533-125616, 126357-126434, 126736-126751, 126998-127236,

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In certain embodiments, an antisense compound or oligonucleotide targeted to a growth hormone
receptor nucleic acid target the following nucleotide regions of SEQ ID NO: 2: : 2571-2586, 2867-3059,
3097-3116, 3341-3695, 4024-4039, 4446-4894, 5392-5817, 6128-6265, 6499-6890, 7231-7246, 8395-8410,
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219633, 219886-220705, 221044-221059, 221483-221607, 221947-221962, 222569-222584, 222914-
25 222998, 223436-223451, 223948-224122, 224409-224430, 224717-224769, 225133-225148, 225436-
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297012, 297587-298115, 298161-298418, 298489-298738, 299082-299187, 299276-299669, 299723-
5 299749, 299788-300504, or 300835-301295.

In certain embodiments, antisense compounds or oligonucleotides target a region of a growth hormone receptor nucleic acid. In certain embodiments, such compounds or oligonucleotides targeted to a region of a GHR nucleic acid have a contiguous nucleobase portion that is complementary to an equal length nucleobase portion of the region. For example, the portion can be at least an 8, 9, 10, 11, 12, 13, 14, 15, or 16
10 contiguous nucleobases portion complementary to an equal length portion of a region recited herein. In certain embodiments, such compounds or oligonucleotide target the following nucleotide regions of SEQ ID NO: 2: 2571-2586, 2867-3059, 3097-3116, 3341-3695, 4024-4039, 4446-4894, 5392-5817, 6128-6265, 6499-6890, 7231-7246, 8395-8410, 9153-9168, 9554-9569, 9931-9946, 10549-10564, 10660-10679, 11020-11035, 11793-12229, 12469-12920, 13351-13415, 13717-13732, 14149-14164, 14361-14555, 14965-15279, 15849-
15 16001, 16253-16272, 16447-16545, 17130-17149, 17377-17669, 17927-17958, 18353-18368, 18636-18773, 19661-19918, 20288-20470, 20979-20994, 21215-21606, 21820-21837, 22150-22165, 22518-22536, 22803-22818, 26494-26522, 29049-29069, 29323-29489, 30550-30565, 30915-31191, 31468-31483, 32363-32382, 32827-33202, 33635-33795, 34138-34157, 34407-34422, 34845-34864, 35466-35485, 35669-35684, 36023-36042, 36266-36327, 36721-36827, 37032-37130, 37276-37295, 37504-37675, 38094-38118, 38841-38856,
20 39716-40538, 40706-40937, 41164-41183, 41342-41439, 42141-42164, 42700-42760, 43173-43537, 43765-46025, 46476-46532, 48423-48438, 50072-50210, 50470-50485, 50719-51234, 51747-51797, 52015-52143, 52230-52245, 52573-52652, 53466-54660, 54886-54901, 63751-64662, 64882-65099, 65363-65378, 65600-65615, 65988-66183, 66566-66581, 66978-67080, 67251-67270, 67662-67929, 68727-68742, 69203-69242, 69565-69620, 69889-70145, 70352-70584, 70925-71071, 71314-71329, 71617-71769, 72107-72241, 72584-
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30 91930-92126, 92356-92371, 93190-93443, 93762-94111, 94374-94389, 94581-94653, 94839-94858, 95292-95583, 95829-95844, 96137-96503, 96793-97013, 97539-97554, 97800-97889, 98132-98151, 98624-98672, 98810-99115, 99258-99273, 99478-99503, 99791-99858, 100281-100300, 100406-100421, 100742-100828, 101080-101103, 101242-101320, 101788-101906, 102549-102568, 103566-103625, 104067-104086, 104277-104858, 105255-105274, 106147-106364, 106632-106647, 106964-107735, 108514-108788,
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146235-146386, 147028-147043, 147259-147284, 147671-147686, 148059-148154, 148564-148579,
148904-149084, 149491-149506, 149787-149877, 150236-150251, 150588-151139, 151373-151659,
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20 170703-170814, 171021-171036, 171207-171226, 171431-171568, 171926-171945, 172447-172462,
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30 225133-225148, 225436-225761, 226785-226898, 227025-227040, 227218-227251, 227485-227500,
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35 246152-246523, 246936-247031, 247203-247240, 247431-247450, 247644-247659, 248223-248363,

248694-248762, 249494-249509, 250001-250020, 250693-250708, 251214-251233, 251601-251637, 251950-252060, 252665-252680, 252838-252863, 253140-253166, 253594-253819, 254036-254083, 254246-254345, 254641-254660, 254905-254920, 255397-255422, 255618-255633, 255992-256704, 257018-257092, 257317-257332, 257818-259305, 259500-259515, 261294-261656, 262021-262036, 262453-262779, 263338-266518, 266861-267131, 267375-268051, 268366-269447, 270038-271850, 271950-271969, 272631-274145, 274205-275747, 275808-276636, 276932-277064, 277391-278380, 278932-279063, 279303-281001, 281587-281610, 282229-283668, 290035-290474, 290924-292550, 292860-294408, 295475-297012, 297587-298115, 298161-298418, 298489-298738, 299082-299187, 299276-299669, 299723-299749, 299788-300504, or 300835-301295.

10 In certain embodiments, antisense compounds or oligonucleotides target intron 1 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within nucleotides 3058-144965 (intron 1) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

15 In certain embodiments, antisense compounds or oligonucleotides target intron 2 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within nucleotides 145047-208139 (intron 2) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

20 In certain embodiments, antisense compounds or oligonucleotides target intron 3 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within nucleotides 208206-267991 (intron 3) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

25 In certain embodiments, antisense compounds or oligonucleotides target intron 4 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within nucleotides 268122-274018 (intron 4) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

30 In certain embodiments, antisense compounds or oligonucleotides target intron 5 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within nucleotides 274192-278925 (intron 5) of a growth hormone receptor nucleic acid having the nucleobase

sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

In certain embodiments, antisense compounds or oligonucleotides target intron 6 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within
5 nucleotides 279105-290308 (intron 6) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

In certain embodiments, antisense compounds or oligonucleotides target intron 7 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within
10 nucleotides 290475-292530 (intron 7) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

In certain embodiments, antisense compounds or oligonucleotides target intron 8 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within
15 nucleotides 292622-297153 (intron 8) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

In certain embodiments, antisense compounds or oligonucleotides target intron 9 of a growth hormone receptor nucleic acid. In certain aspects, antisense compounds or oligonucleotides target within
20 nucleotides 297224-297554 (intron 9) of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000).

In certain embodiments, any of the foregoing compounds or oligonucleotides comprises at least one modified sugar. In certain aspects, at least one modified sugar comprises a 2'-O-methoxyethyl group. In
25 certain aspects, at least one modified sugar is a bicyclic sugar, such as a 4'-CH(CH₃)-O-2' group, a 4'-CH₂-O-2' group, or a 4'-(CH₂)₂-O-2' group. In certain aspects, the modified oligonucleotide comprises at least one modified internucleoside linkage, such as a phosphorothioate internucleoside linkage.

In certain embodiments, any of the foregoing compounds or oligonucleotides comprises at least one modified nucleobase, such as 5-methylcytosine.

30 In certain embodiments, any of the foregoing compounds or oligonucleotides comprises:

a gap segment consisting of linked deoxynucleosides;

a 5' wing segment consisting of linked nucleosides; and

a 3' wing segment consisting of linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment and wherein each nucleoside of each wing segment comprises a modified sugar.

5 Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 10 to 30 linked nucleosides having a nucleobase sequence comprising the sequence recited in SEQ ID NO: 918, 479, 703, 1800, 1904, 2122, 2127, or 2194.

In certain aspects, the modified oligonucleotide has a nucleobase sequence comprising the sequence recited in SEQ ID NOs: 918, 479 or 703, wherein the modified oligonucleotide comprises

10 a gap segment consisting of ten linked deoxynucleosides;

a 5' wing segment consisting of five linked nucleosides; and

a 3' wing segment consisting of five linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment, wherein each nucleoside of each wing segment comprises a 2'-O-methoxyethyl sugar; wherein each
15 internucleoside linkage is a phosphorothioate linkage and wherein each cytosine is a 5-methylcytosine.

In certain aspects, the modified oligonucleotide has a nucleobase sequence comprising the sequence recited in SEQ ID NOs: 1800, 1904, 2122, 2127, or 2194, wherein the modified oligonucleotide comprises:

a gap segment consisting of ten linked deoxynucleosides;

a 5' wing segment consisting of 3 linked nucleosides; and

20 a 3' wing segment consisting of 3 linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment, wherein each nucleoside of each wing segment comprises a 2'-O-methoxyethyl sugar or a constrained ethyl sugar; and wherein each internucleoside linkage is a phosphorothioate linkage.

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 20
25 linked nucleosides having a nucleobase sequence consisting of the sequence recited in SEQ ID NO: 703. In certain aspects, the modified oligonucleotide comprises at least one modified sugar. In certain aspects, the at least one modified sugar comprises a 2'-O-methoxyethyl group. In certain aspects, the at least one modified sugar is a bicyclic sugar, such as a 4'-CH(CH₃)-O-2' group, a 4'-CH₂-O-2' group, or a 4'-(CH₂)₂-O-2' group. In certain aspects, the modified oligonucleotide comprises at least one modified internucleoside
30 linkage, such as a phosphorothioate internucleoside linkage. In certain aspects, the modified oligonucleotide

comprises at least one modified nucleobase, such as a 5-methylcytosine. In certain aspects, the modified oligonucleotide comprises:

- a gap segment consisting of linked deoxynucleosides;
- a 5' wing segment consisting of linked nucleosides; and
- 5 a 3' wing segment consisting of linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment and wherein each nucleoside of each wing segment comprises a modified sugar.

Certain embodiments provide a compound comprising a modified oligonucleotide consisting of 20 linked nucleosides having a nucleobase sequence consisting of the sequence recited in SEQ ID NO: 703, wherein the modified oligonucleotide comprises:

- a gap segment consisting of ten linked deoxynucleosides;
- a 5' wing segment consisting of five linked nucleosides; and
- a 3' wing segment consisting of five linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment; wherein each nucleoside of each wing segment comprises a 2'-O-methoxyethyl sugar; wherein each internucleoside linkage is a phosphorothioate linkage; and wherein each cytosine is a 5-methylcytosine.

In any of the foregoing embodiments, the compound or oligonucleotide can be at least 85%, at least 90%, at least 95%, at least 98%, at least 99%, or 100% complementary to a nucleic acid encoding growth hormone receptor.

In any of the foregoing embodiments, the nucleic acid encoding growth hormone receptor can comprise the nucleotide sequence of any one of SEQ ID NOs: 1-19.

In any of the foregoing embodiments, the compound or oligonucleotide can be single-stranded.

Certain embodiments provide a composition comprising the compound of any of the aforementioned embodiments or salt thereof and at least one of a pharmaceutically acceptable carrier or diluent. In certain aspects, the composition has a viscosity less than about 40 centipoise (cP), less than about 30 centipoise (cP), less than about 20 centipoise (cP), less than about 15 centipoise (cP), or less than about 10 centipoise (cP). In certain aspects, the composition having any of the aforementioned viscosities comprises a compound provided herein at a concentration of about 100 mg/mL, about 125 mg/mL, about 150 mg/mL, about 175 mg/mL, about 200 mg/mL, about 225 mg/mL, about 250 mg/mL, about 275 mg/mL, or about 300 mg/mL. In certain aspects, the composition having any of the aforementioned viscosities and/or compound

concentrations has a temperature of room temperature or about 20°C, about 21°C, about 22°C, about 23°C, about 24°C, about 25°C, about 26°C, about 27°C, about 28°C, about 29°C, or about 30°C.

Certain embodiments provide a method of treating a disease associated with excess growth hormone in a human comprising administering to the human a therapeutically effective amount of the compound or composition of any of the aforementioned embodiments, thereby treating the disease associated with excess growth hormone. In certain aspects, the disease associated with excess growth hormone is acromegaly. In certain aspects, the treatment reduces IGF-1 levels.

Certain embodiments provide a method of preventing a disease associated with excess growth hormone in a human comprising administering to the human a therapeutically effective amount of a compound or composition of any of the aforementioned embodiments, thereby preventing the disease associated with excess growth hormone. In certain embodiments, the disease associated with excess growth hormone is acromegaly.

Certain embodiments provide a method of reducing growth hormone receptor (GHR) levels in a human comprising administering to the human a therapeutically effective amount of the compound or composition of any of the aforementioned embodiments, thereby reducing GHR levels in the human. In certain aspects, the human has a disease associated with excess growth hormone. In certain aspects, the disease associated with excess growth hormone is acromegaly.

In certain aspects, the foregoing methods comprise co-administering the compound or composition and a second agent. In certain aspects, the compound or composition and the second agent are administered concomitantly.

Antisense compounds

Oligomeric compounds include, but are not limited to, oligonucleotides, oligonucleosides, oligonucleotide analogs, oligonucleotide mimetics, antisense compounds, antisense oligonucleotides, and siRNAs. An oligomeric compound may be “antisense” to a target nucleic acid, meaning that it is capable of undergoing hybridization to a target nucleic acid through hydrogen bonding.

In certain embodiments, an antisense compound has a nucleobase sequence that, when written in the 5' to 3' direction, comprises the reverse complement of the target segment of a target nucleic acid to which it is targeted. In certain such embodiments, an antisense oligonucleotide has a nucleobase sequence that, when written in the 5' to 3' direction, comprises the reverse complement of the target segment of a target nucleic acid to which it is targeted.

In certain embodiments, an antisense compound is 10 to 30 subunits in length. In certain embodiments, an antisense compound is 12 to 30 subunits in length. In certain embodiments, an antisense

compound is 12 to 22 subunits in length. In certain embodiments, an antisense compound is 14 to 30 subunits in length. In certain embodiments, an antisense compound is 14 to 20 subunits in length. In certain embodiments, an antisense compound is 15 to 30 subunits in length. In certain embodiments, an antisense compound is 15 to 20 subunits in length. In certain embodiments, an antisense compound is 16 to 30 subunits in length. In certain embodiments, an antisense compound is 16 to 20 subunits in length. In certain embodiments, an antisense compound is 17 to 30 subunits in length. In certain embodiments, an antisense compound is 17 to 20 subunits in length. In certain embodiments, an antisense compound is 18 to 30 subunits in length. In certain embodiments, an antisense compound is 18 to 21 subunits in length. In certain embodiments, an antisense compound is 18 to 20 subunits in length. In certain embodiments, an antisense compound is 20 to 30 subunits in length. In other words, such antisense compounds are from 12 to 30 linked subunits, 14 to 30 linked subunits, 14 to 20 subunits, 15 to 30 subunits, 15 to 20 subunits, 16 to 30 subunits, 16 to 20 subunits, 17 to 30 subunits, 17 to 20 subunits, 18 to 30 subunits, 18 to 20 subunits, 18 to 21 subunits, 20 to 30 subunits, or 12 to 22 linked subunits, respectively. In certain embodiments, an antisense compound is 14 subunits in length. In certain embodiments, an antisense compound is 16 subunits in length. In certain embodiments, an antisense compound is 17 subunits in length. In certain embodiments, an antisense compound is 18 subunits in length. In certain embodiments, an antisense compound is 19 subunits in length. In certain embodiments, an antisense compound is 20 subunits in length. In other embodiments, the antisense compound is 8 to 80, 12 to 50, 13 to 30, 13 to 50, 14 to 30, 14 to 50, 15 to 30, 15 to 50, 16 to 30, 16 to 50, 17 to 30, 17 to 50, 18 to 22, 18 to 24, 18 to 30, 18 to 50, 19 to 22, 19 to 30, 19 to 50, or 20 to 30 linked subunits. In certain such embodiments, the antisense compounds are 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, or 80 linked subunits in length, or a range defined by any two of the above values. In some embodiments the antisense compound is an antisense oligonucleotide, and the linked subunits are nucleotides.

In certain embodiments antisense oligonucleotides may be shortened or truncated. For example, a single subunit may be deleted from the 5' end (5' truncation), or alternatively from the 3' end (3' truncation). A shortened or truncated antisense compound targeted to a GHR nucleic acid may have two subunits deleted from the 5' end, or alternatively may have two subunits deleted from the 3' end, of the antisense compound. Alternatively, the deleted nucleosides may be dispersed throughout the antisense compound, for example, in an antisense compound having one nucleoside deleted from the 5' end and one nucleoside deleted from the 3' end.

When a single additional subunit is present in a lengthened antisense compound, the additional subunit may be located at the 5' or 3' end of the antisense compound. When two or more additional subunits are present, the added subunits may be adjacent to each other, for example, in an antisense compound having

two subunits added to the 5' end (5' addition), or alternatively to the 3' end (3' addition), of the antisense compound. Alternatively, the added subunits may be dispersed throughout the antisense compound, for example, in an antisense compound having one subunit added to the 5' end and one subunit added to the 3' end.

5 It is possible to increase or decrease the length of an antisense compound, such as an antisense oligonucleotide, and/or introduce mismatch bases without eliminating activity. For example, in Woolf et al. (Proc. Natl. Acad. Sci. USA 89:7305-7309, 1992), a series of antisense oligonucleotides 13-25 nucleobases in length were tested for their ability to induce cleavage of a target RNA in an oocyte injection model. Antisense oligonucleotides 25 nucleobases in length with 8 or 11 mismatch bases near the ends of the
10 antisense oligonucleotides were able to direct specific cleavage of the target mRNA, albeit to a lesser extent than the antisense oligonucleotides that contained no mismatches. Similarly, target specific cleavage was achieved using 13 nucleobase antisense oligonucleotides, including those with 1 or 3 mismatches.

Gautschi et al. (*J. Natl. Cancer Inst.* 93:463-471, March 2001) demonstrated the ability of an oligonucleotide having 100% complementarity to the bcl-2 mRNA and having 3 mismatches to the bcl-xL
15 mRNA to reduce the expression of both bcl-2 and bcl-xL *in vitro* and *in vivo*. Furthermore, this oligonucleotide demonstrated potent anti-tumor activity *in vivo*.

Maher and Dolnick (*Nuc. Acid. Res.* 16:3341-3358, 1988) tested a series of tandem 14 nucleobase antisense oligonucleotides, and a 28 and 42 nucleobase antisense oligonucleotides comprised of the sequence of two or three of the tandem antisense oligonucleotides, respectively, for their ability to arrest translation of
20 human DHFR in a rabbit reticulocyte assay. Each of the three 14 nucleobase antisense oligonucleotides alone was able to inhibit translation, albeit at a more modest level than the 28 or 42 nucleobase antisense oligonucleotides.

Certain Antisense Compound Motifs and Mechanisms

25 In certain embodiments, antisense compounds have chemically modified subunits arranged in patterns, or motifs, to confer to the antisense compounds properties such as enhanced inhibitory activity, increased binding affinity for a target nucleic acid, or resistance to degradation by *in vivo* nucleases.

Chimeric antisense compounds typically contain at least one region modified so as to confer increased resistance to nuclease degradation, increased cellular uptake, increased binding affinity for the
30 target nucleic acid, and/or increased inhibitory activity. A second region of a chimeric antisense compound

may confer another desired property e.g., serve as a substrate for the cellular endonuclease RNase H, which cleaves the RNA strand of an RNA:DNA duplex.

Antisense activity may result from any mechanism involving the hybridization of the antisense compound (e.g., oligonucleotide) with a target nucleic acid, wherein the hybridization ultimately results in a biological effect. In certain embodiments, the amount and/or activity of the target nucleic acid is modulated. In certain embodiments, the amount and/or activity of the target nucleic acid is reduced. In certain embodiments, hybridization of the antisense compound to the target nucleic acid ultimately results in target nucleic acid degradation. In certain embodiments, hybridization of the antisense compound to the target nucleic acid does not result in target nucleic acid degradation. In certain such embodiments, the presence of the antisense compound hybridized with the target nucleic acid (occupancy) results in a modulation of antisense activity. In certain embodiments, antisense compounds having a particular chemical motif or pattern of chemical modifications are particularly suited to exploit one or more mechanisms. In certain embodiments, antisense compounds function through more than one mechanism and/or through mechanisms that have not been elucidated. Accordingly, the antisense compounds described herein are not limited by particular mechanism.

Antisense mechanisms include, without limitation, RNase H mediated antisense; RNAi mechanisms, which utilize the RISC pathway and include, without limitation, siRNA, ssRNA and microRNA mechanisms; and occupancy based mechanisms. Certain antisense compounds may act through more than one such mechanism and/or through additional mechanisms.

RNase H-Mediated Antisense

In certain embodiments, antisense activity results at least in part from degradation of target RNA by RNase H. RNase H is a cellular endonuclease that cleaves the RNA strand of an RNA:DNA duplex. It is known in the art that single-stranded antisense compounds which are "DNA-like" elicit RNase H activity in mammalian cells. Accordingly, antisense compounds comprising at least a portion of DNA or DNA-like nucleosides may activate RNase H, resulting in cleavage of the target nucleic acid. In certain embodiments, antisense compounds that utilize RNase H comprise one or more modified nucleosides. In certain embodiments, such antisense compounds comprise at least one block of 1-8 modified nucleosides. In certain such embodiments, the modified nucleosides do not support RNase H activity. In certain embodiments, such antisense compounds are gapmers, as described herein. In certain such embodiments, the gap of the gapmer comprises DNA nucleosides. In certain such embodiments, the gap of the gapmer comprises DNA-like

nucleosides. In certain such embodiments, the gap of the gapmer comprises DNA nucleosides and DNA-like nucleosides.

Certain antisense compounds having a gapmer motif are considered chimeric antisense compounds. In a gapmer an internal region having a plurality of nucleotides that supports RNaseH cleavage is positioned between external regions having a plurality of nucleotides that are chemically distinct from the nucleosides of the internal region. In the case of an antisense oligonucleotide having a gapmer motif, the gap segment generally serves as the substrate for endonuclease cleavage, while the wing segments comprise modified nucleosides. In certain embodiments, the regions of a gapmer are differentiated by the types of sugar moieties comprising each distinct region. The types of sugar moieties that are used to differentiate the regions of a gapmer may in some embodiments include β -D-ribonucleosides, β -D-deoxyribonucleosides, 2'-modified nucleosides (such 2'-modified nucleosides may include 2'-MOE and 2'-O-CH₃, among others), and bicyclic sugar modified nucleosides (such bicyclic sugar modified nucleosides may include those having a constrained ethyl). In certain embodiments, nucleosides in the wings may include several modified sugar moieties, including, for example 2'-MOE and bicyclic sugar moieties such as constrained ethyl or LNA. In certain embodiments, wings may include several modified and unmodified sugar moieties. In certain embodiments, wings may include various combinations of 2'-MOE nucleosides, bicyclic sugar moieties such as constrained ethyl nucleosides or LNA nucleosides, and 2'-deoxynucleosides.

Each distinct region may comprise uniform sugar moieties, variant, or alternating sugar moieties. The wing-gap-wing motif is frequently described as "X-Y-Z", where "X" represents the length of the 5'-wing, "Y" represents the length of the gap, and "Z" represents the length of the 3'-wing. "X" and "Z" may comprise uniform, variant, or alternating sugar moieties. In certain embodiments, "X" and "Y" may include one or more 2'-deoxynucleosides. "Y" may comprise 2'-deoxynucleosides. As used herein, a gapmer described as "X-Y-Z" has a configuration such that the gap is positioned immediately adjacent to each of the 5'-wing and the 3' wing. Thus, no intervening nucleotides exist between the 5'-wing and gap, or the gap and the 3'-wing. Any of the antisense compounds described herein can have a gapmer motif. In certain embodiments, "X" and "Z" are the same; in other embodiments they are different. In certain embodiments, "Y" is between 8 and 15 nucleosides. X, Y, or Z can be any of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30 or more nucleosides.

In certain embodiments, the antisense compound targeted to a GHR nucleic acid has a gapmer motif in which the gap consists of 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or 16 linked nucleosides.

In certain embodiments, the antisense oligonucleotide has a sugar motif described by Formula A as follows: (J)_m-(B)_n-(J)_p-(B)_r-(A)_t-(D)_g-(A)_v-(B)_w-(J)_x-(B)_y-(J)_z

wherein:

each A is independently a 2'-substituted nucleoside;

each B is independently a bicyclic nucleoside;

each J is independently either a 2'-substituted nucleoside or a 2'-deoxynucleoside;

5 each D is a 2'-deoxynucleoside;

m is 0-4; n is 0-2; p is 0-2; r is 0-2; t is 0-2; v is 0-2; w is 0-4; x is 0-2; y is 0-2; z is 0-4; g is 6-14;

provided that:

at least one of m, n, and r is other than 0;

at least one of w and y is other than 0;

10 the sum of m, n, p, r, and t is from 2 to 5; and

the sum of v, w, x, y, and z is from 2 to 5.

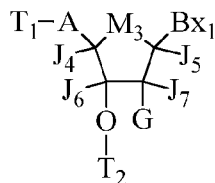
RNAi Compounds

In certain embodiments, antisense compounds are interfering RNA compounds (RNAi), which include double-stranded RNA compounds (also referred to as short-interfering RNA or siRNA) and single-stranded RNAi compounds (or ssRNA). Such compounds work at least in part through the RISC pathway to degrade and/or sequester a target nucleic acid (thus, include microRNA/microRNA-mimic compounds). In certain embodiments, antisense compounds comprise modifications that make them particularly suited for such mechanisms.

i. ssRNA compounds

20 In certain embodiments, antisense compounds including those particularly suited for use as single-stranded RNAi compounds (ssRNA) comprise a modified 5'-terminal end. In certain such embodiments, the 5'-terminal end comprises a modified phosphate moiety. In certain embodiments, such modified phosphate is stabilized (e.g., resistant to degradation/cleavage compared to unmodified 5'-phosphate). In certain embodiments, such 5'-terminal nucleosides stabilize the 5'-phosphorous moiety. Certain modified 5'-
25 terminal nucleosides may be found in the art, for example in WO/2011/139702.

In certain embodiments, the 5'-nucleoside of an ssRNA compound has Formula IIc:



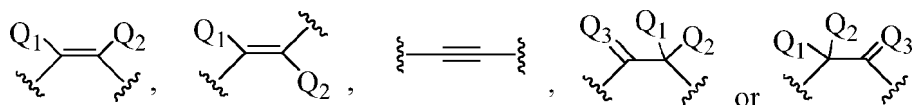
IIc

wherein:

T₁ is an optionally protected phosphorus moiety;

- 5 T₂ is an internucleoside linking group linking the compound of Formula IIc to the oligomeric compound;

A has one of the formulas:



- 10 Q₁ and Q₂ are each, independently, H, halogen, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl, substituted C₂-C₆ alkynyl or N(R₃)(R₄);

Q₃ is O, S, N(R₅) or C(R₆)(R₇);

each R₃, R₄, R₅, R₆ and R₇ is, independently, H, C₁-C₆ alkyl, substituted C₁-C₆ alkyl or C₁-C₆ alkoxy;

- 15 M₃ is O, S, NR₁₄, C(R₁₅)(R₁₆), C(R₁₅)(R₁₆)C(R₁₇)(R₁₈), C(R₁₅)=C(R₁₇), OC(R₁₅)(R₁₆) or OC(R₁₅)(Bx₂);

R₁₄ is H, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl;

- 20 R₁₅, R₁₆, R₁₇ and R₁₈ are each, independently, H, halogen, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl;

Bx₁ is a heterocyclic base moiety;

or if Bx₂ is present then Bx₂ is a heterocyclic base moiety and Bx₁ is H, halogen, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl;

J₄, J₅, J₆ and J₇ are each, independently, H, halogen, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl;

or J₄ forms a bridge with one of J₅ or J₇ wherein said bridge comprises from 1 to 3 linked biradical groups selected from O, S, NR₁₉, C(R₂₀)(R₂₁), C(R₂₀)=C(R₂₁), C[=C(R₂₀)(R₂₁)] and C(=O) and the other two of J₅, J₆ and J₇ are each, independently, H, halogen, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl;

each R₁₉, R₂₀ and R₂₁ is, independently, H, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₁-C₆ alkoxy, substituted C₁-C₆ alkoxy, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl;

G is H, OH, halogen or O-[C(R₈)(R₉)]_n-(C=O)_m-X₁]-Z;

each R₈ and R₉ is, independently, H, halogen, C₁-C₆ alkyl or substituted C₁-C₆ alkyl;

X₁ is O, S or N(E₁);

Z is H, halogen, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl, substituted C₂-C₆ alkynyl or N(E₂)(E₃);

E₁, E₂ and E₃ are each, independently, H, C₁-C₆ alkyl or substituted C₁-C₆ alkyl;

n is from 1 to about 6;

m is 0 or 1;

j is 0 or 1;

each substituted group comprises one or more optionally protected substituent groups independently selected from halogen, OJ₁, N(J₁)(J₂), =NJ₁, SJ₁, N₃, CN, OC(=X₂)J₁, OC(=X₂)N(J₁)(J₂) and C(=X₂)N(J₁)(J₂);

X₂ is O, S or NJ₃;

each J₁, J₂ and J₃ is, independently, H or C₁-C₆ alkyl;

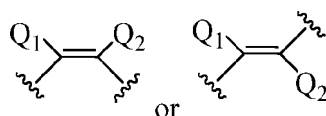
when j is 1 then Z is other than halogen or $N(E_2)(E_3)$; and

wherein said oligomeric compound comprises from 8 to 40 monomeric subunits and is hybridizable to at least a portion of a target nucleic acid.

In certain embodiments, M_3 is O, $CH=CH$, OCH_2 or $OC(H)(Bx_2)$. In certain embodiments, M_3 is O.

5 In certain embodiments, J_4 , J_5 , J_6 and J_7 are each H. In certain embodiments, J_4 forms a bridge with one of J_5 or J_7 .

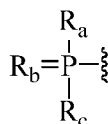
In certain embodiments, A has one of the formulas:



wherein:

10 Q_1 and Q_2 are each, independently, H, halogen, C_1 - C_6 alkyl, substituted C_1 - C_6 alkyl, C_1 - C_6 alkoxy or substituted C_1 - C_6 alkoxy. In certain embodiments, Q_1 and Q_2 are each H. In certain embodiments, Q_1 and Q_2 are each, independently, H or halogen. In certain embodiments, Q_1 and Q_2 is H and the other of Q_1 and Q_2 is F, CH_3 or OCH_3 .

In certain embodiments, T_1 has the formula:



15

wherein:

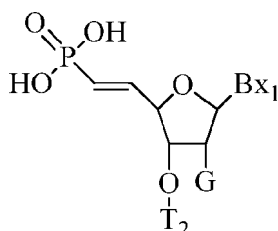
R_a and R_c are each, independently, protected hydroxyl, protected thiol, C_1 - C_6 alkyl, substituted C_1 - C_6 alkyl, C_1 - C_6 alkoxy, substituted C_1 - C_6 alkoxy, protected amino or substituted amino; and

20 R_b is O or S. In certain embodiments, R_b is O and R_a and R_c are each, independently, OCH_3 , OCH_2CH_3 or $CH(CH_3)_2$.

In certain embodiments, G is halogen, OCH_3 , OCH_2F , $OCHF_2$, OCF_3 , OCH_2CH_3 , $O(CH_2)_2F$, OCH_2CHF_2 , OCH_2CF_3 , $OCH_2-CH=CH_2$, $O(CH_2)_2-OCH_3$, $O(CH_2)_2-SCH_3$, $O(CH_2)_2-OCF_3$, $O(CH_2)_3-$ $N(R_{10})(R_{11})$, $O(CH_2)_2-ON(R_{10})(R_{11})$, $O(CH_2)_2-O(CH_2)_2-N(R_{10})(R_{11})$, $OCH_2C(=O)-N(R_{10})(R_{11})$, $OCH_2C(=O)-$ $N(R_{12})-(CH_2)_2-N(R_{10})(R_{11})$ or $O(CH_2)_2-N(R_{12})-C(=NR_{13})[N(R_{10})(R_{11})]$ wherein R_{10} , R_{11} , R_{12} and R_{13} are each,
 25 independently, H or C_1 - C_6 alkyl. In certain embodiments, G is halogen, OCH_3 , OCF_3 , OCH_2CH_3 , OCH_2CF_3 ,

$\text{OCH}_2\text{-CH=CH}_2$, $\text{O(CH}_2)_2\text{-OCH}_3$, $\text{O(CH}_2)_2\text{-O(CH}_2)_2\text{-N(CH}_3)_2$, $\text{OCH}_2\text{C(=O)-N(H)CH}_3$, $\text{OCH}_2\text{C(=O)-N(H)-}$
 $(\text{CH}_2)_2\text{-N(CH}_3)_2$ or $\text{OCH}_2\text{-N(H)-C(=NH)NH}_2$. In certain embodiments, G is F, OCH_3 or $\text{O(CH}_2)_2\text{-OCH}_3$. In
 certain embodiments, G is $\text{O(CH}_2)_2\text{-OCH}_3$.

In certain embodiments, the 5'-terminal nucleoside has Formula IIe:



IIe

In certain embodiments, antisense compounds, including those particularly suitable for ssRNA
 comprise one or more type of modified sugar moieties and/or naturally occurring sugar moieties arranged
 along an oligonucleotide or region thereof in a defined pattern or sugar modification motif. Such motifs may
 include any of the sugar modifications discussed herein and/or other known sugar modifications.

In certain embodiments, the oligonucleotides comprise or consist of a region having uniform sugar
 modifications. In certain such embodiments, each nucleoside of the region comprises the same RNA-like
 sugar modification. In certain embodiments, each nucleoside of the region is a 2'-F nucleoside. In certain
 embodiments, each nucleoside of the region is a 2'-OMe nucleoside. In certain embodiments, each
 nucleoside of the region is a 2'-MOE nucleoside. In certain embodiments, each nucleoside of the region is a
 cEt nucleoside. In certain embodiments, each nucleoside of the region is an LNA nucleoside. In certain
 embodiments, the uniform region constitutes all or essentially all of the oligonucleotide. In certain
 embodiments, the region constitutes the entire oligonucleotide except for 1-4 terminal nucleosides.

In certain embodiments, oligonucleotides comprise one or more regions of alternating sugar
 modifications, wherein the nucleosides alternate between nucleotides having a sugar modification of a first
 type and nucleotides having a sugar modification of a second type. In certain embodiments, nucleosides of
 both types are RNA-like nucleosides. In certain embodiments the alternating nucleosides are selected from:
 2'-OMe, 2'-F, 2'-MOE, LNA, and cEt. In certain embodiments, the alternating modifications are 2'-F and 2'-
 OMe. Such regions may be contiguous or may be interrupted by differently modified nucleosides or
 conjugated nucleosides.

In certain embodiments, the alternating region of alternating modifications each consist of a single
 nucleoside (i.e., the pattern is $(\text{AB})_x\text{A}_y$ wherein A is a nucleoside having a sugar modification of a first type

and B is a nucleoside having a sugar modification of a second type; x is 1-20 and y is 0 or 1). In certain embodiments, one or more alternating regions in an alternating motif includes more than a single nucleoside of a type. For example, oligonucleotides may include one or more regions of any of the following nucleoside motifs:

5 AABBA;

ABBABB;

AABAAB;

ABBABAABB;

ABABAA;

10 AABABAB;

ABABAA;

ABBAABBABABAA;

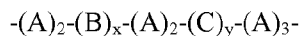
BABBAABBABABAA; or

ABABBAABBABABAA;

15 wherein A is a nucleoside of a first type and B is a nucleoside of a second type. In certain embodiments, A and B are each selected from 2'-F, 2'-OMe, BNA, and MOE.

In certain embodiments, oligonucleotides having such an alternating motif also comprise a modified 5' terminal nucleoside, such as those of formula IIc or IIe.

20 In certain embodiments, oligonucleotides comprise a region having a 2-2-3 motif. Such regions comprises the following motif:



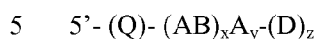
wherein: A is a first type of modified nucleoside;

B and C, are nucleosides that are differently modified than A, however, B and C may have the same or different modifications as one another;

25 x and y are from 1 to 15.

In certain embodiments, A is a 2'-OMe modified nucleoside. In certain embodiments, B and C are both 2'-F modified nucleosides. In certain embodiments, A is a 2'-OMe modified nucleoside and B and C are both 2'-F modified nucleosides.

In certain embodiments, oligonucleosides have the following sugar motif:



wherein:

Q is a nucleoside comprising a stabilized phosphate moiety. In certain embodiments, Q is a nucleoside having Formula IIc or IIe;

A is a first type of modified nucleoside;

10 B is a second type of modified nucleoside;

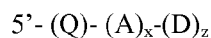
D is a modified nucleoside comprising a modification different from the nucleoside adjacent to it. Thus, if y is 0, then D must be differently modified than B and if y is 1, then D must be differently modified than A. In certain embodiments, D differs from both A and B.

X is 5-15;

15 Y is 0 or 1;

Z is 0-4.

In certain embodiments, oligonucleosides have the following sugar motif:



wherein:

20 Q is a nucleoside comprising a stabilized phosphate moiety. In certain embodiments, Q is a nucleoside having Formula IIc or IIe;

A is a first type of modified nucleoside;

D is a modified nucleoside comprising a modification different from A.

X is 11-30;

25 Z is 0-4.

In certain embodiments A, B, C, and D in the above motifs are selected from: 2'-OMe, 2'-F, 2'-MOE, LNA, and cEt. In certain embodiments, D represents terminal nucleosides. In certain embodiments, such terminal nucleosides are not designed to hybridize to the target nucleic acid (though one or more might hybridize by chance). In certain embodiments, the nucleobase of each D nucleoside is adenine, regardless of the identity of the nucleobase at the corresponding position of the target nucleic acid. In certain embodiments the nucleobase of each D nucleoside is thymine.

In certain embodiments, antisense compounds, including those particularly suited for use as ssRNA comprise modified internucleoside linkages arranged along the oligonucleotide or region thereof in a defined pattern or modified internucleoside linkage motif. In certain embodiments, oligonucleotides comprise a region having an alternating internucleoside linkage motif. In certain embodiments, oligonucleotides comprise a region of uniformly modified internucleoside linkages. In certain such embodiments, the oligonucleotide comprises a region that is uniformly linked by phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide is uniformly linked by phosphorothioate internucleoside linkages. In certain embodiments, each internucleoside linkage of the oligonucleotide is selected from phosphodiester and phosphorothioate. In certain embodiments, each internucleoside linkage of the oligonucleotide is selected from phosphodiester and phosphorothioate and at least one internucleoside linkage is phosphorothioate.

In certain embodiments, the oligonucleotide comprises at least 6 phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide comprises at least 8 phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide comprises at least 10 phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide comprises at least one block of at least 6 consecutive phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide comprises at least one block of at least 8 consecutive phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide comprises at least one block of at least 10 consecutive phosphorothioate internucleoside linkages. In certain embodiments, the oligonucleotide comprises at least one block of at least one 12 consecutive phosphorothioate internucleoside linkages. In certain such embodiments, at least one such block is located at the 3' end of the oligonucleotide. In certain such embodiments, at least one such block is located within 3 nucleosides of the 3' end of the oligonucleotide.

Oligonucleotides having any of the various sugar motifs described herein, may have any linkage motif. For example, the oligonucleotides, including but not limited to those described above, may have a linkage motif selected from non-limiting the table below:

5' most linkage	Central region	3'-region
PS	Alternating PO/PS	6 PS

PS	Alternating PO/PS	7 PS
PS	Alternating PO/PS	8 PS

ii. siRNA compounds

In certain embodiments, antisense compounds are double-stranded RNAi compounds (siRNA). In such embodiments, one or both strands may comprise any modification motif described above for ssRNA. In certain embodiments, ssRNA compounds may be unmodified RNA. In certain embodiments, siRNA compounds may comprise unmodified RNA nucleosides, but modified internucleoside linkages.

Several embodiments relate to double-stranded compositions wherein each strand comprises a motif defined by the location of one or more modified or unmodified nucleosides. In certain embodiments, compositions are provided comprising a first and a second oligomeric compound that are fully or at least partially hybridized to form a duplex region and further comprising a region that is complementary to and hybridizes to a nucleic acid target. It is suitable that such a composition comprise a first oligomeric compound that is an antisense strand having full or partial complementarity to a nucleic acid target and a second oligomeric compound that is a sense strand having one or more regions of complementarity to and forming at least one duplex region with the first oligomeric compound.

The compositions of several embodiments modulate gene expression by hybridizing to a nucleic acid target resulting in loss of its normal function. In some embodiments, the target nucleic acid is GHR. In certain embodiment, the degradation of the targeted GHR is facilitated by an activated RISC complex that is formed with compositions of the invention.

Several embodiments are directed to double-stranded compositions wherein one of the strands is useful in, for example, influencing the preferential loading of the opposite strand into the RISC (or cleavage) complex. The compositions are useful for targeting selected nucleic acid molecules and modulating the expression of one or more genes. In some embodiments, the compositions of the present invention hybridize to a portion of a target RNA resulting in loss of normal function of the target RNA.

Certain embodiments are drawn to double-stranded compositions wherein both the strands comprises a hemimer motif, a fully modified motif, a positionally modified motif or an alternating motif. Each strand of the compositions of the present invention can be modified to fulfil a particular role in for example the siRNA pathway. Using a different motif in each strand or the same motif with different chemical modifications in each strand permits targeting the antisense strand for the RISC complex while inhibiting the incorporation of the sense strand. Within this model, each strand can be independently modified such that it is enhanced for its particular role. The antisense strand can be modified at the 5'-end to

enhance its role in one region of the RISC while the 3'-end can be modified differentially to enhance its role in a different region of the RISC.

The double-stranded oligonucleotide molecules can be a double-stranded polynucleotide molecule comprising self-complementary sense and antisense regions, wherein the antisense region comprises nucleotide sequence that is complementary to nucleotide sequence in a target nucleic acid molecule or a portion thereof and the sense region having nucleotide sequence corresponding to the target nucleic acid sequence or a portion thereof. The double-stranded oligonucleotide molecules can be assembled from two separate oligonucleotides, where one strand is the sense strand and the other is the antisense strand, wherein the antisense and sense strands are self-complementary (i.e. each strand comprises nucleotide sequence that is complementary to nucleotide sequence in the other strand; such as where the antisense strand and sense strand form a duplex or double-stranded structure, for example wherein the double-stranded region is about 15 to about 30, e.g., about 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 or 30 base pairs; the antisense strand comprises nucleotide sequence that is complementary to nucleotide sequence in a target nucleic acid molecule or a portion thereof and the sense strand comprises nucleotide sequence corresponding to the target nucleic acid sequence or a portion thereof (e.g., about 15 to about 25 or more nucleotides of the double-stranded oligonucleotide molecule are complementary to the target nucleic acid or a portion thereof). Alternatively, the double-stranded oligonucleotide is assembled from a single oligonucleotide, where the self-complementary sense and antisense regions of the siRNA are linked by means of a nucleic acid based or non-nucleic acid-based linker(s).

The double-stranded oligonucleotide can be a polynucleotide with a duplex, asymmetric duplex, hairpin or asymmetric hairpin secondary structure, having self-complementary sense and antisense regions, wherein the antisense region comprises nucleotide sequence that is complementary to nucleotide sequence in a separate target nucleic acid molecule or a portion thereof and the sense region having nucleotide sequence corresponding to the target nucleic acid sequence or a portion thereof. The double-stranded oligonucleotide can be a circular single-stranded polynucleotide having two or more loop structures and a stem comprising self-complementary sense and antisense regions, wherein the antisense region comprises nucleotide sequence that is complementary to nucleotide sequence in a target nucleic acid molecule or a portion thereof and the sense region having nucleotide sequence corresponding to the target nucleic acid sequence or a portion thereof, and wherein the circular polynucleotide can be processed either in vivo or in vitro to generate an active siRNA molecule capable of mediating RNAi.

In certain embodiments, the double-stranded oligonucleotide comprises separate sense and antisense sequences or regions, wherein the sense and antisense regions are covalently linked by nucleotide or non-nucleotide linkers molecules as is known in the art, or are alternately non-covalently linked by ionic interactions, hydrogen bonding, van der Waals interactions, hydrophobic interactions, and/or stacking

interactions. In certain embodiments, the double-stranded oligonucleotide comprises nucleotide sequence that is complementary to nucleotide sequence of a target gene. In another embodiment, the double-stranded oligonucleotide interacts with nucleotide sequence of a target gene in a manner that causes inhibition of expression of the target gene.

5 As used herein, double-stranded oligonucleotides need not be limited to those molecules containing only RNA, but further encompasses chemically modified nucleotides and non-nucleotides. In certain embodiments, the short interfering nucleic acid molecules lack 2'-hydroxy (2'-OH) containing nucleotides. In certain embodiments short interfering nucleic acids optionally do not include any ribonucleotides (e.g., nucleotides having a 2'-OH group). Such double-stranded oligonucleotides that do not require the presence of
10 ribonucleotides within the molecule to support RNAi can however have an attached linker or linkers or other attached or associated groups, moieties, or chains containing one or more nucleotides with 2'-OH groups. Optionally, double-stranded oligonucleotides can comprise ribonucleotides at about 5, 10, 20, 30, 40, or 50% of the nucleotide positions. As used herein, the term siRNA is meant to be equivalent to other terms used to describe nucleic acid molecules that are capable of mediating sequence specific RNAi, for example short
15 interfering RNA (siRNA), double-stranded RNA (dsRNA), micro-RNA (miRNA), short hairpin RNA (shRNA), short interfering oligonucleotide, short interfering nucleic acid, short interfering modified oligonucleotide, chemically modified siRNA, post-transcriptional gene silencing RNA (ptgsRNA), and others. In addition, as used herein, the term RNAi is meant to be equivalent to other terms used to describe sequence specific RNA interference, such as post transcriptional gene silencing, translational inhibition, or
20 epigenetics. For example, double-stranded oligonucleotides can be used to epigenetically silence genes at both the post-transcriptional level and the pre-transcriptional level. In a non-limiting example, epigenetic regulation of gene expression by siRNA molecules of the invention can result from siRNA mediated modification of chromatin structure or methylation pattern to alter gene expression (see, for example, Verdel et al., 2004, Science, 303, 672-676; Pal-Bhadra et al., 2004, Science, 303, 669-672; Allshire, 2002, Science,
25 297, 1818-1819; Volpe et al., 2002, Science, 297, 1833-1837; Jenuwein, 2002, Science, 297, 2215-2218; and Hall et al., 2002, Science, 297, 2232-2237).

It is contemplated that compounds and compositions of several embodiments provided herein can target GHR by a dsRNA-mediated gene silencing or RNAi mechanism, including, e.g., "hairpin" or stem-loop double-stranded RNA effector molecules in which a single RNA strand with self-complementary
30 sequences is capable of assuming a double-stranded conformation, or duplex dsRNA effector molecules comprising two separate strands of RNA. In various embodiments, the dsRNA consists entirely of ribonucleotides or consists of a mixture of ribonucleotides and deoxynucleotides, such as the RNA/DNA hybrids disclosed, for example, by WO 00/63364, filed Apr. 19, 2000, or U.S. Ser. No. 60/130,377, filed Apr. 21, 1999. The dsRNA or dsRNA effector molecule may be a single molecule with a region of self-

complementarity such that nucleotides in one segment of the molecule base pair with nucleotides in another segment of the molecule. In various embodiments, a dsRNA that consists of a single molecule consists entirely of ribonucleotides or includes a region of ribonucleotides that is complementary to a region of deoxyribonucleotides. Alternatively, the dsRNA may include two different strands that have a region of complementarity to each other.

In various embodiments, both strands consist entirely of ribonucleotides, one strand consists entirely of ribonucleotides and one strand consists entirely of deoxyribonucleotides, or one or both strands contain a mixture of ribonucleotides and deoxyribonucleotides. In certain embodiments, the regions of complementarity are at least 70, 80, 90, 95, 98, or 100% complementary to each other and to a target nucleic acid sequence. In certain embodiments, the region of the dsRNA that is present in a double-stranded conformation includes at least 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 50, 75, 100, 200, 500, 1000, 2000 or 5000 nucleotides or includes all of the nucleotides in a cDNA or other target nucleic acid sequence being represented in the dsRNA. In some embodiments, the dsRNA does not contain any single stranded regions, such as single stranded ends, or the dsRNA is a hairpin. In other embodiments, the dsRNA has one or more single stranded regions or overhangs. In certain embodiments, RNA/DNA hybrids include a DNA strand or region that is an antisense strand or region (e.g. has at least 70, 80, 90, 95, 98, or 100% complementarity to a target nucleic acid) and an RNA strand or region that is a sense strand or region (e.g. has at least 70, 80, 90, 95, 98, or 100% identity to a target nucleic acid), and vice versa.

In various embodiments, the RNA/DNA hybrid is made in vitro using enzymatic or chemical synthetic methods such as those described herein or those described in WO 00/63364, filed Apr. 19, 2000, or U.S. Ser. No. 60/130,377, filed Apr. 21, 1999. In other embodiments, a DNA strand synthesized in vitro is complexed with an RNA strand made in vivo or in vitro before, after, or concurrent with the transformation of the DNA strand into the cell. In yet other embodiments, the dsRNA is a single circular nucleic acid containing a sense and an antisense region, or the dsRNA includes a circular nucleic acid and either a second circular nucleic acid or a linear nucleic acid (see, for example, WO 00/63364, filed Apr. 19, 2000, or U.S. Ser. No. 60/130,377, filed Apr. 21, 1999.) Exemplary circular nucleic acids include lariat structures in which the free 5' phosphoryl group of a nucleotide becomes linked to the 2' hydroxyl group of another nucleotide in a loop back fashion.

In other embodiments, the dsRNA includes one or more modified nucleotides in which the 2' position in the sugar contains a halogen (such as fluorine group) or contains an alkoxy group (such as a methoxy group) which increases the half-life of the dsRNA in vitro or in vivo compared to the corresponding dsRNA in which the corresponding 2' position contains a hydrogen or an hydroxyl group. In yet other embodiments, the dsRNA includes one or more linkages between adjacent nucleotides other than a naturally-

occurring phosphodiester linkage. Examples of such linkages include phosphoramidate, phosphorothioate, and phosphorodithioate linkages. The dsRNAs may also be chemically modified nucleic acid molecules as taught in U.S. Pat. No. 6,673,661. In other embodiments, the dsRNA contains one or two capped strands, as disclosed, for example, by WO 00/63364, filed Apr. 19, 2000, or U.S. Ser. No. 60/130,377, filed Apr. 21, 1999.

In other embodiments, the dsRNA can be any of the at least partially dsRNA molecules disclosed in WO 00/63364, as well as any of the dsRNA molecules described in U.S. Provisional Application 60/399,998; and U.S. Provisional Application 60/419,532, and PCT/US2003/033466, the teaching of which is hereby incorporated by reference. Any of the dsRNAs may be expressed in vitro or in vivo using the methods described herein or standard methods, such as those described in WO 00/63364.

Occupancy

In certain embodiments, antisense compounds are not expected to result in cleavage or the target nucleic acid via RNase H or to result in cleavage or sequestration through the RISC pathway. In certain such embodiments, antisense activity may result from occupancy, wherein the presence of the hybridized antisense compound disrupts the activity of the target nucleic acid. In certain such embodiments, the antisense compound may be uniformly modified or may comprise a mix of modifications and/or modified and unmodified nucleosides.

Target Nucleic Acids, Target Regions and Nucleotide Sequences

Nucleotide sequences that encode growth hormone receptor (GHR) targetable with the compounds provided herein include, without limitation, the following: GENBANK Accession No. NM_000163.4 (incorporated herein as SEQ ID NO: 1), GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000 (incorporated herein as SEQ ID NO: 2), GENBANK Accession No. X06562.1 (incorporated herein as SEQ ID NO: 3), GENBANK Accession No. DR006395.1 (incorporated herein as SEQ ID NO: 4), GENBANK Accession No. DB052048.1 (incorporated herein as SEQ ID NO: 5), GENBANK Accession No. AF230800.1 (incorporated herein as SEQ ID NO: 6), the complement of GENBANK Accession No. AA398260.1 (incorporated herein as SEQ ID NO: 7), GENBANK Accession No. BC136496.1 (incorporated herein as SEQ ID NO: 8), GENBANK Accession No. NM_001242399.2 (incorporated herein as SEQ ID NO: 9), GENBANK Accession No. NM_001242400.2 (incorporated herein as SEQ ID NO: 10), GENBANK Accession No. NM_001242401.3 (incorporated herein as SEQ ID NO: 11), GENBANK Accession No. NM_001242402.2 (incorporated herein as SEQ ID NO: 12), GENBANK Accession No. NM_001242403.2 (incorporated herein as SEQ ID NO: 13), GENBANK Accession No. NM_001242404.2 (incorporated herein as SEQ ID NO: 14), GENBANK Accession No. NM_001242405.2

(incorporated herein as SEQ ID NO: 15), GENBANK Accession No. NM_001242406.2 (incorporated herein as SEQ ID NO: 16), GENBANK Accession No. NM_001242460.1 (incorporated herein as SEQ ID NO: 17), GENBANK Accession No. NM_001242461.1 (incorporated herein as SEQ ID NO: 18), GENBANK Accession No. NM_001242462.1 (incorporated herein as SEQ ID NO: 19), or GENBANK Accession No. NW_001120958.1 truncated from nucleotides 4410000 to 4720000 (incorporated herein as SEQ ID NO: 2296).

Hybridization

In some embodiments, hybridization occurs between an antisense compound disclosed herein and a GHR nucleic acid. The most common mechanism of hybridization involves hydrogen bonding (e.g., Watson-Crick, Hoogsteen or reversed Hoogsteen hydrogen bonding) between complementary nucleobases of the nucleic acid molecules.

Hybridization can occur under varying conditions. Stringent conditions are sequence-dependent and are determined by the nature and composition of the nucleic acid molecules to be hybridized.

Methods of determining whether a sequence is specifically hybridizable to a target nucleic acid are well known in the art. In certain embodiments, the antisense compounds provided herein are specifically hybridizable with a GHR nucleic acid.

Complementarity

An antisense compound and a target nucleic acid are complementary to each other when a sufficient number of nucleobases of the antisense compound can hydrogen bond with the corresponding nucleobases of the target nucleic acid, such that a desired effect will occur (e.g., antisense inhibition of a target nucleic acid, such as a GHR nucleic acid).

Non-complementary nucleobases between an antisense compound and a GHR nucleic acid may be tolerated provided that the antisense compound remains able to specifically hybridize to a target nucleic acid. Moreover, an antisense compound may hybridize over one or more segments of a GHR nucleic acid such that intervening or adjacent segments are not involved in the hybridization event (e.g., a loop structure, mismatch or hairpin structure).

In certain embodiments, the antisense compounds provided herein, or a specified portion thereof, are, or are at least, 70%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% complementary to a GHR nucleic acid, a target region, target segment, or specified portion thereof. Percent complementarity of an antisense compound with a target nucleic acid can be determined using routine methods.

For example, an antisense compound in which 18 of 20 nucleobases of the antisense compound are complementary to a target region, and would therefore specifically hybridize, would represent 90 percent complementarity. In this example, the remaining noncomplementary nucleobases may be clustered or interspersed with complementary nucleobases and need not be contiguous to each other or to complementary nucleobases. As such, an antisense compound which is 18 nucleobases in length having four noncomplementary nucleobases which are flanked by two regions of complete complementarity with the target nucleic acid would have 77.8% overall complementarity with the target nucleic acid and would thus fall within the scope of the present invention. Percent complementarity of an antisense compound with a region of a target nucleic acid can be determined routinely using BLAST programs (basic local alignment search tools) and PowerBLAST programs known in the art (Altschul *et al.*, *J. Mol. Biol.*, 1990, 215, 403 410; Zhang and Madden, *Genome Res.*, 1997, 7, 649 656). Percent homology, sequence identity or complementarity, can be determined by, for example, the Gap program (Wisconsin Sequence Analysis Package, Version 8 for Unix, Genetics Computer Group, University Research Park, Madison Wis.), using default settings, which uses the algorithm of Smith and Waterman (*Adv. Appl. Math.*, 1981, 2, 482 489).

In certain embodiments, the antisense compounds provided herein, or specified portions thereof, are fully complementary (i.e. 100% complementary) to a target nucleic acid, or specified portion thereof. For example, an antisense compound may be fully complementary to a GHR nucleic acid, or a target region, or a target segment or target sequence thereof. As used herein, “fully complementary” means each nucleobase of an antisense compound is capable of precise base pairing with the corresponding nucleobases of a target nucleic acid. For example, a 20 nucleobase antisense compound is fully complementary to a target sequence that is 400 nucleobases long, so long as there is a corresponding 20 nucleobase portion of the target nucleic acid that is fully complementary to the antisense compound. Fully complementary can also be used in reference to a specified portion of the first and /or the second nucleic acid. For example, a 20 nucleobase portion of a 30 nucleobase antisense compound can be “fully complementary” to a target sequence that is 400 nucleobases long. The 20 nucleobase portion of the 30 nucleobase oligonucleotide is fully complementary to the target sequence if the target sequence has a corresponding 20 nucleobase portion wherein each nucleobase is complementary to the 20 nucleobase portion of the antisense compound. At the same time, the entire 30 nucleobase antisense compound may or may not be fully complementary to the target sequence, depending on whether the remaining 10 nucleobases of the antisense compound are also complementary to the target sequence.

The location of a non-complementary nucleobase may be at the 5' end or 3' end of the antisense compound. Alternatively, the non-complementary nucleobase or nucleobases may be at an internal position of the antisense compound. When two or more non-complementary nucleobases are present, they may be

contiguous (i.e. linked) or non-contiguous. In one embodiment, a non-complementary nucleobase is located in the wing segment of a gapmer antisense oligonucleotide.

In certain embodiments, antisense compounds that are, or are up to 11, 12, 13, 14, 15, 16, 17, 18, 19, or 20 nucleobases in length comprise no more than 4, no more than 3, no more than 2, or no more than 1 non-complementary nucleobase(s) relative to a target nucleic acid, such as a GHR nucleic acid, or specified portion thereof.

In certain embodiments, antisense compounds that are, or are up to 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, or 30 nucleobases in length comprise no more than 6, no more than 5, no more than 4, no more than 3, no more than 2, or no more than 1 non-complementary nucleobase(s) relative to a target nucleic acid, such as a GHR nucleic acid, or specified portion thereof.

The antisense compounds provided also include those which are complementary to a portion of a target nucleic acid. As used herein, "portion" refers to a defined number of contiguous (i.e. linked) nucleobases within a region or segment of a target nucleic acid. A "portion" can also refer to a defined number of contiguous nucleobases of an antisense compound. In certain embodiments, the antisense compounds, are complementary to at least an 8 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least a 9 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least a 10 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least an 11 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least a 12 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least a 13 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least a 14 nucleobase portion of a target segment. In certain embodiments, the antisense compounds are complementary to at least a 15 nucleobase portion of a target segment. Also contemplated are antisense compounds that are complementary to at least a 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, or more nucleobase portion of a target segment, or a range defined by any two of these values.

Identity

The antisense compounds provided herein may also have a defined percent identity to a particular nucleotide sequence, SEQ ID NO, or compound represented by a specific Isis number, or portion thereof. As used herein, an antisense compound is identical to the sequence disclosed herein if it has the same nucleobase pairing ability. For example, a RNA which contains uracil in place of thymidine in a disclosed DNA sequence would be considered identical to the DNA sequence since both uracil and thymidine pair with adenine. Shortened and lengthened versions of the antisense compounds described herein as well as

compounds having non-identical bases relative to the antisense compounds provided herein also are contemplated. The non-identical bases may be adjacent to each other or dispersed throughout the antisense compound. Percent identity of an antisense compound is calculated according to the number of bases that have identical base pairing relative to the sequence to which it is being compared.

5 In certain embodiments, the antisense compounds, or portions thereof, are, or are at least, 70%, 75%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to one or more of the antisense compounds or SEQ ID NOs, or a portion thereof, disclosed herein.

 In certain embodiments, a portion of the antisense compound is compared to an equal length portion of the target nucleic acid. In certain embodiments, an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
10 23, 24, or 25 nucleobase portion is compared to an equal length portion of the target nucleic acid.

 In certain embodiments, a portion of the antisense oligonucleotide is compared to an equal length portion of the target nucleic acid. In certain embodiments, an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, or 25 nucleobase portion is compared to an equal length portion of the target nucleic acid.

Modifications

15 A nucleoside is a base-sugar combination. The nucleobase (also known as base) portion of the nucleoside is normally a heterocyclic base moiety. Nucleotides are nucleosides that further include a phosphate group covalently linked to the sugar portion of the nucleoside. For those nucleosides that include a pentofuranosyl sugar, the phosphate group can be linked to the 2', 3' or 5' hydroxyl moiety of the sugar. Oligonucleotides are formed through the covalent linkage of adjacent nucleosides to one another, to form a
20 linear polymeric oligonucleotide. Within the oligonucleotide structure, the phosphate groups are commonly referred to as forming the internucleoside linkages of the oligonucleotide.

 Modifications to antisense compounds encompass substitutions or changes to internucleoside linkages, sugar moieties, or nucleobases. Modified antisense compounds are often preferred over native forms because of desirable properties such as, for example, enhanced cellular uptake, enhanced affinity for
25 nucleic acid target, increased stability in the presence of nucleases, or increased inhibitory activity.

 Chemically modified nucleosides may also be employed to increase the binding affinity of a shortened or truncated antisense oligonucleotide for its target nucleic acid. Consequently, comparable results can often be obtained with shorter antisense compounds that have such chemically modified nucleosides.

Modified Internucleoside Linkages

The naturally occurring internucleoside linkage of RNA and DNA is a 3' to 5' phosphodiester linkage. Antisense compounds having one or more modified, i.e. non-naturally occurring, internucleoside linkages are often selected over antisense compounds having naturally occurring internucleoside linkages because of desirable properties such as, for example, enhanced cellular uptake, enhanced affinity for target nucleic acids, and increased stability in the presence of nucleases.

Oligonucleotides having modified internucleoside linkages include internucleoside linkages that retain a phosphorus atom as well as internucleoside linkages that do not have a phosphorus atom. Representative phosphorus containing internucleoside linkages include, but are not limited to, phosphodiester, phosphotriester, methylphosphonate, phosphoramidate, and phosphorothioate. Methods of preparation of phosphorous-containing and non-phosphorous-containing linkages are well known.

In certain embodiments, antisense compounds targeted to a GHR nucleic acid comprise one or more modified internucleoside linkages. In certain embodiments, the modified internucleoside linkages are phosphorothioate linkages. In certain embodiments, each internucleoside linkage of an antisense compound is a phosphorothioate internucleoside linkage.

Modified Sugar Moieties

Antisense compounds can optionally contain one or more nucleosides wherein the sugar group has been modified. Such sugar modified nucleosides may impart enhanced nuclease stability, increased binding affinity, or some other beneficial biological property to the antisense compounds. In certain embodiments, nucleosides comprise chemically modified ribofuranose ring moieties. Examples of chemically modified ribofuranose rings include without limitation, addition of substituent groups (including 5' and 2' substituent groups, bridging of non-geminal ring atoms to form bicyclic nucleic acids (BNA), replacement of the ribosyl ring oxygen atom with S, N(R), or C(R₁)(R₂) (R, R₁ and R₂ are each independently H, C₁-C₁₂ alkyl or a protecting group) and combinations thereof. Examples of chemically modified sugars include 2'-F-5'-methyl substituted nucleoside (see PCT International Application WO 2008/101157 Published on 8/21/08 for other disclosed 5',2'-bis substituted nucleosides) or replacement of the ribosyl ring oxygen atom with S with further substitution at the 2'-position (see published U.S. Patent Application US2005-0130923, published on June 16, 2005) or alternatively 5'-substitution of a BNA (see PCT International Application WO 2007/134181 Published on 11/22/07 wherein LNA is substituted with for example a 5'-methyl or a 5'-vinyl group).

Examples of nucleosides having modified sugar moieties include without limitation nucleosides comprising 5'-vinyl, 5'-methyl (*R* or *S*), 4'-S, 2'-F, 2'-OCH₃, 2'-OCH₂CH₃, 2'-OCH₂CH₂F and 2'-O(CH₂)₂OCH₃ substituent groups. The substituent at the 2' position can also be selected from allyl, amino,

azido, thio, O-allyl, O-C₁-C₁₀ alkyl, OCF₃, OCH₂F, O(CH₂)₂SCH₃, O(CH₂)₂-O-N(R_m)(R_n), O-CH₂-C(=O)-N(R_m)(R_n), and O-CH₂-C(=O)-N(R_l)-(CH₂)₂-N(R_m)(R_n), where each R_l, R_m and R_n is, independently, H or substituted or unsubstituted C₁-C₁₀ alkyl.

As used herein, "bicyclic nucleosides" refer to modified nucleosides comprising a bicyclic sugar moiety. Examples of bicyclic nucleosides include without limitation nucleosides comprising a bridge between the 4' and the 2' ribosyl ring atoms. In certain embodiments, antisense compounds provided herein include one or more bicyclic nucleosides comprising a 4' to 2' bridge. Examples of such 4' to 2' bridged bicyclic nucleosides, include but are not limited to one of the formulae: 4'-(CH₂)-O-2' (LNA); 4'-(CH₂)-S-2'; 4'-(CH₂)₂-O-2' (ENA); 4'-CH(CH₃)-O-2' (also referred to as constrained ethyl or cEt) and 4'-CH(CH₂OCH₃)-O-2' (and analogs thereof see U.S. Patent 7,399,845, issued on July 15, 2008); 4'-C(CH₃)(CH₃)-O-2' (and analogs thereof see published International Application WO/2009/006478, published January 8, 2009); 4'-CH₂-N(OCH₃)-2' (and analogs thereof see published International Application WO/2008/150729, published December 11, 2008); 4'-CH₂-O-N(CH₃)-2' (see published U.S. Patent Application US2004-0171570, published September 2, 2004); 4'-CH₂-N(R)-O-2', wherein R is H, C₁-C₁₂ alkyl, or a protecting group (see U.S. Patent 7,427,672, issued on September 23, 2008); 4'-CH₂-C(H)(CH₃)-2' (see Chattopadhyaya *et al.*, *J. Org. Chem.*, 2009, 74, 118-134); and 4'-CH₂-C(=CH₂)-2' (and analogs thereof see published International Application WO 2008/154401, published on December 8, 2008).

Further reports related to bicyclic nucleosides can also be found in published literature (see for example: Singh *et al.*, *Chem. Commun.*, 1998, 4, 455-456; Koshkin *et al.*, *Tetrahedron*, 1998, 54, 3607-3630; Wahlestedt *et al.*, *Proc. Natl. Acad. Sci. U. S. A.*, 2000, 97, 5633-5638; Kumar *et al.*, *Bioorg. Med. Chem. Lett.*, 1998, 8, 2219-2222; Singh *et al.*, *J. Org. Chem.*, 1998, 63, 10035-10039; Srivastava *et al.*, *J. Am. Chem. Soc.*, 2007, 129(26) 8362-8379; Elayadi *et al.*, *Curr. Opinion Invest. Drugs*, 2001, 2, 558-561; Braasch *et al.*, *Chem. Biol.*, 2001, 8, 1-7; and Orum *et al.*, *Curr. Opinion Mol. Ther.*, 2001, 3, 239-243; U.S. Patent Nos. 6,268,490; 6,525,191; 6,670,461; 6,770,748; 6,794,499; 7,034,133; 7,053,207; 7,399,845; 7,547,684; and 7,696,345; U.S. Patent Publication No. US2008-0039618; US2009-0012281; U.S. Patent Serial Nos. 60/989,574; 61/026,995; 61/026,998; 61/056,564; 61/086,231; 61/097,787; and 61/099,844; Published PCT International applications WO 1994/014226; WO 2004/106356; WO 2005/021570; WO 2007/134181; WO 2008/150729; WO 2008/154401; and WO 2009/006478. Each of the foregoing bicyclic nucleosides can be prepared having one or more stereochemical sugar configurations including for example α -L-ribofuranose and β -D-ribofuranose (see PCT international application PCT/DK98/00393, published on March 25, 1999 as WO 99/14226).

In certain embodiments, bicyclic sugar moieties of BNA nucleosides include, but are not limited to, compounds having at least one bridge between the 4' and the 2' position of the pentofuranosyl sugar moiety

wherein such bridges independently comprises 1 or from 2 to 4 linked groups independently selected from -
 $[C(R_a)(R_b)]_n$ -, $-C(R_a)=C(R_b)$ -, $-C(R_a)=N$ -, $-C(=O)$ -, $-C(=NR_a)$ -, $-C(=S)$ -, $-O$ -, $-Si(R_a)_2$ -, $-S(=O)_x$ -, and $-N(R_a)$ -;

wherein:

x is 0, 1, or 2;

5 n is 1, 2, 3, or 4;

each R_a and R_b is, independently, H, a protecting group, hydroxyl, C_1 - C_{12} alkyl, substituted C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl, substituted C_2 - C_{12} alkenyl, C_2 - C_{12} alkynyl, substituted C_2 - C_{12} alkynyl, C_5 - C_{20} aryl, substituted C_5 - C_{20} aryl, heterocycle radical, substituted heterocycle radical, heteroaryl, substituted heteroaryl, C_5 - C_7 alicyclic radical, substituted C_5 - C_7 alicyclic radical, halogen, OJ_1 , NJ_1J_2 , SJ_1 , N_3 , $COOJ_1$, acyl ($C(=O)$ -
 10 H), substituted acyl, CN, sulfonyl ($S(=O)_2J_1$), or sulfoxyl ($S(=O)J_1$); and

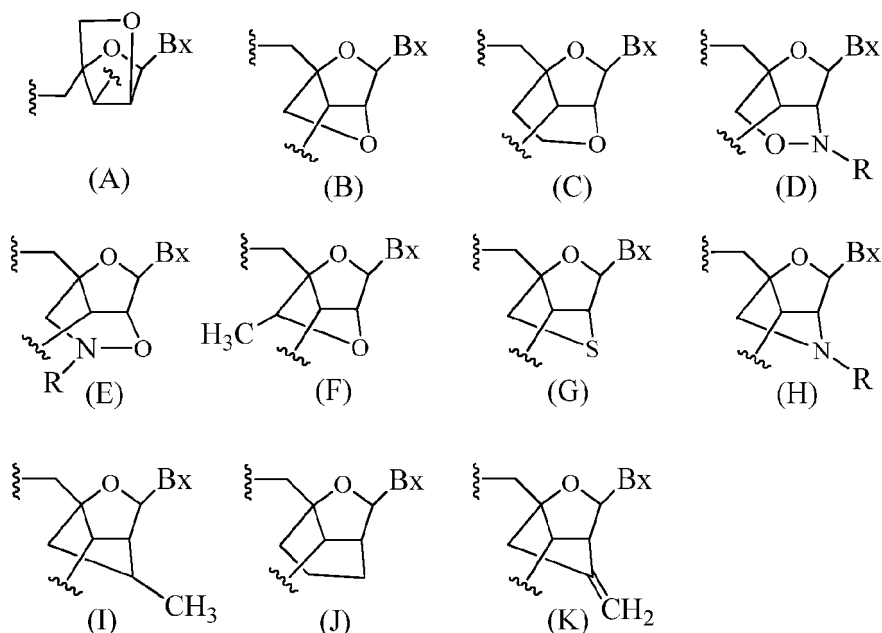
each J_1 and J_2 is, independently, H, C_1 - C_{12} alkyl, substituted C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl, substituted C_2 - C_{12} alkenyl, C_2 - C_{12} alkynyl, substituted C_2 - C_{12} alkynyl, C_5 - C_{20} aryl, substituted C_5 - C_{20} aryl, acyl ($C(=O)$ -
 H), substituted acyl, a heterocycle radical, a substituted heterocycle radical, C_1 - C_{12} aminoalkyl, substituted C_1 - C_{12} aminoalkyl or a protecting group.

15 In certain embodiments, the bridge of a bicyclic sugar moiety is $-[C(R_a)(R_b)]_n$ -, $-[C(R_a)(R_b)]_n-O$ -, $-C(R_aR_b)-N(R)-O$ - or $-C(R_aR_b)-O-N(R)$ -. In certain embodiments, the bridge is 4'- CH_2 -2', 4'-(CH_2)₂-2', 4'-(CH_2)₃-2', 4'- CH_2 -O-2', 4'-(CH_2)₂-O-2', 4'- CH_2 -O-N(R)-2' and 4'- CH_2 -N(R)-O-2' wherein each R is, independently, H, a protecting group or C_1 - C_{12} alkyl.

In certain embodiments, bicyclic nucleosides are further defined by isomeric configuration. For
 20 example, a nucleoside comprising a 4'-2' methylene-oxy bridge, may be in the α -L configuration or in the β -D configuration. Previously, α -L-methyleneoxy (4'- CH_2 -O-2') BNA's have been incorporated into antisense oligonucleotides that showed antisense activity (Frieden *et al.*, *Nucleic Acids Research*, 2003, 21, 6365-6372).

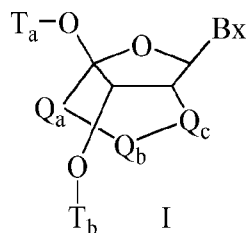
In certain embodiments, bicyclic nucleosides include, but are not limited to, (A) α -L-methyleneoxy
 25 (4'- CH_2 -O-2') BNA, (B) β -D-methyleneoxy (4'- CH_2 -O-2') BNA, (C) ethyleneoxy (4'-(CH_2)₂-O-2') BNA, (D) aminoxy (4'- CH_2 -O-N(R)-2') BNA, (E) oxyamino (4'- CH_2 -N(R)-O-2') BNA, and (F) methyl(methyleneoxy) (4'-CH(CH_3)-O-2') BNA, (G) methylene-thio (4'- CH_2 -S-2') BNA, (H) methylene-amino (4'- CH_2 -N(R)-2') BNA, (I) methyl carbocyclic (4'- CH_2 -CH(CH_3)-2') BNA, (J) propylene carbocyclic (4'-(CH_2)₃-2') BNA and (K) vinyl BNA as depicted below:

30



wherein Bx is the base moiety and R is independently H, a protecting group, C₁-C₁₂ alkyl or C₁-C₁₂ alkoxy.

In certain embodiments, bicyclic nucleosides are provided having Formula I:



wherein:

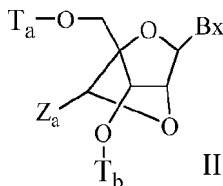
Bx is a heterocyclic base moiety;

-Q_a-Q_b-Q_c- is -CH₂-N(R_c)-CH₂-, -C(=O)-N(R_c)-CH₂-, -CH₂-O-N(R_c)-, -CH₂-N(R_c)-O- or -N(R_c)-O-CH₂;

R_c is C₁-C₁₂ alkyl or an amino protecting group; and

T_a and T_b are each, independently H, a hydroxyl protecting group, a conjugate group, a reactive phosphorus group, a phosphorus moiety or a covalent attachment to a support medium.

In certain embodiments, bicyclic nucleosides are provided having Formula II:



5 wherein:

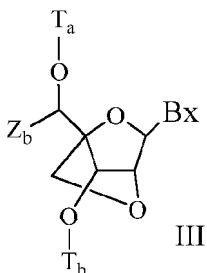
Bx is a heterocyclic base moiety;

Ta and Tb are each, independently H, a hydroxyl protecting group, a conjugate group, a reactive phosphorus group, a phosphorus moiety or a covalent attachment to a support medium;

10 Za is C₁-C₆ alkyl, C₂-C₆ alkenyl, C₂-C₆ alkynyl, substituted C₁-C₆ alkyl, substituted C₂-C₆ alkenyl, substituted C₂-C₆ alkynyl, acyl, substituted acyl, substituted amide, thiol or substituted thio.

In one embodiment, each of the substituted groups is, independently, mono or poly substituted with substituent groups independently selected from halogen, oxo, hydroxyl, OJ_c, NJ_cJ_d, SJ_c, N₃, OC(=X)J_c, and NJ_eC(=X)NJ_cJ_d, wherein each J_c, J_d and J_e is, independently, H, C₁-C₆ alkyl, or substituted C₁-C₆ alkyl and X is O or NJ_c.

15 In certain embodiments, bicyclic nucleosides are provided having Formula III:



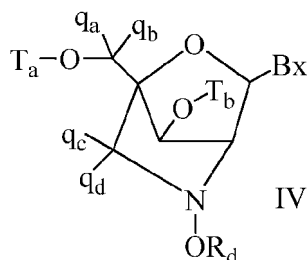
wherein:

Bx is a heterocyclic base moiety;

T_a and T_b are each, independently H, a hydroxyl protecting group, a conjugate group, a reactive phosphorus group, a phosphorus moiety or a covalent attachment to a support medium;

Z_b is C_1 - C_6 alkyl, C_2 - C_6 alkenyl, C_2 - C_6 alkynyl, substituted C_1 - C_6 alkyl, substituted C_2 - C_6 alkenyl, substituted C_2 - C_6 alkynyl or substituted acyl ($C(=O)-$).

5 In certain embodiments, bicyclic nucleosides are provided having Formula IV:



wherein:

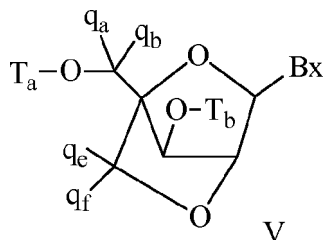
Bx is a heterocyclic base moiety;

10 T_a and T_b are each, independently H, a hydroxyl protecting group, a conjugate group, a reactive phosphorus group, a phosphorus moiety or a covalent attachment to a support medium;

R_d is C_1 - C_6 alkyl, substituted C_1 - C_6 alkyl, C_2 - C_6 alkenyl, substituted C_2 - C_6 alkenyl, C_2 - C_6 alkynyl or substituted C_2 - C_6 alkynyl;

15 each q_a , q_b , q_c and q_d is, independently, H, halogen, C_1 - C_6 alkyl, substituted C_1 - C_6 alkyl, C_2 - C_6 alkenyl, substituted C_2 - C_6 alkenyl, C_2 - C_6 alkynyl or substituted C_2 - C_6 alkynyl, C_1 - C_6 alkoxy, substituted C_1 - C_6 alkoxy, acyl, substituted acyl, C_1 - C_6 aminoalkyl or substituted C_1 - C_6 aminoalkyl;

In certain embodiments, bicyclic nucleosides are provided having Formula V:



wherein:

Bx is a heterocyclic base moiety;

T_a and T_b are each, independently H, a hydroxyl protecting group, a conjugate group, a reactive phosphorus group, a phosphorus moiety or a covalent attachment to a support medium;

5 q_a, q_b, q_c and q_f are each, independently, hydrogen, halogen, C₁-C₁₂ alkyl, substituted C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl, substituted C₂-C₁₂ alkenyl, C₂-C₁₂ alkynyl, substituted C₂-C₁₂ alkynyl, C₁-C₁₂ alkoxy, substituted C₁-C₁₂ alkoxy, OJ_j, SJ_j, SOJ_j, SO₂J_j, NJ_jJ_k, N₃, CN, C(=O)OJ_j, C(=O)NJ_jJ_k, C(=O)J_j, O-C(=O)NJ_jJ_k, N(H)C(=NH)NJ_jJ_k, N(H)C(=O)NJ_jJ_k or N(H)C(=S)NJ_jJ_k;

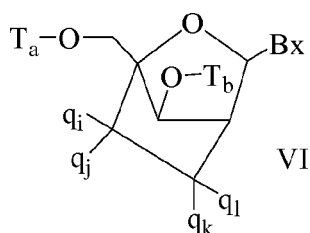
or q_e and q_f together are =C(q_g)(q_h);

10 q_g and q_h are each, independently, H, halogen, C₁-C₁₂ alkyl or substituted C₁-C₁₂ alkyl.

The synthesis and preparation of the methyleneoxy (4'-CH₂-O-2') BNA monomers adenine, cytosine, guanine, 5-methyl-cytosine, thymine and uracil, along with their oligomerization, and nucleic acid recognition properties have been described (Koshkin *et al.*, *Tetrahedron*, 1998, 54, 3607-3630). BNAs and preparation thereof are also described in WO 98/39352 and WO 99/14226.

15 Analogs of methyleneoxy (4'-CH₂-O-2') BNA and 2'-thio-BNAs, have also been prepared (Kumar *et al.*, *Bioorg. Med. Chem. Lett.*, 1998, 8, 2219-2222). Preparation of locked nucleoside analogs comprising oligodeoxyribonucleotide duplexes as substrates for nucleic acid polymerases has also been described (Wengel *et al.*, WO 99/14226). Furthermore, synthesis of 2'-amino-BNA, a novel conformationally restricted high-affinity oligonucleotide analog has been described in the art (Singh *et al.*, *J. Org. Chem.*,
20 1998, 63, 10035-10039). In addition, 2'-amino- and 2'-methylamino-BNA's have been prepared and the thermal stability of their duplexes with complementary RNA and DNA strands has been previously reported.

In certain embodiments, bicyclic nucleosides are provided having Formula VI:



25 wherein:

Bx is a heterocyclic base moiety;

T_a and T_b are each, independently H, a hydroxyl protecting group, a conjugate group, a reactive phosphorus group, a phosphorus moiety or a covalent attachment to a support medium;

each q_i, q_j, q_k and q_l is, independently, H, halogen, C₁-C₁₂ alkyl, substituted C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl, substituted C₂-C₁₂ alkenyl, C₂-C₁₂ alkynyl, substituted C₂-C₁₂ alkynyl, C₁-C₁₂ alkoxy, substituted C₁-C₁₂ alkoxy, OJ_j, SJ_j, SOJ_j, SO₂J_j, NJ_jJ_k, N₃, CN, C(=O)OJ_j, C(=O)NJ_jJ_k, C(=O)J_j, O-C(=O)NJ_jJ_k, N(H)C(=NH)NJ_jJ_k, N(H)C(=O)NJ_jJ_k or N(H)C(=S)NJ_jJ_k; and

q_i and q_j or q_i and q_k together are =C(q_g)(q_h), wherein q_g and q_h are each, independently, H, halogen, C₁-C₁₂ alkyl or substituted C₁-C₁₂ alkyl.

One carbocyclic bicyclic nucleoside having a 4'-(CH₂)₃-2' bridge and the alkenyl analog bridge 4'-CH=CH-CH₂-2' have been described (Freier *et al.*, *Nucleic Acids Research*, 1997, 25(22), 4429-4443 and Albaek *et al.*, *J. Org. Chem.*, 2006, 71, 7731-7740). The synthesis and preparation of carbocyclic bicyclic nucleosides along with their oligomerization and biochemical studies have also been described (Srivastava *et al.*, *J. Am. Chem. Soc.*, 2007, 129(26), 8362-8379).

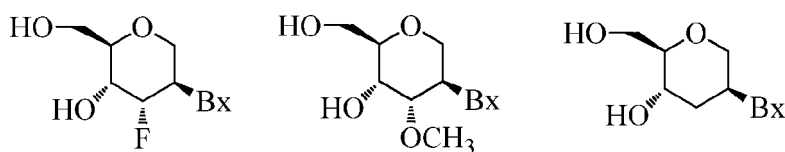
As used herein, "4'-2' bicyclic nucleoside" or "4' to 2' bicyclic nucleoside" refers to a bicyclic nucleoside comprising a furanose ring comprising a bridge connecting two carbon atoms of the furanose ring connects the 2' carbon atom and the 4' carbon atom of the sugar ring.

As used herein, "monocyclic nucleosides" refer to nucleosides comprising modified sugar moieties that are not bicyclic sugar moieties. In certain embodiments, the sugar moiety, or sugar moiety analogue, of a nucleoside may be modified or substituted at any position.

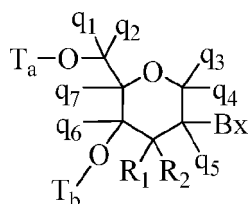
As used herein, "2'-modified sugar" means a furanosyl sugar modified at the 2' position. In certain embodiments, such modifications include substituents selected from: a halide, including, but not limited to substituted and unsubstituted alkoxy, substituted and unsubstituted thioalkyl, substituted and unsubstituted amino alkyl, substituted and unsubstituted alkyl, substituted and unsubstituted allyl, and substituted and unsubstituted alkynyl. In certain embodiments, 2' modifications are selected from substituents including, but not limited to: O[(CH₂)_nO]_mCH₃, O(CH₂)_nNH₂, O(CH₂)_nCH₃, O(CH₂)_nF, O(CH₂)_nONH₂, OCH₂C(=O)N(H)CH₃, and O(CH₂)_nON[(CH₂)_nCH₃]₂, where n and m are from 1 to about 10. Other 2'-substituent groups can also be selected from: C₁-C₁₂ alkyl, substituted alkyl, alkenyl, alkynyl, alkaryl, aralkyl, O-alkaryl or O-aralkyl, SH, SCH₃, OCN, Cl, Br, CN, F, CF₃, OCF₃, SOCH₃, SO₂CH₃, ONO₂, NO₂, N₃, NH₂, heterocycloalkyl, heterocycloalkaryl, aminoalkylamino, polyalkylamino, substituted silyl, an RNA cleaving group, a reporter group, an intercalator, a group for improving pharmacokinetic properties, or a group for

improving the pharmacodynamic properties of an antisense compound, and other substituents having similar properties. In certain embodiments, modified nucleosides comprise a 2'-MOE side chain (Baker *et al.*, *J. Biol. Chem.*, 1997, 272, 11944-12000). Such 2'-MOE substitution have been described as having improved binding affinity compared to unmodified nucleosides and to other modified nucleosides, such as 2'-O-methyl, O-propyl, and O-aminopropyl. Oligonucleotides having the 2'-MOE substituent also have been shown to be antisense inhibitors of gene expression with promising features for *in vivo* use (Martin, *Helv. Chim. Acta*, 1995, 78, 486-504; Altmann *et al.*, *Chimia*, 1996, 50, 168-176; Altmann *et al.*, *Biochem. Soc. Trans.*, 1996, 24, 630-637; and Altmann *et al.*, *Nucleosides Nucleotides*, 1997, 16, 917-926).

As used herein, a "modified tetrahydropyran nucleoside" or "modified THP nucleoside" means a nucleoside having a six-membered tetrahydropyran "sugar" substituted in for the pentofuranosyl residue in normal nucleosides (a sugar surrogate). Modified THP nucleosides include, but are not limited to, what is referred to in the art as hexitol nucleic acid (HNA), anitol nucleic acid (ANA), manitol nucleic acid (MNA) (see Leumann, *Bioorg. Med. Chem.*, 2002, 10, 841-854) or fluoro HNA (F-HNA) having a tetrahydropyran ring system as illustrated below:



In certain embodiments, sugar surrogates are selected having Formula VII:



VII

wherein independently for each of said at least one tetrahydropyran nucleoside analog of Formula VII:

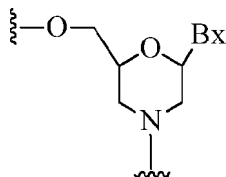
Bx is a heterocyclic base moiety;

T_a and T_b are each, independently, an internucleoside linking group linking the tetrahydropyran nucleoside analog to the antisense compound or one of T_a and T_b is an internucleoside linking group linking the tetrahydropyran nucleoside analog to the antisense compound and the other of T_a and T_b is H, a hydroxyl protecting group, a linked conjugate group or a 5' or 3'-terminal group;

q₁, q₂, q₃, q₄, q₅, q₆ and q₇ are each independently, H, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl or substituted C₂-C₆ alkynyl; and each of R₁ and R₂ is selected from hydrogen, hydroxyl, halogen, substituted or unsubstituted alkoxy, NJ₁J₂, SJ₁, N₃, OC(=X)J₁, OC(=X)NJ₁J₂, NJ₃C(=X)NJ₁J₂ and CN, wherein X is O, S or NJ₁ and each J₁, J₂ and J₃ is, independently, H or C₁-C₆ alkyl.

In certain embodiments, the modified THP nucleosides of Formula VII are provided wherein q₁, q₂, q₃, q₄, q₅, q₆ and q₇ are each H. In certain embodiments, at least one of q₁, q₂, q₃, q₄, q₅, q₆ and q₇ is other than H. In certain embodiments, at least one of q₁, q₂, q₃, q₄, q₅, q₆ and q₇ is methyl. In certain embodiments, THP nucleosides of Formula VII are provided wherein one of R₁ and R₂ is fluoro. In certain embodiments, R₁ is fluoro and R₂ is H; R₁ is methoxy and R₂ is H, and R₁ is methoxyethoxy and R₂ is H.

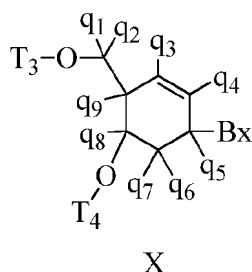
In certain embodiments, sugar surrogates comprise rings having more than 5 atoms and more than one heteroatom. For example nucleosides comprising morpholino sugar moieties and their use in oligomeric compounds has been reported (see for example: Braasch *et al.*, *Biochemistry*, 2002, 41, 4503-4510; and U.S. Patents 5,698,685; 5,166,315; 5,185,444; and 5,034,506). As used here, the term “morpholino” means a sugar surrogate having the following formula:



In certain embodiments, morpholinos may be modified, for example by adding or altering various substituent groups from the above morpholino structure. Such sugar surrogates are referred to herein as “modified morpholinos.”

Combinations of modifications are also provided without limitation, such as 2'-F-5'-methyl substituted nucleosides (see PCT International Application WO 2008/101157 published on 8/21/08 for other disclosed 5', 2'-bis substituted nucleosides) and replacement of the ribosyl ring oxygen atom with S and further substitution at the 2'-position (see published U.S. Patent Application US2005-0130923, published on June 16, 2005) or alternatively 5'-substitution of a bicyclic nucleic acid (see PCT International Application WO 2007/134181, published on 11/22/07 wherein a 4'-CH₂-O-2' bicyclic nucleoside is further substituted at the 5' position with a 5'-methyl or a 5'-vinyl group). The synthesis and preparation of carbocyclic bicyclic nucleosides along with their oligomerization and biochemical studies have also been described (*see, e.g.*, Srivastava *et al.*, *J. Am. Chem. Soc.* 2007, 129(26), 8362-8379).

In certain embodiments, antisense compounds comprise one or more modified cyclohexenyl nucleosides, which is a nucleoside having a six-membered cyclohexenyl in place of the pentofuranosyl residue in naturally occurring nucleosides. Modified cyclohexenyl nucleosides include, but are not limited to those described in the art (see for example commonly owned, published PCT Application WO 2010/036696, published on April 10, 2010, Robeyns *et al.*, *J. Am. Chem. Soc.*, 2008, 130(6), 1979-1984; Horváth *et al.*, *Tetrahedron Letters*, 2007, 48, 3621-3623; Nauwelaerts *et al.*, *J. Am. Chem. Soc.*, 2007, 129(30), 9340-9348; Gu *et al.*, *Nucleosides, Nucleotides & Nucleic Acids*, 2005, 24(5-7), 993-998; Nauwelaerts *et al.*, *Nucleic Acids Research*, 2005, 33(8), 2452-2463; Robeyns *et al.*, *Acta Crystallographica, Section F: Structural Biology and Crystallization Communications*, 2005, F61(6), 585-586; Gu *et al.*, *Tetrahedron*, 2004, 60(9), 2111-2123; Gu *et al.*, *Oligonucleotides*, 2003, 13(6), 479-489; Wang *et al.*, *J. Org. Chem.*, 2003, 68, 4499-4505; Verbeure *et al.*, *Nucleic Acids Research*, 2001, 29(24), 4941-4947; Wang *et al.*, *J. Org. Chem.*, 2001, 66, 8478-82; Wang *et al.*, *Nucleosides, Nucleotides & Nucleic Acids*, 2001, 20(4-7), 785-788; Wang *et al.*, *J. Am. Chem.*, 2000, 122, 8595-8602; Published PCT application, WO 06/047842; and Published PCT Application WO 01/049687; the text of each is incorporated by reference herein, in their entirety). Certain modified cyclohexenyl nucleosides have Formula X.



wherein independently for each of said at least one cyclohexenyl nucleoside analog of Formula X:

Bx is a heterocyclic base moiety;

T₃ and T₄ are each, independently, an internucleoside linking group linking the cyclohexenyl nucleoside analog to an antisense compound or one of T₃ and T₄ is an internucleoside linking group linking the tetrahydropyran nucleoside analog to an antisense compound and the other of T₃ and T₄ is H, a hydroxyl protecting group, a linked conjugate group, or a 5'-or 3'-terminal group; and

q₁, q₂, q₃, q₄, q₅, q₆, q₇, q₈ and q₉ are each, independently, H, C₁-C₆ alkyl, substituted C₁-C₆ alkyl, C₂-C₆ alkenyl, substituted C₂-C₆ alkenyl, C₂-C₆ alkynyl, substituted C₂-C₆ alkynyl or other sugar substituent group.

As used herein, "2'-modified" or "2'-substituted" refers to a nucleoside comprising a sugar comprising a substituent at the 2' position other than H or OH. 2'-modified nucleosides, include, but are not

limited to, bicyclic nucleosides wherein the bridge connecting two carbon atoms of the sugar ring connects the 2' carbon and another carbon of the sugar ring; and nucleosides with non-bridging 2'substituents, such as allyl, amino, azido, thio, O-allyl, O-C₁-C₁₀ alkyl, -OCF₃, O-(CH₂)₂-O-CH₃, 2'-O(CH₂)₂SCH₃, O-(CH₂)₂-O-N(R_m)(R_n), or O-CH₂-C(=O)-N(R_m)(R_n), where each R_m and R_n is, independently, H or substituted or unsubstituted C₁-C₁₀ alkyl. 2'-modified nucleosides may further comprise other modifications, for example at other positions of the sugar and/or at the nucleobase.

As used herein, "2'-F" refers to a nucleoside comprising a sugar comprising a fluoro group at the 2' position of the sugar ring.

As used herein, "2'-OMe" or "2'-OCH₃" or "2'-O-methyl" each refers to a nucleoside comprising a sugar comprising an -OCH₃ group at the 2' position of the sugar ring.

As used herein, "MOE" or "2'-MOE" or "2'-OCH₂CH₂OCH₃" or "2'-O-methoxyethyl" each refers to a nucleoside comprising a sugar comprising a -OCH₂CH₂OCH₃ group at the 2' position of the sugar ring.

As used herein, "oligonucleotide" refers to a compound comprising a plurality of linked nucleosides. In certain embodiments, one or more of the plurality of nucleosides is modified. In certain embodiments, an oligonucleotide comprises one or more ribonucleosides (RNA) and/or deoxyribonucleosides (DNA).

Many other bicyclo and tricyclo sugar surrogate ring systems are also known in the art that can be used to modify nucleosides for incorporation into antisense compounds (see for example review article: Leumann, *Bioorg. Med. Chem.*, 2002, 10, 841-854). Such ring systems can undergo various additional substitutions to enhance activity.

Methods for the preparations of modified sugars are well known to those skilled in the art. Some representative U.S. patents that teach the preparation of such modified sugars include without limitation, U.S.: 4,981,957; 5,118,800; 5,319,080; 5,359,044; 5,393,878; 5,446,137; 5,466,786; 5,514,785; 5,519,134; 5,567,811; 5,576,427; 5,591,722; 5,597,909; 5,610,300; 5,627,053; 5,639,873; 5,646,265; 5,670,633; 5,700,920; 5,792,847 and 6,600,032 and International Application PCT/US2005/019219, filed June 2, 2005 and published as WO 2005/121371 on December 22, 2005, and each of which is herein incorporated by reference in its entirety.

In nucleotides having modified sugar moieties, the nucleobase moieties (natural, modified or a combination thereof) are maintained for hybridization with an appropriate nucleic acid target.

In certain embodiments, antisense compounds comprise one or more nucleosides having modified sugar moieties. In certain embodiments, the modified sugar moiety is 2'-MOE. In certain embodiments, the 2'-MOE modified nucleosides are arranged in a gapmer motif. In certain embodiments, the modified sugar

moiety is a bicyclic nucleoside having a (4'-CH(CH₃)-O-2') bridging group. In certain embodiments, the (4'-CH(CH₃)-O-2') modified nucleosides are arranged throughout the wings of a gapmer motif.

Modified Nucleobases

5 Nucleobase (or base) modifications or substitutions are structurally distinguishable from, yet functionally interchangeable with, naturally occurring or synthetic unmodified nucleobases. Both natural and modified nucleobases are capable of participating in hydrogen bonding. Such nucleobase modifications can impart nuclease stability, binding affinity or some other beneficial biological property to antisense compounds. Modified nucleobases include synthetic and natural nucleobases such as, for example, 5-
10 methylcytosine (5-me-C). Certain nucleobase substitutions, including 5-methylcytosine substitutions, are particularly useful for increasing the binding affinity of an antisense compound for a target nucleic acid. For example, 5-methylcytosine substitutions have been shown to increase nucleic acid duplex stability by 0.6-1.2°C (Sanghvi, Y.S., Crooke, S.T. and Lebleu, B., eds., *Antisense Research and Applications*, CRC Press, Boca Raton, 1993, pp. 276-278).

15 Additional modified nucleobases include 5-hydroxymethyl cytosine, xanthine, hypoxanthine, 2-aminoadenine, 6-methyl and other alkyl derivatives of adenine and guanine, 2-propyl and other alkyl derivatives of adenine and guanine, 2-thiouracil, 2-thiothymine and 2-thiocytosine, 5-halouracil and cytosine, 5-propynyl (-C≡C-CH₃) uracil and cytosine and other alkynyl derivatives of pyrimidine bases, 6-azo uracil, cytosine and thymine, 5-uracil (pseudouracil), 4-thiouracil, 8-halo, 8-amino, 8-thiol, 8-thioalkyl, 8-hydroxyl
20 and other 8-substituted adenines and guanines, 5-halo particularly 5-bromo, 5-trifluoromethyl and other 5-substituted uracils and cytosines, 7-methylguanine and 7-methyladenine, 2-F-adenine, 2-amino-adenine, 8-azaguanine and 8-azaadenine, 7-deazaguanine and 7-deazaadenine and 3-deazaguanine and 3-deazaadenine.

Heterocyclic base moieties can also include those in which the purine or pyrimidine base is replaced with other heterocycles, for example 7-deaza-adenine, 7-deazaguanosine, 2-aminopyridine and 2-pyridone.

25 Nucleobases that are particularly useful for increasing the binding affinity of antisense compounds include 5-substituted pyrimidines, 6-azapyrimidines and N-2, N-6 and O-6 substituted purines, including 2-aminopropyladenine, 5-propynyluracil and 5-propynylcytosine.

In certain embodiments, antisense compounds targeted to a GHR nucleic acid comprise one or more modified nucleobases. In certain embodiments, shortened or gap-widened antisense oligonucleotides targeted
30 to a GHR nucleic acid comprise one or more modified nucleobases. In certain embodiments, the modified nucleobase is 5-methylcytosine. In certain embodiments, each cytosine is a 5-methylcytosine.

Conjugated Antisense compounds

Antisense compounds may be covalently linked to one or more moieties or conjugates which enhance the activity, cellular distribution or cellular uptake of the resulting antisense oligonucleotides. Typical conjugate groups include cholesterol moieties and lipid moieties. Additional conjugate groups include carbohydrates, phospholipids, biotin, phenazine, folate, phenanthridine, anthraquinone, acridine, fluoresceins, rhodamines, coumarins, and dyes.

Antisense compounds can also be modified to have one or more stabilizing groups that are generally attached to one or both termini of antisense compounds to enhance properties such as, for example, nuclease stability. Included in stabilizing groups are cap structures. These terminal modifications protect the antisense compound having terminal nucleic acid from exonuclease degradation, and can help in delivery and/or localization within a cell. The cap can be present at the 5'-terminus (5'-cap), or at the 3'-terminus (3'-cap), or can be present on both termini. Cap structures are well known in the art and include, for example, inverted deoxy abasic caps. Further 3' and 5'-stabilizing groups that can be used to cap one or both ends of an antisense compound to impart nuclease stability include those disclosed in WO 03/004602 published on January 16, 2003.

In certain embodiments, antisense compounds, including, but not limited to those particularly suited for use as ssRNA, are modified by attachment of one or more conjugate groups. In general, conjugate groups modify one or more properties of the attached oligonucleotide, including but not limited to pharmacodynamics, pharmacokinetics, stability, binding, absorption, cellular distribution, cellular uptake, charge and clearance. Conjugate groups are routinely used in the chemical arts and are linked directly or via an optional conjugate linking moiety or conjugate linking group to a parent compound such as an oligonucleotide. Conjugate groups includes without limitation, intercalators, reporter molecules, polyamines, polyamides, polyethylene glycols, thioethers, polyethers, cholesterol, thiocholesterols, cholic acid moieties, folate, lipids, phospholipids, biotin, phenazine, phenanthridine, anthraquinone, adamantane, acridine, fluoresceins, rhodamines, coumarins and dyes. Certain conjugate groups have been described previously, for example: cholesterol moiety (Letsinger et al., Proc. Natl. Acad. Sci. USA, 1989, 86, 6553-6556), cholic acid (Manoharan et al., Bioorg. Med. Chem. Lett., 1994, 4, 1053-1060), a thioether, e.g., hexyl-S-tritylthiol (Manoharan et al., Ann. N.Y. Acad. Sci., 1992, 660, 306-309; Manoharan et al., Bioorg. Med. Chem. Lett., 1993, 3, 2765-2770), a thiocholesterol (Oberhauser et al., Nucl. Acids Res., 1992, 20, 533-538), an aliphatic chain, e.g., do-decan-diol or undecyl residues (Saison-Behmoaras et al., EMBO J., 1991, 10, 1111-1118; Kabanov et al., FEBS Lett., 1990, 259, 327-330; Svinarchuk et al., Biochimie, 1993, 75, 49-54), a phospholipid, e.g., di-hexadecyl-rac-glycerol or triethyl-ammonium 1,2-di-O-hexadecyl-rac-glycero-3-H-phosphonate (Manoharan et al., Tetrahedron Lett., 1995, 36, 3651-3654; Shea et al., Nucl. Acids Res., 1990, 18, 3777-3783), a polyamine or a polyethylene glycol chain (Manoharan et al., Nucleosides & Nucleotides,

1995, 14, 969-973), or adamantane acetic acid (Manoharan et al., Tetrahedron Lett., 1995, 36, 3651-3654), a palmitoyl moiety (Mishra et al., Biochim. Biophys. Acta, 1995, 1264, 229-237), or an octadecylamine or hexylamino-carbonyl-oxycholesterol moiety (Crooke et al., J. Pharmacol. Exp. Ther., 1996, 277, 923-937).

For additional conjugates including those useful for ssRNA and their placement within antisense compounds, see e.g., US Application No.; 61/583,963.

In vitro testing of antisense oligonucleotides

Described herein are methods for treatment of cells with antisense oligonucleotides, which can be modified appropriately for treatment with other antisense compounds.

Cells may be treated with antisense oligonucleotides when the cells reach approximately 60-80% confluency in culture.

One reagent commonly used to introduce antisense oligonucleotides into cultured cells includes the cationic lipid transfection reagent LIPOFECTIN (Invitrogen, Carlsbad, CA). Antisense oligonucleotides may be mixed with LIPOFECTIN in OPTI-MEM 1 (Invitrogen, Carlsbad, CA) to achieve the desired final concentration of antisense oligonucleotide and a LIPOFECTIN concentration that may range from 2 to 12 ug/mL per 100 nM antisense oligonucleotide.

Another reagent used to introduce antisense oligonucleotides into cultured cells includes LIPOFECTAMINE (Invitrogen, Carlsbad, CA). Antisense oligonucleotide is mixed with LIPOFECTAMINE in OPTI-MEM 1 reduced serum medium (Invitrogen, Carlsbad, CA) to achieve the desired concentration of antisense oligonucleotide and a LIPOFECTAMINE concentration that may range from 2 to 12 ug/mL per 100 nM antisense oligonucleotide.

Another technique used to introduce antisense oligonucleotides into cultured cells includes electroporation.

Yet another technique used to introduce antisense oligonucleotides into cultured cells includes free uptake of the oligonucleotides by the cells.

Cells are treated with antisense oligonucleotides by routine methods. Cells may be harvested 16-24 hours after antisense oligonucleotide treatment, at which time RNA or protein levels of target nucleic acids are measured by methods known in the art and described herein. In general, when treatments are performed in multiple replicates, the data are presented as the average of the replicate treatments.

The concentration of antisense oligonucleotide used varies from cell line to cell line. Methods to determine the optimal antisense oligonucleotide concentration for a particular cell line are well known in the art. Antisense oligonucleotides are typically used at concentrations ranging from 1 nM to 300 nM when transfected with LIPOFECTAMINE. Antisense oligonucleotides are used at higher concentrations ranging
5 from 625 to 20,000 nM when transfected using electroporation.

RNA Isolation

RNA analysis can be performed on total cellular RNA or poly(A)+ mRNA. Methods of RNA isolation are well known in the art. RNA is prepared using methods well known in the art, for example, using
10 the TRIZOL Reagent (Invitrogen, Carlsbad, CA) according to the manufacturer's recommended protocols.

Certain Indications

Certain embodiments provided herein relate to methods of treating, preventing, or ameliorating a disease associated with excess growth hormone in a subject by administering a GHR specific inhibitor, such
15 as an antisense compound or oligonucleotide targeted to GHR. In certain aspects, the disease associated with excess growth hormone is acromegaly. In certain aspects, the disease associated with excess growth hormone is gigantism.

Certain embodiments provide a method of treating, preventing, or ameliorating acromegaly in a subject by administering a GHR specific inhibitor, such as an antisense compound or oligonucleotide targeted
20 to GHR. Acromegaly is a disease associated with excess growth hormone (GH). In over 90 percent of acromegaly patients, the overproduction of growth hormones is caused by a benign tumor of the pituitary gland, called an adenoma, which produces excess growth hormone and compresses surrounding brain tissues. Expansion of the adenoma can cause headaches and visual impairment that often accompany acromegaly. In some instances, acromegaly is caused by tumors of the pancreas, lungs, or adrenal glands that lead to an
25 excess of GH, either by producing GH or by producing Growth Hormone Releasing Hormone (GHRH), the hormone that stimulates the pituitary to make GH.

Acromegaly most commonly affects adults in middle age and can result in severe disfigurement, complicating conditions, and premature death. Because of its pathogenesis and slow progression, acromegaly often goes undiagnosed until changes in external features become noticeable, such as changes in the face.
30 Acromegaly is often associated with gigantism.

Features of acromegaly include soft tissue swelling resulting in enlargement of the hands, feet, nose, lips and ears, and a general thickening of the skin; soft tissue swelling of internal organs, such as the heart and kidney; vocal cord swelling resulting in a low voice and slow speech; expansion of the skull; pronounced eyebrow protrusion, often with ocular distension; pronounced lower jaw protrusion and enlargement of the tongue; teeth gapping; and carpal tunnel syndrome. In certain embodiments, any one or combination of these features of acromegaly can be treated, prevented, or ameliorated by administering a compound or composition targeted to GHR provided herein.

EXAMPLES

Non-limiting disclosure and incorporation by reference

While certain compounds, compositions and methods described herein have been described with specificity in accordance with certain embodiments, the following examples serve only to illustrate the compounds described herein and are not intended to limit the same. Each of the references recited in the present application is incorporated herein by reference in its entirety.

Example 1: Antisense inhibition of human growth hormone receptor in Hep3B cells by MOE gapmers

Antisense oligonucleotides were designed targeting a growth hormone receptor (GHR) nucleic acid and were tested for their effects on GHR mRNA in vitro. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cultured Hep3B cells at a density of 20,000 cells per well were transfected using electroporation with 4,500 nM antisense oligonucleotide. After a treatment period of approximately 24 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB (forward sequence CGAGTTCAGTGAGGTGCTCTATGT, designated herein as SEQ ID NO: 2297; reverse sequence AAGAGCCATGGAAAGTAGAAATCTTC, designated herein as SEQ ID NO: 2298; probe sequence TTCCTCAGATGAGCCAATT, designated herein as SEQ ID NO: 2299) was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN®. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The newly designed chimeric antisense oligonucleotides in the Tables below were designed as 5-10-5 MOE or 3-10-4 MOE gapmers. The 5-10-5 MOE gapmers are 20 nucleosides in length, wherein the central gap segment comprises of ten 2'-deoxynucleosides and is flanked by wing segments on the 5' direction and the 3' direction comprising five nucleosides each. The 3-10-4 MOE gapmers are 17 nucleosides in length,

wherein the central gap segment comprises of ten 2'-deoxynucleosides and is flanked by wing segments on the 5' direction and the 3' direction comprising three and four nucleosides respectively. Each nucleoside in the 5' wing segment and each nucleoside in the 3' wing segment has a 2'-MOE modification. The internucleoside linkages throughout each gapmer are phosphorothioate (P=S) linkages. All cytosine residues throughout each gapmer are 5-methylcytosines. "Start site" indicates the 5'-most nucleoside to which the gapmer is targeted in the human gene sequence. "Stop site" indicates the 3'-most nucleoside to which the gapmer is targeted human gene sequence. Each gapmer listed in the Tables below is targeted to either the human GHR mRNA, designated herein as SEQ ID NO: 1 (GENBANK Accession No. NM_000163.4) or the human GHR genomic sequence, designated herein as SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000). 'n/a' indicates that the antisense oligonucleotide does not target that particular gene sequence with 100% complementarity. In case the sequence alignment for a target gene in a particular table is not shown, it is understood that none of the oligonucleotides presented in that table align with 100% complementarity with that target gene.

Table 1

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Target Region	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
523266	164	183	Exon 1	ACCTCCGAGCTTCGCCTCTG	64	3040	3059	20
523267	171	190	Exon-exon junction	CTGTAGGACCTCCGAGCTTC	31	n/a	n/a	21
523268	178	197	Exon-exon junction	TCCATACCTGTAGGACCTCC	37	n/a	n/a	22
523271	206	225	Exon 2	TGCCAAGGTCAACAGCAGCT	80	144990	145009	23
523272	213	232	Exon 2	CTGCCAGTGCCAAGGTCAAC	53	144997	145016	24
523273	220	239	Exon 2	CTTGATCCTGCCAGTGCCAA	49	145004	145023	25
523274	227	246	Exon 2	AGCATCACTTGATCCTGCCA	67	145011	145030	26
523275	234	253	Exon 2	CAGAAAAAGCATCACTTGAT	0	145018	145037	27
523276	241	260	Exon 2	TCACTTCCAGAAAAAGCATC	1	145025	145044	28
523284	361	380	Exon 4	GTCTCTCGCTCAGGTGAACG	48	268024	268043	29
523285	368	387	Exon 4	TGAAAAAGTCTCTCGCTCAG	15	268031	268050	30
523286	375	394	Exon 4	AGTGGCATGAAAAAGTCTCT	14	268038	268057	31
523287	382	401	Exon 4	TCTGTCCAGTGGCATGAAAA	4	268045	268064	32
523301	625	644	Exon 6	GGATCTGGTTGCACTATTTT	36	n/a	n/a	33
523302	632	651	Exon 6	AATGGGTGGATCTGGTTGCA	28	278926	278945	34
523303	647	666	Exon 6	AGTCCAGTTGAGGGCAATGG	26	278941	278960	35

523304	654	673	Exon 6	TCAGTAAAGTCCAGTTGAGG	0	278948	278967	36
523305	675	694	Exon 6	GAATCCCAGTTAAACTGACG	19	278969	278988	37
523306	682	701	Exon 6	TCTGCATGAATCCCAGTTAA	39	278976	278995	38
523309	736	755	Exon 6	ATCCATCCTTTCTGAATATC	34	279030	279049	39
523310	743	762	Exon 6	CAGAACCATCCATCCTTTCT	31	279037	279056	40
523311	750	769	Exon 6	CATACTCCAGAACCATCCAT	44	279044	279063	41
523312	757	776	Exon 6	TGAAGTTCATACTCCAGAAC	23	279051	279070	42
523313	764	783	Exon 6	TTTGTATTGAAGTTCATACT	6	279058	279077	43
523314	771	790	Exon 6	TTACTTCTTTGTATTGAAGT	0	279065	279084	44
523315	778	797	Exon 6	GTTTCATTTACTTCTTTGTA	3	279072	279091	45
523316	785	804	Exon 6	CCATTTAGTTTCATTTACTT	0	279079	279098	46
523317	792	811	Exon 4- exon 5 junction	TCATTTTCCATTTAGTTTCA	19	n/a	n/a	47
523323	862	881	Exon 7	ACACGCACTTCATATTCCTT	63	290360	290379	48
523324	869	888	Exon 7	GGATCTCACACGCACTTCAT	80	290367	290386	49
523328	926	945	Exon 7	AAGTGTTACATAGAGCACCT	56	290424	290443	50
523329	933	952	Exon 7	TCTGAGGAAGTGTTACATAG	53	290431	290450	51
523330	957	976	Exon 7	CTTCTTCACATGTAAATTGG	32	290455	290474	52
523331	964	983	Exon 5- exon 6 junction	TAGAAATCTTCTTCACATGT	4	n/a	n/a	53
523332	971	990	Exon 5- exon 6 junction	TGGAAAGTAGAAATCTTCTT	9	n/a	n/a	54
523333	978	997	Exon 8	AGAGCCATGGAAAGTAGAAA	46	292532	292551	55
523334	985	1004	Exon 8	ATAATTAAGAGCCATGGAAA	0	292539	292558	56

Table 2

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Target Region	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
523421	2072	2091	exon 10	CAGTTGGTCTGTGCTCACAT	76	298489	298508	57
533002	207	226	exon 2	GTGCCAAGGTCAACAGCAGC	63	144991	145010	58
533003	208	227	exon 2	AGTGCCAAGGTCAACAGCAG	62	144992	145011	59
533004	225	244	exon 2	CATCACTTGATCCTGCCAGT	53	145009	145028	60
533005	226	245	exon 2	GCATCACTTGATCCTGCCAG	80	145010	145029	61
533006	228	247	exon 2	AAGCATCACTTGATCCTGCC	75	145012	145031	62
533007	229	248	exon 2	AAAGCATCACTTGATCCTGC	61	145013	145032	63
533019	867	886	exon 7	ATCTCACACGCACTTCATAT	35	290365	290384	64
533020	868	887	exon 7	GATCTCACACGCACTTCATA	47	290366	290385	65
533021	870	889	exon 7	TGGATCTCACACGCACTTCA	86	290368	290387	66

533022	871	890	exon 7	TTGGATCTCACACGCACTTC	70	290369	290388	67
533037	1360	1379	exon 10	TCCAGAATGTCAGGTTTACA	59	297777	297796	68
533038	1361	1380	exon 10	CTCCAGAATGTCAGGTTTAC	74	297778	297797	69
533039	1363	1382	exon 10	GTCTCCAGAATGTCAGGTTT	45	297780	297799	70
533040	1364	1383	exon 10	AGTCTCCAGAATGTCAGGTT	51	297781	297800	71
533042	1525	1544	exon 10	GCTTGGATAAACTGGGCTG	41	297942	297961	72
533043	1526	1545	exon 10	TGCTTGGATAAACTGGGCT	46	297943	297962	73
533044	1528	1547	exon 10	TCTGCTTGGATAAACTGGG	55	297945	297964	74
533045	1529	1548	exon 10	CTCTGCTTGGATAAACTGG	47	297946	297965	75
533046	1530	1549	exon 10	TCTCTGCTTGGATAAACTG	54	297947	297966	76
533047	1744	1763	exon 10	CAGAGTGAGACCATTTCGG	47	298161	298180	77
533048	1745	1764	exon 10	GCAGAGTGAGACCATTTCG	60	298162	298181	78
533049	1747	1766	exon 10	TGGCAGAGTGAGACCATTTC	65	298164	298183	79
533050	1748	1767	exon 10	TTGGCAGAGTGAGACCATT	47	298165	298184	80
533051	1749	1768	exon 10	CTTGGCAGAGTGAGACCATT	30	298166	298185	81
533066	2685	2704	exon 10	CAGTGTGTAGTGTAATATA	53	299102	299121	82
533067	2686	2705	exon 10	ACAGTGTGTAGTGTAATATA	68	299103	299122	83
533068	2688	2707	exon 10	ACACAGTGTGTAGTGTAATA	62	299105	299124	84
533069	2689	2708	exon 10	TACACAGTGTGTAGTGTAAT	55	299106	299125	85
533070	2690	2709	exon 10	GTACACAGTGTGTAGTGTA	50	299107	299126	86
533071	3205	3224	exon 10	TGTACCTTATTCCCTTCCTG	68	299622	299641	87
533072	3206	3225	exon 10	TTGTACCTTATTCCCTTCCT	61	299623	299642	88
533073	3208	3227	exon 10	TCTTGTACCTTATTCCCTTC	60	299625	299644	89
533074	3209	3228	exon 10	TTCTTGTACCTTATTCCCTT	46	299626	299645	90

Table 3

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intronic and exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Target Region	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532174	n/a	n/a	Intron 1	ACATGTACCCAAACCAACAC	37	18731	18750	91
533086	3210	3229	Exon 10	CTTCTTGTACCTTATTCCCT	72	299627	299646	92
533087	3212	3231	Exon 10	TGCTTCTTGTACCTTATTCC	77	299629	299648	93
533088	3213	3232	Exon 10	ATGCTTCTTGTACCTTATTC	63	299630	299649	94
533089	3215	3234	Exon 10	AAATGCTTCTTGTACCTTAT	67	299632	299651	95
533090	3216	3235	Exon 10	AAAATGCTTCTTGTACCTTA	50	299633	299652	96
533091	3217	3236	Exon 10	CAAAATGCTTCTTGTACCTT	44	299634	299653	97
533092	3518	3537	Exon 10	CTTCTGAATGCTTGCTTTGA	29	299935	299954	98
533093	3519	3538	Exon 10	TCTTCTGAATGCTTGCTTTG	47	299936	299955	99
533094	3521	3540	Exon 10	TTTCTTCTGAATGCTTGCTT	63	299938	299957	100

533095	3522	3541	Exon 10	TTTTCTTCTGAATGCTTGCT	51	299939	299958	101
533096	3523	3542	Exon 10	TTTTTCTTCTGAATGCTTGC	34	299940	299959	102
533097	4041	4060	Exon 10	TGCGATAAATGGGAAATACT	36	300458	300477	103
533098	4042	4061	Exon 10	CTGCGATAAATGGGAAATAC	52	300459	300478	104
533099	4043	4062	Exon 10	TCTGCGATAAATGGGAAATA	41	300460	300479	105
533100	4045	4064	Exon 10	GGTCTGCGATAAATGGGAAA	40	300462	300481	106
533101	4046	4065	Exon 10	AGGTCTGCGATAAATGGGAA	39	300463	300482	107
533102	4048	4067	Exon 10	AAAGGTCTGCGATAAATGGG	34	300465	300484	108
533103	4049	4068	Exon 10	AAAAGGTCTGCGATAAATGG	35	300466	300485	109
533104	4050	4069	Exon 10	AAAAAGGTCTGCGATAAATG	15	300467	300486	110
533115	n/a	n/a	Intron 1	CATGAAGGCCACTCTTCCAA	63	12777	12796	111
533116	n/a	n/a	Intron 1	CCATGAAGGCCACTCTTCCA	78	12778	12797	112
533117	n/a	n/a	Intron 1	CCCATGAAGGCCACTCTTCC	71	12779	12798	113
533118	n/a	n/a	Intron 1	TGCCCATGAAGGCCACTCTT	66	12781	12800	114
533119	n/a	n/a	Intron 1	TTGCCCATGAAGGCCACTCT	60	12782	12801	115
533120	n/a	n/a	Intron 1	GTTGCCCATGAAGGCCACTC	74	12783	12802	116
533121	n/a	n/a	Intron 1	GGTCTTTCATGAATCAAGCT	79	17927	17946	117
533122	n/a	n/a	Intron 1	TGGTCTTTCATGAATCAAGC	83	17928	17947	118
533123	n/a	n/a	Intron 1	ATGGTCTTTCATGAATCAAG	83	17929	17948	119
533124	n/a	n/a	Intron 1	TGATGGTCTTTCATGAATCA	78	17931	17950	120
533125	n/a	n/a	Intron 1	CTGATGGTCTTTCATGAATC	82	17932	17951	121
533126	n/a	n/a	Intron 1	GCTGATGGTCTTTCATGAAT	74	17933	17952	122
533127	n/a	n/a	Intron 1	GTACCCAAACCAACACTAAT	57	18727	18746	123
533128	n/a	n/a	Intron 1	TGTACCCAAACCAACACTAA	65	18728	18747	124
533129	n/a	n/a	Intron 1	ATGTACCCAAACCAACACTA	64	18729	18748	125
533130	n/a	n/a	Intron 1	GACATGTACCCAAACCAACA	63	18732	18751	126
533131	n/a	n/a	Intron 1	AGACATGTACCCAAACCAAC	81	18733	18752	127
533132	n/a	n/a	Intron 1	AGGAATGGAAAACCAAATAT	49	26494	26513	128
533133	n/a	n/a	Intron 1	CAGGAATGGAAAACCAAATA	74	26495	26514	129
						121986	122005	
533134	n/a	n/a	Intron 1	TCAGGAATGGAAAACCAAAT	73	26496	26515	130
						121987	122006	
533135	n/a	n/a	Intron 1	ACTCAGGAATGGAAAACCAA	77	26498	26517	131
						113032	113051	
						121989	122008	
533136	n/a	n/a	Intron 1	AACTCAGGAATGGAAAACCA	79	26499	26518	132
						113033	113052	
						121990	122009	
533137	n/a	n/a	Intron 1	TAACTCAGGAATGGAAAACC	67	26500	26519	133
						113034	113053	
						121991	122010	
533138	n/a	n/a	Intron 1	CAAAATTACTGCAGTCACAG	67	39716	39735	134
533139	n/a	n/a	Intron 1	ACAAAATTACTGCAGTCACA	81	39717	39736	135

533140	n/a	n/a	Intron 1	TACAAAATTACTGCAGTCAC	81	39718	39737	136
533141	n/a	n/a	Intron 1	CATACAAAATTACTGCAGTC	67	39720	39739	137
533142	n/a	n/a	Intron 1	ACATACAAAATTACTGCAGT	48	39721	39740	138
533143	n/a	n/a	Intron 1	AACATACAAAATTACTGCAG	53	39722	39741	139
533144	n/a	n/a	Intron 1	TTTTAGTATGAACCTTAAAA	0	42139	42158	140
533145	n/a	n/a	Intron 1	CTTTTAGTATGAACCTTAAA	38	42140	42159	141
533146	n/a	n/a	Intron 1	TCTTTTAGTATGAACCTTAA	57	42141	42160	142
533147	n/a	n/a	Intron 1	AATCTTTTAGTATGAACCTT	60	42143	42162	143
533148	n/a	n/a	Intron 1	CAATCTTTTAGTATGAACCT	70	42144	42163	144
533149	n/a	n/a	Intron 1	ACAATCTTTTAGTATGAACC	60	42145	42164	145
533150	n/a	n/a	Intron 1	AAGTTATGTGACTCTGAGCA	67	43174	43193	146
533151	n/a	n/a	Intron 1	CAAGTTATGTGACTCTGAGC	67	43175	43194	147
533152	n/a	n/a	Intron 1	TCAAGTTATGTGACTCTGAG	63	43176	43195	148
533153	n/a	n/a	Intron 1	AGTTCTCCATTAGGGTTCTG	83	50948	50967	149
533154	n/a	n/a	Intron 1	TAGTTCTCCATTAGGGTTCT	76	50949	50968	150
533155	n/a	n/a	Intron 1	ATAGTTCTCCATTAGGGTTC	51	50950	50969	151
533156	n/a	n/a	Intron 1	AAGCAGGTTGGCAGACAGAC	79	53467	53486	152
533157	n/a	n/a	Intron 1	GAAGCAGGTTGGCAGACAGA	60	53468	53487	153
533158	n/a	n/a	Intron 1	GGAAGCAGGTTGGCAGACAG	67	53469	53488	154
533159	n/a	n/a	Intron 1	TCTTCTTGTGAGCTGGCTTC	61	64882	64901	155
533160	n/a	n/a	Intron 1	GTCTTCTTGTGAGCTGGCTT	83	64883	64902	156
533161	n/a	n/a	Intron 1	AGTCTTCTTGTGAGCTGGCT	81	64884	64903	157

Table 4

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intronic and exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Target Region	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
533133	n/a	n/a	Intron 1	CAGGAATGGAAAACCAAATA	76	26495	26514	129
						121986	122005	
533134	n/a	n/a	Intron 1	TCAGGAATGGAAAACCAAAT	83	26496	26515	130
						121987	122006	
533174	n/a	n/a	Intron 1	TAAGTCTTCTTGTGAGCTGG	73	64886	64905	158
533175	n/a	n/a	Intron 1	TTAAGTCTTCTTGTGAGCTG	58	64887	64906	159
533176	n/a	n/a	Intron 1	ATTAAGTCTTCTTGTGAGCT	51	64888	64907	160
533177	n/a	n/a	Intron 1	TCTCTTCCACTCACATCCAT	72	65989	66008	161
533178	n/a	n/a	Intron 1	GTCTCTTCCACTCACATCCA	86	65990	66009	162
533179	n/a	n/a	Intron 1	AGTCTCTTCCACTCACATCC	80	65991	66010	163
533180	n/a	n/a	Intron 1	TAAGTATTTGTAGCAGTTGC	31	78195	78214	164
533181	n/a	n/a	Intron 1	CTAAGTATTTGTAGCAGTTG	14	78196	78215	165

533182	n/a	n/a	Intron 1	GCTAAGTATTTGTAGCAGTT	59	78197	78216	166
533183	n/a	n/a	Intron 1	TGGCTAAGTATTTGTAGCAG	34	78199	78218	167
533184	n/a	n/a	Intron 1	TTGGCTAAGTATTTGTAGCA	18	78200	78219	168
533185	n/a	n/a	Intron 1	TTTGGCTAAGTATTTGTAGC	21	78201	78220	169
533186	n/a	n/a	Intron 1	AAAATGTCAACAGTGCATAG	61	80636	80655	170
533187	n/a	n/a	Intron 1	CAAAATGTCAACAGTGCATA	78	80637	80656	171
533188	n/a	n/a	Intron 1	CCAAAATGTCAACAGTGCAT	85	80638	80657	172
533189	n/a	n/a	Intron 1	GCCCCAAAATGTCAACAGTGC	82	80640	80659	173
533190	n/a	n/a	Intron 1	GGCCCCAAAATGTCAACAGTG	60	80641	80660	174
533191	n/a	n/a	Intron 1	TGGCCCCAAAATGTCAACAGT	31	80642	80661	175
533192	n/a	n/a	Intron 1	CAGAATCTTCTCTTTGGCCA	66	98624	98643	176
533193	n/a	n/a	Intron 1	GCAGAATCTTCTCTTTGGCC	81	98625	98644	177
533194	n/a	n/a	Intron 1	TGCAGAATCTTCTCTTTGGC	72	98626	98645	178
533195	n/a	n/a	Intron 1	TTTGCAGAATCTTCTCTTTG	33	98628	98647	179
533196	n/a	n/a	Intron 1	ATTTGCAGAATCTTCTCTTT	27	98629	98648	180
533197	n/a	n/a	Intron 1	AATTTGCAGAATCTTCTCTT	38	98630	98649	181
533198	n/a	n/a	Intron 1	ATAAAGCTATGCCATAAAGC	37	99478	99497	182
533199	n/a	n/a	Intron 1	CATAAAGCTATGCCATAAAG	14	99479	99498	183
533200	n/a	n/a	Intron 1	CCATAAAGCTATGCCATAAA	30	99480	99499	184
533201	n/a	n/a	Intron 1	GACCATAAAGCTATGCCATA	54	99482	99501	185
533202	n/a	n/a	Intron 1	TGACCATAAAGCTATGCCAT	64	99483	99502	186
533203	n/a	n/a	Intron 1	CTGACCATAAAGCTATGCCA	61	99484	99503	187
533204	n/a	n/a	Intron 1	CAAAAAGTTGAGCTGAGAAA	0	101078	101097	188
533205	n/a	n/a	Intron 1	CCAAAAGTTGAGCTGAGAA	28	101079	101098	189
533206	n/a	n/a	Intron 1	CCCAAAAAGTTGAGCTGAGA	52	101080	101099	190
533207	n/a	n/a	Intron 1	CACCCAAAAGTTGAGCTGA	60	101082	101101	191
533208	n/a	n/a	Intron 1	ACACCCAAAAGTTGAGCTG	34	101083	101102	192
533209	n/a	n/a	Intron 1	TACACCCAAAAGTTGAGCT	36	101084	101103	193
533210	n/a	n/a	Intron 1	CTTTTAATGGCACCCAAGCA	41	103566	103585	194
533211	n/a	n/a	Intron 1	GCTTTTAATGGCACCCAAGC	54	103567	103586	195
533212	n/a	n/a	Intron 1	TGCTTTTAATGGCACCCAAG	67	103568	103587	196
533213	n/a	n/a	Intron 1	AATGCTTTTAATGGCACCCA	73	103570	103589	197
533214	n/a	n/a	Intron 1	AAATGCTTTTAATGGCACCC	73	103571	103590	198
533215	n/a	n/a	Intron 1	GAAATGCTTTTAATGGCACC	41	103572	103591	199
533216	n/a	n/a	Intron 1	TAATTCTTAAGGGCCCTCTG	36	106963	106982	200
533217	n/a	n/a	Intron 1	ATAATTCTTAAGGGCCCTCT	45	106964	106983	201
533218	n/a	n/a	Intron 1	CATAATTCTTAAGGGCCCTC	50	106965	106984	202
533219	n/a	n/a	Intron 1	AGCATAATTCTTAAGGGCCC	48	106967	106986	203
533220	n/a	n/a	Intron 1	TAGCATAATTCTTAAGGGCC	52	106968	106987	204
533221	n/a	n/a	Intron 1	TTAGCATAATTCTTAAGGGC	28	106969	106988	205
533222	n/a	n/a	Intron 1	AGGAATGGAAAACCAAACAT	13	113028	113047	206
533223	n/a	n/a	Intron 1	CAGGAATGGAAAACCAAACA	64	113029	113048	207
533224	n/a	n/a	Intron 1	TCAGGAATGGAAAACCAAAC	61	113030	113049	208

533225	n/a	n/a	Intron 1	AGGAATGGAAAACCAAATAC	18	121985	122004	209
533226	n/a	n/a	Intron 1	CATGACTATGTTCTGGCAAG	37	125591	125610	210
533227	n/a	n/a	Intron 1	ACATGACTATGTTCTGGCAA	44	125592	125611	211
533228	n/a	n/a	Intron 1	CACATGACTATGTTCTGGCA	63	125593	125612	212
533229	n/a	n/a	Intron 1	GTCACATGACTATGTTCTGG	47	125595	125614	213
533230	n/a	n/a	Intron 1	GGTCACATGACTATGTTCTG	49	125596	125615	214
533231	n/a	n/a	Intron 1	TGGTCACATGACTATGTTCT	30	125597	125616	215
533232	n/a	n/a	Intron 2	CTGAATTCTGAGCTCTGGAA	73	145428	145447	216
533233	n/a	n/a	Intron 2	CCTGAATTCTGAGCTCTGGA	88	145429	145448	217
533234	n/a	n/a	Intron 2	GCCTGAATTCTGAGCTCTGG	92	145430	145449	218
533235	n/a	n/a	Intron 2	AAGCCTGAATTCTGAGCTCT	83	145432	145451	219
533236	n/a	n/a	Intron 2	CAAGCCTGAATTCTGAGCTC	68	145433	145452	220
533237	n/a	n/a	Intron 2	ACAAGCCTGAATTCTGAGCT	81	145434	145453	221
533238	n/a	n/a	Intron 2	GGATCTCAGCTGCAATTCTT	72	146235	146254	222
533239	n/a	n/a	Intron 2	AGGATCTCAGCTGCAATTCT	53	146236	146255	223
533240	n/a	n/a	Intron 2	GAGGATCTCAGCTGCAATTC	69	146237	146256	224
533241	n/a	n/a	Intron 2	CAGAGGATCTCAGCTGCAAT	69	146239	146258	225
533242	n/a	n/a	Intron 2	GCAGAGGATCTCAGCTGCAA	76	146240	146259	226
533243	230	249	Exon 2	AAAAGCATCACTTGATCCTG	23	145014	145033	227

Table 5

Inhibition of GHR mRNA by 3-10-4 MOE gapmers targeting intronic and exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Target Region	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
539284	206	222	Exon 2	CAAGGTCAACAGCAGCT	62	144990	145006	228
539285	207	223	Exon 2	CCAAGGTCAACAGCAGC	74	144991	145007	229
539286	208	224	Exon 2	GCCAAGGTCAACAGCAG	73	144992	145008	230
539290	869	885	Exon 7	TCTCACACGCACTTCAT	29	290367	290383	231
539291	870	886	Exon 7	ATCTCACACGCACTTCA	51	290368	290384	232
539292	871	887	Exon 7	GATCTCACACGCACTTC	56	290369	290385	233
539299	n/a	n/a	Intron 1	CTTTCATGAATCAAGCT	63	17927	17943	234
539300	n/a	n/a	Intron 1	TCTTTCATGAATCAAGC	49	17928	17944	235
539301	n/a	n/a	Intron 1	GTCTTTCATGAATCAAG	61	17929	17945	236
539302	n/a	n/a	Intron 1	GGTCTTTCATGAATCAA	93	17930	17946	237
539303	n/a	n/a	Intron 1	ATGGTCTTTCATGAATC	74	17932	17948	238
539304	n/a	n/a	Intron 1	GATGGTCTTTCATGAAT	56	17933	17949	239
539305	n/a	n/a	Intron 1	TATATCAATATTCTCCC	42	21820	21836	240
539306	n/a	n/a	Intron 1	TTATATCAATATTCTCC	33	21821	21837	241
539307	n/a	n/a	Intron 1	GTTATATCAATATTCTC	12	21822	21838	242

539308	n/a	n/a	Intron 1	TTTCTTTAGCAATAGTT	21	22518	22534	243
539309	n/a	n/a	Intron 1	CTTTCTTTAGCAATAGT	38	22519	22535	244
539310	n/a	n/a	Intron 1	GCTTTCTTTAGCAATAG	39	22520	22536	245
539311	n/a	n/a	Intron 1	AGGAATGGAAAACCAAA	18	26497	26513	246
						113031	113047	
						121988	122004	
539312	n/a	n/a	Intron 1	CAGGAATGGAAAACCAA	40	26498	26514	247
						113032	113048	
						121989	122005	
539313	n/a	n/a	Intron 1	TCAGGAATGGAAAACCA	49	26499	26515	248
						113033	113049	
						121990	122006	
539314	n/a	n/a	Intron 1	TCTCCATTAGGGTTCTG	87	50948	50964	249
539315	n/a	n/a	Intron 1	TTCTCCATTAGGGTTCT	57	50949	50965	250
539316	n/a	n/a	Intron 1	GTTCTCCATTAGGGTTC	73	50950	50966	251
539317	n/a	n/a	Intron 1	AGGTTGGCAGACAGACA	73	53466	53482	252
539318	n/a	n/a	Intron 1	CAGGTTGGCAGACAGAC	84	53467	53483	253
539319	n/a	n/a	Intron 1	GCAGGTTGGCAGACAGA	85	53468	53484	254
539320	n/a	n/a	Intron 1	CTTCTTGTGAGCTGGCT	87	64884	64900	255
539321	n/a	n/a	Intron 1	TCTTCTTGTGAGCTGGC	89	64885	64901	256
539322	n/a	n/a	Intron 1	GTCTTCTTGTGAGCTGG	87	64886	64902	257
539323	n/a	n/a	Intron 1	AGTCTTCTTGTGAGCTG	70	64887	64903	258
539324	n/a	n/a	Intron 1	TCTTCCACTCACATCCA	65	65990	66006	259
539325	n/a	n/a	Intron 1	CTCTTCCACTCACATCC	78	65991	66007	260
539326	n/a	n/a	Intron 1	TCTCTTCCACTCACATC	68	65992	66008	261
539327	n/a	n/a	Intron 1	GTCTCTTCCACTCACAT	74	65993	66009	262
539328	n/a	n/a	Intron 1	ATAGATTTTGA CT TCCC	57	72107	72123	263
539329	n/a	n/a	Intron 1	CATAGATTTTGA CT TCC	35	72108	72124	264
539330	n/a	n/a	Intron 1	GCATAGATTTTGA CT TC	53	72109	72125	265
539331	n/a	n/a	Intron 1	AAAATGTCAACAGTGCA	86	80639	80655	266
539332	n/a	n/a	Intron 1	CAAAATGTCAACAGTGC	73	80640	80656	267
539333	n/a	n/a	Intron 1	CCAAAATGTCAACAGTG	34	80641	80657	268
539334	n/a	n/a	Intron 1	CCCAAAATGTCAACAGT	66	80642	80658	269
539335	n/a	n/a	Intron 1	CATGACTATGTTCTGGC	67	125594	125610	270
539336	n/a	n/a	Intron 1	ACATGACTATGTTCTGG	42	125595	125611	271
539337	n/a	n/a	Intron 1	CACATGACTATGTTCTG	29	125596	125612	272
539338	n/a	n/a	Intron 2	GAATTCTGAGCTCTGGA	77	145429	145445	273
539339	n/a	n/a	Intron 2	TGAATTCTGAGCTCTGG	84	145430	145446	274
539340	n/a	n/a	Intron 2	CTGAATTCTGAGCTCTG	80	145431	145447	275
539341	n/a	n/a	Intron 2	CCTGAATTCTGAGCTCT	84	145432	145448	276
539342	n/a	n/a	Intron 2	GCCTGAATTCTGAGCTC	84	145433	145449	277
539343	n/a	n/a	Intron 2	AGCCTGAATTCTGAGCT	80	145434	145450	278
539344	n/a	n/a	Intron 2	ATATTGTAATTCTTGGT	0	148059	148075	279

539345	n/a	n/a	Intron 2	GATATTGTAATTCTTGG	20	148060	148076	280
539346	n/a	n/a	Intron 2	TGATATTGTAATTCTTG	13	148061	148077	281
539347	n/a	n/a	Intron 2	CTGATATTGTAATTCTT	8	148062	148078	282
539348	n/a	n/a	Intron 2	CCTGATATTGTAATTCT	67	148063	148079	283
539349	n/a	n/a	Intron 2	GCCTGATATTGTAATTC	73	148064	148080	284
539350	n/a	n/a	Intron 2	TGCCTGATATTGTAATT	32	148065	148081	285
539351	n/a	n/a	Intron 2	AATTATGTGCTTTGCCT	58	148907	148923	286
539352	n/a	n/a	Intron 2	CAATTATGTGCTTTGCC	82	148908	148924	287
539353	n/a	n/a	Intron 2	TCAATTATGTGCTTTGC	68	148909	148925	288
539354	n/a	n/a	Intron 2	GTCAATTATGTGCTTTG	80	148910	148926	289
539355	n/a	n/a	Intron 2	GCCATCACCAAACACCA	94	150972	150988	290
539356	n/a	n/a	Intron 2	TGCCATCACCAAACACC	84	150973	150989	291
539357	n/a	n/a	Intron 2	TTGCCATCACCAAACAC	74	150974	150990	292
539358	n/a	n/a	Intron 2	TGGTGACTCTGCCTGAT	85	151387	151403	293
539359	n/a	n/a	Intron 2	CTGGTGACTCTGCCTGA	86	151388	151404	294

Table 6

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intron 1 of SEQ ID NO: 2

ISIS NO	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
523561	TATTTAGAAAGACTTTCTG	11	10373	10392	295
523562	AGGAAAAAATCAAGGAGTTA	8	11173	11192	296
523563	TATTTACTGAACACCTATTC	12	11973	11992	297
523564	GCCCATGAAGGCCACTCTTC	70	12780	12799	298
523565	ACCTATAAATAAAGTGAGGA	0	13581	13600	299
523566	GTTTCATAACCTGCTAATAA	40	14451	14470	300
523567	ATGTGCCTTACAGTTATCAG	36	15251	15270	301
523568	TTCTGAATTTAGAATTATAG	0	16051	16070	302
523569	GTTTATAATCTAGCAGTTAC	26	17130	17149	303
523570	GATGGTCTTTCATGAATCAA	62	17930	17949	304
523571	CATGTACCCAAACCAACACT	65	18730	18749	305
523572	TAAAATACAGCCTACATCAT	0	19637	19656	306
523573	CCATCACTACAACAAACTCA	39	20451	20470	307
523574	ATCTGAAATGATCCCCTTTC	33	21283	21302	308
523575	TGTTGCCCTCCAAAAAGAC	12	22144	22163	309
523576	ATTAAAAATTTAAATGATGT	0	22944	22963	310
523577	CTCAGGAATGGAAAACCAAA	71	26497	26516	311
			113031	113050	
			121988	122007	
523578	AAAATTCTAGAAGATAACAT	0	27838	27857	312
523579	CTAGAAGTCCTAGCCAGAGT	2	28748	28767	313

523580	AACCGATATCACAGAAATAC	0	29548	29567	314
523581	AAGATAGACAGTAACATAAT	0	30348	30367	315
523582	GCACTACAAGAACTGCTTAA	40	31172	31191	316
523583	TTTCCAGACAAAGAATTTCAG	6	31978	31997	317
523584	GTAGACAGCCTTTCTGGAAC	20	32827	32846	318
523585	CATCCTACATAGTGGCTGTG	47	33635	33654	319
523586	CAGAACAGTGTGTGGAGACT	8	34452	34471	320
523587	AGCTTTAAAAATACCTCTGC	52	35466	35485	321
523588	CCCAGGTACTTGCTCTCAGA	22	36266	36285	322
523589	TTACACCTGATTCTAGAAAT	30	37066	37085	323
523590	CTTTTCTCTACAACCTCACA	34	38094	38113	324
523591	TAGTAGTTTGAATTTCAAAG	1	38909	38928	325
523592	ATACAAAATTACTGCAGTCA	60	39719	39738	326
523593	GCCACTGCCAAAAGGAGGA	30	40519	40538	327
523594	TGACAGAAACAGAGCTATGA	33	41342	41361	328
523595	ATCTTTTAGTATGAACCTTA	65	42142	42161	329
523596	AGTTATGTGACTCTGAGCAC	63	43173	43192	330
523597	ACTATGCCCTAGTTACTTCT	29	43973	43992	331
523598	TATAGTGGAAGTGATAGATC	0	44812	44831	332
523599	TGTTTTCTGAAATGGAATGT	0	45733	45752	333
523600	GCTGTAAATGTAATGAGTGT	34	46553	46572	334
523601	GAGAGAAGCCATGGCCCTAG	20	47392	47411	335
523602	CTCTCTTTCCAGAACAAAGA	32	48210	48229	336
523603	TCCAAAATGTCCAGTATAAT	33	50072	50091	337
523604	GTTCTCCATTAGGGTTCTGG	74	50947	50966	338
523605	TTAGTCACCCATCCACCACT	41	51747	51766	339
523606	CATGAATTCACCGAGTTAGG	51	52573	52592	340
523607	AGCAGGTTGGCAGACAGACA	62	53466	53485	341
523608	GAAAGACTTAAATTTTCACA	0	54306	54325	342
523609	TAGTAGAGGAAAAGGAGAAT	0	55730	55749	343
523610	AAACAGGGTCTGGAGTGGAC	3	61243	61262	344
523611	CAAGCTGATAATTA AAAAGA	0	62462	62481	345
523612	ATAAAGATACATTTTCTGGG	8	63277	63296	346
523613	CAGGATTCTTCCTGCCTGGC	47	64085	64104	347
523614	AAGTCTTCTTGTGAGCTGGC	71	64885	64904	348
523615	CTCTTCCACTCACATCCATT	63	65988	66007	349
523616	CCTATATCAGAAGACAAATG	5	66806	66825	350
523617	TCAAAACCCTGCCAAGGTAC	44	67662	67681	351
523618	TCATATTCTACTTCTGTTTA	11	68462	68481	352
523619	CATTCCAGTGTTTCAGTAAG	13	69262	69281	353
523620	GGCCTGGAATTAATCCTCAG	49	70114	70133	354
523621	AATGCCCTCTCCCTGTGCCT	48	70925	70944	355
523622	TTTATAATCAACCTTTGCTA	9	71741	71760	356

523623	ATATAACTACTTAAAATAAT	0	72541	72560	357
523624	TTAGCCAGGATATGGTTGCC	50	73350	73369	358
523625	CTACCTCCATCAAAGAAAAT	0	74190	74209	359
523626	GCATGCATAGATAAGTTTGA	20	74990	75009	360
523627	ATGAGAGTAAATGGATTTTC	10	75790	75809	361
523628	TTGGCAATCCTTGCTTAAAA	34	76598	76617	362
523629	GAATTAAGCCAGACTTATTT	3	77398	77417	363
523630	GGCTAAGTATTTGTAGCAGT	55	78198	78217	364
523631	TTGCCTGTGTGCAACTGGCG	0	79005	79024	365
523632	GTGGCCTTAGTAGGCCAGCT	0	79827	79846	366
523633	CCCAAATGTCAACAGTGCA	70	80639	80658	367
523634	TTAAGCCTTCAATTTGAAAA	0	81455	81474	368
523635	TGCTCAGAAGGTTGAGCATA	0	82261	82280	369
523636	TTAATGCTTTCCCAAAGCTC	35	83061	83080	370
523637	AAAAGACTTCATACCTTTAC	52	83884	83903	371

Table 7

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intron 1 of SEQ ID NO: 2

ISIS NO	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532146	GGCCCCCTGGCACAACAGGA	60	3097	3116	372
532147	TCTAGGGTGATTTCAGGTGGA	62	4537	4556	373
532148	CTTAGATTAATGCAAAACAA	25	4875	4894	374
532149	AGGCAGAGGAGGGTGGAAACC	34	6246	6265	375
532150	AGTCTAATGAGATCTGATGG	76	6499	6518	376
532151	GCTGAAATGAGTTAAGACTT	89	6737	6756	377
532152	ACTTTGGACTGTGGATTTTTT	78	6765	6784	378
532153	GCATATTTACACAATGCCTG	84	6871	6890	379
532154	GGAAATGCCTGGATGTCCAG	27	7241	7260	380
532155	CTGCTGATTTTGGAAATGGAG	68	10660	10679	381
532156	ACTGAACACCTATTCTATGG	51	11968	11987	382
532157	TTTACTGAACACCTATTCTA	23	11971	11990	383
532158	CCCTCAAATTATCCACAAAC	89	12053	12072	384
532159	CTTCTAAATGTTTCCAAGGC	63	12186	12205	385
532160	TTACATCCTGTAGGCTAATT	82	12469	12488	386
532161	CCACTAGCCTGGCCAGACTT	73	12487	12506	387
532162	CTGGTAGATGATCTCAAGTT	84	13351	13370	388
532163	AAAGAATTGAGTTATAAATC	23	13670	13689	389
532164	AACTCATCTCTGGCCAGCAG	89	14361	14380	390
532165	CAACATCATTGTATTTTCTG	33	14965	14984	391
532166	TCTTAGCTTACCAATGAGGA	81	15085	15104	392

532167	TTCCCAGAGCCAAAGCTCAA	77	15982	16001	393
532168	TTTGGCCAATCCCAGCTTAT	59	16253	16272	394
532169	GTTTGCAAATCTTCATTCAC	71	16447	16466	395
532170	CAATAGTCCCTGAGGCTTGG	74	16476	16495	396
532171	TTTCCCCAGATTAAATGCC	85	17650	17669	397
532172	TTCAATAATGCAGTTATTAT	0	18308	18327	398
532173	AAATTCTTGGGCTTAAGCAC	69	18638	18657	399
532174	ACATGTACCCAAACCAACAC	71	18731	18750	91
532175	TGATCCAAATTCAGTACCTA	82	18752	18771	400
532176	GATGATCCAAATTCAGTACC	54	18754	18773	401
532177	CAATATTCATCTTTATATTC	25	19106	19125	402
532178	ATTGCTCTTAAGATAAGTAA	41	19661	19680	403
532179	CAGCTCCCTGAATATCTCTT	74	19783	19802	404
532180	ACTTCACAAATATATTATAA	0	19885	19904	405
532181	GTACAGTCAACTTTACTTCA	89	19899	19918	406
532182	CAATTCCCCTCTTGTC AAC	55	20288	20307	407
532183	TCAACTGCTTTCTGGAGCAG	66	21215	21234	408
532184	ACTGCTGAGCACCTCCAAAA	73	21454	21473	409
532185	CTTAGATTCCTGGTTTATCA	78	21587	21606	410
532186	AGTTATATCAATATTCTCCC	88	21820	21839	411
532187	TATACCATCTTCCCCATAAA	32	22038	22057	412
532188	GGCTTTCTTTAGCAATAGTT	86	22518	22537	413
532189	TACCAGGGATGTAGGTTTAC	82	29050	29069	414
532190	TCACAGCTGAATTCTATCTG	80	29323	29342	415
532191	GGAGATGGACAAATTCCTGC	77	29470	29489	416
532192	CTAGACATGTCATCAAGACA	19	30294	30313	417
532193	CAAATTAATAAAAACAATTAC	10	30385	30404	418
532194	TATTCTTATATCAGACAAAA	30	30532	30551	419
532195	TCAAGGGATCCCTGCCATTC	32	32361	32380	420
532196	CGTCAAGGGATCCCTGCCAT	47	32363	32382	421
532197	GGCACTCCCAGTCTCCAGCT	83	34138	34157	422
532198	TTTCTCCAGCAGAAGTGTC A	60	34845	34864	423
532199	AAGTCCTCTTCCGCCTCCCT	82	36023	36042	424
532200	GGAATTTACCAAAAACAGTT	63	36721	36740	425
532201	AGTTAGGTATTGTCCATTTT	74	37032	37051	426
532202	ACATGGGTATCTTCTAGGAA	77	37111	37130	427
532203	TCAGTTTCAGAGAGACAAAA	41	37276	37295	428
532204	TTTGCCAGGTCCTATGTCGA	69	37656	37675	429
532205	ATTCCTTTTCTCTACAACC	70	38099	38118	430
532206	ATGATAAGAGCCAAGATTTG	13	38994	39013	431
532207	GAAAAAAGGTCCACTGTGGT	49	40356	40375	432
532208	CCTGTCCTGGAATAGTTTCA	49	41164	41183	433
532209	TAGAAAAGTAAATAAGGAAT	15	41501	41520	434

532210	TTATAAACTATGCAATAGG	0	41889	41908	435
532211	TTATTTTCATATTTCCAGAAA	0	42675	42694	436
532212	CATGAATTACAGCTAAAGAT	20	42741	42760	437
532213	TTGCATGTATGTGTTTCTGA	62	43518	43537	438
532214	TCAATCTCTTTATACCCTTA	75	43765	43784	439
532215	TCTTCAATCTCTTTATACCC	58	43768	43787	440
532216	CTATGCCCTAGTTACTTCTA	47	43972	43991	441
532217	AAAGAGAATCTCTTCCTTTT	27	44070	44089	442
532218	TCATTAAAGATTATTATAAC	0	44222	44241	443
532219	TTTGGATGAGTGGAAGGCTA	0	44528	44547	444
532220	GGAAATGGCCTTTTTCCTTA	72	45400	45419	445
532221	GGAGAAGCCCTCTGCCTGTA	60	46477	46496	446
532222	AAACCATATTGTCCACCAGA	84	46510	46529	447

Table 8

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intron 1 of SEQ ID NO: 2

ISIS NO	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532223	CTCAAACCATATTGTCCACC	90	46513	46532	448
532224	GTGTAAATAGTGACTTGAC	76	50123	50142	449
532225	TGAGGCACAGGAAAGTTAAC	52	50719	50738	450
532226	AGCTATAGTTCTCCATTAGG	74	50954	50973	451
532227	TTACTTGCTGACTAAGCCAT	69	51071	51090	452
532228	GTTTGTCAACTCAACATCAA	73	51215	51234	453
532229	GACTATTTGTATATATATAC	33	51491	51510	454
532230	ATGACTATTTGTATATATAT	11	51493	51512	455
532231	ACTCTTCCTTATATTTGCTC	76	51778	51797	456
532232	ATACACTGACTTTTAACATT	67	52039	52058	457
532233	CTTAGAAACAGTAGTTTCAT	42	52124	52143	458
532234	CTGAGCTTTGCCTTAAGAAT	79	52633	52652	459
532235	CACCAGACAGCAGGTAGAGC	81	53540	53559	460
532236	GAGATGGAGTAGAAGGCAAA	43	55926	55945	461
532237	TAGGAAAGGAAGAATACACT	33	63881	63900	462
532238	TAGACCAGGAAGGGTGAGAG	27	64376	64395	463
532239	AAGTTGGATCTGGCATGCAT	64	64574	64593	464
532240	AAAGTTGGATCTGGCATGCA	70	64575	64594	465
532241	CCATAACTCTTCTAACTGGG	84	64643	64662	466
532242	ATATTAAAGTTTGAGAACTA	37	65080	65099	467
532243	CTTAACTACAAAATGCTGGA	71	66164	66183	468
532244	TGAGCAGCTGTCTCAGTTC	43	67061	67080	469
532245	GAGTTCATAAAAGTTTACT	26	67251	67270	470

532246	CTATCCACACCATTCCATAA	73	69203	69222	471
532247	AACATCTAAGTAATGCAAAC	58	69223	69242	472
532248	TTTGCATTCAAAGCCCTGGG	91	69565	69584	473
532249	TCCATATTATAGGCTATGAT	73	69889	69908	474
532250	ATTTTATGATAATGTAAAC	27	69942	69961	475
532251	GAGATCACATTTTCTGAGTA	50	70352	70371	476
532252	ACCTCCCTAGGATTACCTCA	56	71617	71636	477
532253	AAAATCTGATTTATAATCAA	40	71750	71769	478
532254	AGCATAGATTTTGACTTCCC	92	72107	72126	479
532255	AAAGTCATATACACAGGTCT	53	72584	72603	480
532256	CTCATAGCAAATTCCCAGAA	66	73689	73708	481
532257	CAACATGGAGGCTAGCATGT	55	74112	74131	482
532258	AGACTAAGTGGCCTGAATGT	52	74317	74336	483
532259	ACCTACCATGTCACTCTCAA	61	74418	74437	484
532260	AACTTTCTTGTGTTTATCA	9	75511	75530	485
532261	TTTGCAAGACAAAGAAATGA	31	75915	75934	486
532262	CATGCAAAGTGTTCTCTTC	63	76024	76043	487
532263	AGTGCTTTGCTTTCTCTTAT	79	76047	76066	488
532264	GAACAAGAAACACTTGGTAA	44	76555	76574	489
532265	AGTGTTCCAATTAAATGGCA	34	76643	76662	490
532266	AAACAATGCCCTTGTAGTGA	57	76703	76722	491
532267	TATTCTAGGTTTTGAGGTGA	60	76752	76771	492
532268	ATATTCTAGGTTTTGAGGTG	24	76753	76772	493
532269	GTTTTCCATTCTTTAAGAAA	41	76896	76915	494
532270	AGCAATCCATTGATTGTATG	59	77044	77063	495
532271	AATTATGGCAAAATGGAAAA	37	77076	77095	496
532272	ACATTTGCTTATGAGACTAT	62	77638	77657	497
532273	GCAGAGATAATCCTATGATG	42	77841	77860	498
532274	TCCATCTGTTACCTCTCTGT	77	78122	78141	499
532275	TTTGCTGAAGGGCAGAACC	40	79478	79497	500
532276	GAAAAAATCAGATTTTCACA	0	79664	79683	501
532277	AACTTAATTTAATCATTTCT	0	79959	79978	502
532278	TTTGGTTGTCATGAGTTGAG	67	80756	80775	503
532279	TTCCATCTCTAGGGCACTTT	74	80900	80919	504
532280	AGAGCTTATTTTCAAATTC	36	80920	80939	505
532281	ATAAAGAGCAAACAAACATA	42	81524	81543	506
532282	TATAAATTCCTTGGTCTGAT	33	82835	82854	507
532283	AAAATATAAATTCCTTGGTC	13	82839	82858	508
532284	TTTTATAACAGCCTCTGACA	38	82959	82978	509
532285	AAAAGACCATGTTGCTTATT	72	83179	83198	510
532286	ATAGTCAGTCAGAATGTGGT	72	83330	83349	511
532287	TGCCTTAGCTTGGAAGAC	78	83897	83916	512
532288	AGGGCTAGCTGATGCCTCTC	69	84026	84045	513

532289	TTGGACTGGGCTCAAACAGA	72	84381	84400	514
532290	AAAGTCAGGCTAGAGGGACT	49	85713	85732	515
532291	TCCTTGTTTTCTTGTAATGA	50	85945	85964	516
532292	ACACCAGAGGAAGGAAATCA	44	86554	86573	517
532293	GATGTACACCATTTTGAATT	15	86629	86648	518
532294	TGCTCTGGCCTAGCCTATGT	62	86901	86920	519
532295	CAGAGGTGTCTCCCAAGAAA	60	89940	89959	520
532296	AAAGAGAATGGATCAAAGCT	36	91930	91949	521
532297	GATTTGCAGAACAAATCTTG	37	93332	93351	522
532298	TGGTTATGAAGGTTGGACCA	52	94839	94858	523
532299	TGGCTAATTAATGGGCAATT	63	95292	95311	524

Table 9

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intron 1 of SEQ ID NO: 2

ISIS NO	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532300	CTGTGCCATATTGCCTCTAA	87	95471	95490	525
532301	GATTTCAACCAGCTCACCTG	48	95510	95529	526
532302	GCAAAAGGGAACCCTGAAGC	71	95564	95583	527
532303	CTAAGTGTTATAACAAACAC	43	96137	96156	528
532304	GTCCATTGGTATAAACTCA	84	96282	96301	529
532305	TTTCAATACAATAAGATTTA	34	96793	96812	530
532306	GTCCTTAGACCCCTCAATGG	62	96987	97006	531
532307	GAGGATTTATTCATCTAGGC	68	97806	97825	532
532308	CAGTGGGAGGATCAGATATC	46	97870	97889	533
532309	ATCCCATCCAGCAGCTGGAC	67	98132	98151	534
532310	AACTTGGGATGAGTTACTGA	56	98653	98672	535
532311	GAAGGCTACCTAAAAGAAAT	43	98810	98829	536
532312	AAAGAAATATTCACAACATT	39	99096	99115	537
532313	ATGCTTATACTGCTGCTGTA	69	99791	99810	538
532314	TCCTCACTTCAATCACCTTT	70	99819	99838	539
532315	CTCTTTCTTCATAAATAAGT	33	100809	100828	540
532316	TGGTAATCTGTGTCCCTTTA	96	101242	101261	541
532317	TAATAAAAAAGTTTGAAACA	41	102549	102568	542
532318	GGTGGTGGCAAGAGAAAAAT	56	103015	103034	543
532319	CAAAAGGCCCTTTTACATG	28	103034	103053	544
532320	ACTCTACTGGTACCAATTTA	31	103173	103192	545
532321	TCTGAACCTTTTATGCTCTGT	76	103606	103625	546
532322	AACTTTTGCCTGGGCATCCA	16	104067	104086	547
532323	TGACTCCATGTCTCACATCC	66	104392	104411	548
532324	TTACTTCCTAGATAACAACAG	53	104541	104560	549

532325	CTGGCCCCCATGATTCAATT	44	104835	104854	550
532326	AAGACTGGCCCCCATGATTC	49	104839	104858	551
532327	TGTCACTGGTCTGTGTATTT	60	106233	106252	552
532328	ACAGAGTAGATTTAGCATAA	23	106980	106999	553
532329	TAAACAGGTGTACTATTACA	27	107030	107049	554
532330	GCTTTATCAACTAAGTTTAT	22	107716	107735	555
532331	CAGAACTTCTTTTAAAATTG	8	107763	107782	556
532332	GAATACAGACATACCTTGAA	25	108514	108533	557
532333	CCATGACAACAATTTTCAGAG	58	109486	109505	558
532334	ACAAATAGCAATGAATGGGT	45	110878	110897	559
532335	CAACAAATAGCAATGAATGG	47	110880	110899	560
532336	GTACACAAATCAGTAGCTCT	72	115087	115106	561
532337	CTATGTCAAAAAGACTGAAA	4	116370	116389	562
532338	ATATACAGAACATTTTCATCC	13	116743	116762	563
532339	AGAATAGATAAGAACTCACC	32	117195	117214	564
532340	AGGAAAGATACAGTCATTTT	5	117507	117526	565
532341	GCACAAAGAACACCTGGGAA	43	117781	117800	566
532342	CAAGAAGTCTGGGATTATGT	0	117938	117957	567
532343	GTTAGTTATTAAGCTAATCA	48	118245	118264	568
532344	AACCATTATTTATAGGCTAA	14	119127	119146	569
532345	CCAGAATGCGATCACTTCTT	76	120826	120845	570
532346	CCAGAAATTATCCTCCTCTC	70	121209	121228	571
532347	AGGGAAATGCAAATTAAC	20	122479	122498	572
532348	GCATCAAGATACAGAAAAAT	24	122751	122770	573
532349	GAATGTTTATGAGATTTTTC	0	123571	123590	574
532350	GCCAATTATATTGCCACATT	23	124413	124432	575
532351	ATACTTGCTTATGTAGAAAT	45	124589	124608	576
532352	TAATACTTGCTTATGTAGAA	3	124591	124610	577
532353	GAACACATGGCATTCTGATA	36	125178	125197	578
532354	CAGAATTTGCAGTATAAATC	0	126051	126070	579
532355	TATGTTTTGAAATCTTATTT	0	126157	126176	580
532356	ACTACTGCTACCTCATTA	11	126998	127017	581
532357	AAGCAGTGATAGGGTATCTG	59	127080	127099	582
532358	ATGAGGCCTATTACAATGGA	14	127170	127189	583
532359	CTGGAGTCTCATGAGGCCTA	53	127180	127199	584
532360	TGACTATCAGCCTTTTAATC	45	127663	127682	585
532361	TTCAGAGAACAACCTTTGAA	0	127959	127978	586
532362	AGCCATGTGTGATCTGATGT	53	128813	128832	587
532363	GAAATTTACTCCAACTAGC	17	128992	129011	588
532364	AACATCCAGACCACCATCTA	35	130094	130113	589
532365	GTACCAAACCATTCATGCTC	56	131036	131055	590
532366	AGTACCAAACCATTCATGCT	24	131037	131056	591
532367	TTATAGAGCTTGAGATTGAC	7	132165	132184	592

532368	AGTCCATTATAGAGCTTGAG	58	132171	132190	593
532369	AACCATGAGATGCAATGCAG	40	132498	132517	594
532370	AGGATTGAGAATCGCTGATT	42	133168	133187	595
532371	TCTAAAGCATGGCCAGGATT	48	133182	133201	596
532372	GGGACTGAGTATTGATACTT	44	133222	133241	597
532373	AGAAGTAGGGTGTTCAGAT	29	133523	133542	598
532374	AGAAATAGTCTTCCTACTAA	0	133547	133566	599
532375	GCCTCCTTTAAGCTTCTATG	22	134240	134259	600
532376	GGCCTGCCTTTACTTTCCCA	36	134598	134617	601

Table 10

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 1 and 2 of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Sequence	Target region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
523638	n/a	n/a	ACCTCAGTGGACTCTTTCCA	Intron 1	4	84684	84703	602
523639	n/a	n/a	CAAACCTAAGTTCAAGTCCT	Intron 1	62	85523	85542	603
523640	n/a	n/a	AGTTTCACTTCTTGAATCAA	Intron 1	38	86373	86392	604
523641	n/a	n/a	AAGATCAAATGAGGTCAAGG	Intron 1	30	87181	87200	605
523642	n/a	n/a	TAGATACAAATTTTCATCACA	Intron 1	23	88063	88082	606
523643	n/a	n/a	ATTCCTAAAATAGGAGCAGG	Intron 1	45	88870	88889	607
523644	n/a	n/a	TTTTTATGTTGTATAAGATA	Intron 1	0	89670	89689	608
523645	n/a	n/a	GTTCAGCCAATACATGAGTA	Intron 1	48	90473	90492	609
523646	n/a	n/a	CCAGAGGGGAGTTCATTACCA	Intron 1	62	91273	91292	610
523647	n/a	n/a	TCTCTCTAATTCAACCTTAT	Intron 1	44	92107	92126	611
523648	n/a	n/a	ATAATCCTCAGACCTCTTTA	Intron 1	29	92925	92944	612
523649	n/a	n/a	CACTGTGGCAGAATTCCAAG	Intron 1	28	93762	93781	613
523650	n/a	n/a	ACACCTTGGTGCCTAGAAGC	Intron 1	54	94581	94600	614
523651	n/a	n/a	GTAGCAATGACACCTAAGAA	Intron 1	58	95394	95413	615
523652	n/a	n/a	TTTAAAATAATAAATGCTTA	Intron 1	0	96194	96213	616
523653	n/a	n/a	TCATTTGGTCCTTAGACCCC	Intron 1	27	96994	97013	617
523654	n/a	n/a	TTATTCATCTAGGCCGAGTG	Intron 1	57	97800	97819	618
523655	n/a	n/a	TTGCAGAATCTTCTTTTGG	Intron 1	65	98627	98646	619
523656	n/a	n/a	ACCATAAAGCTATGCCATAA	Intron 1	63	99481	99500	620
523657	n/a	n/a	GGCAAGGAGCACAATAGGAC	Intron 1	20	100281	100300	621
523658	n/a	n/a	ACCCAAAAAGTTGAGCTGAG	Intron 1	66	101081	101100	622
523659	n/a	n/a	TAGATTTTCAGACTCTTTCT	Intron 1	46	101887	101906	623
523660	n/a	n/a	AATTTCAATATTGTTGTGTT	Intron 1	0	102760	102779	624
523661	n/a	n/a	ATGCTTTTAATGGCACCCAA	Intron 1	69	103569	103588	625
523662	n/a	n/a	CATGTCTCACATCCAGGTCA	Intron 1	37	104386	104405	626
523663	n/a	n/a	TTCACTGGAGTAGACTTTTA	Intron 1	45	105255	105274	627

523664	n/a	n/a	CTTATAAGGGAGGTCTGGTA	Intron 1	41	106147	106166	628
523665	n/a	n/a	GCATAATTCTTAAGGGCCCT	Intron 1	71	106966	106985	629
523666	n/a	n/a	CCACAGAACTTCTTTTAAAA	Intron 1	27	107766	107785	630
523667	n/a	n/a	GGTGACCATGATTTTAACAA	Intron 1	25	108566	108585	631
523668	n/a	n/a	AACAGCTGCATGACAATTTT	Intron 1	50	109382	109401	632
523669	n/a	n/a	AGAAACAGAATCAGTGACTT	Intron 1	44	110403	110422	633
523670	n/a	n/a	CAGATTCCAGAGAAAAGCCA	Intron 1	14	111203	111222	634
523671	n/a	n/a	TGTGAGAAGAACTCTATCAC	Intron 1	12	112030	112049	635
523672	n/a	n/a	CTCACAAATCACCCTAAAG	Intron 1	31	112842	112861	636
523673	n/a	n/a	CAACGAGTGGATAAAGAAAC	Intron 1	28	113646	113665	637
523674	n/a	n/a	ATAAACTGGATCCTCATCT	Intron 1	13	114446	114465	638
523675	n/a	n/a	ATTAAACTCTCAGCAAAAT	Intron 1	0	115450	115469	639
523676	n/a	n/a	AAAGACTGAAAGAACACAAA	Intron 1	0	116361	116380	640
523677	n/a	n/a	TATCTGCTGCCTTCAGGAGA	Intron 1	0	117168	117187	641
523678	n/a	n/a	TTTGAATTAACCCAATTCAA	Intron 1	0	117999	118018	642
523679	n/a	n/a	TCTTAATTTACAACAGAGGA	Intron 1	25	118821	118840	643
523680	n/a	n/a	AGAAAAGTGACAGGCTTCCC	Intron 1	31	119659	119678	644
523681	n/a	n/a	ATGTTCCCTTGAAGATCCCAA	Intron 1	37	120478	120497	645
523682	n/a	n/a	ATGAATAACACTTGCCACAA	Intron 1	0	121379	121398	646
523683	n/a	n/a	GTATGTTTATCACAGCACAG	Intron 1	56	122180	122199	647
523684	n/a	n/a	AAACACTGCAATATTAGGTT	Intron 1	34	123031	123050	648
523685	n/a	n/a	GATTGGTGCTTTTCAAACCTG	Intron 1	39	123936	123955	649
523686	n/a	n/a	ATTTGTAAGACAAACATGAA	Intron 1	9	124764	124783	650
523687	n/a	n/a	TCACATGACTATGTTCTGGC	Intron 1	72	125594	125613	651
523688	n/a	n/a	AGTCCTGTCCACACTATTAA	Intron 1	6	126415	126434	652
523689	n/a	n/a	CTGGGCTCTGCCTGCTGAAC	Intron 1	17	127217	127236	653
523690	n/a	n/a	AAAACCCTTAAGTATTTCTT	Intron 1	12	128054	128073	654
523691	n/a	n/a	CTCTGTTTCAAACCCCCCAG	Intron 1	21	128854	128873	655
523692	n/a	n/a	GGACAGAACACCAATCACAA	Intron 1	18	129654	129673	656
523693	n/a	n/a	ACCTACCCTTCAAAGTCACG	Intron 1	0	130486	130505	657
523694	n/a	n/a	TTCAGTTCCCAGGAGGCTTA	Intron 1	5	131286	131305	658
523695	n/a	n/a	TTTTGCAATGTCTAGCAATT	Intron 1	0	132086	132105	659
523696	n/a	n/a	ATTAAGATCAGAAAATATTA	Intron 1	0	132953	132972	660
523697	n/a	n/a	TTAATGAGATATTTTGCACC	Intron 1	34	133858	133877	661
523698	n/a	n/a	GAGAGGTAAAGTAAATCTCC	Intron 1	0	134678	134697	662
523699	n/a	n/a	CAGACTCAAATTTGAAAATT	Intron 1	14	135500	135519	663
523700	n/a	n/a	GATAAGGCAATAATACAGCC	Intron 1	1	136306	136325	664
523701	n/a	n/a	ATCATTTGCCAATTTCTGTG	Intron 1	28	137133	137152	665
523702	n/a	n/a	CAAGAAGAAAAGATGCAAAA	Intron 1	0	138035	138054	666
523703	n/a	n/a	AATTTATTTCTTCCTATGA	Intron 1	0	138857	138876	667
523704	n/a	n/a	TTTTGGAAATGTGAGAAACG	Intron 1	0	139771	139790	668
523705	n/a	n/a	AAACACATGAGAAAAGATGA	Intron 1	0	140593	140612	669
523706	n/a	n/a	TGTTGGCTCAGTGGGAATGA	Intron 1	0	141412	141431	670

523707	n/a	n/a	TGAACAGGTTTGCATTTCTC	Intron 1	42	142229	142248	671
523708	n/a	n/a	TCCTAGGTGAACAGGCTATG	Intron 1	38	143029	143048	672
523709	n/a	n/a	CCCTAATCAGGCTGAAATAA	Intron 1	0	143829	143848	673
523710	n/a	n/a	AGGGCCAGTAAGGTTTGCTT	Intron 1	12	144631	144650	674
523711	n/a	n/a	AGCCTGAATTCTGAGCTCTG	Intron 2	88	145431	145450	675
523712	n/a	n/a	AGAGGATCTCAGCTGCAATT	Intron 2	71	146238	146257	676
523713	n/a	n/a	GAAAATCCCTGCTCAAGTGC	Intron 2	67	147262	147281	677
523714	n/a	n/a	TGCCTGATATTGTAATTCTT	Intron 2	90	148062	148081	678

Table 11

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 1 and 2 of SEQ ID NO: 2

ISIS NO	Sequence	Target Region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532377	CTCATACAGTGAAGTCTTCA	Intron 1	73	135431	135450	679
532378	CTCACTAAGCTTGATTCACT	Intron 1	67	135818	135837	680
532379	GATACAGAAATCCCAGTGAC	Intron 1	46	136111	136130	681
532380	TGTGCTTGGGTGTACAGGCA	Intron 1	71	136282	136301	682
532381	TCAAGCACTTACATCATATG	Intron 1	42	136377	136396	683
532382	AGGGTTAGTTATTACACTTA	Intron 1	60	136576	136595	684
532383	AGGCTTCATGTGAGGTAACA	Intron 1	58	136996	137015	685
532384	TGAAAGCTTAGTACAAGAAG	Intron 1	51	138048	138067	686
532385	CTCTCCTCTTGGAGATCCAG	Intron 1	58	138782	138801	687
532386	GCTGAGATTTCTCTCCTCTT	Intron 1	78	138792	138811	688
532387	CTTTTGCTGAGATTTCTCTC	Intron 1	58	138797	138816	689
532388	GAACATATGTCCATAGAATG	Intron 1	57	141700	141719	690
532389	GAACAGGCTATGTAATCAAA	Intron 1	68	143021	143040	691
532390	TTTTTATTACTGTGCAAACC	Intron 1	41	143878	143897	692
532391	ACTGAGGGTGGAAATGGAAA	Intron 2	23	145059	145078	693
532392	ATGCCATACTTTTCATTTCA	Intron 2	87	146351	146370	694
532393	TCTTTAAAGATTTCTCTATGC	Intron 2	66	146367	146386	695
532394	TCACAATTAAATTATGTTTA	Intron 2	47	149858	149877	696
532395	TTTGCCATCACCAAACACCA	Intron 2	94	150972	150991	697
532396	TCAGAATGCTGAAGGATGGG	Intron 2	70	152208	152227	698
532397	ACAATTGCAGGAGAGAACTG	Intron 2	57	152296	152315	699
532398	G TTCAGTCACCTGGAAAGAG	Intron 2	62	152549	152568	700
532399	CGGAGTTCAGTCACCTGGAA	Intron 2	77	152553	152572	701
532400	AATCTAAAGTTCAATGTCCA	Intron 2	77	152752	152771	702
532401	CCACCTTTGGGTGAATAGCA	Intron 2	95	153921	153940	703
532402	CAACATCAAAAGTTTCCACC	Intron 2	81	153936	153955	704
532403	AAGCTTCTATCAACCAACTG	Intron 2	87	154093	154112	705
532404	ACCATTTTCTAATAATTAC	Intron 2	46	154502	154521	706

532405	ACCTGCACTTGGACAACTGA	Intron 2	60	154727	154746	707
532406	GTCAGTGCTTTGGTGATGTA	Intron 2	11	155283	155302	708
532407	TAGAAGCACAGGAAGTAGAG	Intron 2	68	155889	155908	709
532408	TTTAATTTTATTAGAAGCAC	Intron 2	14	155900	155919	710
532409	GAGCAAGAATTAAGAAAATC	Intron 2	29	155973	155992	711
532410	CTCTGCAGTCATGTACACAA	Intron 2	93	156594	156613	712
532411	GCTTGGTTTGTCAATCCTTT	Intron 2	95	156889	156908	713
532412	GTTCTCAAGCAGGAGCCATT	Intron 2	70	157330	157349	714
532413	AGGGTGATCTTCCAAAACAA	Intron 2	87	158612	158631	715
532414	TCTCCTATGCTTCCTTTAAT	Intron 2	25	158813	158832	716
532415	GACATAAATATGTTCACTGA	Intron 2	81	159216	159235	717
532416	TTACTGAGTGACAGTACAGT	Intron 2	65	161588	161607	718
532417	CCAGGCACCAGCACAGGCAC	Intron 2	47	161950	161969	719
532418	TTAATGTCAGTAGAAAGCTG	Intron 2	0	162349	162368	720
532419	GCAGGTGGAAAGAAGATGTC	Intron 2	50	162531	162550	721
532420	GCCAGGGTCTTTACAAAGTT	Intron 2	93	162751	162770	722
532421	CATTACCTTTGTACATGTAC	Intron 2	83	164839	164858	723
532422	GAAGCAACTTCTCTGAGGTC	Intron 2	68	165040	165059	724
532423	GCCTGGCAAGAAGGGCCCTT	Intron 2	56	165856	165875	725
532424	ACACATGTTTTTAAATTTAT	Intron 2	21	166241	166260	726
532425	TCACAATGCACTAAAAGAAA	Intron 2	53	168760	168779	727
532426	TCCCAATGACTTACTGTAGA	Intron 2	78	169073	169092	728
532427	TAAGCATTTATGGAGGAATG	Intron 2	46	169134	169153	729
532428	TGAGGTGGGTGGCCAACAGG	Intron 2	66	170081	170100	730
532429	GTTTTTCATTTTGATTGCAG	Intron 2	88	170158	170177	731
532430	AGCTCAAGTGTTTTTCATTT	Intron 2	64	170167	170186	732
532431	CAATGTCACAGCTGTTTCCT	Intron 2	62	170272	170291	733
532432	GAACCTTTGGAGGCTTTTAGA	Intron 2	55	170703	170722	734
532433	TGTATGCCCCAAACTCCCAT	Intron 2	83	171431	171450	735
532434	ACACAAATAAGGGAATAATA	Intron 2	24	171549	171568	736
532435	TAGTTCAGCCACTATGGAAA	Intron 2	47	171926	171945	737
532436	CTCCAAATTCAGTCCTAGG	Intron 2	93	172746	172765	738
532437	AGTTGGCACTGCTATATCAG	Intron 2	66	173668	173687	739
532438	GGCCTTAGATTGTAAGTTTT	Intron 2	69	174122	174141	740
532439	TTTLAGTATTATTGTAGGAA	Intron 2	16	174188	174207	741
532440	TTTCATTAATGAAACCTGAT	Intron 2	39	174812	174831	742
532441	CCCTCAGCTGCCTCTTCAAT	Intron 2	51	175014	175033	743
532442	TATTGTATCCTGGCCCCTAA	Intron 2	68	175689	175708	744
532443	AGAACAAGAGCCTAGAAGTA	Intron 2	35	176592	176611	745
532444	GTGACTATGTCACTGAATTT	Intron 2	14	176918	176937	746
532445	GCCCTACCCAGCAGCCTGTG	Intron 2	79	177540	177559	747
532446	CAAACATAAAGAGAGTTCCA	Intron 2	79	177811	177830	748
532447	CTTTAAATGAAGTAGAGCTC	Intron 2	0	178090	178109	749

532448	CTGTTCAAAGAATGCAGGCC	Intron 2	70	178905	178924	750
532449	GTCTAGCCTAACAGAGATAT	Intron 2	47	179137	179156	751
532450	AAAGAGTGATGTCTAGCCTA	Intron 2	55	179147	179166	752
532451	CACTTCTTACTCCTTTGAGG	Intron 2	50	179631	179650	753
532452	TTCCACAAGAACTCAGTTT	Intron 2	56	181514	181533	754
532453	AGAAATGCCAAAGATAGCTC	Intron 2	56	182105	182124	755

Table 12

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intron 2 of SEQ ID NO: 2

ISIS NO	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
533249	AGCAGAGGATCTCAGCTGCA	84	146241	146260	756
533250	AATCCCTGCTCAAGTGCTAC	75	147259	147278	757
533251	AAATCCCTGCTCAAGTGCTA	71	147260	147279	758
533252	AAAATCCCTGCTCAAGTGCT	73	147261	147280	759
533253	AGAAAATCCCTGCTCAAGTG	56	147263	147282	760
533254	AAGAAAATCCCTGCTCAAGT	58	147264	147283	761
533255	CAAGAAAATCCCTGCTCAAG	46	147265	147284	762
533256	CTGATATTGTAATTCTTGGT	91	148059	148078	763
533257	CCTGATATTGTAATTCTTGG	90	148060	148079	764
533258	GCCTGATATTGTAATTCTTG	94	148061	148080	765
533259	ATGCCTGATATTGTAATTCT	91	148063	148082	766
533260	AATGCCTGATATTGTAATTC	74	148064	148083	767
533261	CAATGCCTGATATTGTAATT	76	148065	148084	768
533262	AATTATGTGCTTTGCCTGCA	92	148904	148923	769
533263	CAATTATGTGCTTTGCCTGC	83	148905	148924	770
533264	TCAATTATGTGCTTTGCCTG	83	148906	148925	771
533265	TGTCAATTATGTGCTTTGCC	91	148908	148927	772
533266	ATGTCAATTATGTGCTTTGC	83	148909	148928	773
533267	GATGTCAATTATGTGCTTTG	74	148910	148929	774
533268	CTGGTGACTCTGCCTGATGA	77	151385	151404	775
533269	GCTGGTGACTCTGCCTGATG	87	151386	151405	776
533270	TGCTGGTGACTCTGCCTGAT	89	151387	151406	777
533271	GCTGCTGGTGACTCTGCCTG	94	151389	151408	778
533272	GGCTGCTGGTGACTCTGCCT	77	151390	151409	779
533273	TGGCTGCTGGTGACTCTGCC	82	151391	151410	780
533274	GCTGAAGGATGGGCATCCAG	85	152201	152220	781
533275	TGCTGAAGGATGGGCATCCA	85	152202	152221	782
533276	ATGCTGAAGGATGGGCATCC	78	152203	152222	783
533277	GAATGCTGAAGGATGGGCAT	66	152205	152224	784
533278	AGAATGCTGAAGGATGGGCA	81	152206	152225	785

533279	CAGAATGCTGAAGGATGGGC	85	152207	152226	786
533280	TCCAGTAGTCAATATTATTT	87	153001	153020	787
533281	ATCCAGTAGTCAATATTATT	85	153002	153021	788
533282	TATCCAGTAGTCAATATTAT	69	153003	153022	789
533283	GTTATCCAGTAGTCAATATT	77	153005	153024	790
533284	GGTTATCCAGTAGTCAATAT	85	153006	153025	791
533285	TGGTTATCCAGTAGTCAATA	86	153007	153026	792
533286	CAACTTGAGGACAATAAGAG	35	155591	155610	793
533287	TCAACTTGAGGACAATAAGA	62	155592	155611	794
533288	CTCAACTTGAGGACAATAAG	86	155593	155612	795
533289	AACTCAACTTGAGGACAATA	82	155595	155614	796
533290	TAACTCAACTTGAGGACAAT	66	155596	155615	797
533291	ATAACTCAACTTGAGGACAA	87	155597	155616	798
533292	CAGGAAGAAAGGAACCTTAG	77	156391	156410	799
533293	CCAGGAAGAAAGGAACCTTA	84	156392	156411	800
533294	ACCAGGAAGAAAGGAACCTT	86	156393	156412	801
533295	AGACCAGGAAGAAAGGAACC	74	156395	156414	802
533296	TAGACCAGGAAGAAAGGAAC	59	156396	156415	803
533297	ATAGACCAGGAAGAAAGGAA	65	156397	156416	804
533298	TACAATGCACAGGACACGCC	73	157198	157217	805
533299	CTACAATGCACAGGACACGC	85	157199	157218	806
533300	GCTACAATGCACAGGACACG	83	157200	157219	807
533301	ATGCTACAATGCACAGGACA	89	157202	157221	808
533302	TATGCTACAATGCACAGGAC	82	157203	157222	809
533303	ATATGCTACAATGCACAGGA	84	157204	157223	810
533304	CTGATATTTATTGCTGTACG	76	158006	158025	811
533305	CTCTGATATTTATTGCTGTA	80	158008	158027	812
533306	TCTCTGATATTTATTGCTGT	86	158009	158028	813
533307	GTCTCTGATATTTATTGCTG	80	158010	158029	814
533308	CCAGAAGAATTACCCATGCA	85	165550	165569	815
533309	TCCAGAAGAATTACCCATGC	84	165551	165570	816
533310	TTCCAGAAGAATTACCCATG	81	165552	165571	817
533311	TCTTCCAGAAGAATTACCCA	58	165554	165573	818
533312	ATCTTCCAGAAGAATTACCC	64	165555	165574	819
533313	CATCTTCCAGAAGAATTACC	58	165556	165575	820
533314	TTTCTGCAGTATCCTAGCCT	78	166350	166369	821
533315	GTTTCTGCAGTATCCTAGCC	88	166351	166370	822
533316	AGTTTCTGCAGTATCCTAGC	86	166352	166371	823
533317	TCAGTTTCTGCAGTATCCTA	88	166354	166373	824
533318	TTCAGTTTCTGCAGTATCCT	87	166355	166374	825
533319	TTTCAGTTTCTGCAGTATCC	80	166356	166375	826
533320	GTTTCCATTTTCTTGATTCC	70	169601	169620	827
533321	TGTTTCCATTTTCTTGATTCC	54	169602	169621	828

533322	GTGTTTCCATTTTCTTGATT	55	169603	169622	829
533323	TGGTGTTCATTTTCTTGA	73	169605	169624	830
533324	ATGGTGTTCATTTTCTTG	76	169606	169625	831
533325	AATGGTGTTCATTTTCTT	78	169607	169626	832

Table 13

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 2 and 3 of SEQ ID NO: 2

ISIS NO	Sequence	Target region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
533326	AACCCATTTTCATCCATTAA	Intron 2	93	175369	175388	833
533327	GAACCCATTTTCATCCATTAA	Intron 2	83	175370	175389	834
533328	GGAACCCATTTTCATCCATT	Intron 2	92	175371	175390	835
533329	TAGGAACCCATTTTCATCCAT	Intron 2	91	175373	175392	836
533330	GTAGGAACCCATTTTCATCCA	Intron 2	95	175374	175393	837
533331	GGTAGGAACCCATTTTCATCC	Intron 2	92	175375	175394	838
533332	TGAGGGATTGCCTCAGTAGC	Intron 2	66	179616	179635	839
533333	TTGAGGGATTGCCTCAGTAG	Intron 2	72	179617	179636	840
533334	TTTGAGGGATTGCCTCAGTA	Intron 2	67	179618	179637	841
533335	CCTTTGAGGGATTGCCTCAG	Intron 2	74	179620	179639	842
533336	TCCTTTGAGGGATTGCCTCA	Intron 2	66	179621	179640	843
533337	CTCCTTTGAGGGATTGCCTC	Intron 2	76	179622	179641	844
533338	AACTTAGGACTTGGGACATT	Intron 2	64	184575	184594	845
533339	TAAGTTAGGACTTGGGACAT	Intron 2	54	184576	184595	846
533340	CTAAGTTAGGACTTGGGACA	Intron 2	63	184577	184596	847
533341	CACTAAGTTAGGACTTGGGA	Intron 2	82	184579	184598	848
533342	TCACTAAGTTAGGACTTGGG	Intron 2	77	184580	184599	849
533343	GTCCTAAGTTAGGACTTGG	Intron 2	83	184581	184600	850
533344	TGGGCTAGATCAGGATTGGT	Intron 2	81	188617	188636	851
533345	ATGGGCTAGATCAGGATTGG	Intron 2	70	188618	188637	852
533346	CATGGGCTAGATCAGGATTG	Intron 2	64	188619	188638	853
533347	ACCATGGGCTAGATCAGGAT	Intron 2	82	188621	188640	854
533348	TACCATGGGCTAGATCAGGA	Intron 2	88	188622	188641	855
533349	CTACCATGGGCTAGATCAGG	Intron 2	87	188623	188642	856
533350	ATGAGCTTAGCAGTCACTTA	Intron 2	83	189482	189501	857
533351	CATGAGCTTAGCAGTCACTT	Intron 2	87	189483	189502	858
533352	CCATGAGCTTAGCAGTCACT	Intron 2	92	189484	189503	859
533353	GTCTCAGCAAACCTGGGATA	Intron 2	84	190283	190302	860
533354	TGTCTCAGCAAACCTGGGAT	Intron 2	82	190284	190303	861
533355	ATGTCTCAGCAAACCTGGGA	Intron 2	81	190285	190304	862
533356	GAATGTCTCAGCAAACCTGG	Intron 2	76	190287	190306	863
533357	GGAATGTCTCAGCAAACCTG	Intron 2	82	190288	190307	864

533358	AGGAATGTCTCAGCAAACCT	Intron 2	85	190289	190308	865
533359	TACAGACATAGCTCTAACCT	Intron 2	79	191139	191158	866
533360	ATACAGACATAGCTCTAACC	Intron 2	79	191140	191159	867
533361	GATACAGACATAGCTCTAAC	Intron 2	71	191141	191160	868
533362	TGGATACAGACATAGCTCTA	Intron 2	79	191143	191162	869
533363	CTGGATACAGACATAGCTCT	Intron 2	82	191144	191163	870
533364	GCTGGATACAGACATAGCTC	Intron 2	95	191145	191164	871
533365	ACACTGTTTGTGAGGGTCAA	Intron 2	87	191939	191958	872
533366	AACACTGTTTGTGAGGGTCA	Intron 2	81	191940	191959	873
533367	CAACACTGTTTGTGAGGGTC	Intron 2	85	191941	191960	874
533368	AACAACACTGTTTGTGAGGG	Intron 2	65	191943	191962	875
533369	AAACAACACTGTTTGTGAGG	Intron 2	76	191944	191963	876
533370	CAAACAACACTGTTTGTGAG	Intron 2	67	191945	191964	877
533371	TTCAAGTTTAGGATCTGCAG	Intron 2	73	196536	196555	878
533372	CTTCAAGTTTAGGATCTGCA	Intron 2	88	196537	196556	879
533373	GCTTCAAGTTTAGGATCTGC	Intron 2	86	196538	196557	880
533374	GGGCTTCAAGTTTAGGATCT	Intron 2	67	196540	196559	881
533375	AGGGCTTCAAGTTTAGGATC	Intron 2	66	196541	196560	882
533376	CAGGGCTTCAAGTTTAGGAT	Intron 2	74	196542	196561	883
533377	TGTGGCTTTAATTCATAAT	Intron 2	84	198145	198164	884
533378	ATGTGGCTTTAATTCATAA	Intron 2	86	198146	198165	885
533379	TATGTGGCTTTAATTCATA	Intron 2	79	198147	198166	886
533380	GGTATGTGGCTTTAATTCAC	Intron 2	83	198149	198168	887
533381	TGGTATGTGGCTTTAATTC	Intron 2	81	198150	198169	888
533382	GTGGTATGTGGCTTTAATTC	Intron 2	86	198151	198170	889
533383	TCTGTGTTTCAGTTGCATCAC	Intron 2	75	199817	199836	890
533384	TTCTGTGTTTCAGTTGCATCA	Intron 2	82	199818	199837	891
533385	GTTCTGTGTTTCAGTTGCATC	Intron 2	86	199819	199838	892
533386	GTAATCATGAGGAGGCATT	Intron 2	81	201413	201432	893
533387	GGTAATCATGAGGAGGCACT	Intron 2	82	201414	201433	894
533388	TGGTAATCATGAGGAGGCAC	Intron 2	78	201415	201434	895
533389	ATTGGTACTCATGAGGAGGC	Intron 2	64	201417	201436	896
533390	AATTGGTACTCATGAGGAGG	Intron 2	47	201418	201437	897
533391	CAATTGGTACTCATGAGGAG	Intron 2	54	201419	201438	898
533392	AAACTCTGCAACTCCAACCC	Intron 2	69	205549	205568	899
533393	GAAACTCTGCAACTCCAACC	Intron 2	64	205550	205569	900
533394	GGAAACTCTGCAACTCCAAC	Intron 2	83	205551	205570	901
533395	ATGGAAACTCTGCAACTCCA	Intron 2	88	205553	205572	902
533396	CATGGAAACTCTGCAACTCC	Intron 2	70	205554	205573	903
533397	TCATGGAAACTCTGCAACTC	Intron 2	69	205555	205574	904
533398	ACATCTGGATGTGAGGCTCG	Intron 3	64	210559	210578	905
533399	CACATCTGGATGTGAGGCTC	Intron 3	84	210560	210579	906
533400	GTCACATCTGGATGTGAGGC	Intron 3	75	210562	210581	907

533401	TGTCACATCTGGATGTGAGG	Intron 3	51	210563	210582	908
533402	CTGTCACATCTGGATGTGAG	Intron 3	30	210564	210583	909

Table 14

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 2 and 3 of SEQ ID NO: 2

ISIS NO	Sequence	Target region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
523715	GTCAATTATGTGCTTTGCCT	Intron 2	91	148907	148926	910
523716	ACATTCAAAATTCTTCCTTG	Intron 2	50	149787	149806	911
523717	ATCCTGCATATATTTTATTG	Intron 2	20	150588	150607	912
523718	CTGCTGGTGA CTCTGCCTGA	Intron 2	77	151388	151407	913
523719	AATGCTGAAGGATGGGCATC	Intron 2	66	152204	152223	914
523720	TTATCCAGTAGTCAATATTA	Intron 2	71	153004	153023	915
523721	TCTCATGTAAAGTTCTTAA	Intron 2	48	153831	153850	916
523722	TGCACTTGGACAACTGATAG	Intron 2	29	154724	154743	917
523723	ACTCAACTTGAGGACAATAA	Intron 2	88	155594	155613	918
523724	GACCAGGAAGAAAGGAACCT	Intron 2	72	156394	156413	919
523725	TGCTACAATGCACAGGACAC	Intron 2	80	157201	157220	920
523726	TCTGATATTTATTGCTGTAC	Intron 2	73	158007	158026	921
523727	ATGCTTCCTTTAATAAATGT	Intron 2	0	158807	158826	922
523728	AACATTTAGAACCTAGGAGA	Intron 2	20	159610	159629	923
523729	CAAGCTTGCAAGTAGGAAAA	Intron 2	51	160410	160429	924
523730	CCAGGCTGTTTCATGCCAAGG	Intron 2	26	161248	161267	925
523731	CCTGCCAAGGGCAAGCCAGG	Intron 2	17	162064	162083	926
523732	TTTCACCTGGTGA CTGGAAG	Intron 2	51	163019	163038	927
523733	ATTTTCTACCATCAAAGAGA	Intron 2	4	163943	163962	928
523734	GATTAAGTTTCTTTAAAAA	Intron 2	0	164746	164765	929
523735	CTTCCAGAAGAATTACCCAT	Intron 2	56	165553	165572	930
523736	CAGTTTCTGCAGTATCCTAG	Intron 2	77	166353	166372	931
523737	TATTTTGAAAATGAGATTCA	Intron 2	0	167195	167214	932
523738	GTGGCCCGAGTAAAGATAAA	Intron 2	21	167995	168014	933
523739	CCTGTCAATCCTCTTATATG	Intron 2	37	168804	168823	934
523740	GGTGTTTCCATTTTCTTGAT	Intron 2	65	169604	169623	935
523741	ACAGGGTCAAAAGTTCACTT	Intron 2	44	170407	170426	936
523742	TAGGAAAGCTGAGAGAATCC	Intron 2	35	171207	171226	937
523743	AGCATATGAAAAAATACTCA	Intron 2	0	172101	172120	938
523744	CTTCAGAAATCAGCATCTGA	Intron 2	45	172937	172956	939
523745	TTACAAGTGACAGTGTGTTGT	Intron 2	28	173737	173756	940
523746	ATCAGACCCTGAAGAATTTA	Intron 2	29	174560	174579	941
523747	AGGAACCCATTTCATCCATT	Intron 2	83	175372	175391	942
523748	CACATTGGTAACTTAAAGTT	Intron 2	18	176263	176282	943

523749	TATTATCTGACTCATTTCTG	Intron 2	16	177072	177091	944
523750	AAATAAGACAAAGAAAATTC	Intron 2	0	177872	177891	945
523751	TTTTAAAAATAACCAATTCA	Intron 2	0	178788	178807	946
523752	CTTTGAGGGATTGCCTCAGT	Intron 2	66	179619	179638	947
523753	ACAGTCCTCATGAACAGATT	Intron 2	37	180513	180532	948
523754	ACTATCATTAAATAATATTGT	Intron 2	0	181323	181342	949
523755	ATCTAGATTTGCCTTATAAG	Intron 2	27	182123	182142	950
523756	TGGTTGAGGAAGACAGTCTC	Intron 2	16	182962	182981	951
523757	TGGCTCATAACTTCCTTAGC	Intron 2	43	183762	183781	952
523758	ACTAACTTAGGACTTGGGAC	Intron 2	72	184578	184597	953
523759	CTTATAGCATTACTAAGTGG	Intron 2	49	185403	185422	954
523760	TGGTGGCAGGAGAGAGGGAA	Intron 2	48	186203	186222	955
523761	TTTGCCAGGAAATCTTGAAA	Intron 2	35	187003	187022	956
523762	ATAACTTTTCTCTGAAATTT	Intron 2	8	187803	187822	957
523763	CCATGGGCTAGATCAGGATT	Intron 2	59	188620	188639	958
523764	TGAGCTTAGCAGTCACTTAG	Intron 2	62	189481	189500	959
523765	AATGTCTCAGCAAACCTGGG	Intron 2	62	190286	190305	960
523766	GGATACAGACATAGCTCTAA	Intron 2	75	191142	191161	961
523767	ACAACACTGTTTGTGAGGGT	Intron 2	66	191942	191961	962
523768	TCTATTTTCTAATAGCTGTT	Intron 2	49	192742	192761	963
523769	GGCCCCACCTCTGACCTTCA	Intron 2	7	193542	193561	964
523770	TGGTAAAGCTAGAAAAA	Intron 2	0	194346	194365	965
523771	AAGTGGTAAATATGATCACA	Intron 2	23	195159	195178	966
523772	GGCTTCAAGTTTAGGATCTG	Intron 2	52	196539	196558	967
523773	TTGTTGACACTCTCTTTTGG	Intron 2	18	197348	197367	968
523774	GTATGTGGCTTTAATTCACT	Intron 2	71	198148	198167	969
523775	AATTAGTTGTTTTGGCAAAT	Intron 2	14	198988	199007	970
523776	CTGTGTTTCAGTTGCATCACG	Intron 2	75	199816	199835	971
523777	AATGTGGAAGTTTCCTAACA	Intron 2	15	200616	200635	972
523778	TTGGTACTCATGAGGAGGCA	Intron 2	58	201416	201435	973
523779	TTTCTCTGTGTTTAAAATTG	Intron 2	13	202308	202327	974
523780	GTAAAGCACAAATGAACAAAA	Intron 2	21	203115	203134	975
523781	ATCACAGATCTTTGCTACAA	Intron 2	51	203915	203934	976
523782	TCCTGCCTTTCTGAACCAA	Intron 2	50	204721	204740	977
523783	TGGAAACTCTGCAACTCCAA	Intron 2	58	205552	205571	978
523784	ACACAGTAGGGAACAATTTT	Intron 2	8	206412	206431	979
523785	AGACAGATGGTGAAATGATG	Intron 2	0	207219	207238	980
523786	AAACAGAAAGAGAAGAAAAC	Intron 2	0	208117	208136	981
523787	CTTAGATAAATACTTCAAGA	Intron 3	0	208938	208957	982
523788	AGCCACTTCTTTTACAACCT	Intron 3	0	209742	209761	983
523789	TCACATCTGGATGTGAGGCT	Intron 3	80	210561	210580	984
523790	GACTGAAACTTAAAGGTGGG	Intron 3	7	211399	211418	985
523791	AAAGATGTGCAATCATCTAA	Intron 3	44	212204	212223	986

Table 15

Inhibition of GHR mRNA by 3-10-4 MOE gapmers targeting introns 2 and 3 of SEQ ID NO: 2

ISIS NO	Sequence	Target region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
539360	GCTGGTGACTCTGCCTG	Intron 2	95	151389	151405	987
539361	TGCTGGTGACTCTGCCT	Intron 2	95	151390	151406	988
539362	CTGCTGGTGACTCTGCC	Intron 2	93	151391	151407	989
539363	AGTAGTCAATATTATTT	Intron 2	31	153001	153017	990
539364	CAGTAGTCAATATTATT	Intron 2	13	153002	153018	991
539365	CCAGTAGTCAATATTAT	Intron 2	34	153003	153019	992
539366	CCTTTGGGTGAATAGCA	Intron 2	64	153921	153937	993
539367	ACCTTTGGGTGAATAGC	Intron 2	78	153922	153938	994
539368	CACCTTTGGGTGAATAG	Intron 2	40	153923	153939	995
539369	CAACTTGAGGACAATAA	Intron 2	38	155594	155610	996
539370	TCAACTTGAGGACAATA	Intron 2	63	155595	155611	997
539371	CTCAACTTGAGGACAAT	Intron 2	81	155596	155612	998
539372	CAGGAAGAAAGGAACCT	Intron 2	70	156394	156410	999
539373	CCAGGAAGAAAGGAACC	Intron 2	59	156395	156411	1000
539374	ACCAGGAAGAAAGGAAC	Intron 2	43	156396	156412	1001
539375	TGCAGTCATGTACACAA	Intron 2	93	156594	156610	1002
539376	CTGCAGTCATGTACACA	Intron 2	91	156595	156611	1003
539377	TCTGCAGTCATGTACAC	Intron 2	87	156596	156612	1004
539378	TGGTTTGTCAATCCTTT	Intron 2	95	156889	156905	1005
539379	TTGGTTTGTCAATCCTT	Intron 2	97	156890	156906	1006
539380	CTTGGTTTGTCAATCCT	Intron 2	97	156891	156907	1007
539381	TACAATGCACAGGACAC	Intron 2	65	157201	157217	1008
539382	CTACAATGCACAGGACA	Intron 2	85	157202	157218	1009
539383	GCTACAATGCACAGGAC	Intron 2	96	157203	157219	1010
539384	GATATTTATTGCTGTAC	Intron 2	43	158007	158023	1011
539385	TGATATTTATTGCTGTA	Intron 2	35	158008	158024	1012
539386	CTGATATTTATTGCTGT	Intron 2	38	158009	158025	1013
539387	AGGGTCTTTACAAAGTT	Intron 2	61	162751	162767	1014
539388	CAGGGTCTTTACAAAGT	Intron 2	65	162752	162768	1015
539389	CCAGGGTCTTTACAAAG	Intron 2	88	162753	162769	1016
539390	TTCTGCAGTATCCTAGC	Intron 2	72	166352	166368	1017
539391	TTTCTGCAGTATCCTAG	Intron 2	53	166353	166369	1018
539392	GTTTCTGCAGTATCCTA	Intron 2	84	166354	166370	1019
539393	AGTTTCTGCAGTATCCT	Intron 2	78	166355	166371	1020
539394	CAGTTTCTGCAGTATCC	Intron 2	77	166356	166372	1021
539395	CAAATTCCAGTCCTAGG	Intron 2	60	172746	172762	1022
539396	CCAAATTCCAGTCCTAG	Intron 2	75	172747	172763	1023

539397	TCCAAATTCAGTCCTA	Intron 2	62	172748	172764	1024
539398	AACCCATTTTCATCCATT	Intron 2	82	175372	175388	1025
539399	GAACCCATTTTCATCCAT	Intron 2	86	175373	175389	1026
539400	GGAACCCATTTTCATCCA	Intron 2	84	175374	175390	1027
539401	GCTTCATGTCTTTCTAG	Intron 2	88	189119	189135	1028
539402	TGCTTCATGTCTTTCTA	Intron 2	77	189120	189136	1029
539403	GTGCTTCATGTCTTTCT	Intron 2	95	189121	189137	1030
539404	TGAGCTTAGCAGTCACT	Intron 2	92	189484	189500	1031
539405	CATGAGCTTAGCAGTCA	Intron 2	82	189486	189502	1032
539406	TACAGACATAGCTCTAA	Intron 2	45	191142	191158	1033
539407	ATACAGACATAGCTCTA	Intron 2	53	191143	191159	1034
539408	GATACAGACATAGCTCT	Intron 2	67	191144	191160	1035
539409	TGTGGCTTTAATTCAC	Intron 2	70	198148	198164	1036
539410	ATGTGGCTTTAATTCAC	Intron 2	40	198149	198165	1037
539411	TATGTGGCTTTAATTC	Intron 2	35	198150	198166	1038
539412	TGTTTCAGTTGCATCACG	Intron 2	84	199816	199832	1039
539413	GTGTTTCAGTTGCATCAC	Intron 2	80	199817	199833	1040
539414	TGTGTTTCAGTTGCATCA	Intron 2	74	199818	199834	1041
539415	CATCTGGATGTGAGGCT	Intron 3	82	210561	210577	1042
539416	ACATCTGGATGTGAGGC	Intron 3	86	210562	210578	1043
539417	CACATCTGGATGTGAGG	Intron 3	55	210563	210579	1044
539418	TCAGGTAATTTCTGGAA	Intron 3	35	219019	219035	1045
539419	CTCAGGTAATTTCTGGA	Intron 3	44	219020	219036	1046
539420	TCTCAGGTAATTTCTGG	Intron 3	31	219021	219037	1047
539421	TTGCTTATTTACCTGGG	Intron 3	0	225568	225584	1048
539422	TTTGCTTATTTACCTGG	Intron 3	38	225569	225585	1049
539423	TTTTGCTTATTTACCTG	Intron 3	33	225570	225586	1050
539424	ATGATGTTACTACTACT	Intron 3	29	229618	229634	1051
539425	AATGATGTTACTACTAC	Intron 3	10	229619	229635	1052
539426	CAATGATGTTACTACTA	Intron 3	0	229620	229636	1053
539427	CCCCTAGAGCAATGGTC	Intron 3	67	232826	232842	1054
539428	CCCCCTAGAGCAATGGT	Intron 3	65	232827	232843	1055
539429	TCCCCCTAGAGCAATGG	Intron 3	45	232828	232844	1056
539430	TCAATTGCAGATGCTCT	Intron 3	78	237675	237691	1057
539431	CTCAATTGCAGATGCTC	Intron 3	82	237676	237692	1058
539432	GCTCAATTGCAGATGCT	Intron 3	92	237677	237693	1059
539433	AGCTCAATTGCAGATGC	Intron 3	85	237678	237694	1060
539434	GTATATTCAGTCCAAGG	Intron 3	73	248231	248247	1061
539435	AGTATATTCAGTCCAAG	Intron 3	70	248232	248248	1062
539436	CAGTATATTCAGTCCAA	Intron 3	40	248233	248249	1063

Table 16

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 1 and 3 of SEQ ID NO: 2

ISIS NO	Sequence	Target region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532502	GAGTATTTTCAGGCTGGAAAA	Intron 3	43	214623	214642	1064
533404	GTAAGTCAGGAATGGAAAAC	Intron 1	56	26501	26520	1065
				113035	113054	
				121992	122011	
533405	AGTAACTCAGGAATGGAAAA	Intron 1	41	26502	26521	1066
				113036	113055	
				121993	122012	
533406	AAGTAACTCAGGAATGGAAA	Intron 1	43	26503	26522	1067
				113037	113056	
				121994	122013	
533407	GAGATTTCAAATAAATCTCA	Intron 1	0	143207	143226	1068
				143235	143254	
				143263	143282	
				143291	143310	
				143319	143338	
				143347	143366	
				143375	143394	
				143403	143422	
				143431	143450	
533408	TGAGATTTCAAATAAATCTC	Intron 1	11	143208	143227	1069
				143236	143255	
				143264	143283	
				143292	143311	
				143320	143339	
				143348	143367	
				143376	143395	
				143404	143423	
				143432	143451	
533409	GTGAGATTTCAAATAAATCT	Intron 1	0	143209	143228	1070
				143237	143256	
				143265	143284	
				143293	143312	
				143321	143340	
				143349	143368	
				143377	143396	

				143405	143424	
				143433	143452	
				143461	143480	
533410	TGTGAGATTTCAAATAAATC	Intron 1	0	143210	143229	1071
				143238	143257	
				143266	143285	
				143294	143313	
				143322	143341	
				143350	143369	
				143378	143397	
				143406	143425	
				143434	143453	
				143462	143481	
533411	TTGTGAGATTTCAAATAAAT	Intron 1	10	143183	143202	1072
				143211	143230	
				143239	143258	
				143267	143286	
				143295	143314	
				143323	143342	
				143351	143370	
				143379	143398	
				143407	143426	
				143435	143454	
533412	TTTGTGAGATTTCAAATAAA	Intron 1	0	143184	143203	1073
				143212	143231	
				143240	143259	
				143296	143315	
				143324	143343	
				143352	143371	
				143380	143399	
				143464	143483	
533413	CTTTGTGAGATTTCAAATAA	Intron 1	20	143185	143204	1074
				143213	143232	
				143241	143260	
				143297	143316	
				143325	143344	
				143353	143372	
				143381	143400	
				143465	143484	
533414	ACTTTGTGAGATTTCAAATA	Intron 1	57	143186	143205	1075
				143214	143233	
				143242	143261	

				143298	143317	
				143326	143345	
				143354	143373	
				143382	143401	
				143466	143485	
533415	CAC TTTGTGAGATTTCAAAT	Intron 1	69	143187	143206	1076
				143215	143234	
				143243	143262	
				143299	143318	
				143327	143346	
				143355	143374	
				143383	143402	
				143467	143486	
533895	AGTATTTTCAGGCTGGAAAAA	Intron 3	35	214622	214641	1077
533896	TGAGTATTTTCAGGCTGGAAA	Intron 3	55	214624	214643	1078
533897	TCTGAGTATTTTCAGGCTGGA	Intron 3	71	214626	214645	1079
533898	ATCTGAGTATTTTCAGGCTGG	Intron 3	77	214627	214646	1080
533899	TATCTGAGTATTTTCAGGCTG	Intron 3	58	214628	214647	1081
533900	TTTTGTGTTATGCCTTGAGG	Intron 3	51	221483	221502	1082
533901	TTTTGTGTTATGCCTTGAG	Intron 3	55	221484	221503	1083
533902	ATTTTTGTGTTATGCCTTGA	Intron 3	57	221485	221504	1084
533903	ATATTTTTGTGTTATGCCTT	Intron 3	56	221487	221506	1085
533904	AATATTTTTGTGTTATGCCT	Intron 3	61	221488	221507	1086
533905	AAATATTTTTGTGTTATGCC	Intron 3	18	221489	221508	1087
533906	TTGCTTATTTACCTGGGTAA	Intron 3	58	225565	225584	1088
533907	TTTGCTTATTTACCTGGGTA	Intron 3	64	225566	225585	1089
533908	TTTGCTTATTTACCTGGGT	Intron 3	77	225567	225586	1090
533909	CCTTTTGCTTATTTACCTGG	Intron 3	69	225569	225588	1091
533910	GCCTTTTGCTTATTTACCTG	Intron 3	69	225570	225589	1092
533911	TGCCTTTTGCTTATTTACCT	Intron 3	55	225571	225590	1093
533912	ATGATGTTACTACTACTCAA	Intron 3	60	229615	229634	1094
533913	AATGATGTTACTACTACTCA	Intron 3	48	229616	229635	1095
533914	CAATGATGTTACTACTACTC	Intron 3	57	229617	229636	1096
533915	TCCAATGATGTTACTACTAC	Intron 3	69	229619	229638	1097
533916	TTCCAATGATGTTACTACTA	Intron 3	74	229620	229639	1098
533917	ATTCCAATGATGTTACTACT	Intron 3	74	229621	229640	1099
533918	CCCCTAGAGCAATGGTCTAG	Intron 3	71	232823	232842	1100
533919	CCCCCTAGAGCAATGGTCTA	Intron 3	44	232824	232843	1101
533920	TCCCCCTAGAGCAATGGTCT	Intron 3	54	232825	232844	1102
533921	TATCCCCCTAGAGCAATGGT	Intron 3	62	232827	232846	1103
533922	ATATCCCCCTAGAGCAATGG	Intron 3	50	232828	232847	1104
533923	AATATCCCCCTAGAGCAATG	Intron 3	61	232829	232848	1105
533924	GCTCACATTTGGAAGACAGT	Intron 3	68	233623	233642	1106

533925	GGCTCACATTTGGAAGACAG	Intron 3	74	233624	233643	1107
533926	AGGCTCACATTTGGAAGACA	Intron 3	56	233625	233644	1108
533927	AGAGGCTCACATTTGGAAGA	Intron 3	34	233627	233646	1109
533928	TAGAGGCTCACATTTGGAAG	Intron 3	18	233628	233647	1110
533929	TTAGAGGCTCACATTTGGAA	Intron 3	19	233629	233648	1111
533930	CTCAATTGCAGATGCTCTGA	Intron 3	66	237673	237692	1112
533931	GCTCAATTGCAGATGCTCTG	Intron 3	72	237674	237693	1113
533932	AGCTCAATTGCAGATGCTCT	Intron 3	74	237675	237694	1114
533933	AAAGCTCAATTGCAGATGCT	Intron 3	66	237677	237696	1115
533934	TAAAGCTCAATTGCAGATGC	Intron 3	59	237678	237697	1116
533935	ATAAAGCTCAATTGCAGATG	Intron 3	23	237679	237698	1117
533936	GTGAGTCCATTAAACCTCTT	Intron 3	73	244873	244892	1118
533937	TGTGAGTCCATTAAACCTCT	Intron 3	73	244874	244893	1119
533938	ACTGTGAGTCCATTAAACCT	Intron 3	17	244876	244895	1120
533939	AACTGTGAGTCCATTAAACC	Intron 3	19	244877	244896	1121
533940	GAAGTGTGAGTCCATTAAAC	Intron 3	28	244878	244897	1122
533941	ATATTGAAAGGCCCATCAAA	Intron 3	13	246498	246517	1123
533942	AATATTGAAAGGCCCATCAA	Intron 3	31	246499	246518	1124
533943	AAATATTGAAAGGCCCATCA	Intron 3	51	246500	246519	1125
533944	GAAAATATTGAAAGGCCCAT	Intron 3	22	246502	246521	1126
533945	GGAAAATATTGAAAGGCCCA	Intron 3	42	246503	246522	1127
533946	AGGAAAATATTGAAAGGCC	Intron 3	28	246504	246523	1128
533947	GTATATTCAGTCCAAGGATC	Intron 3	65	248228	248247	1129
533948	AGTATATTCAGTCCAAGGAT	Intron 3	63	248229	248248	1130
533949	CAGTATATTCAGTCCAAGGA	Intron 3	67	248230	248249	1131
533950	AACAGTATATTCAGTCCAAG	Intron 3	56	248232	248251	1132
533951	AAACAGTATATTCAGTCCAA	Intron 3	60	248233	248252	1133
533952	AAAACAGTATATTCAGTCCA	Intron 3	59	248234	248253	1134
533953	TCTATTGTTGCCACCTTTAT	Intron 3	45	252838	252857	1135
533954	TTCTATTGTTGCCACCTTTA	Intron 3	52	252839	252858	1136
533955	TTTCTATTGTTGCCACCTTT	Intron 3	46	252840	252859	1137
533956	AGTTTCTATTGTTGCCACCT	Intron 3	59	252842	252861	1138
533957	CAGTTTCTATTGTTGCCACC	Intron 3	41	252843	252862	1139
533958	CCAGTTTCTATTGTTGCCAC	Intron 3	48	252844	252863	1140

Table 17

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting intron 3 of SEQ ID NO: 2

ISIS NO	Sequence	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532454	GCAGAACTGATTGCTTACTT	78	182862	182881	1141
532455	AGGTCATAAGATTTTCATTT	48	183533	183552	1142

532456	GCCTCTGGCCATAAAGAAAT	54	183578	183597	1143
532457	AAAGTTTAAGAGGCACCCCA	31	184508	184527	1144
532458	GAATAAGCACAAAAGTTTAA	28	184519	184538	1145
532459	GAACCAAATAAACCTCTCTT	52	185452	185471	1146
532460	ATGTTGAAATTTGATCCCCA	79	185763	185782	1147
532461	TGTGAGAGCTCACTCACTAT	42	186134	186153	1148
532462	CTTGTGAGAGCTCACTCACT	72	186136	186155	1149
532463	ACATGGTGGCAGGAGAGAGG	42	186206	186225	1150
532464	CTAGAAAGAACTACCTGAG	12	186341	186360	1151
532465	AACTTCAGTTGTAAAATAAT	27	187044	187063	1152
532466	GAAAAGGATTTTGAGATTTC	43	188897	188916	1153
532467	CTTAGCTGTCAAGGCCCTTT	80	189084	189103	1154
532468	TGTGCTTCATGTCTTTCTAG	88	189119	189138	1155
532469	CCCTTGAACATGCTATCCTT	85	189256	189275	1156
532470	CTTGCAGGGATGCATCTCAG	87	189625	189644	1157
532471	TCTCTTGCACATCTAATTTTC	82	189656	189675	1158
532472	CTTCCAGCACAAACCCATCAC	77	190109	190128	1159
532473	GTAACCTACATTCCCTTTATC	52	190860	190879	1160
532474	AGTAACTACATTCCCTTTAT	58	190861	190880	1161
532475	CAGATAGCACAGGGCTAAAA	84	190979	190998	1162
532476	AGAATCAGGAATGTTTGCCT	86	192904	192923	1163
532477	TGACTCAATCATTTAGACTT	45	192990	193009	1164
532478	TCAACAGTCAATGGACTTGT	71	193042	193061	1165
532479	AATTTCTACTGCTATGATGC	75	194806	194825	1166
532480	ATGGTTCCAAATTTCTATCT	86	195704	195723	1167
532481	CTGTATGGCTTTAAGTATTC	63	196756	196775	1168
532482	AACTTATGAACTGTTACCA	86	198307	198326	1169
532483	AATAAGCTTGAAGTCTGAAG	63	199520	199539	1170
532484	TAGTTATCTAACTGCCCAAT	77	199544	199563	1171
532485	TTCTGCAAAGCTTCCCAGTA	72	200314	200333	1172
532486	ACAACCTCAAGCTTCACATA	65	200599	200618	1173
532487	GAATCAATGTTCTGGCAAGA	52	201842	201861	1174
532488	CAGCCTTTCAGCTGTGAAAG	52	204181	204200	1175
532489	AACAATGCCAAGAAATCTAT	74	204369	204388	1176
532490	CCCACAGTAACAATGCCAAG	90	204377	204396	1177
532491	TTTTACCTCCCAGTGAACT	34	205896	205915	1178
532492	TAATTGTTGATCCATGATGT	5	208856	208875	1179
532493	GTTGGAGAGACAAGTTTAAC	29	208975	208994	1180
532494	AGTCATAAAATTCAAATTAT	39	209537	209556	1181
532495	GGCCTTGGGCACACTTTCTC	82	207510	207529	1182
			210189	210208	
532496	AAGTTTTTATTGAAGTTAAT	0	212551	212570	1183
532497	AAGAAAAATTAGGAAGCTAG	31	212649	212668	1184

532498	CAGGGAGATAAGTTTATTCA	61	212797	212816	1185
532499	ATTTAATACACATTGGAATA	15	213390	213409	1186
532500	GTAGGACTATTTATGATTCC	86	213914	213933	1187
532501	CACTCTCTTGGGCTGTAAAG	82	214479	214498	1188
532502	GAGTATTTTCAGGCTGGAAAA	66	214623	214642	1064
532503	TTGTTTGAGTTCCAAAAGAA	39	214932	214951	1189
532504	TTTGCCATGAGACACACAAT	77	215932	215951	1190
532505	CACCAAACCTCAGAGACATG	80	216468	216487	1191
532506	CCACTGTAAAGTGATGCATG	83	217480	217499	1192
532507	CTCTCAGGTAATTTCTGGAA	86	219019	219038	1193
532508	GCTCCTCACAAATGACCCTTT	84	219452	219471	1194
532509	GGGACTGGCACTGGTAATTT	56	220062	220081	1195
532510	CTAACCATTAGTTACTGTAT	69	220558	220577	1196
532511	GGATTTTAGGTTCTTGCTGT	51	221588	221607	1197
532512	TGAATCATATACTGATATCA	63	222914	222933	1198
532513	TTGAGGTATTAAATTTTAAA	0	223001	223020	1199
532514	AGTTTGTAATGTAGTGATTT	19	223156	223175	1200
532515	AAATATTTGATAGCTCACAT	18	224409	224428	1201
532516	AGAAATATTTGATAGCTCAC	57	224411	224430	1202
532517	CCACATTTCAAATGTTCTCT	80	224717	224736	1203
532518	GCAGGAAGAGTGGCATGGAC	59	224750	224769	1204
532519	CACTTATCCAAATGCAGAGA	82	225742	225761	1205
532520	CAAGGTAATGGGAGGCTAGC	47	225903	225922	1206
532521	ATAGTCAAAGCTAAGGATAT	4	226177	226196	1207
532522	GTAATTTTCATTCATGCTTCC	67	226804	226823	1208
532523	GTCCACATTCAGCTGTGTGT	72	231912	231931	1209
532524	TCATTCAGGAAATTCTGCTA	62	232286	232305	1210
532525	AACATGTCTCATTCAGGAAA	71	232294	232313	1211
532526	TAACATGTCTCATTCAGGAA	85	232295	232314	1212
532527	AGATTCCTCAAATTCAGTGA	66	232389	232408	1213
532528	TAAGCGGAAAAGGAGAAAAG	0	233684	233703	1214
532529	AAAGCAAGAGAATTCCTAAA	32	234203	234222	1215
532530	AATGAACCTTTAACTTAGTA	40	234876	234895	1216

Table 18

Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 3-8 and intron-exonic regions of SEQ ID NO: 2

ISIS NO	Sequence	Target region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
523792	AAAGCTTTGTGGATAAAGTT	Intron 3	44	213025	213044	1217
523793	GAAGGAAAGGTTCTGTGGAA	Intron 3	38	213825	213844	1218
523794	CTGAGTATTTTCAGGCTGGAA	Intron 3	84	214625	214644	1219

523795	TTGAATTATCCCTTTAAAAA	Intron 3	38	215446	215465	1220
523796	TTTAGAATGGTTTGGCATAAC	Intron 3	66	216365	216384	1221
523797	GATATGTCCACATTGATTAG	Intron 3	65	218132	218151	1222
523798	ATTATTTAAGCTTCTACTTT	Intron 3	44	218973	218992	1223
523799	ATACATGGCAATTAAGAT	Intron 3	26	219886	219905	1224
523800	TGAGATAGTGTGGGAAATAT	Intron 3	18	220686	220705	1225
523801	TATTTTTGTGTTATGCCTTG	Intron 3	73	221486	221505	1226
523802	TTATTAAGTAGAATATGCCT	Intron 3	16	223110	223129	1227
523803	GATTATTCTATTTTTATTTT	Intron 3	33	223948	223967	1228
523804	AGGAAGAGTGGCATGGACAT	Intron 3	43	224748	224767	1229
523805	CTTTTGCTTATTTACCTGGG	Intron 3	84	225568	225587	1230
523806	TTTATATTATTAATATCATT	Intron 3	31	226371	226390	1231
523807	GGTACATGGCTTTTAAGTGG	Intron 3	53	227218	227237	1232
523808	AATATTGGTCAGGTTTAAGA	Intron 3	28	228018	228037	1233
523809	ATTTTCATCTCTTTCTTAGTT	Intron 3	45	228818	228837	1234
523810	CCAATGATGTTACTACTACT	Intron 3	89	229618	229637	1235
523811	GTTCCCCCAACCCCTTGGA	Intron 3	28	230418	230437	1236
523812	TATAGGAAGTGAGATGTATG	Intron 3	46	231218	231237	1237
523813	ATTATTCTAGAAGAAGATTT	Intron 3	12	232018	232037	1238
523814	ATCCCCCTAGAGCAATGGTC	Intron 3	79	232826	232845	1239
523815	GAGGCTCACATTTGGAAGAC	Intron 3	69	233626	233645	1240
523816	TACACAAATCCAAGGCAGAG	Intron 3	57	234447	234466	1241
523817	AGGAAGAGTGGGAGTGTTAC	Intron 3	35	235258	235277	1242
523818	GTCCCTGACTAGGCATTTTG	Intron 3	43	236071	236090	1243
523819	AAGCTCAATTGCAGATGCTC	Intron 3	80	237676	237695	1244
523820	CTGTGAGTCCATTAAACCTC	Intron 3	81	244875	244894	1245
523821	TGAAATGTGGCTAGTGTGAC	Intron 3	51	245701	245720	1246
523822	AAAATATTGAAAGGCCCATC	Intron 3	68	246501	246520	1247
523823	AATGTCAATAGTGCCCTATT	Intron 3	48	247431	247450	1248
523824	ACAGTATATTCAAGTCCAAGG	Intron 3	82	248231	248250	1249
523825	TGTCTATTTAAGTTTGTTGC	Intron 3	45	250001	250020	1250
523826	TTCAAGTACTGTCATGAATA	Intron 3	47	251214	251233	1251
523827	TTTCTTTTCTTAACTAAG	Intron 3	11	252041	252060	1252
523828	GTTTCTATTGTTGCCACCTT	Intron 3	70	252841	252860	1253
523829	AAGGCCACATATTATAGTAT	Intron 3	29	253698	253717	1254
523830	ACCTGAACATTAATTTCTT	Intron 3	19	255397	255416	1255
523831	GAATGGGCTGAGTAGTTGAA	Intron 3	47	256197	256216	1256
523832	TGATGAACATTGCTAATTTG	Intron 3	26	257018	257037	1257
523833	ATCTTGCCTCGATGAAAGTT	Intron 3	17	257818	257837	1258
523834	TTAAGTGGCACAGCCATGAT	Intron 3	9	258774	258793	1259
523835	AATGAGTTAAGTTGGAACAC	Intron 3	25	261294	261313	1260
523836	TCCTTAGTAGAATGCCTGGA	Intron 3	57	263338	263357	1261
523837	TATGTAGAAAAATAAGCTGG	Intron 3	0	266514	266533	1262

523838	GCCGAGGCAGGCACCTGAGT	Intron 3	43	267375	267394	1263
523839	TGGTACCTATATTGAGAGGT	Intron 4	46	269052	269071	1264
523840	TTAAGGAAAAATATAGTATA	Intron 4	7	269854	269873	1265
523841	TTATTTATGTGTCAGGGATG	Intron 4	28	270668	270687	1266
523842	CAAAAGTTAAGTGCTTTAGG	Intron 4	10	271468	271487	1267
523843	TTCATAGATGTCTAAGGAAT	Intron 4	32	273341	273360	1268
523844	ACCTGTGATTTACCTATTTC	Exon 5- intron 5 junction	18	274185	274204	1269
523845	TGCCTAGAAAACCATATAAA	Intron 5	38	274985	275004	1270
523846	AAACATCCTCAAAGGTACCT	Intron 5	64	275808	275827	1271
523847	CTTCCCTGAGACACACACAT	Intron 5	35	276617	276636	1272
523848	CTTCTTCAATCTTCTCATAC	Intron 5	33	278288	278307	1273
523849	TACCATTTTCCATTTAGTTT	Exon 6- intron 6 junction	7	279088	279107	1274
523850	ATTGGCATCTTTTTCAGTGG	Intron 6	34	279902	279921	1275
523851	TCAAGCTCACGGTTGGAGAC	Intron 6	36	280799	280818	1276
523852	AAATGAAATCAGTATGTTGA	Intron 6	0	281622	281641	1277
523853	TGATTTATCACAAAGGTGCT	Intron 6	29	282437	282456	1278
523854	AAAACAGTAGAAAAGATTAA	Intron 6	14	284073	284092	1279
523855	CTACATCACAGCAGTCAGAA	Intron 6	23	285187	285206	1280
523856	AAAAGATGTAAGTGTGACAT	Intron 6	28	286349 286919	286368 286938	1281
523857	TTACAAGAACTGCTAAAGGG	Intron 6	15	287151	287170	1282
523858	ATAAAGAAAAAGTTAACTGA	Intron 6	9	287982	288001	1283
523859	AGATAATATACTTCTTCTAT	Intron 6	4	288809	288828	1284
523860	CCTTCTTCACATGTAAATTG	Exon 7- intron 7 junction	19	290456	290475	1285
523861	TTTCTATGTAGCTTGTGGTT	Intron 7	30	291258	291277	1286
523862	AGGCAGAGTTTTTATTGATA	Intron 7	19	292058	292077	1287
523863	ATAGTCACCAGCCTAAGCCT	Intron 8	28	292858	292877	1288
523864	AGACTTTTAGCATGCTTGAC	Intron 8	56	293658	293677	1289
523865	TTTACAGCCCTACAGTTCTA	Intron 8	7	294464	294483	1290
523866	CCAGAGAACCTGACTCCAAA	Intron 8	6	295330	295349	1291
523867	CAGAAGAAAATATTAGACAG	Intron 8	10	296993	297012	1292

Table 19
Inhibition of GHR mRNA by 5-10-5 MOE gapmers targeting introns 3-8 of SEQ ID NO: 2

ISIS NO	Sequence	Target Region	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	SEQ ID NO
532531	TATTATACTTCTAAATTCCC	Intron 3	70	236716	236735	1293
532532	TAAAAGCAAGAAAAAGGAAC	Intron 3	52	236889	236908	1294
532533	CCTAATTTATATGAACAAAC	Intron 3	56	237177	237196	1295
532534	TGCAATGCCTTAGCCTAAAA	Intron 3	86	238087	238106	1296
532535	CACCACCATTATTACACTAC	Intron 3	75	238186	238205	1297
532536	AAATAAATCAGATTATTATA	Intron 3	52	238242	238261	1298
532537	CTTAGATCTGTGCTGTCCAA	Intron 3	81	245758	245777	1299
532538	GTTAGTGTTAGATTCTTTGA	Intron 3	67	246152	246171	1300
532539	CATGCTCACGGCTGTGTTAC	Intron 3	66	246248	246267	1301
532540	CCCATCAAATACTGAGTTCT	Intron 3	86	246487	246506	1302
532541	GAAAGTAGTGATTAATGAGA	Intron 3	38	247012	247031	1303
532542	ATTAATCAACAAGTGGCATT	Intron 3	72	247203	247222	1304
532543	TTTAATTTTAGGGTTTAGAG	Intron 3	48	248344	248363	1305
532544	CTTGCTACCACTAGAGCCTT	Intron 3	69	248694	248713	1306
532545	ACCACTGACTTATATCATTT	Intron 3	58	248743	248762	1307
532546	TTCCCCATTGCTAATTTTGT	Intron 3	48	251601	251620	1308
532547	TCCTGAACTTAGTAGCTGG	Intron 3	83	253147	253166	1309
532548	TGTCTTAAAAAGGAATAAAA	Intron 3	52	253785	253804	1310
532549	CCTATAATAAAGTATTGTCT	Intron 3	70	253800	253819	1311
532550	ATGTAAAATGGTATAGCTAC	Intron 3	50	254040	254059	1312
532551	AACCCTCACACACTTCTGTT	Intron 3	71	254064	254083	1313
532552	ATTCTGCATAAGCAGTGTTT	Intron 3	53	254246	254265	1314
532553	TTACTACCCTGAAGAAGAAC	Intron 3	35	254314	254333	1315
532554	AAGACCTATAACTTACTACC	Intron 3	49	254326	254345	1316
532555	TTTCACAAGATTTACTTGGT	Intron 3	77	254641	254660	1317
532556	CAGTTGTGATTGTCAACCTA	Intron 3	77	257073	257092	1318
532557	AATCTTGCCTCGATGAAAGT	Intron 3	57	257819	257838	1319
532558	TGGCCTAAATGTATCAGTTA	Intron 3	66	259157	259176	1320
532559	AGGCTTTGGGTAAAATCTTT	Intron 3	67	259184	259203	1321
532560	TATGATTTTTAAAGATTA	Intron 3	20	261419	261438	1322
532561	GTACAGTGAAAAAGATGTGT	Intron 3	56	263666	263685	1323
532562	GACAGGTATGAAGCAAAACA	Intron 3	64	267033	267052	1324
532563	TGAGCTGAGGGTCTTTGCCG	Intron 3	61	267391	267410	1325
532564	AGGCTGAGTTGTACACAAAC	Intron 4	52	269422	269441	1326
532565	ATGAGGAGGCTGAGTTGTAC	Intron 4	43	269428	269447	1327
532566	TCATAAAGTGGGCCAGCTT	Intron 4	70	270044	270063	1328
532567	ACTCCTAATCCCTCAGTTTT	Intron 4	62	270492	270511	1329

532568	TTTACATGCAAGGAGCTGAG	Intron 4	61	271047	271066	1330
532569	TAATGCCCTTTCTCCCTACT	Intron 4	60	271215	271234	1331
532570	CCTGTTTAGATTATCCCAAA	Intron 4	62	271763	271782	1332
532571	CATGATTCACAGAATTTCTC	Intron 4	56	271831	271850	1333
532572	AGTTAGAAAACCTCAAAGTAT	Intron 4	2	271915	271934	1334
532573	TCAAATGTACTTAGCATAAG	Intron 4	9	271947	271966	1335
532574	ATATCAAATGTACTTAGCAT	Intron 4	59	271950	271969	1336
532575	AAAGTTCAGAAGAGGGAATG	Intron 4	51	273233	273252	1337
532576	AATTCCTATCTGAGTAGTTT	Intron 4	56	273440	273459	1338
532577	GTCCCCTAATTTCAAGCTAA	Intron 4	31	273471	273490	1339
532578	CTATGTCAAATGAAACAAAA	Intron 5	38	274205	274224	1340
532579	TGATTATGCTTTGTGATAAA	Intron 5	42	274624	274643	1341
532580	TCCAGCTGACTAGGAGGGCT	Intron 5	7	275732	275751	1342
532581	CATACCAGTCTCCTCGCTCA	Intron 5	0	276738	276757	1343
532582	ATATAACAGAATCCAACCAT	Intron 5	47	277045	277064	1344
				278361	278380	
532583	TGCAAAAATGGCCAAACTACA	Intron 5	56	277577	277596	1345
532584	TCTTCCTAGCCACATGTGAT	Intron 5	32	278227	278246	1346
532585	TACCATGCTCTCTAATTGCC	Intron 6	47	279624	279643	1347
532586	AGTGATCTGTGCCAGGCTGC	Intron 6	65	279848	279867	1348
532587	AAGTTACAGAACAGATATCT	Intron 6	61	280012	280031	1349
532588	GTATTGTGAAAATAGTACTG	Intron 6	45	280226	280245	1350
532589	AAACACTATCAAGCTCACGG	Intron 6	54	280807	280826	1351
532590	TTCAAGAAAAGTCTTCAAAT	Intron 6	24	280831	280850	1352
532591	GGATCATTTCCCCATGCATG	Intron 6	52	280982	281001	1353
532592	ATATTATATTAAGAAAAATG	Intron 6	4	281422	281441	1354
532593	CTCCCATGTTCACTTAT	Intron 6	49	281587	281606	1355
532594	CATGACATTGGTTTGGGCAA	Intron 6	43	282229	282248	1356
532595	AATGTTGTTGGGAAAATTGG	Intron 6	42	282383	282402	1357
532596	AGCTGCAGGATACAAAGTCA	Intron 6	49	282986	283005	1358
532597	ATATCCTTTCATGATAAAAA	Intron 6	31	283354	283373	1359
532598	ATGGGCTAATATCTCTGATA	Intron 6	50	283590	283609	1360
532599	ACATTACTAATAATTAGAGA	Intron 6	0	285236	285255	1361
532600	ATAAAAACATATGAAAGTAT	Intron 6	12	287093	287112	1362
532601	TTCTGAATTAAATCTATTAG	Intron 6	16	287408	287427	1363
532602	TTACATTTTTGCAAATTTAT	Intron 6	31	287472	287491	1364
532603	TGAACAGTTGATTAACAAAG	Intron 6	15	287887	287906	1365
532604	AAGTTATTGGTTTACTAGAT	Intron 6	0	288598	288617	1366
532605	TTGGAAAAGGTCCTAGAAAA	Intron 6	24	289808	289827	1367
532606	CATGACAGAACTTCTTAGA	Intron 7	25	292035	292054	1368
532607	CCATACTTGCTGACAAATAT	Intron 8	39	294389	294408	1369

Example 2: Dose-dependent antisense inhibition of human GHR in Hep3B cells by MOE gapmers

Gapmers from Example 1 exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in Hep3B cells. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.625 μ M, 1.25 μ M, 2.50 μ M, 5.00 μ M and 10.00 μ M concentrations of antisense oligonucleotide, as specified in the Tables below. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 20

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
523271	41	61	73	86	92	0.8
523274	20	36	64	80	92	1.8
523324	35	45	68	91	90	1.2

Table 21

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
523604	21	42	68	58	86	2.0
523577	6	22	56	66	91	2.7
523614	14	44	61	84	87	1.9
523564	4	26	48	67	86	2.8
523633	30	43	71	82	84	1.4
523571	2	9	38	55	82	3.9

Table 22

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
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523570	25	50	64	77	88	1.5
523592	27	42	59	79	88	1.7
523595	21	50	62	76	90	1.6
523596	36	47	62	75	77	1.4
523607	49	62	71	82	84	0.5
523615	20	49	63	83	91	1.6
523630	4	28	54	79	78	2.6
523661	4	34	48	73	79	2.7
523665	4	28	54	73	79	2.7
523687	30	56	61	78	81	1.4
523711	42	66	78	94	95	0.7
523712	6	37	60	72	89	2.3
523713	4	32	55	72	85	2.5
523714	59	75	88	95	97	0.2

Table 23

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
523655	26	33	60	67	78	2.1
523656	19	33	45	69	87	2.4
523658	0	42	62	67	79	3.1
523715	78	90	92	93	95	<0.6
523718	30	46	67	84	92	1.4
523723	56	69	83	92	94	0.3
523725	45	64	79	89	95	0.6
523726	32	48	77	88	89	1.2
523736	0	64	75	90	96	1.5
523747	48	64	80	91	92	0.6
523758	25	39	61	74	84	1.9
523766	7	37	66	81	93	2.0
523776	26	54	72	78	83	1.3
523789	62	68	81	85	90	0.2

Table 24

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
523719	24	46	65	84	93	1.5
523720	18	49	72	85	93	1.5
523724	43	61	77	91	91	0.7
523735	8	42	63	81	93	2.0

523740	37	58	72	83	88	1.0
523752	9	29	52	72	86	2.5
523763	8	32	57	70	80	2.6
523764	43	52	67	77	79	0.9
523765	24	48	62	88	4	1.5
523767	49	62	67	72	82	0.6
523772	29	39	54	62	61	2.7
523774	28	59	63	88	91	1.2
523778	25	32	63	78	84	1.9
523783	0	22	53	72	88	2.8

Table 25

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
532151	57	69	76	85	88	<0.6
532153	23	43	54	80	86	1.8
532158	46	58	81	87	87	0.6
532160	17	26	55	76	92	2.2
532162	14	46	71	83	93	1.7
532164	37	76	82	90	93	0.6
532171	41	81	67	81	83	<0.6
532181	56	81	84	89	93	0.2
532186	26	65	75	83	91	1.1
532188	51	68	80	89	93	<0.6
532189	24	31	52	75	86	2.1
532197	0	40	66	85	93	2.1
532199	24	37	50	73	87	2.1
532222	12	41	67	84	94	1.8

Table 26

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
532175	41	54	76	84	89	0.9
532223	53	69	75	88	94	<0.6
532235	43	58	67	77	82	0.8
532241	39	53	62	73	87	1.2
532248	49	65	72	85	93	0.6
532254	52	62	85	87	92	<0.6
532300	20	29	49	66	78	2.7
532304	26	39	66	78	90	1.7

532316	41	66	76	86	94	0.7
532395	32	56	84	93	97	1.0
532401	47	80	92	96	98	<0.6
532411	73	90	94	97	98	<0.6
532420	38	49	82	85	97	1.0
532436	37	58	75	90	96	0.9

Table 27

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
532410	66	83	92	94	97	<0.6
532468	45	68	78	93	94	0.6
532469	0	17	56	76	92	2.8
532470	10	34	62	84	94	2.0
532475	13	36	52	64	87	2.5
532476	34	64	73	79	93	0.9
532480	28	54	67	78	87	1.4
532482	21	39	69	83	92	1.7
532490	42	60	68	84	93	0.9
532500	37	50	63	81	87	1.2
532506	13	41	66	75	89	1.9
532507	47	59	71	86	89	0.7
532508	0	31	73	83	89	2.2
532526	31	56	78	79	88	1.1

Table 28

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
532495	59	74	81	87	95	<0.6
532501	49	53	71	83	84	0.7
532534	53	75	85	91	97	<0.6
532535	0	34	61	84	92	2.6
532537	49	67	80	90	94	<0.6
532540	59	70	87	93	95	<0.6
532547	57	71	81	91	92	<0.6
532555	48	36	61	72	85	1.3
532556	33	57	67	86	90	1.1

Table 29

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
523421	32	57	81	82	88	1.0
533006	46	43	69	83	91	1.0
533121	53	75	75	88	93	<0.6
533122	65	77	82	90	93	<0.6
533123	39	71	84	91	95	0.6
533125	49	61	81	85	91	0.6
533131	3	57	59	82	90	1.9
533136	32	65	62	81	88	1.1
533139	13	51	72	90	94	1.5
533140	36	66	39	87	92	1.2
533153	50	65	83	89	90	<0.6
533156	43	64	74	85	90	0.7
533160	57	80	87	91	95	<0.6
533161	54	62	81	89	92	<0.6

Table 30

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
533234	50	70	86	93	95	<0.6
533237	5	45	63	84	93	1.9
533233	43	55	76	90	95	0.8
533179	31	63	75	87	87	1.0
533178	53	67	76	89	94	<0.6
533187	5	15	53	79	86	2.7
533188	49	68	83	89	94	<0.6
533271	45	66	85	92	94	0.6
533134	22	45	64	81	89	1.6
533258	52	72	88	93	95	<0.6
533235	50	54	75	82	90	0.7
533262	23	54	78	91	96	1.2
533189	48	66	78	82	88	<0.6
533193	38	53	72	77	91	1.0

Table 31

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
533259	63	78	84	90	92	<0.6
533291	25	57	75	86	96	1.2

533256	67	76	90	95	95	<0.6
533269	42	75	82	94	97	0.6
533265	67	78	91	95	97	<0.6
533318	16	45	77	87	95	1.5
533257	55	84	91	96	96	<0.6
533280	34	62	80	91	91	0.9
533301	52	77	84	93	96	<0.6
533316	41	50	79	93	94	0.9
533270	62	71	88	94	97	<0.6
533330	46	76	93	97	98	<0.6
533317	55	60	82	87	96	<0.6
533315	39	56	82	87	93	0.9

Table 32

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
533364	71	77	92	90	94	<0.6
533925	26	55	61	85	91	1.4
533326	54	77	80	93	95	<0.6
533916	18	62	69	83	93	1.4
533328	52	68	89	94	98	<0.6
533932	42	49	80	86	92	0.9
533352	42	82	88	93	94	<0.6
533917	20	37	57	78	84	2.0
533331	54	83	89	93	96	<0.6
533936	21	46	73	84	88	1.5
533329	56	73	84	92	98	<0.6
533937	26	32	79	86	94	1.5
533908	58	66	81	88	94	<0.6
533898	61	64	84	90	92	<0.6

Table 33

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539371	32	41	82	92	98	1.2
539382	18	58	74	91	97	1.3
539392	34	59	79	94	96	0.9
539398	31	53	89	94	98	1.0
539399	31	72	87	95	97	0.8
539400	36	60	79	93	97	0.9

539405	33	58	74	91	94	1.0
539412	23	61	80	93	95	1.1
539413	53	75	86	92	96	<0.6
539415	47	62	84	91	96	0.6
539416	61	85	94	97	96	<0.6
539430	24	48	68	80	93	1.5
539431	14	40	71	89	95	1.7
539433	46	67	74	92	95	0.6

Example 3: Dose-dependent antisense inhibition of human GHR in Hep3B cells by MOE gapmers

Gapmers from the studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in Hep3B cells. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.3125 μ M, 0.625 μ M, 1.25 μ M, 2.50 μ M, 5.00 μ M and 10.00 μ M concentrations of antisense oligonucleotide, as specified in the Tables below. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 34

ISIS No	0.3125 μ M	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
523814	0	24	48	52	68	82	2.2
523805	13	29	55	0	79	85	1.5
523822	0	19	26	41	65	85	2.8
523820	0	19	29	58	74	86	2.3
523815	3	6	19	37	45	71	4.8
523828	12	19	32	51	64	74	2.7
523801	3	9	31	43	59	76	3.3
523824	12	28	44	63	77	85	1.7
523794	13	21	30	51	66	78	2.5
523810	15	34	55	72	78	86	1.3
523819	0	24	40	60	66	75	2.4

Table 35

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539302	31	56	80	92	97	98	0.5
539314	16	28	49	69	85	95	1.3
539319	8	30	45	71	90	94	1.4
539320	11	42	64	83	92	95	1.0
539321	25	48	64	82	95	97	0.8
539322	19	34	58	72	90	96	1.1
539331	7	14	46	69	88	96	1.6
539355	28	35	67	89	96	98	0.8
539358	12	39	56	80	93	98	1.1
539359	15	23	58	77	93	98	1.2

Table 36

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539318	23	21	56	73	88	94	1.2
539325	14	26	38	74	92	98	1.4
539339	18	23	58	83	92	98	1.1
539341	17	29	62	84	94	95	1.0
539342	20	31	43	71	90	95	1.2
539352	15	23	41	61	89	95	1.5
539356	24	46	62	83	90	97	0.8
539361	37	42	73	88	96	98	0.6
539379	53	66	83	96	96	98	0.2
539380	52	77	91	97	97	99	0.1
539383	34	61	71	89	98	98	0.5

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Table 37

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539360	45	60	81	94	97	98	0.3
539362	21	36	72	90	98	99	0.8
539375	23	36	66	85	95	99	0.9
539376	26	35	58	82	95	99	0.9
539377	29	31	43	64	85	89	1.3
539378	37	59	81	93	97	98	0.4

539389	34	61	61	87	95	97	0.5
539401	34	52	63	84	92	95	0.6
539403	52	73	83	94	97	98	0.1
539404	22	55	74	88	94	96	0.6
539432	32	50	75	86	94	96	0.6

Example 4: Dose-dependent antisense inhibition of human GHR in Hep3B cells by MOE gapmers

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in Hep3B cells. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.625 μ M, 1.25 μ M, 2.50 μ M, 5.00 μ M and 10.00 μ M concentrations of antisense oligonucleotide, as specified in the Tables below. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 38

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
523271	26	41	80	89	94	1.4
523274	13	35	63	85	95	1.9
523324	26	40	64	88	95	1.6
523577	27	50	72	87	95	1.3
523604	49	66	74	81	87	0.5
523614	43	54	82	92	89	0.8

Table 39

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
523564	16	48	69	75	91	1.7
523570	24	52	65	71	88	1.6

523592	6	31	52	65	81	2.8
523595	13	49	60	79	92	1.8
523596	20	49	62	71	75	1.9
523607	38	63	66	74	76	0.8
523615	17	48	60	80	92	1.8
523630	19	42	42	67	80	2.5
523633	41	69	78	79	80	0.6
523665	16	45	56	71	80	2.1
523687	37	59	73	75	78	0.9
523711	33	63	78	91	93	0.9
523712	13	36	61	78	87	2.1
523714	63	85	91	96	96	<0.6

Table 40

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
523655	28	42	57	74	76	1.9
523656	33	43	53	74	88	1.7
523661	29	29	66	79	82	1.9
523713	35	45	64	83	87	1.3
523715	83	86	92	93	94	<0.6
523718	27	52	69	84	95	1.3
523723	65	74	86	85	94	<0.6
523725	37	63	78	78	92	0.8
523726	43	57	72	86	89	0.8
523736	39	65	80	88	95	0.8
523747	51	71	83	86	93	<0.6
523766	30	50	70	82	89	1.3
523776	45	59	67	79	84	0.7
523789	63	75	76	83	83	<0.6

Table 41

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
523719	18	40	56	73	83	2.1
523720	36	46	59	64	89	1.5
523724	44	60	75	81	87	0.7
523735	11	40	60	78	84	2.1
523740	17	47	61	80	81	1.8
523752	25	31	38	70	84	2.5

523758	23	48	58	72	80	1.8
523763	2	24	48	64	75	3.3
523764	22	49	45	73	75	2.1
523765	42	40	57	79	87	1.4
523767	43	53	56	69	79	1.2
523774	36	52	71	81	89	1.1
523778	15	45	59	75	79	2.0
523783	5	30	48	66	83	2.9

Table 42

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
532151	40	45	64	71	82	1.3
532158	28	47	63	70	87	1.6
532164	36	47	64	75	89	1.3
532171	35	47	50	69	89	1.6
532175	27	38	43	75	87	2.1
532181	21	56	63	69	80	1.7
532186	28	49	62	73	91	1.5
532188	40	52	73	75	90	1.0
532223	22	34	53	71	90	2.2
532235	35	31	48	68	73	2.3
532241	6	24	29	51	72	4.5
532248	19	37	47	73	84	2.3
532254	56	56	72	85	90	0.5
532316	32	55	50	78	90	1.5

Table 43

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
532304	44	57	68	78	73	0.7
532395	47	62	82	91	96	0.6
532401	70	83	91	94	96	<0.6
532410	56	71	85	90	96	<0.6
532411	88	93	96	97	98	<0.6
532420	61	67	82	85	96	<0.6
532436	48	49	77	90	97	0.8
532468	42	67	82	89	94	0.6
532476	32	58	75	84	90	1.1
532482	5	26	56	71	87	2.6
532490	18	47	55	69	86	2.0

532501	4	22	43	59	77	3.5
532507	39	63	66	83	89	0.9
532526	30	48	67	82	88	1.4

Table 44

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
533121	59	67	78	83	87	0.2
533122	48	73	78	84	90	0.4
533125	47	61	74	89	89	0.6
533136	5	25	58	79	90	2.4
533156	37	48	69	77	87	1.2
533161	28	67	77	89	90	1.0
533178	30	60	72	90	92	1.1
533179	37	66	76	76	87	0.8
533188	32	64	74	80	90	1.0
533189	49	66	77	81	81	0.4
533193	26	48	69	75	85	1.5
533233	39	60	59	84	93	1.0
533234	45	69	84	91	94	0.5
533235	28	49	69	82	90	1.4

Table 45

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
533256	47	72	86	90	94	<0.6
533257	63	77	88	91	96	<0.6
533258	66	81	88	95	95	<0.6
533259	48	70	84	90	93	<0.6
533262	44	66	79	90	96	0.7
533265	59	74	85	93	96	<0.6
533269	25	55	74	86	87	1.2
533270	34	59	73	86	95	1.0
533271	63	82	88	92	92	<0.6
533291	14	46	64	84	89	1.8
533301	49	61	75	83	91	0.6
533315	22	39	73	76	91	1.7
533317	26	53	68	85	94	1.3
533318	29	40	46	77	91	1.9

Table 46

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
533280	58	64	77	82	87	0.3
533316	35	55	68	87	91	1.1
533326	34	68	76	89	96	0.8
533328	54	55	79	83	92	0.5
533329	46	62	72	83	95	0.7
533330	56	75	83	91	94	0.3
533331	54	61	80	86	89	0.4
533352	54	62	79	83	89	0.4
533364	52	73	83	91	94	0.4
533898	17	47	63	78	87	1.8
533908	35	58	74	82	87	1
533916	22	46	72	78	88	1.6
533932	51	62	70	79	80	0.5
533937	20	40	61	79	85	1.9

Example 5: Dose-dependent antisense inhibition of human GHR in Hep3B cells by MOE gapmers

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in Hep3B cells. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.3125 μM, 0.625 μM, 1.25 μM, 2.50 μM, 5.00 μM and 10.00 μM concentrations of antisense oligonucleotide, as specified in the Tables below. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 47

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
523577	0	16	33	59	72	94	2.2
523633	15	33	66	73	82	86	1.1
523764	11	33	50	68	78	83	1.5
523794	12	30	33	56	76	82	1.9
523805	21	48	66	78	85	92	0.8
523810	18	36	61	80	89	90	1.0
523814	13	35	52	67	81	88	1.3
523819	11	30	57	72	81	89	1.3
523820	0	15	43	61	84	92	1.8
523824	21	27	59	72	84	90	1.2

Table 48

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539302	34	41	56	83	83	96	0.8
539321	30	32	76	73	80	94	0.8
539322	22	36	57	72	78	94	1.1
539355	23	42	48	72	71	88	1.2
539359	21	38	48	73	78	92	1.2
539320	14	32	53	72	82	91	1.3
539341	3	19	35	56	78	89	2.0
539342	6	18	33	51	70	83	2.3
539356	0	0	21	45	73	94	2.7
539358	0	15	23	50	52	91	2.9

Table 49

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539339	22	37	52	77	90	92	1.0
539360	28	49	72	82	95	97	0.7
539361	36	56	75	86	95	98	0.5
539362	24	26	63	77	91	97	1.0
539375	21	29	39	63	77	91	1.5
539378	8	42	64	85	92	97	1.0
539379	43	59	80	89	96	98	0.3
539380	61	73	90	95	98	98	0.1
539383	30	49	75	87	97	98	0.6

539403	48	55	75	85	94	96	0.3
539432	36	42	69	79	88	95	0.7

Table 50

ISIS No	0.3125 μM	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
539376	34	46	62	82	94	98	0.7
539389	53	58	78	86	94	97	0.2
539392	1	19	26	68	81	94	1.9
539399	27	52	65	78	92	98	0.7
539400	7	26	43	59	88	95	1.6
539401	32	39	77	90	92	95	0.6
539404	22	59	77	87	93	95	0.6
539413	16	33	53	82	86	96	1.1
539415	4	44	56	74	81	94	1.2
539416	37	61	70	85	92	95	0.4
539433	31	52	70	85	87	94	0.6

Example 6: Antisense inhibition of human growth hormone receptor in Hep3B cells by deoxy, MOE and cEt gapmers

Additional antisense oligonucleotides were designed targeting a growth hormone receptor (GHR) nucleic acid and were tested for their effects on GHR mRNA in vitro. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cultured Hep3B cells at a density of 20,000 cells per well were transfected using electroporation with 5,000 nM antisense oligonucleotide. After a treatment period of approximately 24 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN®. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The newly designed chimeric antisense oligonucleotides in the Tables below were designed as deoxy, MOE, and cEt gapmers. The deoxy, MOE and cEt oligonucleotides are 16 nucleosides in length wherein the nucleoside have either a MOE sugar modification, an cEt sugar modification, or a deoxy modification. The 'Chemistry' column describes the sugar modifications of each oligonucleotide. 'k' indicates a cEt sugar modification; 'd' indicates deoxyribose; and 'e' indicates a MOE modification. The internucleoside linkages throughout each gapmer are phosphorothioate (P=S) linkages. All cytosine residues throughout each gapmer are 5-methylcytosines. "Start site" indicates the 5'-most nucleoside to which the gapmer is targeted in the

human gene sequence. “Stop site” indicates the 3’-most nucleoside to which the gapmer is targeted human gene sequence. Each gapmer listed in the Tables below is targeted to either the human GHR mRNA, designated herein as SEQ ID NO: 1 (GENBANK Accession No. NM_000163.4) or the human GHR genomic sequence, designated herein as SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000). ‘n/a’ indicates that the antisense oligonucleotide does not target that particular gene sequence with 100% complementarity. In case the sequence alignment for a target gene in a particular table is not shown, it is understood that none of the oligonucleotides presented in that table align with 100% complementarity with that target gene.

Table 51

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
541262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	84	156891	1370
541263	164	Intron 1	CCGAGCTTCGCCTCTG	eekddddddddddkke	89	3040	1371
541264	167	Intron 1	CCTCCGAGCTTCGCCT	eekddddddddddkke	90	3043	1372
541265	170	Junction spanning two exons	GGACCTCCGAGCTTCG	eekddddddddddkke	89	n/a	1373
541266	176	Junction spanning two exons	CCTGTAGGACCTCCGA	eekddddddddddkke	83	n/a	1374
541268	214	Exon 2	CCAGTGCCAAGGTCAA	eekddddddddddkke	87	144998	1375
541269	226	Exon 2	CACTTGATCCTGCCAG	eekddddddddddkke	67	145010	1376
541270	244	Exon 2	CACTTCCAGAAAAAGC	eekddddddddddkke	34	145028	1377
541278	365	Exon 4/Intron 3	GTCTCTCGCTCAGGTG	eekddddddddddkke	77	268028	1378
541279	368	Exon 4/Intron 3	AAAGTCTCTCGCTCAG	eekddddddddddkke	76	268031	1379
541280	373	Exon 4/Intron 3	ATGAAAAAGTCTCTCG	eekddddddddddkke	66	268036	1380
541283	445	exon 2-exon 3 junction	TCCTTCTGGTATAGAA	eekddddddddddkke	37	n/a	1381
541288	554	Exon 5	CAATAAGGTATCCAGA	eekddddddddddkke	49	274114	1382
541289	561	Exon 5	CTTGATAACAATAAGGT	eekddddddddddkke	66	274121	1383
541290	569	Exon 5	CTAGTTAGCTTGATAC	eekddddddddddkke	61	274129	1384
541293	628	exon 3-exon 4 junction	GATCTGGTTGCACTAT	eekddddddddddkke	57	n/a	1385
541294	639	Exon 6	GGCAATGGGTGGATCT	eekddddddddddkke	38	278933	1386
541295	648	Exon 6	CCAGTTGAGGGCAATG	eekddddddddddkke	67	278942	1387
541296	654	Exon 6	TAAAGTCCAGTTGAGG	eekddddddddddkke	43	278948	1388

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541301	924	Exon 7	TACATAGAGCACCTCA	eeekkkkkkkkkkkke	86	290422	1389
541302	927	Exon 7	TGTTACATAGAGCACC	eeekkkkkkkkkkkke	78	290425	1390
541303	930	Exon 7	AAGTGTTACATAGAGC	eeekkkkkkkkkkkke	59	290428	1391
541304	958	Exon 7	CTTCACATGTAAATTG	eeekkkkkkkkkkkke	26	290456	1392
541305	981	Exon 8	GAGCCATGGAAAGTAG	eeekkkkkkkkkkkke	66	292535	1393
541310	1127	Exon 7-exon 8 junction	CCTTCCTTGAGGAGAT	eeekkkkkkkkkkkke	26	n/a	1394
541320	1317	Exon 10	CTTCACCCCTAGGTTA	eeekkkkkkkkkkkke	38	297734	1395
541321	1322	Exon 10	CCATCCTTCACCCCTA	eeekkkkkkkkkkkke	81	297739	1396
541322	1326	Exon 10	GTCGCCATCCTTCACC	eeekkkkkkkkkkkke	79	297743	1397
541323	1331	Exon 10	CCAGAGTCGCCATCCT	eeekkkkkkkkkkkke	64	297748	1398
541325	1420	Exon 10	GTGGCTGAGCAACCTC	eeekkkkkkkkkkkke	79	297837	1399
541326	1434	Exon 10	CCCTTTTAACCTCTGT	eeekkkkkkkkkkkke	67	297851	1400
541331	1492	Exon 10	CATCATGATAAGGTGA	eeekkkkkkkkkkkke	16	297909	1401
541332	1526	Exon 10	TGGATAACACTGGGCT	eeekkkkkkkkkkkke	30	297943	1402
541333	1532	Exon 10	TCTGCTTGGATAACAC	eeekkkkkkkkkkkke	63	297949	1403
541335	1597	Exon 10	GAATATGGGCAGCTTG	eeekkkkkkkkkkkke	33	298014	1404
541336	1601	Exon 10	AGCTGAATATGGGCAG	eeekkkkkkkkkkkke	34	298018	1405
541337	1607	Exon 10	TTGCTTAGCTGAATAT	eeekkkkkkkkkkkke	39	298024	1406
541338	1611	Exon 10	TGGATTGCTTAGCTGA	eeekkkkkkkkkkkke	79	298028	1407
541339	1614	Exon 10	ACTTGATTGCTTAGC	eeekkkkkkkkkkkke	73	298031	1408

Example 7: Antisense inhibition of human growth hormone receptor in Hep3B cells by deoxy, MOE and cEt gapmers

Additional antisense oligonucleotides were designed targeting a growth hormone receptor (GHR) nucleic acid and were tested for their effects on GHR mRNA in vitro. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cultured Hep3B cells at a density of 20,000 cells per well were transfected using electroporation with 4,500 nM antisense oligonucleotide. After a treatment period of approximately 24 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN®. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The newly designed chimeric antisense oligonucleotides in the Tables below were designed as deoxy, MOE, and cEt gapmers. The deoxy, MOE and cEt oligonucleotides are 16 nucleosides in length wherein the nucleoside have either a MOE sugar modification, a cEt sugar modification, or a deoxy modification. The ‘Chemistry’ column describes the sugar modifications of each oligonucleotide. ‘k’ indicates a cEt sugar modification; ‘d’ indicates deoxyribose; and ‘e’ indicates a MOE modification. The internucleoside linkages throughout each gapmer are phosphorothioate (P=S) linkages. All cytosine residues throughout each gapmer

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are 5-methylcytosines. “Start site” indicates the 5’-most nucleoside to which the gapmer is targeted in the human gene sequence. “Stop site” indicates the 3’-most nucleoside to which the gapmer is targeted human gene sequence. Each gapmer listed in the Tables below is targeted to either the human GHR mRNA, designated herein as SEQ ID NO: 1 (GENBANK Accession No. NM_000163.4) or the human GHR genomic sequence, designated herein as SEQ ID NO: 2 (GENBANK Accession No. NT_006576.16 truncated from nucleotides 42411001 to 42714000). ‘n/a’ indicates that the antisense oligonucleotide does not target that particular gene sequence with 100% complementarity. In case the sequence alignment for a target gene in a particular table is not shown, it is understood that none of the oligonucleotides presented in that table align with 100% complementarity with that target gene. The oligonucleotides of Table 54 do not target SEQ ID NOs: 1 or 2, but instead target variant gene sequences SEQ ID NO: 4 (GENBANK Accession No. DR006395.1) or SEQ ID NO: 7 (the complement of GENBANK Accession No. AA398260.1).

Table 52

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
541262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekdddddddddkke	86	156891	1370
541340	1619	Exon 10	AGTGAACCTTGATTGC	eekdddddddddkke	73	298036	1409
541341	1641	Exon 10	GGCATAAAAGTCGATG	eekdddddddddkke	41	298058	1410
541342	1644	Exon 10	CTGGGCATAAAAGTCG	eekdddddddddkke	33	298061	1411
541343	1683	Exon 10	GGAAAGGACCACACTA	eekdddddddddkke	34	298100	1412
541344	1746	Exon 10	GAGTGAGACCATTTC	eekdddddddddkke	65	298163	1413
541345	1827	Exon 10	GATGTGAGGAGCCACA	eekdddddddddkke	54	298244	1414
541346	1830	Exon 10	CTTGATGTGAGGAGCC	eekdddddddddkke	70	298247	1415
541347	1835	Exon 10	TCAACCTTGATGTGAG	eekdddddddddkke	38	298252	1416
541348	1839	Exon 10	TGATTCAACCTTGATG	eekdddddddddkke	39	298256	1417
541349	1842	Exon 10	GTGTGATTCAACCTTG	eekdddddddddkke	74	298259	1418
541350	1845	Exon 10	TATGTGTGATTCAACC	eekdddddddddkke	58	298262	1419
541351	1949	Exon 10	GGCATCTCAGAACCTG	eekdddddddddkke	41	298366	1420
541352	1965	Exon 10	GGTATAGTCTGGGACA	eekdddddddddkke	18	298382	1421
541353	1969	Exon 10	TGGAGGTATAGTCTGG	eekdddddddddkke	17	298386	1422
541354	1972	Exon 10	GAATGGAGGTATAGTC	eekdddddddddkke	0	298389	1423
541355	1975	Exon 10	TATGAATGGAGGTATA	eekdddddddddkke	0	298392	1424
541356	1978	Exon 10	CTATATGAATGGAGGT	eekdddddddddkke	30	298395	1425
541357	1981	Exon 10	GTACTATATGAATGGA	eekdddddddddkke	43	298398	1426
541358	1987	Exon 10	GGGACTGTACTATATG	eekdddddddddkke	12	298404	1427
541369	2306	Exon 10	TTACATTGCACAATAG	eekdddddddddkke	21	298723	1428

541373	2667	Exon 10	TAGCCATGCTTGAAGT	eekdddddddddkke	34	299084	1429
541374	2686	Exon 10	TGTGTAGTGTAATATA	eekdddddddddkke	10	299103	1430
541375	2690	Exon 10	ACAGTGTGTAGTGTA	eekdddddddddkke	82	299107	1431
541376	2697	Exon 10	GCAGTACACAGTGTGT	eekdddddddddkke	46	299114	1432
541377	2700	Exon 10	ACTGCAGTACACAGTG	eekdddddddddkke	32	299117	1433
541378	2740	Exon 10	TTAGACTGTAGTTGCT	eekdddddddddkke	25	299157	1434
541379	2746	Exon 10	CCAGCTTTAGACTGTA	eekdddddddddkke	69	299163	1435
541380	2750	Exon 10	TAAACCAGCTTTAGAC	eekdddddddddkke	20	299167	1436
541381	2755	Exon 10	AACATTAAACCAGCTT	eekdddddddddkke	64	299172	1437
541382	2849	Exon 10	ACTACAATCATTTTAG	eekdddddddddkke	0	299266	1438
541383	2853	Exon 10	GATTACTACAATCATT	eekdddddddddkke	0	299270	1439
541384	2859	Exon 10	AATGCAGATTACTACA	eekdddddddddkke	46	299276	1440
541385	2865	Exon 10	TCCAATAATGCAGATT	eekdddddddddkke	52	299282	1441
541386	2941	Exon 10	GTTGATCTGTGCAAAC	eekdddddddddkke	74	299358	1442
541389	3037	Exon 10	TCTACTTCTCTTAGCA	eekdddddddddkke	50	299454	1443
541393	3215	Exon 10	GCTTCTTGTACCTTAT	eekdddddddddkke	84	299632	1444
541394	3237	Exon 10	GATTTGCTTCAACTTA	eekdddddddddkke	47	299654	1445
541395	3305	Exon 10	GGTTATAGGCTGTGAA	eekdddddddddkke	0	299722	1446
541396	3308	Exon 10	TCTGGTTATAGGCTGT	eekdddddddddkke	88	299725	1447
541397	3311	Exon 10	GTGTCTGGTTATAGGC	eekdddddddddkke	56	299728	1448
541398	3316	Exon 10	AGTATGTGTCTGGTTA	eekdddddddddkke	76	299733	1449
541399	3371	Exon 10	GGGACTGAAAACCTTG	eekdddddddddkke	50	299788	1450
541400	3975	Exon 10	AGTATTCTTCACTGAG	eekdddddddddkke	36	300392	1451
541401	4044	Exon 10	GCGATAAATGGGAAAT	eekdddddddddkke	36	300461	1452
541402	4048	Exon 10	GTCTGCGATAAATGGG	eekdddddddddkke	52	300465	1453
541403	4058	Exon 10	CCTAAAAAAGGTCTGC	eekdddddddddkke	51	300475	1454
541404	4072	Exon 10	CATTAAGCTTGCTTCC	eekdddddddddkke	53	300489	1455

Table 53

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID

NO: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
541262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekdddddddddkke	85	156891	1370
541421	4418	Exon 10	CACAACTAGTCATACT	eekdddddddddkke	42	300835	1456
541422	4428	Exon 10	AACTGCCAGACACAAC	eekdddddddddkke	68	300845	1457
541423	4431	Exon 10	ATAAACTGCCAGACAC	eekdddddddddkke	86	300848	1458
541424	4503	Exon 10	TATCAGGAATCCAAGA	eekdddddddddkke	11	300920	1459
541425	4521	Exon 10	TTGATAACAGAAGCAC	eekdddddddddkke	16	300938	1460

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541426	4528	Exon 10	TTGGTGTTTGATAACA	eekddddddddddkke	31	300945	1461
541427	4531	Exon 10	ATGTTGGTGTTTGATA	eekddddddddddkke	32	300948	1462
541429	30	Exon 1	CCGCCACTGTAGCAGC	eekddddddddddkke	77	2906	1463
541430	35	Exon 1	CGCCACCGCCACTGTA	eekddddddddddkke	88	2911	1464
541431	63	Exon 1	GCCGCCCGGGCTCAGC	eekddddddddddkke	86	2939	1465
541432	67	Exon 1	CGCCGCCCGGGGCT	eekddddddddddkke	61	2943	1466
541433	144	Exon 1	GAGAGCGCGGGTTCGC	eekddddddddddkke	57	3020	1467
541434	n/a	Exon 1/Intron 1	CTACTGACCCCAGTTC	eekddddddddddkke	80	3655	1468
541435	n/a	Exon 1/Intron 1	TCACTCTACTGACCCC	eekddddddddddkke	90	3660	1469
541436	n/a	Exon 1/Intron 1	TCATGCGGACTGGTGG	eekddddddddddkke	56	3679	1470
541437	n/a	Exon 3/Intron 3	ATGTGAGCATGGACCC	eekddddddddddkke	82	225438	1471
541438	n/a	Exon 3/Intron 3	TCTTGATATGTGAGCA	eekddddddddddkke	93	225445	1472
541439	n/a	Exon 3/Intron 3	TTCAAGTTGGTGAGCT	eekddddddddddkke	72	226788	1473
541440	n/a	Exon 3/Intron 3	TGCTTCCTTCAAGTTG	eekddddddddddkke	68	226795	1474
541441	n/a	Exon 3/Intron 3	TGTAATTTTCATTCATG	eekddddddddddkke	62	226809	1475
541442	n/a	Exon 3/Intron 3	CCTTTTGCCAAGAGCA	eekddddddddddkke	85	226876	1476
541443	n/a	Exon 3/Intron 3	GATCCTTTTGCCAAGA	eekddddddddddkke	77	226879	1477
541444	n/a	Exon 3/Intron 3	GCTAGTAATGTTACAT	eekddddddddddkke	68	238331	1478
541445	n/a	Exon 3/Intron 3	GCAACTTGCTAGTAAT	eekddddddddddkke	65	238338	1479
541446	n/a	Exon 3/Intron 3	TGTGCAACTTGCTAGT	eekddddddddddkke	44	238341	1480
541447	n/a	Exon 3/Intron 3	GGATTTTCAGTTTGAAT	eekddddddddddkke	0	238363	1481
541448	n/a	Exon 3/Intron 3	CTCAGAGCCTTGGTAG	eekddddddddddkke	65	238428	1482
541449	n/a	Exon 1/Intron 1	CAAACGCGCAAAAGAC	eekddddddddddkke	1	3608	1483
541450	n/a	Exon 1/Intron 1	GCCCGCACAAACGCGC	eekddddddddddkke	11	3615	1484
541451	n/a	Exon 1/Intron 1	GGTTAAAGAAGTTGCT	eekddddddddddkke	60	93190	1485
541452	n/a	Exon 1/Intron 1	CCCAGTGAATTCAGCA	eekddddddddddkke	85	93245	1486
541453	n/a	Exon 1/Intron 1	GCGCCCAGTGAATTCA	eekddddddddddkke	74	93248	1487
541454	n/a	Exon 1/Intron 1	AAGATGCGCCCAGTGA	eekddddddddddkke	71	93253	1488
541455	n/a	Exon 1/Intron 1	TGTAAGATGCGCCCAG	eekddddddddddkke	75	93256	1489
541456	n/a	Exon 1/Intron 1	AATTACTTGTAAGATG	eekddddddddddkke	15	93263	1490
541457	n/a	Exon 1/Intron 1	CCCAGAAGGCACTTGT	eekddddddddddkke	61	93302	1491
541458	n/a	Exon 1/Intron 1	TTGCAGAACAAATCTT	eekddddddddddkke	3	93333	1492
541459	n/a	Exon 1/Intron 1	CATGGAAGATTTGCAG	eekddddddddddkke	17	93343	1493
541460	n/a	Exon 1/Intron 1	GGTCATGGAAGATTTG	eekddddddddddkke	57	93346	1494
541461	n/a	Exon 1/Intron 1	GACCTTGATCATGGAA	eekddddddddddkke	51	93352	1495
541462	n/a	Exon 1/Intron 1	TGCCAATCCAAAGAGG	eekddddddddddkke	34	93369	1496
541463	n/a	Exon 1/Intron 1	GGGTCTGCCAATCCAA	eekddddddddddkke	67	93374	1497
541464	n/a	Exon 1/Intron 1	TCCCTGGGTCTGCCAA	eekddddddddddkke	82	93379	1498
541465	n/a	Exon 1/Intron 1	AAGTGTGAATTTATCT	eekddddddddddkke	16	93408	1499
541466	n/a	Exon 1/Intron 1	GGAGATCTCAACAAGG	eekddddddddddkke	38	93428	1500
541468	n/a	Exon 1/Intron 1	TCGCCCATCACTCTTC	eekddddddddddkke	43	93989	1501
541469	n/a	Exon 1/Intron 1	CCTGTCGCCCATCACT	eekddddddddddkke	61	93993	1502
541470	n/a	Exon 1/Intron 1	TCACCTGTGCCCCATC	eekddddddddddkke	70	93996	1503

541471	n/a	Exon 1/Intron 1	CCATCACCTGTCGCCC	eekddddddddddkke	89	93999	1504
541472	n/a	Exon 1/Intron 1	TCACCATCACCTGTCG	eekddddddddddkke	72	94002	1505
541473	n/a	Exon 1/Intron 1	TAATAGTTGTCACCAT	eekddddddddddkke	42	94011	1506
541474	n/a	Exon 1/Intron 1	TTCAGATCTTATTAAT	eekddddddddddkke	0	94023	1507
541475	n/a	Exon 1/Intron 1	TTGCAAATTCAGTCTG	eekddddddddddkke	32	94096	1508
541477	n/a	Exon 2/Intron 2	CGTTCTCTTGGAAGTA	eekddddddddddkke	78	198766	1509
541478	n/a	Exon 2/Intron 2	TCTTGAATAAAATTTTCG	eekddddddddddkke	25	198780	1510
541479	n/a	Exon 2/Intron 2	AAGCTCACTCTTCAAT	eekddddddddddkke	60	198810	1511
541480	n/a	Exon 2/Intron 2	TCCAAGCTCACTCTTC	eekddddddddddkke	49	198813	1512
541481	n/a	Exon 2/Intron 2	GCTCCTGCCACTCTGT	eekddddddddddkke	75	198837	1513
541482	n/a	Exon 2/Intron 2	ATGGGCAAAGGCATCT	eekddddddddddkke	60	198874	1514
541483	n/a	5' UTR	AGTCTTCCCGGCGAGG	eekddddddddddkke	32	2571	1515
541484	n/a	5' and overlappig with exon 1	CCGCCGCTCCCTAGCC	eekddddddddddkke	73	2867	1516
541485	n/a	Intron 1	GCCCCGCAACTCCCTGC	eekddddddddddkke	37	3341	1517
541486	n/a	Intron 1	CGCCTCCCCAGGCGCA	eekddddddddddkke	34	4024	1518
541487	n/a	Intron 1	GAGTGTCTTCCCAGGC	eekddddddddddkke	86	4446	1519
541488	n/a	Intron 1	CTGAAGACTCCTTGAA	eekddddddddddkke	39	4721	1520
541489	n/a	Intron 1	GGCTAGCCAAGTTGGA	eekddddddddddkke	54	5392	1521
541490	n/a	Intron 1	TGACTCCAGTCTTACC	eekddddddddddkke	76	5802	1522
541491	n/a	Intron 1	ATTCATTGTGGTCAGC	eekddddddddddkke	91	6128	1523
541492	n/a	Intron 1	GAAGTGGGTTTTTCCC	eekddddddddddkke	86	6543	1524
541493	n/a	Intron 1	GCCTTGGTTCAGGTGA	eekddddddddddkke	79	6786	1525

Table 54

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting SEQ ID NO: 3 and 4

ISIS NO	Target Start Site	Target SEQ ID NO	Sequence	Chemistry	% inhibition	SEQ ID NO
541428	66	3	CCACTGTAGCAGCCGC	eekddddddddddkke	92	1526
541476	263	4	TAGGTATTCAGAGCC	eekddddddddddkke	80	1527

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Table 55

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic regions of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 1 Start Site	SEQ ID NO: 2 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	541277	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	80	1370
541494	7231	541509	Intron 1	GTCCAGGCAGAGTTGT	eekddddddddddkke	30	1528
541495	7570	541510	Intron 1	AGCCAAATGTTGGTCA	eekddddddddddkke	19	1529
541496	8395	541511	Intron 1	GAGGGCGAGTTTTTCC	eekddddddddddkke	71	1530

541497	9153	541512	Intron 1	GTGGCATTGGCAAGCC	eekddddddddddkke	81	1531
541498	9554	541513	Intron 1	ACCCCACTGCACCAAG	eekddddddddddkke	67	1532
541499	9931	541514	Intron 1	TCCAAGTACTTGCCAA	eekddddddddddkke	83	1533
541500	10549	541515	Intron 1	AGTGCCTGGCCTAAGG	eekddddddddddkke	75	1534
541501	11020	541516	Intron 1	GCGCTTCTTCCCTAGG	eekddddddddddkke	71	1535
541502	11793	541517	Intron 1	CATCTTGCCCAGGGAT	eekddddddddddkke	84	1536
541503	12214	541518	Intron 1	CCATCTTGCTCCAAGT	eekddddddddddkke	93	1537
541504	12474	541519	Intron 1	CTTACATCCTGTAGGC	eekddddddddddkke	71	1538
541505	12905	541520	Intron 1	CGCCTCCTGGTCCTCA	eekddddddddddkke	97	1539
541506	13400	541521	Intron 1	CCCTATGCACTACCTA	eekddddddddddkke	49	1540
541507	13717	541522	Intron 1	GAGGGACTGTGGTGCT	eekddddddddddkke	65	1541
541508	14149	541523	Intron 1	GCCCAATATGTGCCAG	eekddddddddddkke	60	1542
541509	14540	541524	Intron 1	GCTCTCTCATCGCTGG	eekddddddddddkke	90	1543
541510	15264	541525	Intron 1	CTCAAGGCTATGTGCC	eekddddddddddkke	67	1544
541511	15849	541526	Intron 1	TCCACATCCCTCATGT	eekddddddddddkke	68	1545
541512	16530	541527	Intron 1	AGGACTGAAGGCCCAT	eekddddddddddkke	49	1546
541513	17377	541528	Intron 1	GTGCGACTTACCAGCT	eekddddddddddkke	85	1547
541514	17581	541529	Intron 1	TCGCTAAAGCCACACA	eekddddddddddkke	89	1548
541515	17943	541530	Intron 1	GCTCTGGCTGATGGTC	eekddddddddddkke	92	1549
541516	18353	541531	Intron 1	TTCCCATGAGGATTTT	eekddddddddddkke	70	1550
541517	18636	541532	Intron 1	TTGGGCTTAAGCACTA	eekddddddddddkke	71	1551
541518	19256	541533	Intron 1	GCTAGCACCTAGTCCA	eekddddddddddkke	71	1552
541519	19814	541534	Intron 1	CCTCTGGCCTACAACA	eekddddddddddkke	64	1553
541520	20365	541535	Intron 1	ACCCTCATCAGCACC	eekddddddddddkke	93	1554
541521	20979	541536	Intron 1	GGCCACCCCTGATCCT	eekddddddddddkke	66	1555
541522	21566	541537	Intron 1	GAAGCTCCCTTGCCCA	eekddddddddddkke	96	1556
541523	22150	541538	Intron 1	AGTGTGCCCCCTCCAA	eekddddddddddkke	83	1557
541524	22803	541539	Intron 1	GGGTCTCCAACCTACT	eekddddddddddkke	70	1558
541525	29049	541540	Intron 1	GGGATGTAGGTTTACC	eekddddddddddkke	74	1559
541526	29554	541541	Intron 1	GCAACCGATATCACAG	eekddddddddddkke	60	1560
541527	30245	541542	Intron 1	TGCCCTGGAACAAATT	eekddddddddddkke	13	1561
541528	30550	541543	Intron 1	AGTCTAGGAGTAGCTA	eekddddddddddkke	50	1562
541529	30915	541544	Intron 1	GCTGTTGTCAAGAGAC	eekddddddddddkke	55	1563
541530	31468	541545	Intron 1	CACCTAGACACTCAGT	eekddddddddddkke	47	1564
541531	32366	541546	Intron 1	GTCAAGGGATCCCTGC	eekddddddddddkke	34	1565
541532	32897	541547	Intron 1	TCCCCCTGGCACTCCA	eekddddddddddkke	79	1566
541533	33187	541548	Intron 1	GCCTGGTAACTCCATT	eekddddddddddkke	56	1567
541534	33780	541549	Intron 1	GGGCTCACCAACTGTG	eekddddddddddkke	39	1568
541535	34407	541550	Intron 1	CCACAGGATCATATCA	eekddddddddddkke	37	1569
541536	34846	541551	Intron 1	CTCCAGCAGAAGTGTC	eekddddddddddkke	10	1570
541537	35669	541552	Intron 1	AGCCCAACTGTTGCCT	eekddddddddddkke	79	1571
541538	36312	541553	Intron 1	TGCCAGGCAGTTGCCA	eekddddddddddkke	75	1572
541539	36812	541554	Intron 1	GCCAGTAAGCACCTTG	eekddddddddddkke	93	1573

541540	37504	541555	Intron 1	CTAGCTTCCCAGCCCC	eekddddddddddkke	46	1574
541541	38841	541556	Intron 1	TCAAGCCCAGCTAGCA	eekddddddddddkke	39	1575
541542	39108	541557	Intron 1	CCTCACAGGCCCTAAT	eekddddddddddkke	4	1576
541543	39408	541558	Intron 1	ACCTGCTTACATGGTA	eekddddddddddkke	21	1577
541544	40250	541559	Intron 1	CCTTTGCTAGGACCCA	eekddddddddddkke	52	1578
541545	40706	541560	Intron 1	GGGACTGCCACCAAGG	eekddddddddddkke	27	1579
541546	40922	541561	Intron 1	GCTAGATGTTTCAGGCC	eekddddddddddkke	34	1580
541547	41424	541562	Intron 1	CCTATGGCCATGCTGA	eekddddddddddkke	32	1581
541548	41999	541563	Intron 1	GTATGCTAGTTCCCAT	eekddddddddddkke	83	1582
541549	42481	541564	Intron 1	CCCTCATAATCTTGGG	eekddddddddddkke	13	1583
541550	42700	541565	Intron 1	GTCCAACCACTACCAC	eekddddddddddkke	74	1584
541551	43291	541566	Intron 1	ACTTGCAGATAGCTGA	eekddddddddddkke	73	1585
541552	43500	541567	Intron 1	GCATGACCCCACTGCC	eekddddddddddkke	72	1586
541553	43947	541568	Intron 1	GAGGGTCACATTCCCT	eekddddddddddkke	23	1587
541554	44448	541569	Intron 1	TCTCTTACTGGTGGGT	eekddddddddddkke	90	1588
541555	45162	541570	Intron 1	GCCCCCTTCTGGATA	eekddddddddddkke	28	1589
541556	46010	541571	Intron 1	CCTCATGCGACACCAC	eekddddddddddkke	71	1590
541557	46476	541572	Intron 1	AGCCCTCTGCCTGTAA	eekddddddddddkke	67	1591
541558	47447	541573	Intron 1	CTCCCAGCTATAGGCG	eekddddddddddkke	38	1592
541559	47752	541574	Intron 1	GCTAGCTGCGCAAGGA	eekddddddddddkke	5	1593
541560	48001	541575	Intron 1	GCGCAGCCCGCTGCAA	eekddddddddddkke	18	1594
541561	48423	541576	Intron 1	TGCATGATCCACCCCA	eekddddddddddkke	65	1595
541562	50195	541577	Intron 1	GCTTAGTGCTGGCCCA	eekddddddddddkke	72	1596
541563	50470	541578	Intron 1	CCTTCCAGTCCTCATA	eekddddddddddkke	81	1597
541564	51104	541579	Intron 1	ATAGTGTCAAGGCCCA	eekddddddddddkke	91	1598
541565	51756	541580	Intron 1	AGGCCTTAGTCACCCA	eekddddddddddkke	88	1599
541566	52015	541581	Intron 1	TAACCAACCTAAGGGA	eekddddddddddkke	11	1600
541567	52230	541582	Intron 1	ATTCTGGTGATGCCCT	eekddddddddddkke	66	1601
541568	52588	541583	Intron 1	GTGTTCACTGCCATGA	eekddddddddddkke	67	1602
541569	53532	541584	Intron 1	GGTAGAGCACACTGCC	eekddddddddddkke	47	1603
541570	54645	541585	Intron 1	CCACTTTAATGCCACC	eekddddddddddkke	76	1604

Table 56

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic regions of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	156906	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	88	1370
541571	54886	54901	Intron 1	GTCAAATGCTGTTGGG	eekddddddddddkke	91	1605
541572	55900	55915	Intron 1	CATCCCCTATCAGGGT	eekddddddddddkke	53	1606

541573	62266	62281	Intron 1	CTCGAATCCCTTGAGC	eekddddddddddkke	73	1607
541574	62733	62748	Intron 1	GATTCCCTCCCCTAAC	eekddddddddddkke	27	1608
541575	63173	63188	Intron 1	ATCCATCCATGTGCTG	eekddddddddddkke	92	1609
541576	63751	63766	Intron 1	GAGCATGCCTCAGTGG	eekddddddddddkke	81	1610
541577	63964	63979	Intron 1	CAGAAGGACTGCCTCT	eekddddddddddkke	50	1611
541578	64213	64228	Intron 1	ACAATGCTCAACAGCC	eekddddddddddkke	75	1612
541579	64576	64591	Intron 1	GTTGGATCTGGCATGC	eekddddddddddkke	80	1613
541580	65027	65042	Intron 1	CGGCTGAGAGCAAGGG	eekddddddddddkke	88	1614
541581	65363	65378	Intron 1	GAGAGGGTTCAGCCTG	eekddddddddddkke	62	1615
541582	65600	65615	Intron 1	ACTTAGTTCCTAGCCA	eekddddddddddkke	91	1616
541583	66087	66102	Intron 1	GTGAACCAGATGTGCT	eekddddddddddkke	86	1617
541584	66566	66581	Intron 1	GGAGTGACAGCTAAGT	eekddddddddddkke	98	1618
541585	66978	66993	Intron 1	AAGTGTTCAGAGCCAC	eekddddddddddkke	97	1619
541586	67662	67677	Intron 1	AACCCTGCCAAGGTAC	eekddddddddddkke	45	1620
541587	67914	67929	Intron 1	GATGGTGAGCACTACC	eekddddddddddkke	78	1621
541588	68278	68293	Intron 1	GGCAGGATAGGACAGA	eekddddddddddkke	11	1622
541589	68727	68742	Intron 1	GCAAAGTGATGAGCCT	eekddddddddddkke	81	1623
541590	69207	69222	Intron 1	CTATCCACACCATTC	eekddddddddddkke	93	1624
541591	69605	69620	Intron 1	GGATCATGGGCCCCCTA	eekddddddddddkke	70	1625
541592	70130	70145	Intron 1	GTGAATTTGCTGGGCC	eekddddddddddkke	94	1626
541593	70569	70584	Intron 1	GTGATGGGCCCAAGGC	eekddddddddddkke	67	1627
541594	71056	71071	Intron 1	TCCTCAGTCGGCTTGC	eekddddddddddkke	69	1628
541595	71314	71329	Intron 1	CAGCCTTTTGCCAGAT	eekddddddddddkke	93	1629
541596	71620	71635	Intron 1	CCTCCCTAGGATTACC	eekddddddddddkke	42	1630
541597	72226	72241	Intron 1	ACGCCCCAATCACTCA	eekddddddddddkke	79	1631
541598	72655	72670	Intron 1	GCATGACCCATTATGT	eekddddddddddkke	94	1632
541599	73061	73076	Intron 1	TCCCTCCAAGAGCTCA	eekddddddddddkke	83	1633
541600	73708	73723	Intron 1	GATGCCTGTGGCTGAC	eekddddddddddkke	84	1634
541601	74107	74122	Intron 1	GGCTAGCATGTTGCCT	eekddddddddddkke	19	1635
541602	74542	74557	Intron 1	TAACCCACTAGGCTGG	eekddddddddddkke	84	1636
541603	74947	74962	Intron 1	TGGCCCAAAACTAATC	eekddddddddddkke	34	1637
541604	75192	75207	Intron 1	GGAGCAGTCTGGCACC	eekddddddddddkke	85	1638
541605	75699	75714	Intron 1	TATTCTGTGGGACAAG	eekddddddddddkke	51	1639
541606	75979	75994	Intron 1	GTGTCTAGTTCAGCC	eekddddddddddkke	86	1640
541607	76410	76425	Intron 1	TACTATCATGTAGCGC	eekddddddddddkke	87	1641
541608	76701	76716	Intron 1	TGCCCTTGTAGTGAGA	eekddddddddddkke	31	1642
541609	76980	76995	Intron 1	TCCCCAACCTACAAGC	eekddddddddddkke	41	1643
541610	77292	77307	Intron 1	GCTCTAGGCATATGAA	eekddddddddddkke	63	1644
541611	77555	77570	Intron 1	TACCTCCCTTGTAGGG	eekddddddddddkke	27	1645
541612	77854	77869	Intron 1	GGTTCCCTTGCAAGAGA	eekddddddddddkke	62	1646
541613	78311	78326	Intron 1	GTGCCCTCTTCATGCC	eekddddddddddkke	68	1647
541614	79006	79021	Intron 1	CCTGTGTGCAACTGGC	eekddddddddddkke	85	1648
541615	79490	79505	Intron 1	CTGAGTCATTTGCCTG	eekddddddddddkke	93	1649

541616	79829	79844	Intron 1	GGCCTTAGTAGGCCAG	eekddddddddddkke	0	1650
541617	80277	80292	Intron 1	GTCCTTGCAGTCAACC	eekddddddddddkke	77	1651
541618	80575	80590	Intron 1	GCTGGGCCAAGTCCAT	eekddddddddddkke	77	1652
541619	80895	80910	Intron 1	TAGGGCACTTTTGGCC	eekddddddddddkke	31	1653
541620	81207	81222	Intron 1	GCTGAGGTCCCTCTCT	eekddddddddddkke	34	1654
541621	81761	81776	Intron 1	CTTTGGTCCCATTGCC	eekddddddddddkke	83	1655
541622	82233	82248	Intron 1	GGAACATGCCAAGGGC	eekddddddddddkke	91	1656
541623	82738	82753	Intron 1	AGGTGGTCTCCCTTCA	eekddddddddddkke	74	1657
541624	83056	83071	Intron 1	TCCCAAAGCTCCCCTC	eekddddddddddkke	53	1658
541625	83401	83416	Intron 1	CCTGGCCTAGCAAGCT	eekddddddddddkke	47	1659
541626	84048	84063	Intron 1	TCTTAGCCCTGGGCTA	eekddddddddddkke	12	1660
541627	84388	84403	Intron 1	GACTTGGACTGGGCTC	eekddddddddddkke	81	1661
541628	85261	85276	Intron 1	GGCCTAGGATCTAGGA	eekddddddddddkke	0	1662
541629	85714	85729	Intron 1	GTCAGGCTAGAGGGAC	eekddddddddddkke	41	1663
541630	86220	86235	Intron 1	GGAAGTTCTCCCAGCC	eekddddddddddkke	47	1664
541631	86640	86655	Intron 1	CCTGACTGATGTACAC	eekddddddddddkke	35	1665
541632	86903	86918	Intron 1	CTCTGGCCTAGCCTAT	eekddddddddddkke	54	1666
541633	87247	87262	Intron 1	GGCTGCTGTCAGATGC	eekddddddddddkke	79	1667
541634	88293	88308	Intron 1	TCTCAGGTGTAGGCAG	eekddddddddddkke	59	1668
541635	88605	88620	Intron 1	GGTCACTGAGACTGGG	eekddddddddddkke	88	1669
541636	88952	88967	Intron 1	ACCCACTAGCAGCTAG	eekddddddddddkke	61	1670
541637	89160	89175	Intron 1	CGGATGAGGCAGTTAG	eekddddddddddkke	42	1671
541638	89855	89870	Intron 1	TGGTAGGCCCTCTGGC	eekddddddddddkke	28	1672
541639	90240	90255	Intron 1	GTCACAAGGTGGGTGC	eekddddddddddkke	28	1673
541640	90513	90528	Intron 1	GTCTTGCCCTCACGGA	eekddddddddddkke	73	1674
541641	91073	91088	Intron 1	GCAGTCTGTGGACTTA	eekddddddddddkke	93	1675
541642	91647	91662	Intron 1	TGCTCTCTGGTCACAC	eekddddddddddkke	75	1676
541643	92069	92084	Intron 1	TATCCCCCAGAGCCAT	eekddddddddddkke	68	1677
541644	92356	92371	Intron 1	AAGGTGAGAGGGCACT	eekddddddddddkke	75	1678
541645	92904	92919	Intron 1	GTTTTAACCTCACCT	eekddddddddddkke	0	1679
541646	93846	93861	Intron 1	CCTTCCACTGACCTTC	eekddddddddddkke	56	1680
541647	94374	94389	Intron 1	GACACTAGCCTAAGCC	eekddddddddddkke	37	1681

Table 57

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic regions of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	156906	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	94	1370
541648	94638	94653	Intron 1	GGTTAGCCCTCAGCCT	eekddddddddddkke	61	1682
541649	94839	94854	Intron 1	TATGAAGGTTGGACCA	eekddddddddddkke	69	1683

541650	95509	95524	Intron 1	CAACCAGCTCACCTGA	eekddddddddddkke	37	1684
541651	95829	95844	Intron 1	GGGCTCCAAGGCTCTC	eekddddddddddkke	75	1685
541652	96158	96173	Intron 1	AGCTGTTACATGCCAA	eekddddddddddkke	93	1686
541653	96488	96503	Intron 1	GGCCCAGAGGTTATAG	eekddddddddddkke	30	1687
541654	96991	97006	Intron 1	GTCCTTAGACCCCTCA	eekddddddddddkke	70	1688
541655	97539	97554	Intron 1	GCCCTGGCTAGAGACA	eekddddddddddkke	39	1689
541656	98132	98147	Intron 1	CATCCAGCAGCTGGAC	eekddddddddddkke	35	1690
541657	98833	98848	Intron 1	GACTGAGGTCATCACA	eekddddddddddkke	60	1691
541658	99258	99273	Intron 1	GGCCAGGCACATCATG	eekddddddddddkke	45	1692
541659	99843	99858	Intron 1	GGAGCTCATTGAGCCA	eekddddddddddkke	36	1693
541660	100406	100421	Intron 1	GTGCCCATGCTGTGT	eekddddddddddkke	70	1694
541661	100742	100757	Intron 1	CCAAGTGTGGCTTCAG	eekddddddddddkke	54	1695
541662	101305	101320	Intron 1	CCACCCTTTATACGCA	eekddddddddddkke	87	1696
541663	101788	101803	Intron 1	CAGTAACCCCAAGGGA	eekddddddddddkke	12	1697
541664	102649	102664	Intron 1	CCCCACCTTATATGGG	eekddddddddddkke	9	1698
541665	103034	103049	Intron 1	AGGCCCTTTTACATG	eekddddddddddkke	9	1699
541666	103316	103331	Intron 1	TCAATAAGTCCCTAGG	eekddddddddddkke	20	1700
541667	104277	104292	Intron 1	GGCATTGAGTGACTGC	eekddddddddddkke	51	1701
541668	104679	104694	Intron 1	ATAATGCCTTCTCAGC	eekddddddddddkke	62	1702
541669	106349	106364	Intron 1	GTGAGGCATTTAGCCC	eekddddddddddkke	35	1703
541670	106632	106647	Intron 1	GCTCTTGTGTTGGGTA	eekddddddddddkke	89	1704
541671	107084	107099	Intron 1	TGTGCAGGAGGTCTCA	eekddddddddddkke	60	1705
541672	107949	107964	Intron 1	TGGAGAGTCTTGTCTC	eekddddddddddkke	17	1706
541673	108773	108788	Intron 1	GTGACCCACCCAAGAG	eekddddddddddkke	34	1707
541674	109336	109351	Intron 1	GTTGTAGCTAGTG TTC	eekddddddddddkke	74	1708
541675	109849	109864	Intron 1	GCCTTAGTTTGTGCCA	eekddddddddddkke	78	1709
541676	110427	110442	Intron 1	GCCCCAGCTGAGAATT	eekddddddddddkke	29	1710
541677	110701	110716	Intron 1	ACAACAATCCAGGGTG	eekddddddddddkke	61	1711
541678	110959	110974	Intron 1	CTCCCCTGGAAGTCAC	eekddddddddddkke	59	1712
541679	111307	111322	Intron 1	GCCCTCATGGCTCAAG	eekddddddddddkke	60	1713
541680	112499	112514	Intron 1	TCAGCAGATAGGGAGC	eekddddddddddkke	61	1714
541681	113896	113911	Intron 1	GAATGCGGTGATCAGG	eekddddddddddkke	29	1715
541682	117477	117492	Intron 1	CTGAGAGAATTGGCCC	eekddddddddddkke	5	1716
541683	117740	117755	Intron 1	AGGCACATTGTTACCA	eekddddddddddkke	26	1717
541684	118229	118244	Intron 1	GGGAGGCACTAGAGAA	eekddddddddddkke	13	1718
541685	119269	119284	Intron 1	TACAGTAACACATCCC	eekddddddddddkke	78	1719
541686	119688	119703	Intron 1	GAAGCTCAGCCTGATC	eekddddddddddkke	45	1720
541687	120376	120391	Intron 1	CTTGCCTGACAACCTA	eekddddddddddkke	53	1721
541688	120738	120753	Intron 1	GCCTACCTGCTTTTGC	eekddddddddddkke	10	1722
541689	121242	121257	Intron 1	TTCCCAACCACTTAG	eekddddddddddkke	7	1723
541690	121615	121630	Intron 1	TCTCCTATTTAGTTA	eekddddddddddkke	23	1724
541691	121823	121838	Intron 1	GGGTGATGGATGAACT	eekddddddddddkke	40	1725
541692	122345	122360	Intron 1	ACACTGCTGGTAGTGA	eekddddddddddkke	0	1726

541693	122588	122603	Intron 1	ACCCAAGTAGCCTGTC	eekddddddddddkke	35	1727
541694	123152	123167	Intron 1	GAGACCTGCTGCCTGA	eekddddddddddkke	80	1728
541695	123671	123686	Intron 1	ACATCTCTTGGGAGGT	eekddddddddddkke	78	1729
541696	124040	124055	Intron 1	ACATAGTACCCCTCCA	eekddddddddddkke	35	1730
541697	124430	124445	Intron 1	CTCTCAAGTACCTGCC	eekddddddddddkke	72	1731
541698	124824	124839	Intron 1	TTGTACCCAACCCCC	eekddddddddddkke	15	1732
541699	125032	125047	Intron 1	AGGCCACATAAATGC	eekddddddddddkke	21	1733
541700	125533	125548	Intron 1	GAGCATCCCCTACACT	eekddddddddddkke	12	1734
541701	126357	126372	Intron 1	GCTGGGCCTTTAGCTG	eekddddddddddkke	66	1735
541702	126736	126751	Intron 1	TTGGTCAATTGGGCAG	eekddddddddddkke	79	1736
541703	127179	127194	Intron 1	GTCTCATGAGGCCTAT	eekddddddddddkke	60	1737
541704	127454	127469	Intron 1	GGAGGTGGGATCCAC	eekddddddddddkke	35	1738
541705	128467	128482	Intron 1	GCCCACTACCTAGCAC	eekddddddddddkke	30	1739
541706	129096	129111	Intron 1	CCCAGCTGGCTGGTCG	eekddddddddddkke	50	1740
541707	129312	129327	Intron 1	GCACCAGGTCTCCTGT	eekddddddddddkke	7	1741
541708	129516	129531	Intron 1	GTCTAGAAGCCTAGGG	eekddddddddddkke	23	1742
541709	129976	129991	Intron 1	GCCGGGTGTTGGTGCA	eekddddddddddkke	50	1743
541710	130308	130323	Intron 1	TTGGTGCCTGTGTTGC	eekddddddddddkke	49	1744
541711	130767	130782	Intron 1	TGCTTCTGATCCCTAC	eekddddddddddkke	18	1745
541712	131286	131301	Intron 1	GTTCCAGGAGGCTTA	eekddddddddddkke	56	1746
541713	131676	131691	Intron 1	AGGCCCTAGAGTCTA	eekddddddddddkke	41	1747
541714	132292	132307	Intron 1	TGGTGTGCCAGACTT	eekddddddddddkke	60	1748
541715	132730	132745	Intron 1	GATGGCTAACCCACTG	eekddddddddddkke	14	1749
541716	133101	133116	Intron 1	CCCCCAAAGTTGCC	eekddddddddddkke	12	1750
541717	133522	133537	Intron 1	TAGGGTGTTCAGATC	eekddddddddddkke	44	1751
541718	133724	133739	Intron 1	GTACCATGAAGCTCTG	eekddddddddddkke	67	1752
541719	134086	134101	Intron 1	CTTGGACTTGGACCAT	eekddddddddddkke	42	1753
541720	134441	134456	Intron 1	GTGCATAGGCCTGTC	eekddddddddddkke	42	1754
541721	135015	135030	Intron 1	CCTCACCTGAACACCC	eekddddddddddkke	23	1755
541722	135859	135874	Intron 1	ATGCCTCCCCGCAACT	eekddddddddddkke	27	1756
541723	136287	136302	Intron 1	TTGTGCTTGGGTGTAC	eekddddddddddkke	39	1757
541724	137000	137015	Intron 1	AGGCTTCATGTGAGGT	eekddddddddddkke	86	1758

Table 58

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting introns 1 and 2 of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	156906	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	95	1370
541725	137372	137387	Intron 1	TGTAAGAGGTCTCCC	eekddddddddddkke	53	1759
541726	137750	137765	Intron 1	GACCTGTGCAGCAGGT	eekddddddddddkke	32	1760

541727	138783	138798	Intron 1	TCCTCTTGGAGATCCA	eekdddddddddkke	44	1761
541728	139825	139840	Intron 1	AGGTCATAGGACTGCT	eekdddddddddkke	73	1762
541729	140343	140358	Intron 1	GAAGGTCAGACTAGGG	eekdddddddddkke	53	1763
541730	140686	140701	Intron 1	TCTGTAGACTGCCAG	eekdddddddddkke	87	1764
541731	141116	141131	Intron 1	GTCCCTCTATTCCCCT	eekdddddddddkke	57	1765
541732	141591	141606	Intron 1	AATTGCCATGCTCCCA	eekdddddddddkke	56	1766
541733	142113	142128	Intron 1	GATGACCTTCCTCCAA	eekdddddddddkke	15	1767
541734	142327	142342	Intron 1	GTTTCCAGTAGCACCT	eekdddddddddkke	82	1768
541735	143118	143133	Intron 1	GGCCTTGAGCTGATGG	eekdddddddddkke	11	1769
541736	143836	143851	Intron 1	TATCCCTAATCAGGCT	eekdddddddddkke	40	1770
541737	144094	144109	Intron 1	GGTGTCCACATCCCGG	eekdddddddddkke	58	1771
541738	144558	144573	Intron 1	AGCTGGACAGGCCATA	eekdddddddddkke	27	1772
541740	145510	145525	Intron 2	GGTAATCACCCAGAGA	eekdddddddddkke	90	1773
541741	145937	145952	Intron 2	GCGCTAAGTCTGCTGT	eekdddddddddkke	92	1774
541742	146320	146335	Intron 2	CCTCAAATCTTGCCCA	eekdddddddddkke	96	1775
541743	147028	147043	Intron 2	ATCCAGACCTGGCAGA	eekdddddddddkke	84	1776
541744	147262	147277	Intron 2	ATCCCTGCTCAAGTGC	eekdddddddddkke	89	1777
541745	147671	147686	Intron 2	CAGGCACTCCTTGGA	eekdddddddddkke	93	1778
541746	148139	148154	Intron 2	AGCTGAGGTATCCCTC	eekdddddddddkke	94	1779
541747	148564	148579	Intron 2	GGGCCAGCAAGTCTT	eekdddddddddkke	33	1780
541748	149069	149084	Intron 2	GTTTTGTCAGTGTGCA	eekdddddddddkke	98	1781
541749	149491	149506	Intron 2	GTGACCTGCTGAATC	eekdddddddddkke	95	1782
541750	150236	150251	Intron 2	GGCTGAAGTGTGCACC	eekdddddddddkke	95	1783
541751	150748	150763	Intron 2	GGGTGGTCCCCTCCT	eekdddddddddkke	91	1784
541752	151124	151139	Intron 2	GAGGAATCCTGGGCC	eekdddddddddkke	94	1785
541753	151373	151388	Intron 2	ATGACAAGCTAGGTGC	eekdddddddddkke	81	1786
541754	151644	151659	Intron 2	TTGCCAGACAGGGCAC	eekdddddddddkke	18	1787
541755	152373	152388	Intron 2	AGACCCCTCCCACTAT	eekdddddddddkke	43	1788
541756	152617	152632	Intron 2	GGTGCTGGGTGACCGG	eekdddddddddkke	91	1789
541757	153349	153364	Intron 2	GGCCAAACGGTGCCCT	eekdddddddddkke	23	1790
541758	153918	153933	Intron 2	TGGGTGAATAGCAACC	eekdddddddddkke	85	1791
541759	154171	154186	Intron 2	GCCCCAAGGAAGTGA	eekdddddddddkke	76	1792
541760	154813	154828	Intron 2	CAGGCTTCATGTGTGG	eekdddddddddkke	92	1793
541761	155289	155304	Intron 2	CTGTCAGTGCTTTGGT	eekdddddddddkke	52	1794
541762	156233	156248	Intron 2	GAGTACCCTGGCAGGT	eekdddddddddkke	58	1795
541763	156847	156862	Intron 2	TAGCTAGCACCTGGGT	eekdddddddddkke	90	1796
541764	157552	157567	Intron 2	GGCAAACCTTTGAGCC	eekdddddddddkke	27	1797
541765	157927	157942	Intron 2	GCTATCATTGGAGCAG	eekdddddddddkke	94	1798
541766	158542	158557	Intron 2	CCTCTGAGTACTCCCT	eekdddddddddkke	96	1799
541767	159252	159267	Intron 2	AGCTGAAGGCAACCAG	eekdddddddddkke	97	1800
541768	159539	159554	Intron 2	GGGCAGTTTTCATAG	eekdddddddddkke	89	1801
541769	159778	159793	Intron 2	GGTCCTACCTCTGACA	eekdddddddddkke	82	1802
541770	160352	160367	Intron 2	GGCTGCCTTAGGGTGG	eekdddddddddkke	90	1803

541771	160812	160827	Intron 2	CGCACCTCCCCCACTA	eekddddddddddkke	15	1804
541772	161461	161476	Intron 2	GCTTATTGGTCCATGG	eekddddddddddkke	93	1805
541773	161821	161836	Intron 2	AACCGCAGAGCCCCCA	eekddddddddddkke	76	1806
541774	162132	162147	Intron 2	GGGCTTGTCTGCCAA	eekddddddddddkke	33	1807
541775	162639	162654	Intron 2	GGGACCTGCGCTGACT	eekddddddddddkke	86	1808
541776	163024	163039	Intron 2	CTTTCACCTGGTGACT	eekddddddddddkke	83	1809
541777	163542	163557	Intron 2	AGCTTGAGGGAGTATA	eekddddddddddkke	52	1810
541778	164144	164159	Intron 2	GCCTGCTCAATTGAGG	eekddddddddddkke	32	1811
541779	164570	164585	Intron 2	ATAGCAGCTGGCTGCC	eekddddddddddkke	24	1812
541780	165419	165434	Intron 2	AAAAGCTTGGCACCCC	eekddddddddddkke	91	1813
541781	165859	165874	Intron 2	CCTGGCAAGAAGGGCC	eekddddddddddkke	65	1814
541782	166435	166450	Intron 2	TTAGCCCATCTATCCC	eekddddddddddkke	82	1815
541783	166837	166852	Intron 2	GTGGTCTCCCTGTGCC	eekddddddddddkke	90	1816
541784	167107	167122	Intron 2	AGCCCTCTCTGGCAAA	eekddddddddddkke	38	1817
541785	168004	168019	Intron 2	TTACTGTGGCCCGAGT	eekddddddddddkke	94	1818
541786	169062	169077	Intron 2	GTAGACTCCTAGGGTC	eekddddddddddkke	90	1819
541787	169696	169711	Intron 2	CCTCCAGTTAGTGTGC	eekddddddddddkke	91	1820
541788	170081	170096	Intron 2	GTGGGTGGCCAACAGG	eekddddddddddkke	91	1821
541789	170799	170814	Intron 2	GGGATTCCCTGGTAGC	eekddddddddddkke	77	1822
541790	171021	171036	Intron 2	GTGAGACCGGCCTTTG	eekddddddddddkke	23	1823
541791	171530	171545	Intron 2	ACTGGCACCCACTTGG	eekddddddddddkke	54	1824
541792	172447	172462	Intron 2	ATTGGCCTAATGCCCC	eekddddddddddkke	76	1825
541793	172733	172748	Intron 2	AGGCTATACATTCCAG	eekddddddddddkke	94	1826
541794	173045	173060	Intron 2	GGTGGCAGCTAGGTGG	eekddddddddddkke	80	1827
541795	173677	173692	Intron 2	TCCACAGTTGGCACTG	eekddddddddddkke	77	1828
541796	174128	174143	Intron 2	TGGGCCTTAGATTGTA	eekddddddddddkke	69	1829
541797	174521	174536	Intron 2	TGTCTTCCTGGTGGCC	eekddddddddddkke	97	1830
541798	174870	174885	Intron 2	CCCGCCTCTCCAGCAA	eekddddddddddkke	89	1831
541799	175275	175290	Intron 2	GCAGCAGCCAATAAGT	eekddddddddddkke	76	1832
541800	175691	175706	Intron 2	TTGTATCCTGGCCCCT	eekddddddddddkke	80	1833
541801	176038	176053	Intron 2	GCCTCATGGGCCTTAC	eekddddddddddkke	66	1834

Table 59

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting introns 2 and 3 of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	156906	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	97	1370
541802	176619	176634	Intron 2	GGATGCCAGTCTTGGC	eekddddddddddkke	48	1835
541803	176835	176850	Intron 2	CTGCTCTCAGTACCTC	eekddddddddddkke	87	1836
541804	177300	177315	Intron 2	ACCCAAGAAGTCACCT	eekddddddddddkke	93	1837

541805	177551	177566	Intron 2	GCCTCAAGCCCTACCC	eekddddddddddkke	73	1838
541806	178066	178081	Intron 2	AGCTCCAGCCTATAGA	eekddddddddddkke	81	1839
541807	178361	178376	Intron 2	GGTCCACATGGCCCTA	eekddddddddddkke	90	1840
541808	178895	178910	Intron 2	CAGGCCCAGGATTGTC	eekddddddddddkke	81	1841
541809	179444	179459	Intron 2	GGGCCTGCTTTGCAGC	eekddddddddddkke	81	1842
541810	179863	179878	Intron 2	ACTCCTCTCTTTAGGC	eekddddddddddkke	87	1843
541811	180524	180539	Intron 2	CTGGGTAACAGTCCTC	eekddddddddddkke	98	1844
541812	181528	181543	Intron 2	ACTGTATGGTTTCCAC	eekddddddddddkke	83	1845
541813	182103	182118	Intron 2	GCCAAAGATAGCTCTT	eekddddddddddkke	94	1846
541814	182978	182993	Intron 2	GGCATTGGAAGTTGGT	eekddddddddddkke	87	1847
541815	183193	183208	Intron 2	CCCTTCCTGACCTTAC	eekddddddddddkke	55	1848
541816	183658	183673	Intron 2	TTACCCTCTATTACCC	eekddddddddddkke	65	1849
541818	184501	184516	Intron 2	GGCACCCCAGGCCGGG	eekddddddddddkke	25	1850
541819	185080	185095	Intron 2	CAGCAGCTAGTTCCCC	eekddddddddddkke	96	1851
541820	185327	185342	Intron 2	GTGGGCACTAGTGTGT	eekddddddddddkke	75	1852
541821	185682	185697	Intron 2	TGCCCTTGTCAGGGCA	eekddddddddddkke	20	1853
541822	186025	186040	Intron 2	GCAGATAGGCTCAGCA	eekddddddddddkke	98	1854
541823	186570	186585	Intron 2	CCCTAGCCCTTAGCAC	eekddddddddddkke	44	1855
541824	186841	186856	Intron 2	ACTGGAATGGCCCTCT	eekddddddddddkke	86	1856
541825	187176	187191	Intron 2	TTTGCTCATGCTCACA	eekddddddddddkke	96	1857
541826	187629	187644	Intron 2	GCCTTTGTGTGTCACT	eekddddddddddkke	99	1858
541827	187857	187872	Intron 2	TATGTGGTAGCATGTC	eekddddddddddkke	96	1859
541828	188442	188457	Intron 2	CCCCAGGAAGTTGGCC	eekddddddddddkke	68	1860
541829	189086	189101	Intron 2	TAGCTGTCAAGGCCCT	eekddddddddddkke	90	1861
541830	189534	189549	Intron 2	CCTAGTCAGCCACTAG	eekddddddddddkke	20	1862
541831	189889	189904	Intron 2	AGACTCCCCATCAGCC	eekddddddddddkke	74	1863
541832	190172	190187	Intron 2	GTGAAGGGCCTTCATC	eekddddddddddkke	68	1864
541833	190961	190976	Intron 2	GGTTGAGAGTCCAATG	eekddddddddddkke	95	1865
541834	191404	191419	Intron 2	CAGCTAATTCCTCAT	eekddddddddddkke	79	1866
541835	191614	191629	Intron 2	TTGTGTCTCAACCCAC	eekddddddddddkke	95	1867
541836	191999	192014	Intron 2	GGCTATGCTGCATGCT	eekddddddddddkke	91	1868
541837	192860	192875	Intron 2	CCCCATACCCAGTGGA	eekddddddddddkke	71	1869
541838	193460	193475	Intron 2	GGTGTTTTTCCTCCCT	eekddddddddddkke	95	1870
541839	194144	194159	Intron 2	GAGCCTGCCCAACTTT	eekddddddddddkke	90	1871
541840	194425	194440	Intron 2	TGATGCCCAAGAGTGA	eekddddddddddkke	85	1872
541841	194953	194968	Intron 2	TTCCCTCTGCGAACAT	eekddddddddddkke	96	1873
541842	195428	195443	Intron 2	GTTCCATCTCAATCCA	eekddddddddddkke	94	1874
541843	196858	196873	Intron 2	ACGGCCACTCCACTGG	eekddddddddddkke	44	1875
541844	197326	197341	Intron 2	TGGAAGTGGTTCCAGA	eekddddddddddkke	90	1876
541845	197946	197961	Intron 2	TTGCCCCAGACCAACA	eekddddddddddkke	47	1877
541846	198366	198381	Intron 2	GAGGTTGTGGAGGTGC	eekddddddddddkke	26	1878
541847	198715	198730	Intron 2	GAGTTGCTGTGTGTGA	eekddddddddddkke	83	1879
541848	198939	198954	Intron 2	CATGTCAGAGGTGTCC	eekddddddddddkke	93	1880

541849	199506	199521	Intron 2	AGGTAAGGATCATGGC	eekddddddddddkke	87	1881
541850	199816	199831	Intron 2	GTTCAGTTGCATCACG	eekddddddddddkke	90	1882
541851	200249	200264	Intron 2	GCCCAGCTAGCCACCC	eekddddddddddkke	68	1883
541852	201258	201273	Intron 2	CCTTAGCAGCCAGGCC	eekddddddddddkke	86	1884
541853	202079	202094	Intron 2	GCACTTAGGGTTTTC	eekddddddddddkke	94	1885
541854	202382	202397	Intron 2	GTTGAACTTTCCTAC	eekddddddddddkke	53	1886
541855	202702	202717	Intron 2	TGACTCCTTGAGACAG	eekddddddddddkke	83	1887
541856	203098	203113	Intron 2	TGCGCTGGCTTAGCAA	eekddddddddddkke	59	1888
541857	203464	203479	Intron 2	GGCCTAACATCAGCAG	eekddddddddddkke	88	1889
541858	204212	204227	Intron 2	ACTCCTCCAGTTAGC	eekddddddddddkke	70	1890
541859	205630	205645	Intron 2	ACCAGTGGCCAATGTC	eekddddddddddkke	92	1891
541861	206422	206437	Intron 2	GCCTAGACACAGTAGG	eekddddddddddkke	70	1892
541862	206749	206764	Intron 2	TATTCTCCCCCTAGGG	eekddddddddddkke	42	1893
541863	207517	207532	Intron 2	GACGGCCTTGGGCACA	eekddddddddddkke	96	1894
	210196	210211					
541865	208659	208674	Intron 3	GCAGGCTGTATTAGCA	eekddddddddddkke	15	1895
541867	209999	210014	Intron 3	ACCCCTATCCTGCAC	eekddddddddddkke	58	1896
541868	210281	210296	Intron 3	TCCTCCATACCTAGAG	eekddddddddddkke	61	1897
	211033	211048					
541869	210502	210517	Intron 3	GATAGGTGCCCACTGT	eekddddddddddkke	80	1898
541870	210920	210935	Intron 3	GTCAGTTCTGGCTAGG	eekddddddddddkke	97	1899
541871	211269	211284	Intron 3	GCCTGAACTTACAAGC	eekddddddddddkke	68	1900
541872	211836	211851	Intron 3	ACCCTGGGCTGACCTT	eekddddddddddkke	92	1901
541873	212606	212621	Intron 3	GGACCTGGACAAGCAA	eekddddddddddkke	97	1902
541874	213099	213114	Intron 3	CTCCTTGCGAGAGAGG	eekddddddddddkke	7	1903
541875	213425	213440	Intron 3	AGAGTTGACATGGGCA	eekddddddddddkke	96	1904
541876	213846	213861	Intron 3	CACTAGGTCCCTGACC	eekddddddddddkke	37	1905
541877	214483	214498	Intron 3	CACTCTCTTGGGCTGT	eekddddddddddkke	94	1906
541878	214884	214899	Intron 3	AGGGACCTGCATTCCA	eekddddddddddkke	72	1907

Table 60

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting introns 2 and 3 of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	156906	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	91	1370
541879	215493	215508	Intron 3	TTCACCACCCATTGGG	eekddddddddddkke	63	1908
541880	216192	216207	Intron 3	ATCTGGTCTGAGGGCC	eekddddddddddkke	92	1909
541881	216458	216473	Intron 3	GACATGCAATTGACCC	eekddddddddddkke	98	1910
541882	217580	217595	Intron 3	GTGTGCAGCAGACTGT	eekddddddddddkke	92	1911
541883	218233	218248	Intron 3	GACAGTCCAGCTGCAA	eekddddddddddkke	84	1912

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541884	218526	218541	Intron 3	CCTGCGGCAGTGAAGA	eekddddddddddkke	85	1913
541885	218734	218749	Intron 3	CTCTGAGGATAAACCT	eekddddddddddkke	76	1914
541886	219342	219357	Intron 3	GTTCCCAGCTCCCCAA	eekddddddddddkke	68	1915
541887	219618	219633	Intron 3	TAGGGTCAGTGTCCCA	eekddddddddddkke	79	1916
541888	220039	220054	Intron 3	GGCGAGCCTCTCAGCC	eekddddddddddkke	52	1917
541889	220393	220408	Intron 3	GACTCATCCAGGCAGT	eekddddddddddkke	91	1918
541890	220665	220680	Intron 3	TCCCTCCCTTAGGCAC	eekddddddddddkke	71	1919
541891	221044	221059	Intron 3	GAGGAGCCAGGCATAT	eekddddddddddkke	80	1920
541892	221562	221577	Intron 3	CACCAACGAAGTCCCC	eekddddddddddkke	89	1921
541893	221947	221962	Intron 3	GCTGGCAGTCACCAA	eekddddddddddkke	90	1922
541894	222569	222584	Intron 3	GCCCACACCATGAGC	eekddddddddddkke	70	1923
541895	222983	222998	Intron 3	AGTGAGATGCCCTGGT	eekddddddddddkke	92	1924
541896	223436	223451	Intron 3	CACTGGCAGTTAGACC	eekddddddddddkke	88	1925
541897	224107	224122	Intron 3	ACTCTGGCCACTAGTA	eekddddddddddkke	80	1926
541898	224731	224746	Intron 3	GGTAGGGTGGCCACAT	eekddddddddddkke	78	1927
541899	225133	225148	Intron 3	GAGCCATGTCTAGGCA	eekddddddddddkke	18	1928
541900	225465	225480	Intron 3	CAGACTGAAACCCACC	eekddddddddddkke	86	1929
541901	225671	225686	Intron 3	TATGGTCCAGCCACCA	eekddddddddddkke	76	1930
541902	226110	226125	Intron 3	TACCTCCTCTGTTGGT	eekddddddddddkke	36	1931
541903	227025	227040	Intron 3	ACACCTCAGTCATGAT	eekddddddddddkke	92	1932
541904	227236	227251	Intron 3	AACAGGCTTCAAGAGG	eekddddddddddkke	91	1933
541905	227485	227500	Intron 3	GTACTACTGGCCATGT	eekddddddddddkke	73	1934
541906	227914	227929	Intron 3	CTGCAGGCGGTTGCTA	eekddddddddddkke	60	1935
541907	228718	228733	Intron 3	GTCTGTTGCCAAGAGC	eekddddddddddkke	95	1936
541908	229174	229189	Intron 3	CCCTGGGTCACTTAAG	eekddddddddddkke	44	1937
541909	229423	229438	Intron 3	CCTGTCCTTGCTTGCA	eekddddddddddkke	96	1938
541910	230042	230057	Intron 3	GCCCAGCTTATCCTAA	eekddddddddddkke	78	1939
541911	230313	230328	Intron 3	AGTAGAGCCTTTGCCT	eekddddddddddkke	75	1940
541912	230580	230595	Intron 3	CTGTCTCTTGCCCAT	eekddddddddddkke	80	1941
541913	231330	231345	Intron 3	GGCCCAAATCTTGAGT	eekddddddddddkke	67	1942
541914	231817	231832	Intron 3	GCTTGTTACAGCACTA	eekddddddddddkke	92	1943
541915	232088	232103	Intron 3	ACTTTGGCCCAGAGAT	eekddddddddddkke	51	1944
541916	232884	232899	Intron 3	GCAGTCAGGTCAGCTG	eekddddddddddkke	75	1945
541917	233210	233225	Intron 3	GCCTTGCTCTACTACC	eekddddddddddkke	65	1946
541918	233657	233672	Intron 3	GGCTCTGCTATTGGCC	eekddddddddddkke	59	1947
541919	233998	234013	Intron 3	CTTATAGAGCCTTGCC	eekddddddddddkke	59	1948
541920	234296	234311	Intron 3	GGAAGGGCCCAAATAT	eekddddddddddkke	15	1949
541921	234903	234918	Intron 3	GATCTACTCCTACTGC	eekddddddddddkke	65	1950
541922	235313	235328	Intron 3	GTCAGCCTGTGTCTGA	eekddddddddddkke	45	1951
541923	235770	235785	Intron 3	AGCTTCCTCCTTACAC	eekddddddddddkke	54	1952
541924	236198	236213	Intron 3	CTGCTAAGCCCCCTACC	eekddddddddddkke	59	1953
541925	236684	236699	Intron 3	AGAGGTCAGGTGCATA	eekddddddddddkke	77	1954
541926	237055	237070	Intron 3	TTCAGCCTGGTTGGGA	eekddddddddddkke	71	1955

541927	237585	237600	Intron 3	GATTGATTGAGCTCCT	eekddddddddddkke	86	1956
541928	237949	237964	Intron 3	ATGGACTCCCTAGGCT	eekddddddddddkke	61	1957
541929	238542	238557	Intron 3	TACTCAAGGGCCCCTC	eekddddddddddkke	67	1958
541930	245319	245334	Intron 3	GGCATATGTAGCTTGC	eekddddddddddkke	91	1959
541931	245765	245780	Intron 3	GAGCTTAGATCTGTGC	eekddddddddddkke	73	1960
541932	246251	246266	Intron 3	ATGCTCACGGCTGTGT	eekddddddddddkke	81	1961
541933	246500	246515	Intron 3	ATTGAAAGGCCCATCA	eekddddddddddkke	45	1962
541934	246936	246951	Intron 3	CAACCCAGTTTGCCGG	eekddddddddddkke	71	1963
541935	247225	247240	Intron 3	CAGCTATTCCTGTTT	eekddddddddddkke	53	1964
541936	247644	247659	Intron 3	GCTGTGTCACACTTCC	eekddddddddddkke	98	1965
541937	248223	248238	Intron 3	GTCCAAGGATCACAGC	eekddddddddddkke	86	1966
541938	248695	248710	Intron 3	GCTACCACTAGAGCCT	eekddddddddddkke	81	1967
541939	249494	249509	Intron 3	GTTTCAGGGCTTATGT	eekddddddddddkke	63	1968
541940	250693	250708	Intron 3	TCCCACACCTATTGAA	eekddddddddddkke	51	1969
541941	251622	251637	Intron 3	ACTGACTAGAGAGTCC	eekddddddddddkke	81	1970
541942	251950	251965	Intron 3	TCCAAGGCTGATGTCC	eekddddddddddkke	85	1971
541943	252665	252680	Intron 3	TCCCATGGTGGACATG	eekddddddddddkke	39	1972
541944	253140	253155	Intron 3	AGTAGCTGGCAGAAGG	eekddddddddddkke	85	1973
541945	253594	253609	Intron 3	CTGGGAGTGACTACTA	eekddddddddddkke	77	1974
541946	254036	254051	Intron 3	TGGTATAGCTACTGGG	eekddddddddddkke	84	1975
541947	254905	254920	Intron 3	CTGTGGTTTGGCAGGT	eekddddddddddkke	90	1976
541948	255407	255422	Intron 3	GTTCTCACCTGA ACTA	eekddddddddddkke	65	1977
541949	255618	255633	Intron 3	ATAGGCTACTGGCAGG	eekddddddddddkke	89	1978
541950	255992	256007	Intron 3	CCCAGCTAGCTGGAGT	eekddddddddddkke	50	1979
541951	256428	256443	Intron 3	GGCTGGCTCTCAAAGG	eekddddddddddkke	61	1980
541952	256689	256704	Intron 3	TGGTGATACTGTGGCA	eekddddddddddkke	94	1981
541953	257317	257332	Intron 3	GCTGATTTTGGTGCCA	eekddddddddddkke	92	1982
541954	257826	257841	Intron 3	GCTAATCTTGCCCTCGA	eekddddddddddkke	52	1983
541955	258407	258422	Intron 3	CACTGGTGGCTTTCAA	eekddddddddddkke	31	1984

Table 61

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID

NOs: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
541262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	93	156891	1370
541956	n/a	Intron 3	GTCCCCCTTCTTAAGCA	eekddddddddddkke	56	258980	1985
541957	n/a	Intron 3	GCCAGGCCAACTGTGG	eekddddddddddkke	53	259290	1986
541958	n/a	Intron 3	GGCCCGTTATGGTGGA	eekddddddddddkke	72	259500	1987
541959	n/a	Intron 3	CCTAAAGTCCA ACTCC	eekddddddddddkke	76	261641	1988

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541960	n/a	Intron 3	CCCTATCCAGCCTTCA	eekddddddddddkke	77	262021	1989
541961	n/a	Intron 3	AAGCATGGCCTCTGGC	eekddddddddddkke	23	262453	1990
541962	n/a	Intron 3	TACCCTGCACCCTCCT	eekddddddddddkke	71	262764	1991
541963	n/a	Intron 3	TCCTTAGTAGAATGCC	eekddddddddddkke	82	263342	1992
541964	n/a	Intron 3	TTAGCCCTGGGAGCAC	eekddddddddddkke	78	263913	1993
541965	n/a	Intron 3	GCTGGGTCAGGTAGCG	eekddddddddddkke	71	266503	1994
541966	n/a	Intron 3	GGGAGGCTCTCAATCT	eekddddddddddkke	75	266861	1995
541967	n/a	Intron 3	GTAAGTGCAGAATGCC	eekddddddddddkke	87	267116	1996
541968	n/a	Intron 3	TGCCGAGGCAGGCACC	eekddddddddddkke	33	267380	1997
541969	n/a	Intron 3	TCCGTGTCTAGGAGGT	eekddddddddddkke	84	267865	1998
541970	n/a	Intron 4	GTCTCCCTGCATTGGA	eekddddddddddkke	31	268366	1999
541971	n/a	Intron 4	CCATATCACTCTCCTC	eekddddddddddkke	79	268786	2000
541972	n/a	Intron 4	CGAACACCTTGAGCCA	eekddddddddddkke	90	269252	2001
541973	n/a	Intron 4	GGCCCAGCTTAAGAGG	eekddddddddddkke	59	270038	2002
541974	n/a	Intron 4	CTGATACTCCTAATCC	eekddddddddddkke	70	270501	2003
541975	n/a	Intron 4	GCCTGTAGGGCTGTGC	eekddddddddddkke	82	270817	2004
541976	n/a	Intron 4	TGCCCTTTCTCCCTAC	eekddddddddddkke	87	271216	2005
541977	n/a	Intron 4	AGTGCATGTCAGTACC	eekddddddddddkke	75	271812	2006
541978	n/a	Intron 4	TGCTCCTCAGCTGTTG	eekddddddddddkke	44	272631	2007
541979	n/a	Intron 4	GTTTGGGACCATCCCT	eekddddddddddkke	41	272834	2008
541980	n/a	Intron 4	AGTGCTCTCTAGGGTC	eekddddddddddkke	87	273257	2009
541981	n/a	Intron 4	TACAGAGAATCACCCC	eekddddddddddkke	82	273651	2010
541982	n/a	Intron 4	GTCCAAGTAAGGTGCT	eekddddddddddkke	57	273947	2011
541983	n/a	Intron 5	GACCTTGCAGGCTTCC	eekddddddddddkke	87	274244	2012
541984	n/a	Intron 5	GGGCAAAGGATCCTCT	eekddddddddddkke	71	274758	2013
541985	n/a	Intron 5	CCCATTCTGCTATCCC	eekddddddddddkke	92	275198	2014
541986	n/a	Intron 5	GCTGACTAGGAGGGCT	eekddddddddddkke	62	275732	2015
541987	n/a	Intron 5	CCTGTGAGGTAGTACC	eekddddddddddkke	83	276309	2016
541988	n/a	Intron 5	GTCCCCCTCCAGTCTA	eekddddddddddkke	50	276932	2017
541989	n/a	Intron 5	GAGGACTCAATTCTCT	eekddddddddddkke	0	277149	2018
541990	n/a	Intron 5	GACAAGGTCCTTTTGG	eekddddddddddkke	43	277391	2019
541991	n/a	Intron 5	GCTCTTGTGTGCACCC	eekddddddddddkke	90	277730	2020
541992	n/a	Intron 5	TCACCGCCTGCACCAC	eekddddddddddkke	75	278342	2021
541993	n/a	Intron 5	GGTTGCACTGTGCAAT	eekddddddddddkke	26	278917	2022
541994	n/a	Intron 6	TTCCACAGGCCTCCAT	eekddddddddddkke	64	279303	2023
541995	n/a	Intron 6	GCTGAGTTCCATATGC	eekddddddddddkke	72	279679	2024
541996	n/a	Intron 6	GAACCGCCACCTCAGG	eekddddddddddkke	38	280157	2025
541997	n/a	Intron 6	GCTCACGGTTGGAGAC	eekddddddddddkke	42	280799	2026
541998	n/a	Intron 6	TGGGCTCCCATGTTCA	eekddddddddddkke	45	281595	2027
541999	n/a	Intron 6	TCACTCTACCAACCTC	eekddddddddddkke	33	282572	2028
542000	n/a	Intron 6	TCCTTGCTTACAGATG	eekddddddddddkke	33	283079	2029
542001	n/a	Intron 6	TGATGCTAGCATTACC	eekddddddddddkke	37	283653	2030
542002	n/a	Intron 6	TGGGTAAGTGGCTAGT	eekddddddddddkke	47	285711	2031

542003	n/a	Intron 6	AACCATTCCTCACCAA	eekddddddddddkke	53	287181	2032
542004	n/a	Intron 6	GCCCTGAACAGTTGAT	eekddddddddddkke	37	287895	2033
542005	n/a	Intron 6	GGCTCCTATCATACCT	eekddddddddddkke	38	288943	2034
542006	n/a	Intron 6	TAGGTCTCACAACCCT	eekddddddddddkke	10	289638	2035
542007	n/a	Intron 6	GTGCATTAGTCTTCCA	eekddddddddddkke	74	290035	2036
542008	n/a	Intron 7	CAAAAGCCAGGTTAGC	eekddddddddddkke	13	290503	2037
542009	n/a	Intron 7	CTGCTGTTGACTACCT	eekddddddddddkke	50	290924	2038
542010	n/a	Intron 7	GTACCTGCCAGCTACT	eekddddddddddkke	35	291807	2039
542011	n/a	Exon 8- intron 8 junction	CCTACCTTTGCTGTTT	eekddddddddddkke	12	292611	2040
542012	n/a	Intron 8	AGTCACCAGCCTAAGC	eekddddddddddkke	47	292860	2041
542013	n/a	Intron 8	AGGCAACCTGGGAGTG	eekddddddddddkke	52	293377	2042
542014	n/a	Intron 8	TGGCCTTCACAATGGC	eekddddddddddkke	33	294052	2043
542015	n/a	Intron 8	GGTGAAGTGGGTTGGA	eekddddddddddkke	27	294536	2044
542016	n/a	Intron 8	GCTGGTTGTCTGCTGC	eekddddddddddkke	60	294931	2045
542017	n/a	Intron 8	AGTTTGTGACCCCTGC	eekddddddddddkke	81	295475	2046
542018	n/a	Intron 8	CCACTCAGTGTGAATG	eekddddddddddkke	85	295955	2047
542019	n/a	Intron 8	CTGGCCTCAGGGCAAT	eekddddddddddkke	51	296186	2048
542020	n/a	Intron 8	GTAGACTTGGGTAGGT	eekddddddddddkke	53	296680	2049
542022	n/a	3'UTR	TGGTGCTAAGCTCTCC	eekddddddddddkke	67	301009	2050
542023	n/a	3'UTR	CATGCTCAAGCTGGAA	eekddddddddddkke	47	301280	2051
542024	206	Exon 2	AAGGTCAACAGCAGCT	eekddddddddddkke	93	144990	2052
542025	207	Exon 2	CAAGGTCAACAGCAGC	eekddddddddddkke	85	144991	2053
542026	208	Exon 2	CCAAGGTCAACAGCAG	eekddddddddddkke	82	144992	2054
542027	209	Exon 2	GCCAAGGTCAACAGCA	eekddddddddddkke	84	144993	2055

Table 62

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID

NOs: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
541262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	86	156891	1370
542034	870	Exon 7	TCTCACACGCACTTCA	eekddddddddddkke	49	290368	2056
542035	871	Exon 7	ATCTCACACGCACTTC	eekddddddddddkke	39	290369	2057
542036	872	Exon 7	GATCTCACACGCACTT	eekddddddddddkke	50	290370	2058
542049	n/a	Intron 1	CTTTCATGAATCAAGC	eekddddddddddkke	85	17928	2059
542050	n/a	Intron 1	TCTTTCATGAATCAAG	eekddddddddddkke	54	17929	2060
542051	n/a	Intron 1	GTCTTTCATGAATCAA	eekddddddddddkke	96	17930	2061
542052	n/a	Intron 1	GGTCTTTCATGAATCA	eekddddddddddkke	98	17931	2062

542053	n/a	Intron 1	ATGGTCTTTCATGAAT	eekddddddddddkke	94	17933	2063
542054	n/a	Intron 1	GATGGTCTTTCATGAA	eekddddddddddkke	73	17934	2064
542055	n/a	Intron 1	TGATGGTCTTTCATGA	eekddddddddddkke	83	17935	2065
542056	n/a	Intron 1	TATATCAATATTCTCC	eekddddddddddkke	75	21821	2066
542057	n/a	Intron 1	TTATATCAATATTCTC	eekddddddddddkke	23	21822	2067
542058	n/a	Intron 1	GTTATATCAATATTCT	eekddddddddddkke	87	21823	2068
542059	n/a	Intron 1	TTTCTTTAGCAATAGT	eekddddddddddkke	85	22519	2069
542060	n/a	Intron 1	CTTTCTTTAGCAATAG	eekddddddddddkke	81	22520	2070
542061	n/a	Intron 1	GCTTTCTTTAGCAATA	eekddddddddddkke	68	22521	2071
542062	n/a	Intron 1	CTCCATTAGGGTTCTG	eekddddddddddkke	91	50948	2072
542063	n/a	Intron 1	TCTCCATTAGGGTTCT	eekddddddddddkke	88	50949	2073
542064	n/a	Intron 1	TTCTCCATTAGGGTTC	eekddddddddddkke	85	50950	2074
542065	n/a	Intron 1	GTTCTCCATTAGGGTT	eekddddddddddkke	84	50951	2075
542066	n/a	Intron 1	AGGTTGGCAGACAGAC	eekddddddddddkke	92	53467	2076
542067	n/a	Intron 1	CAGGTTGGCAGACAGA	eekddddddddddkke	93	53468	2077
542068	n/a	Intron 1	GCAGGTTGGCAGACAG	eekddddddddddkke	91	53469	2078
542069	n/a	Intron 1	CTTCTTGTGAGCTGGC	eekddddddddddkke	95	64885	2079
542070	n/a	Intron 1	TCCTTCTGTGAGCTGG	eekddddddddddkke	89	64886	2080
542071	n/a	Intron 1	GTCTTCTTGTGAGCTG	eekddddddddddkke	96	64887	2081
542072	n/a	Intron 1	AGTCTTCTTGTGAGCT	eekddddddddddkke	81	64888	2082
542073	n/a	Intron 1	TCTTCCACTCACATCC	eekddddddddddkke	89	65991	2083
542074	n/a	Intron 1	CTCTTCCACTCACATC	eekddddddddddkke	79	65992	2084
542075	n/a	Intron 1	TCTCTTCCACTCACAT	eekddddddddddkke	86	65993	2085
542076	n/a	Intron 1	GTCTCTTCCACTCACA	eekddddddddddkke	92	65994	2086
542077	n/a	Intron 1	ATAGATTTTGACTTCC	eekddddddddddkke	86	72108	2087
542078	n/a	Intron 1	CATAGATTTTGACTTC	eekddddddddddkke	42	72109	2088
542079	n/a	Intron 1	GCATAGATTTTGACTT	eekddddddddddkke	66	72110	2089
542080	n/a	Intron 1	AAATGTCAACAGTGCA	eekddddddddddkke	97	80639	2090
542081	n/a	Intron 1	CATGACTATGTTCTGG	eekddddddddddkke	68	125595	2091
542082	n/a	Intron 1	ACATGACTATGTTCTG	eekddddddddddkke	66	125596	2092
542083	n/a	Intron 1	CACATGACTATGTTCT	eekddddddddddkke	74	125597	2093
542084	n/a	Intron 2	GAATTCTGAGCTCTGG	eekddddddddddkke	91	145430	2094
542085	n/a	Intron 2	TGAATTCTGAGCTCTG	eekddddddddddkke	94	145431	2095
542086	n/a	Intron 2	CTGAATTCTGAGCTCT	eekddddddddddkke	94	145432	2096
542087	n/a	Intron 2	CCTGAATTCTGAGCTC	eekddddddddddkke	93	145433	2097
542088	n/a	Intron 2	GCCTGAATTCTGAGCT	eekddddddddddkke	87	145434	2098
542089	n/a	Intron 2	AGCCTGAATTCTGAGC	eekddddddddddkke	84	145435	2099
542090	n/a	Intron 2	ATATTGTAATTCTTGG	eekddddddddddkke	47	148060	2100
542091	n/a	Intron 2	GATATTGTAATTCTTG	eekddddddddddkke	61	148061	2101
542092	n/a	Intron 2	TGATATTGTAATTCTT	eekddddddddddkke	0	148062	2102
542093	n/a	Intron 2	CTGATATTGTAATTCT	eekddddddddddkke	58	148063	2103
542094	n/a	Intron 2	CCTGATATTGTAATTC	eekddddddddddkke	95	148064	2104
542095	n/a	Intron 2	GCCTGATATTGTAATT	eekddddddddddkke	85	148065	2105

542096	n/a	Intron 2	TGCCTGATATTGTAAT	eekddddddddddkke	86	148066	2106
542097	n/a	Intron 2	ATTATGTGCTTTGCCT	eekddddddddddkke	86	148907	2107
542098	n/a	Intron 2	AATTATGTGCTTTGCC	eekddddddddddkke	75	148908	2108
542099	n/a	Intron 2	CAATTATGTGCTTTGC	eekddddddddddkke	88	148909	2109
542100	n/a	Intron 2	TCAATTATGTGCTTTG	eekddddddddddkke	78	148910	2110
542101	n/a	Intron 2	GTCAATTATGTGCTTT	eekddddddddddkke	97	148911	2111
542102	n/a	Intron 2	GCCATCACCAAACACC	eekddddddddddkke	97	150973	2112
542103	n/a	Intron 2	TGCCATCACCAAACAC	eekddddddddddkke	90	150974	2113
542104	n/a	Intron 2	TTGCCATCACCAAACA	eekddddddddddkke	89	150975	2114
542105	n/a	Intron 2	TGGTGACTCTGCCTGA	eekddddddddddkke	98	151388	2115
542106	n/a	Intron 2	CTGGTGACTCTGCCTG	eekddddddddddkke	96	151389	2116
542107	n/a	Intron 2	GCTGGTGACTCTGCCT	eekddddddddddkke	98	151390	2117
542108	n/a	Intron 2	TGCTGGTGACTCTGCC	eekddddddddddkke	97	151391	2118
542109	n/a	Intron 2	CTGCTGGTGACTCTGC	eekddddddddddkke	93	151392	2119

Table 63

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting introns 2 and 3 of SEQ ID NO: 2

ISIS NO	SEQ ID NO: 2 Start Site	SEQ ID NO: 2 Stop Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO
541262	156891	156906	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	95	1370
542110	153002	153017	Intron 2	AGTAGTCAATATTATT	eekddddddddddkke	74	2120
542111	153003	153018	Intron 2	CAGTAGTCAATATTAT	eekddddddddddkke	55	2121
542112	153004	153019	Intron 2	CCAGTAGTCAATATTA	eekddddddddddkke	97	2122
542113	153922	153937	Intron 2	CCTTTGGGTGAATAGC	eekddddddddddkke	90	2123
542114	153923	153938	Intron 2	ACCTTTGGGTGAATAG	eekddddddddddkke	71	2124
542115	153924	153939	Intron 2	CACCTTTGGGTGAATA	eekddddddddddkke	78	2125
542116	155595	155610	Intron 2	CAACTTGAGGACAATA	eekddddddddddkke	89	2126
542118	155597	155612	Intron 2	CTCAACTTGAGGACAA	eekddddddddddkke	98	2127
542119	156395	156410	Intron 2	CAGGAAGAAAGGAACC	eekddddddddddkke	95	2128
542120	156396	156411	Intron 2	CCAGGAAGAAAGGAAC	eekddddddddddkke	83	2129
542121	156397	156412	Intron 2	ACCAGGAAGAAAGGAA	eekddddddddddkke	90	2130
542122	156595	156610	Intron 2	TGCAGTCATGTACACA	eekddddddddddkke	97	2131
542123	156596	156611	Intron 2	CTGCAGTCATGTACAC	eekddddddddddkke	90	2132
542124	156597	156612	Intron 2	TCTGCAGTCATGTACA	eekddddddddddkke	81	2133
542125	156890	156905	Intron 2	TGGTTTGTCAATCCTT	eekddddddddddkke	97	2134
542126	156892	156907	Intron 2	CTTGGTTTGTCAATCC	eekddddddddddkke	99	2135
542127	157204	157219	Intron 2	GCTACAATGCACAGGA	eekddddddddddkke	98	2136
542128	157205	157220	Intron 2	TGCTACAATGCACAGG	eekddddddddddkke	98	2137
542129	158008	158023	Intron 2	GATATTTATTGCTGTA	eekddddddddddkke	61	2138

542130	158009	158024	Intron 2	TGATATTTATTGCTGT	eekdddddddddkke	41	2139
542131	158010	158025	Intron 2	CTGATATTTATTGCTG	eekdddddddddkke	86	2140
542132	162752	162767	Intron 2	AGGGTCTTTACAAAGT	eekdddddddddkke	69	2141
542133	162753	162768	Intron 2	CAGGGTCTTTACAAAG	eekdddddddddkke	71	2142
542134	162754	162769	Intron 2	CCAGGGTCTTTACAAA	eekdddddddddkke	93	2143
542135	166353	166368	Intron 2	TTCTGCAGTATCCTAG	eekdddddddddkke	84	2144
542136	166354	166369	Intron 2	TTTCTGCAGTATCCTA	eekdddddddddkke	88	2145
542137	166355	166370	Intron 2	GTTTCTGCAGTATCCT	eekdddddddddkke	95	2146
542138	166356	166371	Intron 2	AGTTTCTGCAGTATCC	eekdddddddddkke	92	2147
542139	166357	166372	Intron 2	CAGTTTCTGCAGTATC	eekdddddddddkke	93	2148
542140	172747	172762	Intron 2	CAAATTCCAGTCCTAG	eekdddddddddkke	73	2149
542141	172748	172763	Intron 2	CCAAATTCCAGTCCTA	eekdddddddddkke	91	2150
542142	172749	172764	Intron 2	TCCAAATTCCAGTCCT	eekdddddddddkke	90	2151
542143	175372	175387	Intron 2	ACCCATTTTCATCCATT	eekdddddddddkke	94	2152
542144	175373	175388	Intron 2	AACCCATTTTCATCCAT	eekdddddddddkke	93	2153
542145	175374	175389	Intron 2	GAACCCATTTTCATCCA	eekdddddddddkke	97	2154
542146	175375	175390	Intron 2	GGAACCCATTTTCATCC	eekdddddddddkke	96	2155
542147	175376	175391	Intron 2	AGGAACCCATTTTCATC	eekdddddddddkke	68	2156
542148	189120	189135	Intron 2	GCTTCATGTCTTTCTA	eekdddddddddkke	90	2157
542149	189121	189136	Intron 2	TGCTTCATGTCTTTCT	eekdddddddddkke	96	2158
542150	189122	189137	Intron 2	GTGCTTCATGTCTTTC	eekdddddddddkke	97	2159
542151	189485	189500	Intron 2	TGAGCTTAGCAGTCAC	eekdddddddddkke	92	2160
542152	189486	189501	Intron 2	ATGAGCTTAGCAGTCA	eekdddddddddkke	95	2161
542153	189487	189502	Intron 2	CATGAGCTTAGCAGTC	eekdddddddddkke	95	2162
542154	191143	191158	Intron 2	TACAGACATAGCTCTA	eekdddddddddkke	91	2163
542155	191144	191159	Intron 2	ATACAGACATAGCTCT	eekdddddddddkke	74	2164
542156	191145	191160	Intron 2	GATACAGACATAGCTC	eekdddddddddkke	91	2165
542157	191146	191161	Intron 2	GGATACAGACATAGCT	eekdddddddddkke	94	2166
542158	198149	198164	Intron 2	TGTGGCTTTAATTCAC	eekdddddddddkke	71	2167
542159	198150	198165	Intron 2	ATGTGGCTTTAATTCA	eekdddddddddkke	81	2168
542160	198151	198166	Intron 2	TATGTGGCTTTAATTC	eekdddddddddkke	78	2169
542161	199817	199832	Intron 2	TGTTTCAGTTGCATCAC	eekdddddddddkke	91	2170
542162	199818	199833	Intron 2	GTGTTTCAGTTGCATCA	eekdddddddddkke	89	2171
542163	199819	199834	Intron 2	TGTGTTTCAGTTGCATC	eekdddddddddkke	90	2172
542164	210562	210577	Intron 3	CATCTGGATGTGAGGC	eekdddddddddkke	90	2173
542165	210563	210578	Intron 3	ACATCTGGATGTGAGG	eekdddddddddkke	78	2174
542166	210564	210579	Intron 3	CACATCTGGATGTGAG	eekdddddddddkke	55	2175
542167	219020	219035	Intron 3	TCAGGTAATTTCTGGA	eekdddddddddkke	82	2176
542168	219021	219036	Intron 3	CTCAGGTAATTTCTGG	eekdddddddddkke	73	2177
542169	219022	219037	Intron 3	TCTCAGGTAATTTCTG	eekdddddddddkke	40	2178
542170	225568	225583	Intron 3	TGCTTATTTACCTGGG	eekdddddddddkke	90	2179
542171	225569	225584	Intron 3	TTGCTTATTTACCTGG	eekdddddddddkke	90	2180
542172	225570	225585	Intron 3	TTTGCTTATTTACCTG	eekdddddddddkke	79	2181

542173	225571	225586	Intron 3	TTTGCTTATTTACCT	eekddddddddddkke	32	2182
542174	229619	229634	Intron 3	ATGATGTTACTACTAC	eekddddddddddkke	63	2183
542175	229620	229635	Intron 3	AATGATGTTACTACTA	eekddddddddddkke	53	2184
542176	229621	229636	Intron 3	CAATGATGTTACTACT	eekddddddddddkke	12	2185
542177	232827	232842	Intron 3	CCCCTAGAGCAATGGT	eekddddddddddkke	76	2186
542178	232828	232843	Intron 3	CCCCCTAGAGCAATGG	eekddddddddddkke	83	2187
542179	232829	232844	Intron 3	TCCCCCTAGAGCAATG	eekddddddddddkke	49	2188
542180	237676	237691	Intron 3	TCAATTGCAGATGCTC	eekddddddddddkke	88	2189
542181	237677	237692	Intron 3	CTCAATTGCAGATGCT	eekddddddddddkke	90	2190
542182	237678	237693	Intron 3	GCTCAATTGCAGATGC	eekddddddddddkke	81	2191
542183	237679	237694	Intron 3	AGCTCAATTGCAGATG	eekddddddddddkke	85	2192
542184	248232	248247	Intron 3	GTATATTCAGTCCAAG	eekddddddddddkke	90	2193
542185	248233	248248	Intron 3	AGTATATTCAGTCCAA	eekddddddddddkke	94	2194
542186	248234	248249	Intron 3	CAGTATATTCAGTCCA	eekddddddddddkke	97	2195

Table 64

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID

NOs: 1 and 2

SIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
11262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	93	156891	1370
15316	168	exon 1- intron 1 junction	ACCTCCGAGCTTCGCC	eekddddddddddkke	80	3044	2196
15317	173	exon-exon junction	GTAGGACCTCCGAGCT	eekddddddddddkke	74	n/a	2197
15318	177	exon-exon junction	ACCTGTAGGACCTCCG	eekddddddddddkke	70	n/a	2198
545321	213	Exon 2	CAGTGCCAAGGTCAAC	eekddddddddddkke	77	144997	2199
545322	225	Exon 2	ACTTGATCCTGCCAGT	eekddddddddddkke	36	145009	2200
545332	361	Exon 4/ Intron 3	CTCGCTCAGGTGAACG	eekddddddddddkke	57	268024	2201
545333	366	Exon 4/ Intron 3	AGTCTCTCGCTCAGGT	eekddddddddddkke	88	268029	2202
545337	444	Exon 4-intron 4 junction	CCTTCTGGTATAGAAC	eekddddddddddkke	21	268107	2203
545340	570	Exon 5	GCTAGTTAGCTTGATA	eekddddddddddkke	39	274130	2204
545343	626	exon 3- exon 4 junction	TCTGGTTGCACTATTT	eekddddddddddkke	34	n/a	2205
545344	629	exon 3- exon 4 junction	GGATCTGGTTGCACTA	eekddddddddddkke	30	n/a	2206
545345	632	Exon 6	GGTGGATCTGGTTGCA	eekddddddddddkke	18	278926	2207
545346	638	Exon 6	GCAATGGGTGGATCTG	eekddddddddddkke	50	278932	2208
545347	647	Exon 6	CAGTTGAGGGCAATGG	eekddddddddddkke	71	278941	2209

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545348	651	Exon 6	AGTCCAGTTGAGGGCA	eekddddddddddkke	58	278945	2210
5349	655	Exon 6	GTAAAGTCCAGTTGAG	eekddddddddddkke	34	278949	2211
5350	660	Exon 6	GTTTCAGTAAAGTCCAG	eekddddddddddkke	52	278954	2212
5351	685	Exon 6	CTGCATGAATCCCAGT	eekddddddddddkke	77	278979	2213
5355	923	Exon 7	ACATAGAGCACCTCAC	eekddddddddddkke	38	290421	2214
5356	926	Exon 7	GTTACATAGAGCACCT	eekddddddddddkke	79	290424	2215
5357	929	Exon 7	AGTGTTACATAGAGCA	eekddddddddddkke	70	290427	2216
5362	1124	Exon 7- exon 8 junction	TCCTTGAGGAGATCTG	eekddddddddddkke	3	n/a	2217
5363	1170	Exon 10	GCTATCATGAATGGCT	eekddddddddddkke	69	297587	2218
5364	1180	Exon 10	CGGGTTTATAGCTATC	eekddddddddddkke	58	297597	2219
5369	1320	Exon 10	ATCCTTCACCCCTAGG	eekddddddddddkke	46	297737	2220
5370	1328	Exon 10	GAGTCGCCATCCTTCA	eekddddddddddkke	60	297745	2221
5371	1332	Exon 10	TCCAGAGTCGCCATCC	eekddddddddddkke	51	297749	2222
5373	1418	Exon 10	GGCTGAGCAACCTCTG	eekddddddddddkke	80	297835	2223
5374	1422	Exon 10	CTGTGGCTGAGCAACC	eekddddddddddkke	63	297839	2224
5380	1524	Exon 10	GATAACACTGGGCTGC	eekddddddddddkke	60	297941	2225
5381	1530	Exon 10	TGCTTGATAACACTG	eekddddddddddkke	76	297947	2226
5382	1533	Exon 10	CTCTGCTTGGATAACA	eekddddddddddkke	60	297950	2227
5386	1600	Exon 10	GCTGAATATGGGCAGC	eekddddddddddkke	29	298017	2228
5387	1613	Exon 10	CTTGGATTGCTTAGCT	eekddddddddddkke	59	298030	2229
5388	1645	Exon 10	CCTGGGCATAAAAGTC	eekddddddddddkke	47	298062	2230
5392	1832	Exon 10	ACCTTGATGTGAGGAG	eekddddddddddkke	44	298249	2231

Table 65

Inhibition of GHR mRNA by deoxy, MOE and cEt gapmers targeting intronic and exonic regions of SEQ ID

NOs: 1 and 2

ISIS NO	SEQ ID NO: 1 Start Site	Target Region	Sequence	Chemistry	% inhibition	SEQ ID NO: 2 Start Site	SEQ ID NO
541262	n/a	Intron 2	TTGGTTTGTCAATCCT	eekddddddddddkke	89	156891	1370
545393	1838	Exon 10	GATTCAACCTTGATGT	eekddddddddddkke	40	298255	2232
545394	1844	Exon 10	ATGTGTGATTCAACCT	eekddddddddddkke	80	298261	2233
545395	1956	Exon 10	TGGGACAGGCATCTCA	eekddddddddddkke	29	298373	2234
545396	1961	Exon 10	TAGTCTGGGACAGGCA	eekddddddddddkke	48	298378	2235
545397	1968	Exon 10	GGAGGTATAGTCTGGG	eekddddddddddkke	61	298385	2236
545398	1986	Exon 10	GGACTGTACTATATGA	eekddddddddddkke	48	298403	2237
545401	2077	Exon 10	TCAGTTGGTCTGTGCT	eekddddddddddkke	60	298494	2238
545402	2095	Exon 10	GCTAAGGCATGATTTT	eekddddddddddkke	53	298512	2239
545406	2665	Exon 10	GCCATGCTTGAAGTCT	eekddddddddddkke	87	299082	2240

545407	2668	Exon 10	ATAGCCATGCTTGAAG	eekddddddddddkke	70	299085	2241
545408	2692	Exon 10	ACACAGTGTGTAGTGT	eekddddddddddkke	60	299109	2242
545409	2699	Exon 10	CTGCAGTACACAGTGT	eekddddddddddkke	31	299116	2243
545410	2704	Exon 10	ACCAACTGCAGTACAC	eekddddddddddkke	57	299121	2244
545411	2739	Exon 10	TAGACTGTAGTTGCTA	eekddddddddddkke	53	299156	2245
545412	2747	Exon 10	ACCAGCTTTAGACTGT	eekddddddddddkke	56	299164	2246
545413	2945	Exon 10	GTAAGTTGATCTGTGC	eekddddddddddkke	79	299362	2247
545414	2963	Exon 10	TACTTCTTTTGGTGCC	eekddddddddddkke	82	299380	2248
545416	3212	Exon 10	TCTTGACCTTATTCC	eekddddddddddkke	73	299629	2249
545417	3306	Exon 10	TGGTTATAGGCTGTGA	eekddddddddddkke	90	299723	2250
545418	3309	Exon 10	GTCTGGTTATAGGCTG	eekddddddddddkke	88	299726	2251
545419	3313	Exon 10	ATGTGTCTGGTTATAG	eekddddddddddkke	68	299730	2252
545420	3317	Exon 10	GAGTATGTGTCTGGTT	eekddddddddddkke	84	299734	2253
545421	4049	Exon 10	GGTCTGCGATAAATGG	eekddddddddddkke	69	300466	2254
545429	4424	Exon 10	GCCAGACACAACTAGT	eekddddddddddkke	59	300841	2255
545430	31	Exon 1	ACCGCCACTGTAGCAG	eekddddddddddkke	76	2907	2256
545431	36	Exon 1	CCGCCACCGCCACTGT	eekddddddddddkke	94	2912	2257
545432	103	Exon 1	GGGCCTCCGGCCCGCG	eekddddddddddkke	22	2979	2258
545433	143	Exon 1	AGAGCGCGGGTTCGCG	eekddddddddddkke	61	3019	2259
545434	n/a	Intron 1/Exon 1	TACTGACCCCAGTTCC	eekddddddddddkke	68	3654	2260
545435	n/a	Intron 1/Exon 1	ACTCTACTGACCCCAG	eekddddddddddkke	70	3658	2261
545436	n/a	Intron 1/Exon 1	GTCACTCTACTGACCC	eekddddddddddkke	83	3661	2262
545437	n/a	Intron 1/Exon 1	TTCATGCGGACTGGTG	eekddddddddddkke	68	3680	2263
545438	n/a	Intron 3/Exon 3	GTGAGCATGGACCCCA	eekddddddddddkke	94	225436	2264
545439	n/a	Intron 3/Exon 3	TGATATGTGAGCATGG	eekddddddddddkke	88	225442	2265
545440	n/a	Intron 3/Exon 3	AAGTTGGTGAGCTTCT	eekddddddddddkke	85	226785	2266
545441	n/a	Intron 3/Exon 3	CCTTCAAGTTGGTGAG	eekddddddddddkke	88	226790	2267
545442	n/a	Intron 3/Exon 3	GTAAGATCCTTTTGCC	eekddddddddddkke	70	226883	2268
545443	n/a	Intron 3/Exon 3	CAGCTGTGCAACTTGC	eekddddddddddkke	50	238345	2269
545444	n/a	Intron 3/Exon 3	GCCTTGGTAGGTAGGG	eekddddddddddkke	68	238422	2270
545445	n/a	Intron 3/Exon 3	AGAGCCTTGGTAGGTA	eekddddddddddkke	85	238425	2271
545446	n/a	Intron 1/Exon 1	CCCGCACAAACGCGCA	eekddddddddddkke	10	3614	2272
545447	n/a	Intron 1/Exon 1	GTCTTCAAGGTCAGTT	eekddddddddddkke	92	93208	2273

545448	n/a	Intron 1/Exon 1	GCCCAGTGAATTCAGC	eekddddddddddkke	76	93246	2274
545449	n/a	Intron 1/Exon 1	AGATGCGCCCAGTGAA	eekddddddddddkke	60	93252	2275
545450	n/a	Intron 1/Exon 1	GTAAGATGCGCCCAGT	eekddddddddddkke	78	93255	2276
545451	n/a	Intron 1/Exon 1	CCAGAAGGCACTTGTA	eekddddddddddkke	42	93301	2277
545452	n/a	Intron 1/Exon 1	GGAAGATTTGCAGAAC	eekddddddddddkke	15	93340	2278
545453	n/a	Intron 1/Exon 1	CCTTGGTCATGGAAGA	eekddddddddddkke	35	93350	2279
545454	n/a	Intron 1/Exon 1	TGACCTTGGTCATGGA	eekddddddddddkke	55	93353	2280
545455	n/a	Intron 1/Exon 1	GAGGTGACCTTGGTCA	eekddddddddddkke	70	93357	2281
545456	n/a	Intron 1/Exon 1	ATCCAAAGAGGTGACC	eekddddddddddkke	41	93364	2282
545457	n/a	Intron 1/Exon 1	GCCAATCCAAAGAGGT	eekddddddddddkke	56	93368	2283
545458	n/a	Intron 1/Exon 1	GGTCTGCCAATCCAAA	eekddddddddddkke	79	93373	2284
545459	n/a	Intron 1/Exon 1	CCCTGGGTCTGCCAAT	eekddddddddddkke	68	93378	2285
545460	n/a	Intron 1/Exon 1	GAGATCTCAACAAGGG	eekddddddddddkke	52	93427	2286
545461	n/a	Intron 1/Exon 1	CGCCCATCACTCTTCC	eekddddddddddkke	68	93988	2287
545462	n/a	Intron 1/Exon 1	CACCTGTCGCCCATCA	eekddddddddddkke	67	93995	2288
545463	n/a	Intron 1/Exon 1	CATCACCTGTCGCCCA	eekddddddddddkke	78	93998	2289
545464	n/a	Intron 1/Exon 1	CACCATCACCTGTCGC	eekddddddddddkke	74	94001	2290
545465	n/a	Intron 1/Exon 1	AATAGTTGTCACCATC	eekddddddddddkke	76	94010	2291
545466	n/a	Intron 1/Exon 1	GCCACCTTTCATGAGA	eekddddddddddkke	58	94048	2292
545467	n/a	Intron 2/Exon 2	CTCTTGGAAGTAGGTA	eekddddddddddkke	89	198762	2293
545468	n/a	Intron 2/Exon 2	GTTCTCTTGGAAGTAG	eekddddddddddkke	80	198765	2294
545469	n/a	Intron 2/Exon 2	TAAACAGGTTGGTCTG	eekddddddddddkke	68	198854	2295

Example 8: Dose-dependent antisense inhibition of human GHR in Hep3B cells by deoxy, MOE and cEt gapmers

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in Hep3B cells. The antisense oligonucleotides were tested in a series of

experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.625 μ M, 1.25 μ M, 2.50 μ M, 5.00 μ M and 10.00 μ M concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 66

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
541396	30	51	68	74	67	1.4
541262	55	87	90	94	97	0.2
541393	30	38	52	66	81	2.1
541375	41	45	54	64	79	1.6
541438	44	49	75	80	91	0.9
541428	35	32	56	78	88	1.8
541491	13	46	67	55	95	2.0
541435	21	46	55	72	94	1.9
541471	11	49	50	77	89	2.0
541430	24	44	56	57	79	2.2
541492	32	40	65	80	85	1.5
541431	22	46	73	84	92	1.5

Table 67

ISIS No	0.625 μ M	1.250 μ M	2.50 μ M	5.00 μ M	10.00 μ M	IC ₅₀ (μ M)
541487	36	46	66	85	92	1.3
541423	33	55	64	80	93	1.2
541452	37	60	79	87	94	0.9
541505	51	75	86	92	97	0.4
541522	54	76	81	90	95	0.3
541539	65	76	85	94	98	0.2
541503	54	65	80	93	97	0.5

541520	43	61	86	94	96	0.7
541515	57	72	85	92	94	0.3
541564	57	72	88	90	97	0.3
541554	43	65	81	89	93	0.7
541509	11	8	19	6	8	>10
541584	59	65	84	91	96	0.3
541585	70	80	93	92	98	0.1

Table 68

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
541598	26	43	75	80	76	1.5
541592	35	48	67	85	95	1.2
541641	22	63	70	91	93	1.2
541590	27	59	70	94	95	1.2
541615	40	65	84	88	94	0.7
541595	35	57	73	84	95	1.0
541575	49	60	79	84	95	0.6
541571	41	50	76	80	94	1.0
541582	0	10	25	50	82	4.4
541262	66	79	93	94	99	<0.6
541652	1	44	80	82	87	1.9
541670	29	40	63	79	89	1.6
541662	17	13	45	62	84	3.1
541724	37	47	72	85	95	1.2

Table 69

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
541748	86	94	96	98	98	<0.6
541767	83	91	95	96	98	<0.6
541797	78	89	93	97	99	<0.6
541766	59	82	92	97	99	<0.6
541742	65	87	93	95	99	<0.6
541750	80	86	96	96	99	<0.6
541262	79	88	93	97	97	<0.6
541749	71	84	93	95	98	<0.6
541793	71	88	94	97	98	<0.6
541785	56	79	89	93	98	<0.6
541746	34	61	85	94	97	0.9

541752	49	72	88	93	93	<0.6
541826	86	94	95	99	98	<0.6
541811	66	87	93	97	98	<0.6

Table 70

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
541822	83	88	95	96	96	<0.6
541870	77	87	95	97	98	<0.6
541262	85	93	96	97	98	<0.6
541873	32	77	93	94	97	0.7
541819	60	91	97	97	99	<0.6
541841	86	91	95	96	97	<0.6
541825	78	88	95	98	98	<0.6
541863	63	77	87	93	97	<0.6
541827	42	80	87	94	97	<0.6
541875	77	84	93	96	97	<0.6
541835	56	73	90	95	98	<0.6
541838	72	90	93	98	97	<0.6
541833	52	69	83	92	97	<0.6
541813	47	75	86	95	97	<0.6

Table 71

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
541853	74	79	88	93	91	<0.6
541842	69	85	91	97	99	<0.6
541877	79	91	93	98	97	<0.6
541848	58	90	96	98	98	0.7
541804	23	81	89	95	95	0.8
541881	87	94	98	98	99	<0.6
541936	91	96	98	99	98	<0.6
541909	56	80	89	95	97	<0.6
541907	75	91	95	97	98	<0.6
541952	68	81	93	97	98	<0.6
541953	68	80	94	97	98	<0.6
541914	60	78	94	97	97	<0.6
541880	56	74	89	94	95	<0.6
541903	37	74	87	96	98	0.6

Table 72

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
541895	47	72	85	93	94	<0.6
541882	60	67	89	93	97	<0.6
541889	63	80	87	94	97	<0.6
541904	26	78	23	89	93	1.4
545418	0	81	91	94	95	1.7
541930	58	71	82	88	92	<0.6
545439	67	87	93	96	98	<0.6
542024	15	58	78	87	90	1.4
541985	59	81	88	93	97	<0.6
541972	47	58	83	90	92	0.6
541991	57	64	88	92	83	<0.6
541980	33	50	76	72	93	1.2

Table 73

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
541264	26	44	64	79	89	1.6
541265	29	32	62	79	91	1.8
541263	25	40	62	78	93	1.7
541268	57	73	85	90	95	0.3
541266	15	33	46	66	90	2.5
542107	93	97	98	98	98	<0.6
542052	93	96	97	96	98	<0.6
542105	80	92	96	98	97	<0.6
542102	94	96	96	97	98	<0.6
542108	90	92	94	97	99	<0.6
542080	87	93	95	95	97	<0.6

Table 74

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
542101	90	97	97	97	95	<0.6
542051	89	96	95	98	97	<0.6
542106	83	93	96	96	98	<0.6
542071	84	91	94	97	97	<0.6
542094	85	92	94	97	98	<0.6
542069	89	94	97	95	98	<0.6

542086	83	94	96	97	98	<0.6
542085	85	92	96	97	97	<0.6
542053	64	83	94	98	97	<0.6
542087	69	84	99	95	98	<0.6
542109	87	94	96	98	98	<0.6
542126	96	98	99	98	98	<0.6
542127	94	96	97	98	97	<0.6
542128	90	96	98	98	97	<0.6

Table 75

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
542118	97	97	98	95	43	<0.6
542186	93	96	98	99	98	<0.6
542150	95	97	98	99	99	<0.6
542122	90	94	98	98	99	<0.6
542125	88	97	98	98	99	<0.6
542145	90	96	98	99	99	<0.6
542112	86	94	99	99	99	<0.6
542149	88	93	99	98	99	<0.6
542146	79	93	96	97	98	<0.6
542153	87	94	97	98	99	<0.6
542119	64	84	93	97	98	<0.6
542137	76	91	97	97	98	<0.6
542152	84	94	96	96	97	<0.6
542157	83	95	98	99	98	<0.6

Table 76

ISIS No	0.625 μM	1.250 μM	2.50 μM	5.00 μM	10.00 μM	IC ₅₀ (μM)
542185	82	93	96	96	94	<0.6
542143	81	91	96	98	98	<0.6
542144	77	93	95	96	99	<0.6
542139	87	93	98	98	98	<0.6
542134	83	90	90	95	96	<0.6
545333	68	85	91	96	98	<0.6
545373	57	73	86	92	97	<0.6
545438	84	96	98	97	99	<0.6
545431	77	91	93	97	98	<0.6
545447	70	85	96	96	97	<0.6
545417	62	82	90	93	95	<0.6
545467	77	88	91	94	95	<0.6

545441	63	82	92	94	96	<0.6
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Example 9: Dose-dependent antisense inhibition of human GHR in Hep3B cells by deoxy, MOE and cEt gapmers

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in Hep3B cells. The antisense oligonucleotides were tested in a series of experiments that had similar culture conditions. The results for each experiment are presented in separate tables shown below. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.04 μ M, 0.11 μ M, 0.33 μ M, 1.00 μ M, and 3.00 μ M concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 77

ISIS No	0.04 μ M	0.11 μ M	0.33 μ M	1.00 μ M	3.00 μ M	IC ₅₀ (μ M)
539380	11	16	57	93	98	0.2
541724	0	27	71	66	83	0.3
541748	28	40	71	90	97	0.1
541767	19	38	54	87	98	0.2
541797	23	46	70	88	97	0.1
541766	15	26	49	82	96	0.3
541742	17	28	41	80	95	0.3
541750	33	27	60	89	98	0.2
541749	27	16	62	84	82	0.2
541793	0	14	44	77	96	0.4
541785	4	11	39	75	95	0.4
541752	14	6	45	70	94	0.4
541826	8	34	74	94	99	0.2
541811	6	4	45	79	97	0.4
541822	9	29	67	89	97	0.2

Table 78

ISIS No	0.04 μM	0.11 μM	0.33 μM	1.00 μM	3.00 μM	IC ₅₀ (μM)
539380	0	16	47	82	98	0.4
541819	3	12	50	76	94	0.3
541841	0	19	47	80	95	0.3
541825	0	6	40	74	96	0.4
541827	5	26	48	76	95	0.3
541835	7	11	33	74	93	0.4
541838	21	26	61	90	97	0.2
541833	0	9	41	63	89	0.5
541813	0	17	28	65	92	0.5
541842	5	15	30	72	90	0.4
541804	0	12	3	49	79	1.1
542024	0	0	26	54	76	1.0
542107	15	45	78	92	99	0.1
542105	2	14	55	88	98	0.3
542102	10	16	73	88	98	0.2

Table 79

ISIS No	0.04 μM	0.11 μM	0.33 μM	1.00 μM	3.00 μM	IC ₅₀ (μM)
539380	4	18	50	86	95	0.3
542108	15	13	65	86	97	0.2
542101	17	40	68	92	98	0.2
542106	4	23	56	88	98	0.3
542094	0	30	51	86	96	0.3
542086	13	38	50	84	97	0.2
542085	0	27	57	90	98	0.3
542087	7	3	49	80	92	0.4
542109	17	10	56	88	98	0.3
542126	40	63	91	96	99	<0.03
542127	27	47	69	93	97	0.1
542128	11	30	66	90	98	0.2
542118	14	42	77	95	98	0.1
542150	31	46	72	94	98	0.1
542122	13	14	59	90	97	0.3

Table 80

ISIS No	0.04 μM	0.11 μM	0.33 μM	1.00 μM	3.00 μM	IC ₅₀ (μM)
539380	0	2	50	86	97	0.4

542125	31	32	69	89	96	0.1
542145	15	29	64	91	97	0.2
542112	14	38	61	87	96	0.2
542149	9	37	63	90	97	0.2
542146	13	33	59	82	95	0.2
542153	22	26	63	86	96	0.2
542119	10	20	34	70	87	0.4
542137	3	19	47	77	95	0.3
542152	0	9	47	82	96	0.4
542157	0	26	56	84	96	0.3
542143	8	12	44	81	95	0.3
542144	0	21	42	75	95	0.4
542139	0	14	46	82	97	0.4
542134	3	23	43	72	92	0.4

Table 81

ISIS No	0.04 μM	0.11 μM	0.33 μM	1.00 μM	3.00 μM	IC ₅₀ (μM)
539380	0	9	64	85	97	0.3
541870	7	15	48	80	92	0.3
541262	0	29	63	90	98	0.2
541863	0	26	40	82	93	0.4
541875	6	30	71	84	91	0.2
541853	0	13	39	67	91	0.5
541877	0	26	41	79	94	0.4
541881	0	30	54	87	94	0.3
541936	20	41	73	93	98	0.1
541909	0	16	34	64	90	0.5
541907	6	31	59	84	96	0.2
541952	0	0	50	72	92	0.5
541953	0	22	50	80	92	0.4
541914	0	0	46	76	93	0.4
541880	0	13	48	79	89	0.4

Table 82

ISIS No	0.04 μM	0.11 μM	0.33 μM	1.00 μM	3.00 μM	IC ₅₀ (μM)
539380	0	5	53	78	94	0.4
541903	12	20	26	62	88	0.5
541895	3	12	29	66	92	0.5
541882	2	0	27	65	86	0.7
541889	12	12	47	68	87	0.4

541930	0	6	40	59	85	0.6
541985	0	16	41	66	93	0.4
542031	1	0	22	55	80	0.8
541972	0	1	23	46	83	0.9
541991	4	35	42	67	89	0.4
542052	5	28	70	92	98	0.2
542080	0	18	54	87	96	0.3
542051	0	18	52	86	97	0.3
542071	5	3	51	74	95	0.4
542069	0	7	56	85	94	0.3

Table 83

ISIS No	0.04 μM	0.11 μM	0.33 μM	1.00 μM	3.00 μM	IC ₅₀ (μM)
539380	11	20	54	89	92	0.3
542053	6	14	38	69	74	0.6
542186	14	43	70	90	98	0.2
542185	0	26	48	80	96	0.3
545333	0	4	27	65	90	0.6
545336	0	15	24	43	79	0.9
545373	0	2	9	42	86	1.0
545438	0	24	56	81	92	0.3
545431	0	18	50	73	91	0.4
545447	0	15	34	78	93	0.4
545417	0	11	39	66	87	0.5
545467	12	16	37	76	93	0.4
545441	21	15	20	60	87	0.6
545439	17	24	49	82	91	0.3

Example 10: Dose-dependent antisense inhibition of rhesus monkey GHR in LLC-MK2 cells

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested for their potency for rhesus GHR mRNA in LLC-MK2 cells. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.12 μM, 0.37 μM, 1.11 μM, 3.33 μM, and 10.00 μM concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 84

ISIS No	Chemistry	0.12 μ M	0.37 μ M	1.11 μ M	3.33 μ M	10.00 μ M	IC ₅₀ (μ M)
541262	Deoxy, MOE and cEt	9	25	42	85	91	1.1
541742	Deoxy, MOE and cEt	0	24	19	58	77	3.2
541767	Deoxy, MOE and cEt	6	10	30	68	88	2.0
541875	Deoxy, MOE and cEt	7	19	64	84	96	0.9
541881	Deoxy, MOE and cEt	6	24	59	79	91	1.0
542101	Deoxy, MOE and cEt	0	5	38	71	81	2.0
542112	Deoxy, MOE and cEt	5	17	33	67	76	2.0
542118	Deoxy, MOE and cEt	1	6	35	68	86	2.0
542125	Deoxy, MOE and cEt	0	12	57	83	93	1.0
542127	Deoxy, MOE and cEt	1	0	30	68	84	2.4
542128	Deoxy, MOE and cEt	12	0	26	58	83	2.7
542153	Deoxy, MOE and cEt	4	0	0	36	59	6.6
542185	Deoxy, MOE and cEt	4	0	25	56	87	2.5
542186	Deoxy, MOE and cEt	15	23	51	73	90	1.1
542051	Deoxy, MOE and cEt	5	19	40	81	94	1.2

5

Table 85

ISIS No	Chemistry	0.12 μ M	0.37 μ M	1.11 μ M	3.33 μ M	10.00 μ M	IC ₅₀ (μ M)
523723	5-10-5 MOE	23	14	31	43	71	3.5
532254	5-10-5 MOE	29	35	42	69	87	0.8
532401	5-10-5 MOE	27	28	46	73	88	1.2
533932	5-10-5 MOE	10	24	48	70	92	1.2
539376	3-10-4 MOE	21	8	8	35	81	4.3
539399	3-10-4 MOE	2	10	14	18	57	8.3

539404	3-10-4 MOE	39	12	25	27	57	7.7
539416	3-10-4 MOE	24	35	44	79	89	1.0
539432	3-10-4 MOE	9	29	42	73	89	1.2
541262	Deoxy, MOE and cEt	0	43	63	88	94	0.8
541742	Deoxy, MOE and cEt	3	19	35	56	85	1.9
541767	Deoxy, MOE and cEt	3	24	39	64	86	1.6
545439	Deoxy, MOE and cEt	19	15	43	74	80	1.7
545447	Deoxy, MOE and cEt	25	34	58	80	90	0.6

Example 11: Dose-dependent antisense inhibition of GHR in cynomolgus primary hepatocytes

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested for their potency for GHR mRNA in cynomolgus monkey primary hepatocytes. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.12 μ M, 0.37 μ M, 1.11 μ M, 3.33 μ M, and 10.00 μ M concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 86

ISIS No	Chemistry	0.12 μ M	0.37 μ M	1.11 μ M	3.33 μ M	10.00 μ M	IC ₅₀ (μ M)
541262	Deoxy, MOE and cEt	40	52	75	92	98	0.3
541742	Deoxy, MOE and cEt	40	57	51	91	96	0.2
541767	Deoxy, MOE and cEt	36	59	60	78	91	0.4
541875	Deoxy, MOE and cEt	54	76	88	95	95	<0.1
541881	Deoxy, MOE and cEt	53	75	85	98	98	<0.1
542101	Deoxy, MOE and cEt	38	55	78	89	97	0.2
542112	Deoxy, MOE	28	50	74	89	96	0.4

	and cEt						
542118	Deoxy, MOE and cEt	20	45	69	84	91	0.5
542125	Deoxy, MOE and cEt	33	62	77	92	97	0.3
542127	Deoxy, MOE and cEt	30	50	65	86	92	0.4
542128	Deoxy, MOE and cEt	25	40	52	80	93	0.7
542153	Deoxy, MOE and cEt	10	31	51	73	85	1.0
542185	Deoxy, MOE and cEt	12	45	65	85	93	0.6
542186	Deoxy, MOE and cEt	36	54	74	90	96	0.3
542051	Deoxy, MOE and cEt	9	29	32	32	42	>10

Table 87

ISIS No	Chemistry	0.12 μM	0.37 μM	1.11 μM	3.33 μM	10.00 μM	IC ₅₀ (μM)
523435	5-10-5 MOE	35	47	61	74	85	0.5
523723	5-10-5 MOE	4	16	40	66	86	1.8
532254	5-10-5 MOE	14	15	24	16	9	>10
532401	5-10-5 MOE	37	54	73	88	94	0.3
533932	5-10-5 MOE	23	40	69	78	86	0.6
539376	3-10-4 MOE	3	0	44	65	91	2.0
539399	3-10-4 MOE	0	0	9	42	67	5.0
539404	3-10-4 MOE	0	0	26	52	71	3.5
539416	3-10-4 MOE	8	29	62	89	93	0.7
539432	3-10-4 MOE	0	24	55	85	93	0.9
541262	Deoxy, MOE and cEt	23	52	73	92	96	0.4
541742	Deoxy, MOE and cEt	15	51	73	86	97	0.5
541767	Deoxy, MOE and cEt	19	20	39	68	81	1.8

545439	Deoxy, MOE and cEt	0	0	30	61	90	2.4
545447	Deoxy, MOE and cEt	0	17	17	19	27	>10

Example 12: Dose-dependent antisense inhibition of GHR in Hep3B cells

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested for their potency for GHR mRNA at various doses in Hep3B cells. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.12 μ M, 0.37 μ M, 1.11 μ M, 3.33 μ M, and 10.00 μ M concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 88

ISIS No	0.12 μ M	0.37 μ M	1.11 μ M	3.33 μ M	10.00 μ M	IC ₅₀ (μ M)
541262	25	43	76	85	94	0.5
541742	32	55	76	88	97	0.3
541767	29	56	83	89	97	0.3
541875	38	68	84	93	94	0.1
541881	32	57	81	94	97	0.3
542051	34	66	83	95	98	0.2
542101	25	55	85	95	98	0.3
542112	18	56	83	95	98	0.4
542118	42	61	88	95	97	0.1
542125	30	63	87	95	98	0.2
542127	50	70	91	91	98	0.1
542128	38	63	88	96	98	0.2
542153	37	59	85	94	97	0.2
542185	44	51	76	89	96	0.2
542186	46	59	84	95	97	0.1

Table 89

ISIS No	0.12 μM	0.37 μM	1.11 μM	3.33 μM	10.00 μM	IC ₅₀ (μM)
523435	9	26	49	78	93	1.0
523723	7	16	39	72	90	1.4
532254	36	46	69	86	94	0.4
532401	25	54	71	86	91	0.4
533932	8	47	69	80	94	0.7
539376	26	31	54	73	86	0.8
539399	23	43	72	89	94	0.5
539404	30	60	88	95	98	0.2
539416	30	59	84	93	98	0.3
539432	35	62	88	95	98	0.2
541262	43	60	84	89	98	0.2
541742	23	53	73	84	97	0.4
541767	22	49	74	85	92	0.4
545439	41	69	88	95	96	0.1
545447	31	47	63	74	82	0.5

Example 13: Dose-dependent antisense inhibition of GHR in cynomolgus primary hepatocytes

Gapmers from studies described above exhibiting significant *in vitro* inhibition of GHR mRNA were selected and tested at various doses in cynomolgous monkey primary hepatocytes. Cells were plated at a density of 35,000 cells per well and transfected using electroporation with 0.04 μM, 0.12 μM, 0.37 μM, 1.11 μM, 3.33 μM, and 10.00 μM concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. GHR mRNA levels were significantly reduced in a dose-dependent manner in antisense oligonucleotide treated cells.

Table 90

ISIS No	0.04 μM	0.12 μM	0.37 μM	1.11 μM	3.33 μM	10.00 μM	IC ₅₀ (μM)
541767	8	17	29	48	59	58	0.4

541875	20	39	48	51	55	58	0.2
541881	23	36	49	60	56	58	0.1
542112	23	21	35	42	54	68	0.5
542118	19	14	26	38	54	59	0.8
542153	17	20	27	39	46	52	2.2
542185	20	23	27	46	39	56	2.0
532254	1	20	23	11	1	23	>10
532401	0	15	24	39	47	55	1.6
523723	0	0	7	24	49	54	2.0

Example 14: Comparative analysis of dose-dependent antisense inhibition of GHR in Hep3B cells

ISIS 532401 was compared with specific antisense oligonucleotides disclosed in US 2006/0178325 by testing at various doses in Hep3B cells. The oligonucleotides were selected based on the potency demonstrated in studies described in the application. Cells were plated at a density of 20,000 cells per well and transfected using electroporation with 0.11 μ M, 0.33 μ M, 1.00 μ M, 1.11 μ M, 3.00 μ M, and 9.00 μ M concentrations of antisense oligonucleotide. After a treatment period of approximately 16 hours, RNA was isolated from the cells and GHR mRNA levels were measured by quantitative real-time PCR. Human primer probe set RTS3437_MGB was used to measure mRNA levels. GHR mRNA levels were adjusted according to total RNA content, as measured by RIBOGREEN[®]. Results are presented as percent inhibition of GHR, relative to untreated control cells.

The half maximal inhibitory concentration (IC₅₀) of each oligonucleotide is also presented. The results indicate that ISIS 532401 was markedly more potent than the most potent oligonucleotides of US 2006/0178325.

Table 91

ISIS No	0.11 μ M	0.33 μ M	1.00 μ M	3.00 μ M	9.00 μ M	IC ₅₀ (μ M)
227452	11	12	46	73	92	1.4
227488	26	25	39	76	88	1.2
272309	16	14	39	66	91	1.6
272322	13	20	44	70	86	1.4
272328	22	20	24	43	56	5.7
272338	22	24	52	71	85	1.1
532401	34	53	72	87	94	0.3

Example 15: Tolerability of 5-10-5 MOE gapmers targeting human GHR in CD1 mice

CD1® mice (Charles River, MA) are a multipurpose mice model, frequently utilized for safety and efficacy testing. The mice were treated with ISIS antisense oligonucleotides selected from studies described above and evaluated for changes in the levels of various plasma chemistry markers.

5 *Treatment*

Groups of eight- to ten-week old male CD1 mice were injected subcutaneously twice a week for 6 weeks with 50 mg/kg of ISIS oligonucleotides (100 mg/kg/week dose). One group of male CD1 mice was injected subcutaneously twice a week for 6 weeks with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

10 *Plasma chemistry markers*

To evaluate the effect of ISIS oligonucleotides on liver and kidney function, plasma levels of transaminases, bilirubin, creatinine, and BUN were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). The results are presented in Table 92. ISIS oligonucleotides that caused changes in the levels of any of the liver or kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 92

Plasma chemistry markers in CD1 mice plasma at week 6

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)	Creatinine (mg/dL)	BUN (mg/dL)
PBS	31	50	0.28	0.15	28
ISIS 523271	366	285	0.18	0.11	29
ISIS 523324	222	139	0.19	0.10	31
ISIS 523604	2106	1157	0.41	0.06	48
ISIS 532254	66	84	0.11	0.10	27
ISIS 533121	176	155	0.19	0.09	27
ISIS 533161	1094	904	0.23	0.07	29
ISIS 533178	78	83	0.18	0.08	28
ISIS 533234	164	147	0.21	0.09	26

Hematology assays

20 Blood obtained from all mice groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and platelets, and total hemoglobin content. The results are presented in Table 93. ISIS oligonucleotides that

caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 93

Hematology markers in CD1 mice plasma at week 6

	HCT (%)	Hemoglobin (g/dL)	RBC ($10^6/\mu\text{L}$)	WBC ($10^3/\mu\text{L}$)	Platelets ($10^3/\mu\text{L}$)
PBS	45	13	8.2	4.1	689
ISIS 523271	42	12	7.9	4.5	1181
ISIS 523324	39	11	7.5	7.9	980
ISIS 523604	33	10	6.9	14.1	507
ISIS 532254	35	10	6.9	7.2	861
ISIS 533121	39	12	7.9	8.4	853
ISIS 533161	49	14	9.3	9.0	607
ISIS 533178	44	13	8.5	6.9	765
ISIS 533234	42	12	7.8	9.2	1045

5

Example 16: Tolerability of 5-10-5 MOE gapmers targeting human GHR in CD1 mice

CD1® mice were treated with ISIS antisense oligonucleotides selected from studies described above and evaluated for changes in the levels of various plasma chemistry markers.

Treatment

10 Groups of eight- to ten-week old male CD1 mice were injected subcutaneously twice a week for 6 weeks with 50 mg/kg of ISIS oligonucleotide (100 mg/kg/week dose). One group of male CD1 mice was injected subcutaneously twice a week for 6 weeks with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

Plasma chemistry markers

15 To evaluate the effect of ISIS oligonucleotides on liver and kidney function, plasma levels of transaminases, bilirubin, creatinine, and BUN were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). The results are presented in Table 94. ISIS oligonucleotides that caused changes in the levels of any of the liver or kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 94

Plasma chemistry markers in CD1 mice plasma at week 6

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)	Creatinine (mg/dL)	BUN (mg/dL)
PBS	30	59	0.26	0.14	20
ISIS 523715	636	505	0.24	0.14	22
ISIS 523723	57	80	0.20	0.16	23
ISIS 523726	165	167	0.18	0.15	23
ISIS 523736	140	177	0.20	0.15	23
ISIS 523747	96	108	0.17	0.14	23
ISIS 523789	45	74	0.20	0.15	22
ISIS 532395	64	111	0.23	0.12	21
ISIS 532401	47	88	0.21	0.17	22
ISIS 532411	225	426	0.17	0.16	22
ISIS 532420	60	99	0.21	0.12	25
ISIS 532468	319	273	0.15	0.14	21
ISIS 533932	62	81	0.18	0.14	21

Hematology assays

5 Blood obtained from all mice groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WB), RBC, and platelets, and total hemoglobin content. The results are presented in Table 95. ISIS oligonucleotides that caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

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Table 95

Hematology markers in CD1 mice plasma at week 6

	HCT (%)	Hemoglobin (g/dL)	RBC (10 ⁶ /μL)	WBC (10 ³ /μL)	Platelets (10 ³ /μL)
PBS	43	13	8.1	3.3	1047
ISIS 523715	40	12	8.1	4.2	1153
ISIS 523723	35	11	6.8	2.9	1154
ISIS 523726	32	10	6.8	5.8	1056
ISIS 523736	35	11	7.1	3.6	1019
ISIS 523747	37	11	7.7	2.8	1146
ISIS 523789	37	11	7.3	2.5	1033
ISIS 532395	37	11	7.4	4.5	890
ISIS 532401	36	11	7.1	3.7	1175
ISIS 532411	27	8	5.3	3.2	641

ISIS 532420	35	11	7.0	3.3	1101
ISIS 532468	36	11	7.4	4.0	1043
ISIS 533932	36	11	7.2	3.8	981

Example 17: Tolerability of 3-10-4 MOE gapmers targeting human GHR in CD1 mice

CD1® mice were treated with ISIS antisense oligonucleotides selected from studies described above and evaluated for changes in the levels of various plasma chemistry markers.

5 Treatment

Groups of eight- to ten-week old male CD1 mice were injected subcutaneously twice a week for 6 weeks with 50 mg/kg of ISIS oligonucleotide (100 mg/kg/week dose). One group of male CD1 mice was injected subcutaneously twice a week for 6 weeks with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

10 Plasma chemistry markers

To evaluate the effect of ISIS oligonucleotides on liver and kidney function, plasma levels of transaminases, bilirubin, creatinine, and BUN were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). The results are presented in Table 96. ISIS oligonucleotides that caused changes in the levels of any of the liver or kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

15

Table 96

Plasma chemistry markers in CD1 mice plasma at week 6

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)	Creatinine (mg/dL)	BUN (mg/dL)
PBS	48	63	0.20	0.13	28
ISIS 539302	204	192	0.15	0.15	24
ISIS 539321	726	455	0.17	0.12	27
ISIS 539360	3287	2495	0.58	0.13	22
ISIS 539361	310	226	0.17	0.11	21
ISIS 539376	77	75	0.14	0.12	27
ISIS 539379	134	136	0.16	0.13	24
ISIS 539380	180	188	0.14	0.12	23
ISIS 539383	80	81	0.15	0.12	25
ISIS 539399	119	127	0.13	0.12	24
ISIS 539401	1435	1172	0.24	0.11	24
ISIS 539403	1543	883	0.18	0.12	26
ISIS 539404	75	109	0.16	0.13	23

ISIS 539416	100	107	0.19	0.15	26
ISIS 539432	55	64	0.20	0.14	22
ISIS 539433	86	91	0.12	0.13	22

Hematology assays

Blood obtained from all mice groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and platelets, and total hemoglobin content. The results are presented in Table 97. ISIS oligonucleotides that caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 97

Hematology markers in CD1 mice plasma at week 6

	HCT (%)	Hemoglobin (g/dL)	RBC ($10^6/\mu\text{L}$)	WBC ($10^3/\mu\text{L}$)	Platelets ($10^3/\mu\text{L}$)
PBS	46	13	8.5	6	954
ISIS 539302	40	11	8.1	13	830
ISIS 539321	39	11	7.8	16	723
ISIS 539360	49	14	9.0	14	671
ISIS 539361	45	13	8.5	9	893
ISIS 539376	42	12	7.7	6	988
ISIS 539379	42	12	8.1	7	795
ISIS 539380	38	10	7.7	8	950
ISIS 539383	45	12	8.4	8	795
ISIS 539399	41	12	8.0	10	895
ISIS 539401	41	11	8.2	9	897
ISIS 539403	33	9	6.2	13	1104
ISIS 539404	42	12	8.4	7	641
ISIS 539416	41	11	7.5	5	686
ISIS 539432	44	12	8.0	6	920
ISIS 539433	40	11	7.4	6	987

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Example 18: Tolerability of deoxy, MOE and cEt gapmers targeting human GHR in CD1 mice

CD1® mice were treated with ISIS antisense oligonucleotides selected from studies described above and evaluated for changes in the levels of various plasma chemistry markers.

Treatment

Groups of eight- to ten-week old male CD1 mice were injected subcutaneously twice a week for 6 weeks with 25 mg/kg of ISIS oligonucleotide (50 mg/kg/week dose). One group of male CD1 mice was injected subcutaneously twice a week for 6 weeks with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

5 *Plasma chemistry markers*

To evaluate the effect of ISIS oligonucleotides on liver and kidney function, plasma levels of transaminases, bilirubin, creatinine, and BUN were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). The results are presented in Table 98. ISIS oligonucleotides that caused changes in the levels of any of the liver or kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 98

Plasma chemistry markers in CD1 mice plasma at week 6

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)	Creatinine (mg/dL)	BUN (mg/dL)
PBS	36	71	0.22	0.18	22
ISIS 541262	115	133	0.21	0.18	21
ISIS 541724	543	531	0.34	0.17	21
ISIS 541742	44	71	0.18	0.16	21
ISIS 541748	269	582	0.16	0.15	22
ISIS 541749	626	491	0.20	0.20	22
ISIS 541750	1531	670	0.20	0.18	23
ISIS 541766	2107	1139	0.21	0.21	23
ISIS 541767	42	62	0.21	0.17	20
ISIS 541822	493	202	0.13	0.16	22
ISIS 541826	889	398	0.21	0.14	17
ISIS 541838	266	172	0.16	0.15	20
ISIS 541870	445	272	0.23	0.16	23
ISIS 541875	103	114	0.20	0.15	20
ISIS 541907	940	725	0.16	0.19	35
ISIS 541991	1690	1733	0.31	0.20	23

Hematology assays

Blood obtained from all mice groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and platelets, and total hemoglobin content. The results are presented in Table 99. ISIS oligonucleotides that

caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 99

Hematology markers in CD1 mice plasma at week 6

	HCT (%)	Hemoglobin (g/dL)	RBC ($10^6/\mu\text{L}$)	WBC ($10^3/\mu\text{L}$)	Platelets ($10^3/\mu\text{L}$)
PBS	37	11	7	3	1083
ISIS 541262	38	11	7	6	1010
ISIS 541724	52	16	10	9	940
ISIS 541742	47	14	9	6	1134
ISIS 541748	41	12	8	7	941
ISIS 541749	41	12	8	5	1142
ISIS 541750	42	12	8	4	1409
ISIS 541766	39	11	7	7	989
ISIS 541767	46	14	9	2	994
ISIS 541822	42	12	8	3	1190
ISIS 541826	41	12	8	10	1069
ISIS 541838	44	13	8	6	1005
ISIS 541870	38	11	7	8	1020
ISIS 541875	44	13	8	6	1104
ISIS 541907	40	11	8	9	1271
ISIS 541991	34	10	6	6	1274

5

Example 19: Tolerability of deoxy, MOE and cEt gapmers targeting human GHR in CD1 mice

CD1® mice were treated with ISIS antisense oligonucleotides selected from studies described above and evaluated for changes in the levels of various plasma chemistry markers. The 3-10-4 MOE gapmer ISIS 539376 was also included in the study.

10 *Treatment*

Groups of eight- to ten-week old male CD1 mice were injected subcutaneously twice a week for 6 weeks with 25 mg/kg of ISIS oligonucleotide (50 mg/kg/week dose). One group of male CD1 mice was injected subcutaneously twice a week for 6 weeks with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

15 *Plasma chemistry markers*

To evaluate the effect of ISIS oligonucleotides on liver and kidney function, plasma levels of transaminases, bilirubin, creatinine, and BUN were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). The results are presented in Table 100. ISIS oligonucleotides that

caused changes in the levels of any of the liver or kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 100

Plasma chemistry markers in CD1 mice plasma at week 6

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)	Creatinine (mg/dL)	BUN (mg/dL)
PBS	43	66	0.21	0.11	20
ISIS 541881	63	109	0.28	0.13	23
ISIS 541936	3260	2108	0.40	0.13	24
ISIS 542051	97	119	0.23	0.12	23
ISIS 542052	454	236	0.23	0.12	25
ISIS 542069	293	211	0.23	0.13	27
ISIS 542085	91	87	0.18	0.10	21
ISIS 542086	137	133	0.24	0.10	23
ISIS 542094	86	143	0.23	0.13	21
ISIS 542101	46	74	0.19	0.10	21
ISIS 542102	4920	2432	2.30	0.15	29
ISIS 542105	1255	575	0.35	0.13	21
ISIS 542106	3082	2295	3.42	0.17	23
ISIS 542107	4049	3092	0.50	0.14	20
ISIS 542108	1835	859	0.32	0.11	21
ISIS 539376	40	79	0.27	0.08	22

5

Hematology assays

Blood obtained from all mice groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and total hemoglobin content. The results are presented in Table 101. ISIS oligonucleotides that caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

10

Table 101

Hematology markers in CD1 mice plasma at week 6

	HCT (%)	Hemoglobin (g/dL)	RBC (10 ⁶ /μL)	WBC (10 ³ /μL)
PBS	46	13	8	6
ISIS 541881	53	15	10	7
ISIS 541936	41	11	8	18
ISIS 542051	49	14	9	8

ISIS 542052	46	13	9	9
ISIS 542069	43	13	8	7
ISIS 542085	38	11	7	5
ISIS 542086	49	14	9	9
ISIS 542094	36	10	6	5
ISIS 542101	44	13	9	5
ISIS 542102	27	7	5	25
ISIS 542105	42	12	8	7
ISIS 542106	37	10	7	14
ISIS 542107	41	12	7	17
ISIS 542108	51	14	8	10
ISIS 539376	49	14	10	5

Example 20: Tolerability of deoxy, MOE and cEt gapmers targeting human GHR in CD1 mice

CD1® mice were treated with ISIS antisense oligonucleotides selected from studies described above and evaluated for changes in the levels of various plasma chemistry markers.

5 Treatment

Groups of eight- to ten-week old male CD1 mice were injected subcutaneously twice a week for 6 weeks with 25 mg/kg of ISIS oligonucleotide (50 mg/kg/week dose). One group of male CD1 mice was injected subcutaneously twice a week for 6 weeks with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

10 Plasma chemistry markers

To evaluate the effect of ISIS oligonucleotides on liver and kidney function, plasma levels of transaminases, bilirubin, creatinine, and BUN were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). The results are presented in Table 102. ISIS oligonucleotides that caused changes in the levels of any of the liver or kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

15

Table 102

Plasma chemistry markers in CD1 mice plasma at week 6

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)	Creatinine (mg/dL)	BUN (mg/dL)
PBS	51	63	0.3	0.14	27
ISIS 542109	3695	2391	0.8	0.19	24
ISIS 542112	119	104	0.3	0.16	28
ISIS 542118	66	86	0.3	0.15	26

ISIS 542122	1112	350	0.3	0.16	27
ISIS 542125	79	92	0.2	0.13	26
ISIS 542126	381	398	0.5	0.14	23
ISIS 542127	54	85	0.3	0.16	26
ISIS 542128	55	89	0.2	0.12	24
ISIS 542145	834	671	0.3	0.11	24
ISIS 542146	163	107	0.2	0.14	30
ISIS 542149	974	752	0.3	0.12	26
ISIS 542150	2840	2126	2.4	0.17	23
ISIS 542153	53	75	0.2	0.14	28
ISIS 542157	137	122	0.3	0.13	25
ISIS 542185	57	72	0.2	0.11	23
ISIS 542186	62	84	0.2	0.12	24
ISIS 545431	2622	1375	3.0	0.15	28
ISIS 545438	1710	1000	0.3	0.14	26
ISIS 545439	70	117	0.2	0.12	28
ISIS 545447	141	108	0.3	0.13	26

Hematology assays

Blood obtained from all mice groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and total hemoglobin content. The results are presented in Table 103. ISIS oligonucleotides that caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 103

Hematology markers in CD1 mice plasma at week 6

	HCT (%)	Hemoglobin (g/dL)	RBC ($10^6/\mu\text{L}$)	WBC ($10^3/\mu\text{L}$)	Platelets ($10^3/\mu\text{L}$)
PBS	40	12	7	6	1210
ISIS 542109	47	13	9	16	1244
ISIS 542112	50	13	8	7	1065
ISIS 542118	42	12	8	8	1120
ISIS 542122	37	11	7	7	1064
ISIS 542125	42	13	8	7	1063
ISIS 542126	34	10	7	9	1477
ISIS 542127	41	12	7	7	1144
ISIS 542128	40	12	7	6	1196
ISIS 542145	42	12	8	8	1305
ISIS 542146	45	13	8	7	1310

ISIS 542149	33	10	6	12	903
ISIS 542150	27	7	5	18	1202
ISIS 542153	46	13	8	5	1130
ISIS 542157	44	12	9	6	791
ISIS 542185	45	13	8	3	1031
ISIS 542186	44	12	8	6	985
ISIS 545431	28	7	6	13	2609
ISIS 545438	40	11	8	8	1302
ISIS 545439	48	13	9	4	857
ISIS 545447	45	13	9	9	964

Example 21: Tolerability of MOE gapmers targeting human GHR in Sprague-Dawley rats

Sprague-Dawley rats are a multipurpose model used for safety and efficacy evaluations. The rats were treated with ISIS antisense oligonucleotides from the studies described in the Examples above and evaluated for changes in the levels of various plasma chemistry markers.

Treatment

Male Sprague-Dawley rats were maintained on a 12-hour light/dark cycle and fed ad libitum with Purina normal rat chow, diet 5001. Groups of 4 Sprague-Dawley rats each were injected subcutaneously twice a week for 6 weeks with 50 mg/kg of ISIS oligonucleotide (100 mg/kg weekly dose). Forty eight hours after the last dose, rats were euthanized and organs and plasma were harvested for further analysis.

Liver function

To evaluate the effect of ISIS oligonucleotides on hepatic function, plasma levels of transaminases were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). Plasma levels of ALT (alanine transaminase) and AST (aspartate transaminase) were measured and the results are presented in Table 104 expressed in IU/L. Plasma levels of bilirubin were also measured using the same clinical chemistry analyzer and the results are also presented in Table 104 expressed in mg/dL. ISIS oligonucleotides that caused changes in the levels of any markers of liver function outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 104

Liver function markers in Sprague-Dawley rats

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)
PBS	69	90	0.15
ISIS 523723	79	123	0.12
ISIS 523789	71	105	0.15

ISIS 532254	67	97	0.14
ISIS 532401	61	77	0.12
ISIS 532420	102	127	0.17
ISIS 533178	157	219	0.34
ISIS 533234	71	90	0.11
ISIS 533932	58	81	0.12
ISIS 539376	75	101	0.14
ISIS 539380	86	128	0.16
ISIS 539383	64	94	0.14
ISIS 539399	52	95	0.14
ISIS 539404	88	118	0.13
ISIS 539416	63	104	0.14
ISIS 539432	63	90	0.13
ISIS 539433	69	92	0.13

Kidney function

To evaluate the effect of ISIS oligonucleotides on kidney function, plasma levels of blood urea nitrogen (BUN) and creatinine were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). Results are presented in Table 105, expressed in mg/dL. ISIS oligonucleotides that caused changes in the levels of any of the kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 105

Kidney function markers (mg/dL) in Sprague-Dawley rats

	BUN	Creatinine
PBS	24	0.32
ISIS 523723	20	0.39
ISIS 523789	19	0.37
ISIS 532254	21	0.43
ISIS 532401	17	0.36
ISIS 532420	20	0.31
ISIS 533178	20	0.43
ISIS 533234	22	0.41
ISIS 533932	19	0.43
ISIS 539376	19	0.36
ISIS 539380	18	0.35
ISIS 539383	19	0.35
ISIS 539399	18	0.39
ISIS 539404	23	0.39

ISIS 539416	17	0.39
ISIS 539432	20	0.39
ISIS 539433	20	0.34

Hematology assays

Blood obtained from all rat groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and total hemoglobin content. The results are presented in Table 106. ISIS oligonucleotides that caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 106

Hematology markers in Sprague-Dawley rats

	HCT (%)	Hemoglobin (g/dL)	RBC ($10^6/\mu\text{L}$)	WBC ($10^3/\mu\text{L}$)	Platelets ($10^3/\mu\text{L}$)
PBS	46	15	8	11	1078
ISIS 523723	38	12	7	19	626
ISIS 523789	38	12	8	12	702
ISIS 532254	36	12	7	11	547
ISIS 532401	42	14	8	12	858
ISIS 532420	37	12	7	17	542
ISIS 533178	37	12	7	15	1117
ISIS 533234	38	12	7	8	657
ISIS 533932	40	13	7	9	999
ISIS 539376	43	14	9	8	910
ISIS 539380	33	11	5	6	330
ISIS 539383	39	13	7	10	832
ISIS 539399	37	11	7	4	603
ISIS 539404	37	12	7	6	639
ISIS 539416	33	11	6	9	601
ISIS 539432	44	14	9	10	810
ISIS 539433	38	12	7	9	742

10

Organ weights

Liver, heart, spleen and kidney weights were measured at the end of the study, and are presented in Table 107. ISIS oligonucleotides that caused any changes in organ weights outside the expected range for antisense oligonucleotides were excluded from further studies.

Table 107
Organ weights (g)

	Heart	Liver	Spleen	Kidney
PBS	0.35	3.6	0.2	0.8
ISIS 523723	0.31	4.9	0.7	0.8
ISIS 523789	0.34	4.8	0.6	0.8
ISIS 532254	0.32	5.0	0.6	1.0
ISIS 532401	0.32	3.8	0.4	0.8
ISIS 532420	0.29	4.6	0.7	1.0
ISIS 533178	0.34	5.2	0.7	0.9
ISIS 533234	0.30	4.4	0.6	1.0
ISIS 533932	0.31	3.9	0.5	0.9
ISIS 539376	0.29	4.4	0.4	0.8
ISIS 539380	0.31	6.3	1.6	1.2
ISIS 539383	0.31	4.5	0.6	1.0
ISIS 539399	0.31	4.5	0.8	1.0
ISIS 539404	0.34	4.9	0.6	1.0
ISIS 539416	0.32	4.7	0.7	0.9
ISIS 539432	0.30	3.8	0.4	0.8
ISIS 539433	0.28	4.1	0.7	1.0

Example 22: Tolerability of deoxy, MOE, and cEt gapmers targeting human GHR in Sprague-Dawley rats

Sprague-Dawley rats were treated with ISIS antisense oligonucleotides from the studies described in the Examples above and evaluated for changes in the levels of various plasma chemistry markers.

Treatment

Male Sprague-Dawley rats were maintained on a 12-hour light/dark cycle and fed ad libitum with Purina normal rat chow, diet 5001. Groups of 4 Sprague-Dawley rats each were injected subcutaneously once a week for 6 weeks with 50 mg/kg of ISIS oligonucleotide (50 mg/kg weekly dose). Two groups of rats were injected subcutaneously once a week for 6 weeks with PBS. Forty eight hours after the last dose, rats were euthanized and organs and plasma were harvested for further analysis.

Liver function

To evaluate the effect of ISIS oligonucleotides on hepatic function, plasma levels of transaminases were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). Plasma levels of ALT and AST were measured and the results are presented in Table 108 expressed in IU/L. Plasma levels of bilirubin were also measured using the same clinical chemistry analyzer and the results are

also presented in Table 108 expressed in mg/dL. ISIS oligonucleotides that caused changes in the levels of any markers of liver function outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 108

Liver function markers in Sprague-Dawley rats

	ALT (IU/L)	AST (IU/L)	Bilirubin (mg/dL)
PBS group 1	34	56	0.08
PBS group 2	37	54	0.09
ISIS 541881	53	77	0.12
ISIS 542051	61	96	0.09
ISIS 542101	64	214	0.10
ISIS 542112	46	72	0.10
ISIS 542118	42	60	0.08
ISIS 542125	39	67	0.10
ISIS 542127	56	75	0.12
ISIS 542128	45	71	0.12
ISIS 542153	44	69	0.11
ISIS 542185	44	93	0.09
ISIS 542186	51	107	0.12
ISIS 545439	41	73	0.10
ISIS 545447	103	114	0.10
ISIS 541262	106	133	0.12
ISIS 541742	56	102	0.11
ISIS 541767	53	69	0.09
ISIS 541875	70	133	0.08

Kidney function

To evaluate the effect of ISIS oligonucleotides on kidney function, plasma levels of blood urea nitrogen (BUN) and creatinine were measured using an automated clinical chemistry analyzer (Hitachi Olympus AU400e, Melville, NY). Results are presented in Table 109, expressed in mg/dL. ISIS oligonucleotides that caused changes in the levels of any of the kidney function markers outside the expected range for antisense oligonucleotides were excluded in further studies.

Table 109

Kidney function markers (mg/dL) in Sprague-Dawley rats

	BUN	Creatinine
PBS group 1	16	0.2
PBS group 2	15	0.2
ISIS 541881	22	0.3
ISIS 542051	18	0.2
ISIS 542101	22	0.3
ISIS 542112	18	0.2
ISIS 542118	18	0.3
ISIS 542125	18	0.3
ISIS 542127	19	0.3
ISIS 542128	18	0.3
ISIS 542153	17	0.3
ISIS 542185	19	0.3
ISIS 542186	19	0.3
ISIS 545439	16	0.2
ISIS 545447	16	0.2
ISIS 541262	21	0.4
ISIS 541742	19	0.2
ISIS 541767	15	0.2
ISIS 541875	16	0.2

Hematology assays

- 5 Blood obtained from all rat groups were sent to Antech Diagnostics for hematocrit (HCT) measurements and analysis, as well as measurements of the various blood cells, such as WBC, RBC, and total hemoglobin content. The results are presented in Table 110. ISIS oligonucleotides that caused changes in the levels of any of the hematology markers outside the expected range for antisense oligonucleotides were excluded in further studies.

10

Table 110

Hematology markers in Sprague-Dawley rats

	HCT (%)	Hemoglobin (g/dL)	RBC ($10^6/\mu\text{L}$)	WBC ($10^3/\mu\text{L}$)	Platelets ($10^3/\mu\text{L}$)
PBS group 1	43	14	7	7	775
PBS group 2	49	15	8	8	1065
ISIS 541881	41	13	8	6	553
ISIS 542051	39	13	7	9	564
ISIS 542101	37	12	7	15	603

ISIS 542112	45	14	8	10	587
ISIS 542118	47	15	8	7	817
ISIS 542125	41	13	7	7	909
ISIS 542127	44	14	8	10	872
ISIS 542128	44	14	8	7	679
ISIS 542153	48	15	8	7	519
ISIS 542185	44	14	8	9	453
ISIS 542186	44	14	8	12	433
ISIS 545439	40	12	7	11	733
ISIS 545447	43	13	8	9	843
ISIS 541262	46	14	8	17	881
ISIS 541742	47	15	8	10	813
ISIS 541767	53	16	9	9	860
ISIS 541875	42	13	7	9	840

Organ weights

Liver, heart, spleen and kidney weights were measured at the end of the study, and are presented in Table 111. ISIS oligonucleotides that caused any changes in organ weights outside the expected range for antisense oligonucleotides were excluded from further studies.

Table 111

Organ weights (g)

	Heart	Liver	Spleen	Kidney
PBS group 1	0.4	3.7	0.2	0.9
PBS group 2	0.3	3.2	0.2	0.7
ISIS 541881	0.4	3.4	0.4	0.9
ISIS 542051	0.4	3.8	0.4	1.0
ISIS 542101	0.3	4.2	0.6	1.1
ISIS 542112	0.3	3.7	0.4	0.8
ISIS 542118	0.4	3.6	0.2	0.8
ISIS 542125	0.4	3.7	0.3	1.1
ISIS 542127	0.3	4.2	0.3	0.8
ISIS 542128	0.3	3.5	0.3	0.8
ISIS 542153	0.3	3.5	0.3	0.8
ISIS 542185	0.4	3.8	0.4	0.9
ISIS 542186	0.3	3.8	0.6	0.9
ISIS 545439	0.4	4.1	0.3	0.9
ISIS 545447	0.4	3.4	0.3	1.1
ISIS 541262	0.3	3.4	0.3	2.0

ISIS 541742	0.3	3.8	0.3	0.8
ISIS 541767	0.3	3.4	0.2	0.8
ISIS 541875	0.3	5.2	0.4	1.0

Example 23: Effect of ISIS antisense oligonucleotides targeting human GHR in cynomolgus monkeys

Cynomolgus monkeys were treated with ISIS antisense oligonucleotides selected from studies described in the Examples above. Antisense oligonucleotide efficacy and tolerability, as well as their pharmacokinetic profile in the liver and kidney, were evaluated.

At the time this study was undertaken, the cynomolgus monkey genomic sequence was not available in the National Center for Biotechnology Information (NCBI) database; therefore, cross-reactivity with the cynomolgus monkey gene sequence could not be confirmed. Instead, the sequences of the ISIS antisense oligonucleotides used in the cynomolgus monkeys was compared to a rhesus monkey sequence for homology. It is expected that ISIS oligonucleotides with homology to the rhesus monkey sequence are fully cross-reactive with the cynomolgus monkey sequence as well. The human antisense oligonucleotides tested are cross-reactive with the rhesus genomic sequence (GENBANK Accession No. NW_001120958.1 truncated from nucleotides 4410000 to 4720000, designated herein as SEQ ID NO: 2296). The greater the complementarity between the human oligonucleotide and the rhesus monkey sequence, the more likely the human oligonucleotide can cross-react with the rhesus monkey sequence. The start and stop sites of each oligonucleotide to SEQ ID NO: 2296 is presented in Table 112. "Start site" indicates the 5'-most nucleotide to which the gapmer is targeted in the rhesus monkey gene sequence.

Table 112

Antisense oligonucleotides complementary to the rhesus GHR genomic sequence (SEQ ID NO: 2296)

ISIS No	Target Start Site	Target Stop Site	Chemistry	SEQ ID NO
523723	149071	149090	5-10-5 MOE	918
532254	64701	64720	5-10-5 MOE	479
532401	147560	147579	5-10-5 MOE	703
541767	152700	152715	Deoxy, MOE and cEt	1800
541875	210099	210114	Deoxy, MOE and cEt	1904
542112	146650	146665	Deoxy, MOE and cEt	2122
542118	149074	149089	Deoxy, MOE and cEt	2127
542185	245782	245797	Deoxy, MOE and cEt	2194

Study 1

Prior to the study, the monkeys were kept in quarantine during which the animals were observed daily for general health. The monkeys were 2-4 years old and weighed between 2 and 4 kg. Nine groups of 5 randomly assigned male cynomolgus monkeys each were injected subcutaneously with ISIS oligonucleotide or PBS using a stainless steel dosing needle and syringe of appropriate size into the intracapsular region and outer thigh of the monkeys. The monkeys were dosed three times (days 1, 4, and 7) for the first week, and then subsequently once a week for 12 weeks with 40 mg/kg of ISIS oligonucleotide. A control group of 5 cynomolgus monkeys was injected with PBS in a similar manner and served as the control group.

During the study period, the monkeys were observed twice daily for signs of illness or distress. Any animal experiencing more than momentary or slight pain or distress due to the treatment, injury or illness was treated by the veterinary staff with approved analgesics or agents to relieve the pain after consultation with the Study Director. Any animal in poor health or in a possible moribund condition was identified for further monitoring and possible euthanasia. Scheduled euthanasia of the animals was conducted on day 86 by exsanguination after ketamine/xylazine-induced anesthesia and administration of sodium pentobarbital. The protocols described in the Example were approved by the Institutional Animal Care and Use Committee (IACUC).

Target Reduction

RNA analysis

On day 86, RNA was extracted from liver, white adipose tissue (WAT) and kidney for real-time PCR analysis of measurement of mRNA expression of GHR. Results are presented as percent inhibition of mRNA, relative to PBS control, normalized with RIBOGREEN[®]. 'n.d.' indicates that the data for that particular oligonucleotide was not measured. As shown in Table 113, treatment with ISIS antisense oligonucleotides resulted in significant reduction of GHR mRNA in comparison to the PBS control. Specifically, treatment with ISIS 532401 resulted in significant reduction of mRNA expression in all tissues.

The expression of the growth hormone-responsive gene, ALS was also measured in liver, kidney and adipose tissue. Treatment with ISIS 532401 resulted in ALS RNA expression reduction in liver by $44 \pm 9 \%$, correlating with GHR levels. There was no reduction observed in adipose tissue. The expression of IGF1 in the liver was also measured. Treatment with ISIS 532401 resulted in IGF1 RNA expression reduction in liver by $71 \pm 10 \%$, correlating with GHR levels.

Table 113

Percent inhibition of GHR mRNA in the cynomolgus monkey liver relative to the PBS control

ISIS No	Liver	Kidney	WAT
532401	60	47	59
532254	63	65	n.d.
523723	38	0	n.d.
542112	61	60	36
542118	0	22	27
542185	66	53	n.d.
541767	0	14	n.d.
541875	34	77	n.d.

Protein analysis

5 Approximately 1 mL of blood was collected from all available animals at day 85 and placed in tubes containing the potassium salt of EDTA. The tubes were centrifuged (3000 rpm for 10 min at room temperature) to obtain plasma. Plasma levels of IGF-1 and GH were measured in the plasma. The results are presented in Table 114. The results indicate that treatment with ISIS oligonucleotides resulted in reduced IGF-1 protein levels.

10 Plasma levels of IGF1 after treatment with ISIS 532401 are also presented in Table 115 and demonstrate the effect of antisense inhibition of GHR in reducing IGF1 levels at day 7 and day 85.

Table 114

Plasma protein levels in the cynomolgus monkey

	IGF-1 (% baseline)	GH (ng/mL)
PBS	121	19
532401	57	39
532254	51	26
523723	77	16
542112	46	48
542118	97	6
542185	59	32
541767	101	22
541875	45	47

Table 115

Plasma IGF1 levels in the cynomolgus monkey

	Day 7	Day 85
PBS	458	643
ISIS 532401	326	263

Tolerability studies5 *Body and organ weight measurements*

To evaluate the effect of ISIS oligonucleotides on the overall health of the animals, body and organ weights were measured. Body weights were measured on day 84 and are presented in Table 115. Organ weights were measured on day 86 and the data is also presented in Table 115. The results indicate that effect of treatment with antisense oligonucleotides on body and organ weights was within the expected range for antisense oligonucleotides. Specifically, treatment with ISIS 532401 was well tolerated in terms of the body and organ weights of the monkeys.

Table 115

Final body and organ weights in cynomolgus monkey

	Body Wt (kg)	Spleen (g)	Kidney (g)	Liver (g)
PBS	2.7	2.8	12.3	56.7
532401	2.6	4.0	11.5	58.5
532254	2.6	4.8	15.4	69.5
523723	2.8	3.1	14.8	69.4
542112	2.6	3.5	13.6	60.0
542118	2.7	2.7	11.9	58.6
542185	2.6	5.5	17.2	68.5
541767	2.8	5.1	11.7	65.1
541875	2.8	5.5	13.2	55.0

15 *Liver function*

To evaluate the effect of ISIS oligonucleotides on hepatic function, blood samples were collected from all the study groups. The blood samples were collected via femoral venipuncture, 48 hrs post-dosing. The monkeys were fasted overnight prior to blood collection. Blood was collected in tubes containing K₂-EDTA anticoagulant, which were centrifuged to obtain plasma. Levels of various liver function markers were measured using a Toshiba 200FR NEO chemistry analyzer (Toshiba Co., Japan). Plasma levels of ALT and AST and bilirubin were measured. The Tables below present the results for ALT and AST levels at various

time points. The results indicate that antisense oligonucleotides had no effect on liver function outside the expected range for antisense oligonucleotides. Specifically, treatment with ISIS 532401 was well tolerated in terms of the liver function in monkeys.

Table 116

ALT levels (IU/L) in cynomolgus monkey

	Day 16	Day 44	Day 86
PBS	46	37	40
ISIS 532401	63	59	88
ISIS 532254	62	46	56
ISIS 523723	50	77	86
ISIS 542112	53	54	60
ISIS 542118	38	41	52
ISIS 542185	58	59	91
ISIS 541767	56	45	46
ISIS 541875	70	54	71

Table 117

AST levels (IU/L) in cynomolgus monkey

	Day 16	Day 44	Day 86
PBS	58	40	45
ISIS 532401	47	48	61
ISIS 532254	71	81	98
ISIS 523723	56	61	73
ISIS 542112	58	65	89
ISIS 542118	41	40	46
ISIS 542185	61	63	98
ISIS 541767	52	39	63
ISIS 541875	70	50	70

10 *Kidney function*

To evaluate the effect of ISIS oligonucleotides on kidney function, blood samples were collected from all the study groups. The blood samples were collected via femoral venipuncture, 48 hrs post-dosing. The monkeys were fasted overnight prior to blood collection. Blood was collected in tubes containing K₂-EDTA anticoagulant, which were centrifuged to obtain plasma. Levels of BUN and creatinine were measured using a Toshiba 200FR NEO chemistry analyzer (Toshiba Co., Japan). The Tables below present the results for BUN and creatinine levels at various time points.

The plasma chemistry data indicate that most of the ISIS oligonucleotides did not have any effect on the kidney function outside the expected range for antisense oligonucleotides. Specifically, treatment with ISIS 532401 was well tolerated in terms of the kidney function of the monkeys.

Table 118

BUN levels (mg/dL) in cynomolgus monkey

	Day 16	Day 44	Day 86
PBS	29	26	26
ISIS 532401	27	27	27
ISIS 532254	21	22	25
ISIS 523723	25	24	22
ISIS 542112	26	24	24
ISIS 542118	29	27	29
ISIS 542185	22	21	22
ISIS 541767	29	24	24
ISIS 541875	29	24	21

Table 119

Creatinine levels (mg/dL) in cynomolgus monkey

	Day 16	Day 44	Day 86
PBS	0.9	0.8	0.9
ISIS 532401	1.1	1.0	1.1
ISIS 532254	1.0	1.0	1.0
ISIS 523723	1.0	1.0	1.0
ISIS 542112	1.0	0.9	1.0
ISIS 542118	0.9	0.9	0.9
ISIS 542185	1.0	0.9	0.9
ISIS 541767	1.1	0.9	0.9
ISIS 541875	1.2	1.1	1.1

Hematology

To evaluate any effect of ISIS oligonucleotides in cynomolgus monkeys on hematologic parameters, blood samples of approximately 1.3 mL of blood was collected from each of the available study animals in tubes containing K₂-EDTA. Samples were analyzed for red blood cell (RBC) count, white blood cells (WBC) count, individual white blood cell counts, such as that of monocytes, neutrophils, lymphocytes, as well as for platelet count, hemoglobin content and hematocrit, using an ADVIA120 hematology analyzer (Bayer, USA). The Table below presents the results for platelet count at various time points. 'n/a' indicates that the data for that time point is not available.

The data indicate the oligonucleotides did not cause any changes in hematologic parameters outside the expected range for antisense oligonucleotides at this dose. Specifically, treatment with ISIS 532401 was well tolerated in terms of the hematologic parameters of the monkeys.

Table 120Platelet count ($\times 10^3/\mu\text{L}$) in cynomolgus monkey

	Day 30	Day 58	Day 86
PBS	538	464	403
ISIS 532401	493	465	395
ISIS 532254	334	328	306
ISIS 523723	352	304	268
ISIS 542112	454	430	368
ISIS 542118	418	379	377
ISIS 542185	370	303	296
ISIS 541767	435	326	325
ISIS 541875	437	359	n/a

C-reactive protein and complement C3 level analysis

To evaluate any inflammatory effect of ISIS oligonucleotides in cynomolgus monkeys, blood samples were taken for analysis. The monkeys were fasted overnight prior to blood collection.

Approximately 1.5 mL of blood was collected from each animal and put into tubes without anticoagulant for serum separation. The tubes were kept at room temperature for a minimum of 90 min and then centrifuged at 3,000 rpm for 10 min at room temperature to obtain serum. C-reactive protein (CRP), which is synthesized in the liver and which serves as a marker of inflammation, was measured using a Toshiba 200FR NEO chemistry analyzer (Toshiba Co., Japan). The Tables below present the results for CRP and C3 levels at various time points. The results indicate that treatment with ISIS 532401 did not cause inflammation in monkeys.

Table 121

CRP (mg/L) in cynomolgus monkey

	Day 16	Day 44	Day 86
PBS	3.8	2.0	2.0
ISIS 532401	2.3	1.7	1.9
ISIS 532254	2.1	3.2	5.9
ISIS 523723	6.1	4.5	4.4
ISIS 542112	2.5	2.7	2.7
ISIS 542118	2.2	2.8	2.1

ISIS 542185	2.3	11.9	9.3
ISIS 541767	1.9	1.5	6.7
ISIS 541875	4.9	3.5	8.4

Table 122

C3 (mg/dL) on day 85 (24 hours after dosing) in cynomolgus monkey

	C3
PBS	114
ISIS 532401	96
ISIS 532254	100
ISIS 523723	87
ISIS 542112	100
ISIS 542118	110
ISIS 542185	98
ISIS 541767	99
ISIS 541875	81

Measurement of oligonucleotide concentration

5 The concentration of the full-length oligonucleotide in the liver and the kidney of the monkeys was measured. The method used is a modification of previously published methods (Leeds et al., 1996; Geary et al., 1999) which consist of a phenol-chloroform (liquid-liquid) extraction followed by a solid phase extraction. An internal standard (ISIS 355868, a 27-mer 2'-O-methoxyethyl modified phosphorothioate oligonucleotide, GCGTTTGCTCTTCTTCTTGCGTTTTT, designated herein as SEQ ID NO: 2300) was added prior to extraction. Tissue sample concentrations were calculated using calibration curves, with a lower limit of quantitation (LLOQ) of approximately 1.14 µg/g. Half-lives were then calculated using WinNonlin software (PHARSIGHT).

The results are presented in Table 123, expressed as µg/g of tissue, as well as the ratio of concentration in kidney versus liver.

Table 123

Oligonucleotide concentration in the liver and kidney of cynomolgus monkeys

	Chemistry	Liver	Kidney	K/L ratio
ISIS 532401	5-10-5 MOE	725	2154	3.0
ISIS 532254	5-10-5 MOE	911	4467	4.9
ISIS 523723	5-10-5 MOE	657	3093	4.7
ISIS 542112	3-10-3 cEt/MOE	491	2863	5.8
ISIS 542118	3-10-3 cEt/MOE	429	1222	2.8

ISIS 542185	3-10-3 cEt/MOE	432	3126	7.2
ISIS 541767	3-10-3 cEt/MOE	280	994	3.5
ISIS 541875	3-10-3 cEt/MOE	766	3892	5.1

Study 2

One group of 5 randomly assigned male cynomolgus monkeys was injected subcutaneously with ISIS 532401 or PBS using a stainless steel dosing needle and syringe of appropriate size into the intracapsular region and outer thigh of the monkeys. The monkeys were dosed a loading dose per week (days 1, 3, 5, and 7) for the first week, and then subsequently once a week (days 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, and 91) with 40 mg/kg of ISIS 532401. A control group of 5 cynomolgus monkeys was injected with PBS in a similar manner and served as the control group.

Target Reduction

RNA analysis

On day 93, RNA was extracted from liver, white adipose tissue (WAT) and muscle for real-time PCR analysis of measurement of mRNA expression of GHR. Treatment with ISIS 532401 resulted in significant reduction of GHR mRNA in liver and white adipose tissue.

The expression of the growth hormone-responsive gene, ALS was also measured in the liver. Treatment with ISIS 532401 resulted in ALS RNA expression reduction in liver by 38%, correlating with GHR levels. 'n.d.' indicates that the levels were not checked in that particular tissue. The expression of IGF1 in the liver, muscle and fat tissues was also measured. Treatment with ISIS 532401 resulted in IGF1 RNA expression reduction in liver and in the WAT, correlating with GHR levels.

Table 124

Effect of treatment with ISIS 532401 on mRNA levels (% inhibition compared to the PBS control) in the cynomolgus monkey

	Liver	WAT	Muscle
GHR	64	75	21
ALS	38	n.d.	n.d.
IGF1	73	56	35

Protein analysis

Plasma levels of IGF-1 and GH were measured in the plasma. The results are presented in the Table below. The results indicate that treatment with ISIS 532401 resulted in reduced IGF-1 protein levels. There was no increase in plasma growth hormone levels.

Table 125

Plasma IGF1 levels (ng/mL) in the cynomolgus monkey

	Day 7	Day 49	Day 91
PBS	625	776	850
ISIS 532401	378	455	363

Table 126

Plasma growth hormone levels (ng/mL) in the cynomolgus monkey

	Day 7	Day 49	Day 91
PBS	25	27	33
ISIS 532401	16	13	17

5

Example 24: Measurement of viscosity of ISIS antisense oligonucleotides targeting human GHR

The viscosity of select antisense oligonucleotides from the study described in the Examples above was measured with the aim of screening out antisense oligonucleotides which have a viscosity more than 40 cP. Oligonucleotides having a viscosity greater than 40 cP would be too viscous to be administered to any subject.

10

ISIS oligonucleotides (32-35 mg) were weighed into a glass vial, 120 μ L of water was added and the antisense oligonucleotide was dissolved into solution by heating the vial at 50°C. Part of (75 μ L) the pre-heated sample was pipetted to a micro-viscometer (Cambridge). The temperature of the micro-viscometer was set to 25°C and the viscosity of the sample was measured. Another part (20 μ L) of the pre-heated sample was pipetted into 10 mL of water for UV reading at 260 nm at 85°C (Cary UV instrument). The results are presented in Table 127 and indicate that all the antisense oligonucleotides solutions are optimal in their viscosity under the criterion stated above.

15

Table 127

Viscosity of ISIS antisense oligonucleotides targeting human GHR

ISIS No.	Chemistry	Viscosity (cP)
523723	5-10-5 MOE	8
532254	5-10-5 MOE	22
532401	5-10-5 MOE	12
541767	Deoxy, MOE and cEt	13
541875	Deoxy, MOE and cEt	33

542112	Deoxy, MOE and cEt	10
542118	Deoxy, MOE and cEt	14
542185	Deoxy, MOE and cEt	17

Example 25: Effect of antisense inhibition of GHR in mice

In order to confirm the effect of antisense inhibition of GHR in the primate model, an ISIS oligonucleotide targeting murine GHR was employed to replicate the result in a mouse model.

- 5 ISIS 563223 (GAGACTTTTCCTTGACACA, designated herein as SEQ ID NO: 2301) is a 5-10-5 MOE gapmer murine antisense oligonucleotide targeting murine GHR (GENBANK Accession No; NM_010284.2, designated herein as SEQ ID NO: 2302) at target start site 3230. A group of male and female CD1 mice were injected with a loading dose (on days 1, 3, 5, and 7) on the first week and subsequently with a once weekly dose (on days 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, and 91) with 40 mg/kg of ISIS 563223.
- 10 One group of CD1 mice was injected in a similar manner with PBS. Mice were euthanized 48 hours after the last dose, and organs and plasma were harvested for further analysis.

mRNA expression

- Liver mRNA expression of GHR, GHBP, IGF1, and ALS were measured. The results are presented in Table 128. Antisense inhibition of GHR resulted in inhibition of GHBP, IGF1 and ALS gene expression
- 15 levels.

Table 128

mRNA expression (% Inhibition) in CD1 mice liver

	% (in male mice)	% (in female mice)
GHR	98	96
GHBP	74	66
IGF1	60	48
ALS	84	74

Protein expression

- 20 Plasma levels of IGF1 and growth hormone were measured. The results are presented in Table 129. Antisense inhibition of GHR resulted in decrease in IGF1 levels, and had no effect on growth hormone levels.

Table 129

IGF1 protein levels (ng/mL) in CD1 mice liver

	in male mice	in female mice
PBS	949	1002
ISIS 563223	439	740

Table 130

Growth hormone protein levels (ng/mL) in CD1 mice liver

	in male mice	in female mice
PBS	3.3 ± 2.2	2.2 ± 1.3
ISIS 563223	5.6 ± 6.7	2.9 ± 1.7

CLAIMS:

1. A compound comprising a modified oligonucleotide 18 to 30 linked nucleosides in length, wherein the modified oligonucleotide has a nucleobase sequence comprising a portion of at least 18 contiguous nucleobases 100% complementary to an equal length portion of nucleobases 153921-153940 of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2, wherein the nucleobase sequence of the modified oligonucleotide is at least 90% complementary to SEQ ID NO: 2,

wherein the modified oligonucleotide comprises:

a gap segment consisting of linked deoxynucleosides;

a 5' wing segment consisting of linked nucleosides; and

a 3' wing segment consisting of linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment and wherein each nucleoside of each wing segment comprises a modified sugar.

2. The compound of claim 1, wherein the modified oligonucleotide is 100% complementary to SEQ ID NO: 2.

3. The compound of any preceding claim, wherein the modified oligonucleotide has a nucleobase sequence comprising the sequence recited in SEQ ID NO: 703, optionally wherein the modified oligonucleotide consists of 20 linked nucleosides and has a nucleobase sequence consisting of the sequence recited in SEQ ID NO: 703.

4. The compound of any one of claims 1-3, wherein the modified oligonucleotide comprises at least one modified sugar and wherein the at least one modified sugar optionally comprises a 2'-O-methoxyethyl group or is a bicyclic sugar, such as a bicyclic sugar that comprises a 4'-CH(CH₃)-O-2' group or a bicyclic sugar that comprises a 4'-CH₂-O-2' or 4'-(CH₂)₂-O-2' group.

5. The compound of any one of claims 1-4, wherein the modified oligonucleotide comprises at least one modified internucleoside linkage and wherein the modified internucleoside linkage is optionally a phosphorothioate internucleoside linkage.

6. The compound of any one of claims 1-5, wherein the modified oligonucleotide comprises at least one modified nucleobase and wherein the modified nucleobase is optionally 5-methylcytosine.

7. The compound of any preceding claim, wherein the modified oligonucleotide consists of 20 linked nucleosides having a nucleobase sequence consisting of the sequence recited in SEQ ID NO: 703, and wherein the modified oligonucleotide comprises:

a gap segment consisting of ten linked deoxynucleosides;

a 5' wing segment consisting of five linked nucleosides; and

a 3' wing segment consisting of five linked nucleosides;

wherein the gap segment is positioned between the 5' wing segment and the 3' wing segment;

wherein each nucleoside of each wing segment comprises a 2'-O-methoxyethyl sugar; wherein at least one internucleoside linkage is a phosphorothioate linkage; and wherein each cytosine is a 5-methylcytosine.

8. The compound of any one of claims 1-7, wherein the compound is single-stranded.

9. A composition comprising the compound of any one of claims 1-8 or salt thereof and at least one of a pharmaceutically acceptable carrier or diluent.

10. The compound of any one of claims 1-8, or the composition of claim 9, for use in or when used in therapy.

11. The compound or the composition for use of claim 10, for use in or when used in treating or preventing a disease associated with excess growth hormone in a human, wherein the disease associated with excess growth hormone is optionally acromegaly.

12. The compound of any one of claims 1-8 or the composition of claim 9, for use in or when used in reducing growth hormone receptor (GHR) levels in a human comprising administering to the human a therapeutically effective amount of the compound or composition, thereby reducing GHR levels in the human, optionally wherein the human has a disease associated with excess growth hormone, such as acromegaly.

13. A compound when used in a method of treating or preventing a disease associated with excess growth hormone in a human, wherein the compound comprises a modified oligonucleotide 18 to 30 linked nucleosides in length, wherein the modified oligonucleotide has a nucleobase sequence comprising a portion of at least 18 contiguous nucleobases 100% complementary to an equal length portion of nucleobases 153921-153940 of a growth hormone receptor nucleic acid having the nucleobase sequence of SEQ ID NO: 2, wherein the nucleobase sequence of the modified oligonucleotide is at least 90% complementary to SEQ ID NO: 2.

14. A method of treating or preventing a disease associated with excess growth hormone in a human, wherein the disease associated with excess growth hormone is optionally acromegaly, wherein the method comprises administering the compound of any one of claims 1-8, or the composition of claim 9.

15. Use of the compound of any one of claims 1-8, or the composition of claim 9 in the manufacture of a medicament for treating or preventing a disease associated with excess growth hormone in a human, wherein the disease associated with excess growth hormone is optionally acromegaly.

16. The compound or composition for use according to claim 11, or the method of claim 14 or the use of claim 15, wherein treating the acromegaly reduces IGF-1 levels.

17. A method of reducing growth hormone receptor (GHR) levels in a human, comprising administering to the human a therapeutically effective amount of the compound of any one of claims 1-8 or the composition of claim 9, thereby reducing GHR levels in the human, optionally wherein the human has a disease associated with excess growth hormone, such as acromegaly.

18. Use of the compound of any one of claims 1-8, or the composition of claim 9 in the manufacture of a medicament for reducing growth hormone receptor (GHR) levels in a human, optionally wherein the human has a disease associated with excess growth hormone, such as acromegaly.

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