

ANGIOTENSINOGEN-MODULATING COMPOSITIONS AND METHODS OF USE THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 63/326,733, filed April 1, 2022; and U.S. Provisional Application No. 63/407,071, filed September 15, 2022. The disclosure of each of the prior applications is considered part of and is incorporated by reference in its entirety in the disclosure of this application.

BACKGROUND

Angiotensinogen (AGT), also known as SERPINA8, is a member of the serpin family. The encoded protein is angiotensinogen precursor which is largely expressed in the liver and is cleaved by the enzyme renin in response to lowered blood pressure. The product, angiotensin I, is subsequently cleaved by angiotensin converting enzyme (ACE) to generate the physiologically active angiotensin II. Angiotensin II is the active peptide of the renin-angiotensin-aldosterone system (RAAS). Angiotensin II interacts with receptors to mediate vasoconstriction, thirst, release of vasopressin and aldosterone, renal sodium reabsorption, fibrosis, inflammation, angiogenesis, vascular aging, and atherosclerosis. Release of aldosterone causes the kidneys to increase reabsorption of sodium and water, leading to an increase of the fluid volume in a body which, in turn, can increase blood pressure. Therefore, overstimulation or activity of the RAAS pathway can lead to high blood pressure. High levels of angiotensin II are associated with chronic high blood pressure (systemic arterial hypertension, essential hypertension or hypertension), renal failure and cardiac fibrosis.

Hypertension is the most common risk factor for cardiovascular disease (CVD; including coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation and peripheral artery disease), chronic kidney disease (CKD) and cognitive impairment, and is the leading single contributor to all-cause death and disability worldwide (Forouzanfar et al., Lancet, 2016, 388:1659-1724). The World Health Organization estimates that 1.28 billion adults aged 30-79 years worldwide have hypertension. Less than half that population is diagnosed and treated and of those only about 20% are able to control their hypertension through pharmacological treatment, diet and lifestyle changes.

The American Heart Association has defined resistant hypertension as uncontrolled blood pressure (BP) $\geq 130/80$ mmHg, despite concurrent use of 3 anti-hypertension drug classes comprising a calcium channel blocker, a blocker of renin-angiotensin system, and a

thiazide diuretic, preferably chlorthalidone. Resistant hypertension may also be defined as treatment with ≥ 4 classes of anti-hypertension medication regardless of BP. The global prevalence of resistant hypertension is estimated to be approximately 14.7% among the treated population. Therapies currently approved for treating hypertension have significant limitations. Drugs such as ACE inhibitors and angiotensin receptor blockers are the primary treatments for hypertension. Such drugs are limited in their ability to inhibit the RAAS pathway and have considerable adverse effects and contraindications in certain patient populations (Momoniat et al., Cleveland Clinic Journal of Medicine, 2019, 86:601-607).

Factors such as increased age and obesity predispose individuals to risk of resistant hypertension. With an aging and increasingly overweight population and lack of effective treatments, the prevalence of hypertension, resistant hypertension and related disease is expected to continue to rise. Accordingly, there is a need to find effective treatments for RAAS related diseases.

SUMMARY

The present disclosure provides compounds, compositions, and methods for modulating the expression or activity of AGT. In certain embodiments, the compounds, compositions, and methods can be used to reduce the expression of AGT mRNA in a cell or animal. In certain embodiments, the compounds, compositions, and methods can be used to reduce the amount of AGT protein in a cell or animal.

In certain embodiments, the animal has a RAAS related disease, disorder or condition. In certain embodiments, the disease, disorder or condition is hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. Certain compounds, compositions and methods provided herein are directed to reducing a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an animal. In certain embodiments, the compounds and compositions provided herein are potent and tolerable and inhibit AGT expression, which can be used to treat, prevent, ameliorate, or slow progression of a RAAS related disease, disorder or condition or a

symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

In certain embodiments, the compounds and compositions comprise one or more features that are effective for increasing potency. In certain embodiments, the compounds and compositions comprise one or more features that are effective for increasing tolerability. In certain embodiments, compounds and compositions comprise one or more features that are effective for targeting the compound or composition to a cell or tissue. In certain embodiments, the compounds and compositions are more potent, have greater duration of action or have greater therapeutic value than compounds publicly disclosed.

DETAILED DESCRIPTION

It is to be understood that both the foregoing summary and the following detailed description are exemplary and explanatory only and are not restrictive of the embodiments, as claimed. 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, treatises, and GenBank, NCBI and other sequence reference records are hereby expressly incorporated by reference for the portions of the document discussed herein, as well as in their entirety as of the date of filing this application.

It is understood that the sequence set forth in each SEQ ID NO contained herein is independent of any modification to a sugar moiety, an internucleoside linkage, or a nucleobase even if shown in context with a modified compound. As such, compounds defined by a SEQ ID NO may comprise, independently, one or more modifications to a sugar moiety, an internucleoside linkage, or a nucleobase. Oligomeric compounds referenced by Compound Number or Ref ID NO indicate a combination of nucleobase sequence, chemical modification, and motif.

Herein, the use of the singular includes the plural unless specifically stated otherwise. For example, the articles “a” and “an” are used herein to refer to one or to more than one (i.e., to at least one) of the grammatical object of the article. By way of example, “an element” means one element or more than one element, e.g., a plurality of elements. 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 and is used interchangeably with, the phrase “including but not limited to”.

Definitions

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

“Angiotensinogen,” used interchangeably with the term “AGT,” refers to any nucleic acid or protein of AGT. Exemplary nucleotide and amino acid sequences of AGT can be found, for example, at GenBank Accession No. NM_000029.4 (incorporated herein as SEQ ID NO: 1), the complement of nucleotides 230702523 to 230745583 of NC_000001.11 (incorporated herein as SEQ ID NO: 2), NM_001382817.3 (incorporated herein as SEQ ID NO: 3) and nucleotides 5469 to 17068 of NG_008836.2 (incorporated herein as SEQ ID NO: 4). Additional examples of AGT sequences are readily available through publicly available databases, e.g., GenBank, UniProt, and OMIM. Further information on AGT can be found, for example, at ncbi.nlm.nih.gov/gene/?term=AGT. AGT, as used herein, also refers to variations of the AGT gene including variants provided in the SNP database. Numerous sequence variations within the AGT gene have been identified and may be found at, for example, NCBI dbSNP and UniProt (see, e.g., ncbi.nlm.nih.gov/snp/?term=AGT). “AGT mRNA” means an mRNA encoding a AGT protein. AGT may be referred to in either upper or lower case.

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

“2'-O-methoxyethyl” or “2'-MOE” means a 2'-O(CH₂)₂-OCH₃ modification. A 2'-O-methoxyethyl modified sugar is a modified sugar with 2'-O(CH₂)₂-OCH₃ in the place of the 2'-OH group of a ribosyl ring.

“5' start site” means the nucleotide of the target nucleic acid or region which is aligned to the 3'-most nucleoside of an antisense oligonucleotide.

“3' stop site” means the nucleotide of the target nucleic acid or region which is aligned to the 5'-most nucleoside of an antisense oligonucleotide.

“About” means within $\pm 10\%$ of a value. For example, if it is stated, “a compound achieved about 70% inhibition of AGT”, it is implied that AGT levels are inhibited within a range of 60% and 80%. When about is present before a series of numbers or a range, it is understood that “about” can modify each of the numbers in the series or range.

“Administer” or “administering” refers to routes of introducing a compound or composition provided herein to an individual to perform its intended function. An example, routes of administration that can be used include, but are not limited to, parenteral administration, such as subcutaneous, intravenous, or intramuscular injection or infusion.

“Ameliorate” refers to an improvement or 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 or severity of one or more indicators of a condition or disease. The progression or 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 oligonucleotide” or “antisense strand” means an oligonucleotide which includes a region that is complementary to a target nucleic acid, e.g., a AGT RNA or a region thereof.

“Complementarity” in reference to an oligonucleotide means the nucleobase sequence of such oligonucleotide or one or more regions thereof that is complementary to the nucleobase sequence of another oligonucleotide or nucleic acid or one or more regions thereof when the two nucleobase sequences are aligned in opposing directions.

Complementary nucleobases, as described herein, are limited to the following pairs: adenine (A) and thymine (T), adenine (A) and uracil (U), and cytosine (C) and guanine (G) unless otherwise specified. Complementary oligonucleotides and/or nucleic acids need not have nucleobase complementarity at each nucleoside and may include one or more nucleobase mismatches. By contrast, “fully complementary” or “100% complementary” in reference to oligonucleotides means that such oligonucleotides have nucleobase matches at each nucleoside without any nucleobase mismatches.

“Composition” or “pharmaceutical composition” means a mixture of substances suitable for administering to an individual. For example, a composition may comprise one or more compounds or salt thereof and a sterile aqueous solution.

“Co-administration” means administration of two or more compounds in any manner in which the pharmacological effects of both are manifest in the patient. Co-administration does not require both compounds to be administered in a single pharmaceutical composition, in the same dosage form, by the same route of administration, or at the same time. The effects of both compounds need not manifest themselves at the same time. The effects need only be

overlapping for a period of time and need not be coextensive. Co-administration includes parallel or sequential administration of the one or more compounds.

“Conjugate group” means a group of atoms that is attached to an oligonucleotide. A conjugate group is optionally attached to an oligonucleotide through a conjugate linker. A conjugate group may, for example, alter the distribution, targeting, or half-life of a compound into which it is incorporated. Conjugate groups include targeting moieties.

“Conjugate linker” means a group of atoms comprising at least one bond that connects a linked moiety to an oligonucleotide.

“Identity” in reference to an oligonucleotide means the nucleobase sequence of such oligonucleotide or one or more regions thereof that matches the nucleobase sequence of another oligonucleotide or nucleic acid or one or more regions thereof. Identity of an oligonucleotide to another oligonucleotide or nucleic acid need not require each nucleobase to match and may include one or more different nucleobases. By contrast, “fully identical” or “100% identity” in reference to oligonucleotides means that such oligonucleotides have the same nucleobase at each relative position over its length as the other oligonucleotide or nucleic acid.

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

“Inhibiting the expression or activity” with reference to a target nucleic acid or protein means to reduce or block the expression or activity of such target relative to the expression or activity in an untreated or control sample and does not necessarily indicate a total elimination of expression or activity.

As used herein, the term “internucleoside linkage” is the covalent linkage between adjacent nucleosides in an oligonucleotide. As used herein, “modified internucleoside linkage” means any internucleoside linkage other than a phosphodiester internucleoside linkage. “Phosphorothioate internucleoside linkage” is a modified internucleoside linkage in which one of the non-bridging oxygen atoms of a phosphodiester internucleoside linkage is replaced with a sulfur atom.

Representative internucleoside linkages having a chiral center include but are not limited to alkylphosphonates and phosphorothioates. Modified oligonucleotides comprising internucleoside linkages having a chiral center can be prepared as populations of modified oligonucleotides comprising stereorandom internucleoside linkages, or as populations of modified oligonucleotides comprising phosphorothioate linkages in particular stereochemical configurations as further described below. Unless otherwise indicated, chiral internucleoside

linkages of modified oligonucleotides described herein can be stereorandom or in a particular stereochemical configuration.

The compounds of the present disclosure may also contain unnatural proportions of atomic isotopes at one or more of the atoms that constitute such compounds. For example, the compounds may be radiolabeled with radioactive isotopes, such as for example tritium (^3H), iodine-125 (^{125}I), or carbon-14 (^{14}C). All isotopic variations of the compounds of the present disclosure, whether radioactive or not, are encompassed within the scope of the present disclosure.

The term “isotopic variant” refers to a therapeutic agent (e.g., a compound and/or modified oligonucleotide disclosed herein) that contains an unnatural proportion of an isotope at one or more of the atoms that constitute such a therapeutic agent. In certain embodiments, an “isotopic variant” of a therapeutic agent contains unnatural proportions of one or more isotopes, including, but not limited to, hydrogen (H), deuterium (^2H), tritium (^3H), carbon-11 (^{11}C), carbon-12 (^{12}C), carbon-13 (^{13}C), carbon-14 (^{14}C), nitrogen-13 (^{13}N), nitrogen-14 (^{14}N), nitrogen-15 (^{15}N), oxygen-14 (^{14}O), oxygen-15 (^{15}O), oxygen-16 (^{16}O), oxygen-17 (^{17}O), oxygen-18 (^{18}O), fluorine-17 (^{17}F), fluorine-18 (^{18}F), phosphorus-31 (^{31}P), phosphorus-32 (^{32}P), phosphorus-33 (^{33}P), sulfur-32 (^{32}S), sulfur-33 (^{33}S), sulfur-34 (^{34}S), sulfur-35 (^{35}S), sulfur-36 (^{36}S), chlorine-35 (^{35}Cl), chlorine-36 (^{36}Cl), chlorine-37 (^{37}Cl), bromine-79 (^{79}Br), bromine-81 (^{81}Br), iodine 123 (^{123}I), iodine-125 (^{125}I), iodine-127 (^{127}I), iodine-129 (^{129}I), and iodine-131 (^{131}I). In certain embodiments, an “isotopic variant” of a therapeutic agent contains unnatural proportions of one or more isotopes, including, but not limited to, hydrogen (H), deuterium (^2H), tritium (^3H), carbon-11 (^{11}C), carbon-12 (^{12}C), carbon-13 (^{13}C), carbon-14 (^{14}C), nitrogen-13 (^{13}N), nitrogen-14 (^{14}N), nitrogen-15 (^{15}N), oxygen-14 (^{14}O), oxygen-15 (^{15}O), oxygen-16 (^{16}O), oxygen-17 (^{17}O), oxygen-18 (^{18}O), fluorine-17 (^{17}F), fluorine-18 (^{18}F), phosphorus-31 (^{31}P), phosphorus-32 (^{32}P), phosphorus-33 (^{33}P), sulfur-32 (^{32}S), sulfur-33 (^{33}S), sulfur-34 (^{34}S), sulfur-35 (^{35}S), sulfur-36 (^{36}S), chlorine-35 (^{35}Cl), chlorine-36 (^{36}Cl), chlorine-37 (^{37}Cl), bromine-79 (^{79}Br), bromine-81 (^{81}Br), iodine 123 (^{123}I), iodine-125 (^{125}I), iodine-127 (^{127}I), iodine-129 (^{129}I), and iodine-131 (^{131}I).

It will be understood that, in a therapeutic agent (e.g., a compound and/or modified oligonucleotide disclosed herein), any hydrogen can be ^2H , for example, or any carbon can be ^{13}C , for example, or any nitrogen can be ^{15}N , for example, or any oxygen can be ^{18}O , for example, where feasible according to the judgment of one of skill. In certain embodiments, an “isotopic variant” of a therapeutic agent contains unnatural proportions of deuterium (D).

“Mismatch” or “non-complementary” means a nucleobase of a first oligonucleotide or nucleic acid that is not complementary to the corresponding nucleobase of a second oligonucleotide or nucleic acid when the first oligonucleotide/nucleic acid and second oligonucleotide/nucleic acid are aligned in an antiparallel orientation. For example, nucleobases including, but not limited to, a universal nucleobase, inosine, and hypoxanthine, are capable of hybridizing with at least one nucleobase but are still mismatched or non-complementary with respect to the nucleobase to which they are hybridized. As another example, a nucleobase of a first oligonucleotide/nucleic acid that is not capable of hybridizing to the corresponding nucleobase of a second oligonucleotide/nucleic acid when the first and second oligonucleotides are aligned in an antiparallel orientation is a mismatch or non-complementary nucleobase.

“Modified oligonucleotide” means an oligonucleotide, wherein at least one sugar, nucleobase, or internucleoside linkage is modified.

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

“Motif” means the pattern of unmodified and modified sugar moieties, nucleobases, and/or internucleoside linkages, in an oligonucleotide.

“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. As used herein a “naturally occurring nucleobase” is adenine (A), thymine (T), cytosine (C), uracil (U), and guanine (G). A “modified nucleobase” is a naturally occurring nucleobase that is chemically modified. A “universal base” or “universal nucleobase” is a nucleobase other than a naturally occurring nucleobase and modified nucleobase and is capable of pairing with any nucleobase.

“Nucleobase sequence” means the order of contiguous nucleobases in a nucleic acid or oligonucleotide independent of any sugar or internucleoside linkage.

“Nucleoside” means a compound comprising a nucleobase and a sugar moiety. The nucleobase and sugar moiety are each, independently, unmodified or modified. “Modified

nucleoside” means a nucleoside comprising a modified nucleobase and/or a modified sugar moiety. Modified nucleosides include abasic nucleosides, which lack a nucleobase.

“Oligomeric Compound” means a compound comprising one or more oligonucleotides and optionally one or more additional features, such as a conjugate group or terminal group. Examples of oligomeric compounds include single-stranded and double-stranded compounds, such as, oligonucleotides, antisense oligonucleotides, interfering RNA compounds (RNAi compounds), microRNA targeting oligonucleotides, occupancy-based compounds (e.g., mRNA processing or translation blocking compounds and splicing compounds). RNAi compounds include double-stranded compounds (e.g., short-interfering RNA (siRNA) and double-stranded RNA (dsRNA)) and single-stranded compounds (e.g., single-stranded siRNA (ssRNA), single-stranded RNAi (ssRNAi), short hairpin RNA (shRNA) and microRNA mimics) which work at least in part through the RNA-induced silencing complex (RISC) pathway resulting in sequence specific degradation and/or sequestration of a target nucleic acid through a process known as RNA interference (RNAi). The term “RNAi compound” is meant to be equivalent to other terms used to describe nucleic acid compounds that are capable of mediating sequence-specific RNA interference, for example, interfering RNA (iRNA), iRNA agent, RNAi agent, short interfering oligonucleotide, short interfering nucleic acid, short interfering modified oligonucleotide, chemically modified siRNA, and others. Additionally, the term “RNAi” is meant to be equivalent to other terms used to describe sequence-specific RNA interference.

The term “oligomeric duplex” means a duplex formed by two oligomeric compounds having complementary nucleobase sequences. Each oligomeric compound of an oligomeric duplex may be referred to as a “duplexed oligomeric compound.” The oligonucleotides of each oligomeric compound of an oligomeric duplex may include non-complementary overhanging nucleosides. In some embodiments, the terms “duplexed oligomeric compound” and “modified oligonucleotide” are used interchangeably. In other embodiments, the terms “oligomeric duplex” and “compound” are used interchangeably.

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

“Pharmaceutically acceptable carrier or diluent” means any substance suitable for use in administering to an individual. In certain embodiments, a pharmaceutically acceptable carrier or diluent aids the administration of a compound to and absorption by an individual and can be included in the compositions of the present disclosure without causing a significant adverse toxicological effect on the patient. Non-limiting examples of pharmaceutically acceptable excipients include water, NaCl, normal saline solutions, and the like. For example, a pharmaceutically acceptable carrier can be a sterile aqueous solution, such as PBS or water-for-injection. One of skill in the art will recognize that other pharmaceutical excipients are useful in the present disclosure.

“Pharmaceutically acceptable salt” means or refers to physiologically and pharmaceutically acceptable salts of compounds, such as oligomeric compounds or oligonucleotides, i.e., salts that retain the desired biological activity of the parent compound and do not impart undesired toxicological effects thereto.

As used herein, a pharmaceutically acceptable salt is any salt of a compound provided herein which retains its biological properties and which is not toxic or otherwise undesirable for pharmaceutical use. The pharmaceutically acceptable salts of the therapeutic agents disclosed herein include salts that are prepared with relatively nontoxic acids or bases, depending on the particular substituents found on the compounds or modified oligonucleotides described herein.

When compounds of the present disclosure contain relatively acidic functionalities, base addition salts can be obtained by contacting the neutral form of such compounds with a sufficient amount of the desired base, either neat or in a suitable inert solvent.

When compounds of the present disclosure contain relatively basic functionalities, acid addition salts can be obtained by contacting the neutral form of such compounds with a sufficient amount of the desired acid, either neat or in a suitable inert solvent.

Thus, the compounds of the present disclosure may exist as salts, such as with pharmaceutically acceptable acids. Such salts may be derived from a variety of organic and inorganic counter-ions well known in the art. Such salts include, but are not limited to: (1) acid addition salts formed with organic or inorganic acids such as hydrochloric, hydrobromic, sulfuric, nitric, phosphoric, sulfamic, acetic, trifluoroacetic, trichloroacetic, propionic, hexanoic, cyclopentylpropionic, glycolic, glutaric, pyruvic, lactic, malonic, succinic, sorbic, ascorbic, malic, maleic, fumaric, tartaric, citric, benzoic, 3-(4-hydroxybenzoyl)benzoic, picric, cinnamic, mandelic, phthalic, lauric, methanesulfonic, ethanesulfonic, 1,2-ethanedisulfonic, 2-hydroxyethanesulfonic, benzenesulfonic, 4-chlorobenzenesulfonic, 2-

naphthalenesulfonic, 4-toluenesulfonic, camphoric, camphorsulfonic, 4-methylbicyclo[2.2.2]-oct-2-ene-1-carboxylic, glucoheptonic, 3-phenylpropionic, trimethylacetic, tert-butylacetic, lauryl sulfuric, gluconic, benzoic, glutamic, hydroxynaphthoic, salicylic, stearic, cyclohexylsulfamic, quinic, muconic acid and the like acids; or (2) salts formed when an acidic proton present in the parent compound either (a) is replaced by a metal ion, e.g., an alkali metal ion, an alkaline earth ion or an aluminum ion, or alkali metal or alkaline earth metal hydroxides, such as sodium, potassium, calcium, magnesium, aluminum, lithium, zinc, and barium hydroxide, ammonia, or (b) coordinates with an organic base, such as aliphatic, alicyclic, or aromatic organic amines, such as ammonia, methylamine, dimethylamine, diethylamine, picoline, ethanolamine, diethanolamine, triethanolamine, ethylenediamine, lysine, arginine, ornithine, choline, N,N'-dibenzylethylene-diamine, chlorprocaine, diethanolamine, procaine, N-benzylphenethylamine, N-methylglucamine piperazine, tris(hydroxymethyl)-aminomethane, tetramethylammonium hydroxide, and the like (see, for example, Berge et al., "Pharmaceutical Salts," Journal of Pharmaceutical Science, 1977, 66, 1-19).

Pharmaceutically acceptable salts further include, by way of example only and without limitation, sodium, potassium, calcium, magnesium, ammonium, tetraalkylammonium, and the like, and when the compound contains a basic functionality, salts of non-toxic organic or inorganic acids, such as hydrohalides, e.g. hydrochloride and hydrobromide, sulfate, phosphate, sulfamate, nitrate, acetate, trifluoroacetate, trichloroacetate, propionate, hexanoate, cyclopentylpropionate, glycolate, glutarate, pyruvate, lactate, malonate, succinate, sorbate, ascorbate, malate, maleate, fumarate, tartarate, citrate, benzoate, 3-(4-hydroxybenzoyl)benzoate, picrate, cinnamate, mandelate, phthalate, laurate, methanesulfonate (mesylate), ethanesulfonate, 1,2-ethane-disulfonate, 2-hydroxyethanesulfonate, benzenesulfonate (besylate), 4-chlorobenzenesulfonate, 2-naphthalenesulfonate, 4-toluenesulfonate, camphorate, camphorsulfonate, 4-methylbicyclo[2.2.2]-oct-2-ene-1-carboxylate, glucoheptonate, 3-phenylpropionate, trimethylacetate, tert-butylacetate, lauryl sulfate, gluconate, benzoate, glutamate, hydroxynaphthoate, salicylate, stearate, cyclohexylsulfamate, quinate, muconate, and the like. In some embodiments, the pharmaceutically acceptable salt of the compounds and modified oligonucleotides disclosed herein is a sodium or a potassium salt. In some embodiments, the pharmaceutically acceptable salt of the compounds and modified oligonucleotides disclosed herein is a sodium salt.

The neutral forms of the compounds are preferably regenerated by contacting the salt with a base or acid and isolating the parent compound in the conventional manner. The parent form of the compound may differ from the various salt forms in certain physical properties, such as solubility in polar solvents. In embodiments, compounds of the present disclosure contain both basic and acidic functionalities that allow the compounds to be converted into either base or acid addition salts. The neutral forms of the compounds may be regenerated by contacting the salt with a base or acid and isolating the parent compound in a conventional manner. The parent form of the compounds differs from the various salt forms in certain physical properties, such as solubility in polar solvents, but, unless specifically indicated, the salts disclosed herein are equivalent to the parent form of the compound for the purposes of the present disclosure.

“Pharmaceutical agent” means a compound that provides a therapeutic benefit when administered to an individual.

“Phosphorothioate linkage” means a modified phosphate linkage in which one of the non-bridging oxygen atoms is replaced with a sulfur atom.

“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 oligonucleotide.

“Prevent” refers to delaying or forestalling the onset, development or progression of a disease, disorder, or condition for a period of time.

“RNA interference compound” or “RNAi compound” means a compound that acts, at least in part, through an RNA-induced silencing complex (RISC) pathway or Ago2, but not through RNase H, to modulate a target nucleic acid and/or protein encoded by a target nucleic acid. RNAi compounds include, but are not limited to double-stranded siRNA, single-stranded siRNA, and microRNA, including microRNA mimics.

“Sense oligonucleotide” or “sense strand” means the strand of a double-stranded compound that includes a region that is substantially complementary to a region of the antisense strand of the compound.

“Specifically inhibit” with reference to a target nucleic acid or protein means to reduce or block expression or activity of the target nucleic acid or protein while minimizing or eliminating effects on non-target nucleic acids or proteins.

“Subunit” with reference to an oligonucleotide means a nucleotide, nucleoside, nucleobase or sugar or a modified nucleotide, nucleoside, nucleobase or sugar as provided herein.

“Target nucleic acid,” “target RNA,” and “nucleic acid target” all mean a nucleic acid capable of being targeted by compounds described herein.

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

“Targeting moiety” means a conjugate group that provides an enhanced affinity for a selected target, e.g., molecule, cell or cell type, compartment, e.g., a cellular or organ compartment, tissue, organ or region of the body, as, e.g., compared to a compound absent such a moiety.

“Terminal group” means a chemical group or group of atoms that is covalently linked to a terminus of an oligonucleotide.

“Therapeutically effective amount” or “effective amount” means an amount of a compound, pharmaceutical agent, or composition that provides a therapeutic benefit to an individual. A “therapeutically effective amount” or “effective amount” is an amount sufficient for a compound to accomplish a stated purpose relative to the absence of the compound (e.g., achieve the effect for which it is administered, treat, prevent or ameliorate a disease or reduce one or more symptoms of a disease or condition). An example of a “therapeutically effective amount” or “effective amount” is an amount sufficient to contribute to the treatment, prevention, amelioration, or reduction of a symptom or symptoms of a disease. A “reduction” of a symptom or symptoms (and grammatical equivalents of this phrase) means decreasing of the severity or frequency of the symptom(s), or elimination of the symptom(s). A “prophylactically effective amount” of a drug is an amount of a drug that, when administered to a subject, will have the intended prophylactic effect, e.g., preventing or delaying the onset (or reoccurrence) of an injury, disease, pathology or condition, or reducing the likelihood of the onset (or reoccurrence) of an injury, disease, pathology, or condition, or their symptoms. The term “therapeutically effective amount,” as used herein, refers to that amount of the therapeutic agent sufficient to provide a therapeutic benefit to an individual, such as treating, preventing or ameliorating the disease or disorder or symptom thereof, as described above. For example, for the given parameter, a therapeutically effective amount will show an increase or decrease of at least 5%, 10%, 15%, 20%, 25%, 40%, 50%, 60%, 75%, 80%, 90%, or at least 100%. Therapeutic efficacy can also be expressed as “-fold”

increase or decrease. For example, a therapeutically effective amount can have at least a 1.2-fold, 1.5-fold, 2-fold, 5-fold, or more effect over a control.

The terms “treating” or “treatment” refer to any indicia of success in the therapy or amelioration of an injury, disease, pathology or condition, including any objective or subjective parameter such as abatement; remission; diminishing of symptoms or making the injury, pathology or condition more tolerable to the patient; slowing in the rate of degeneration or decline; making the final point of degeneration less debilitating; improving a patient's physical or mental well-being. The treatment or amelioration of symptoms can be based on objective or subjective parameters, including the results of a physical examination. The term “treating” and conjugations thereof, may include prevention of an injury, pathology, condition, or disease. In embodiments, treating is preventing. In embodiments, treating does not include preventing.

“Treating” or “treatment” as used herein (and as well-understood in the art) also broadly includes any approach for obtaining beneficial or desired results in a subject's condition, including clinical results. Beneficial or desired clinical results can include, but are not limited to, alleviation or amelioration of one or more symptoms or conditions, diminishment of the extent of a disease, stabilizing (i.e., not worsening) the state of disease, prevention of a disease's transmission or spread, delay or slowing of disease progression, amelioration or palliation of the disease state, diminishment of the reoccurrence of disease, and remission, whether partial or total and whether detectable or undetectable. In other words, “treatment” as used herein includes any cure, amelioration, or prevention of a disease. Treatment may prevent the disease from occurring; inhibit the disease's spread; relieve the disease's symptoms, fully or partially remove the disease's underlying cause, shorten a disease's duration, or do a combination of these things.

“Treating” and “treatment” as used herein include prophylactic treatment. Treatment methods include administering to a subject a therapeutically effective amount of a compound described herein. The administering step may consist of a single administration or may include a series of administrations. The length of the treatment period depends on a variety of factors, such as the severity of the condition, the age of the patient, the concentration of the compound, the activity of the compositions used in the treatment, or a combination thereof. It will also be appreciated that the effective dosage of an agent used for the treatment or prophylaxis may increase or decrease over the course of a particular treatment or prophylaxis regime. In some instances, chronic administration may be required. For example, the compositions are administered to the subject in an amount and for a duration sufficient to

treat the patient. "Treat" refers to administering a compound or pharmaceutical composition to an animal in order to effect an alteration or improvement of a disease, disorder, or condition in the animal.

Certain compounds of the present disclosure possess asymmetric carbon atoms (optical or chiral centers) or double bonds; the enantiomers, racemates, diastereomers, tautomers, geometric isomers, stereoisomeric forms that may be defined, in terms of absolute stereochemistry, as (R)- or (S)- or, as (D)- or (L)- for amino acids, and individual isomers are encompassed within the scope of the present disclosure. The compounds of the present disclosure do not include those that are known in art to be too unstable to synthesize and/or isolate. The present disclosure is meant to include compounds in racemic and optically pure forms. Optically active (R)- and (S)-, or (D)- and (L)-isomers may be prepared using chiral synthons or chiral reagents or resolved using conventional techniques. When the compounds described herein contain olefinic bonds or other centers of geometric asymmetry, and unless specified otherwise, it is intended that the compounds include both E and Z geometric isomers.

As used herein, the term "isomers" refers to compounds having the same number and kind of atoms, and hence the same molecular weight, but differing in respect to the structural arrangement or configuration of the atoms.

The term "tautomer," as used herein, refers to one of two or more structural isomers which exist in equilibrium and which are readily converted from one isomeric form to another.

It will be apparent to one skilled in the art that certain compounds of this disclosure may exist in tautomeric forms, all such tautomeric forms of the compounds being within the scope of the disclosure.

Unless otherwise stated, structures depicted herein are also meant to include all stereochemical forms of the structure (i.e., the R and S configurations for each asymmetric center). Therefore, single stereochemical isomers as well as enantiomeric and diastereomeric mixtures of the present compounds are within the scope of the disclosure.

As used herein, "chirally enriched population" means a plurality of molecules of identical molecular formula, wherein the number or percentage of molecules within the population that contain a particular stereochemical configuration at a particular chiral center is greater than the number or percentage of molecules expected to contain the same particular stereochemical configuration at the same particular chiral center within the population if the particular chiral center were stereorandom. Chirally enriched populations of molecules

having multiple chiral centers within each molecule may contain one or more stereorandom chiral centers. In certain embodiments, the molecules are modified oligonucleotides. In certain embodiments, the molecules are compounds comprising modified oligonucleotides.

Unless otherwise stated, structures depicted herein are also meant to include compounds which differ only in the presence of one or more isotopically enriched atoms. For example, compounds having the present structures except for the replacement of a hydrogen by a deuterium or tritium, or the replacement of a carbon by ^{13}C - or ^{14}C -enriched carbon are within the scope of this disclosure.

As used herein, “stereorandom chiral center” in the context of a population of molecules of identical molecular formula means a chiral center having a random stereochemical configuration. For example, in a population of molecules comprising a stereorandom chiral center, the number of molecules having the (S) configuration of the stereorandom chiral center may be but is not necessarily the same as the number of molecules having the (R) configuration of the stereorandom chiral center. The stereochemical configuration of a chiral center is considered random when it is the results of a synthetic method that is not designed to control the stereochemical configuration. In certain embodiments, a stereorandom chiral center is a stereorandom phosphorothioate internucleoside linkage.

Certain Embodiments

In certain aspects, the disclosure relates to methods, compounds and compositions for inhibiting AGT. In certain embodiments, AGT is specifically inhibited. In certain embodiments, AGT is specifically degraded. In certain embodiments, AGT expression is inhibited. In certain embodiments, AGT translation is inhibited. In certain embodiments, AGT activity is inhibited. In certain embodiments, AGT expression, translation, or activity is reduced by at least 10% relative to the expression, translation, or activity in an untreated or control sample. For example, in certain embodiments, AGT expression, translation, or activity is reduced by at least 10%, at least 20%, at least 30%, at least 40%, at least 50%, at least 60%, at least 70%, at least 80%, at least 90%, at least 95%, 10-50%, 25-50%, 25-75%, 50-75%, 50-99%, or 75-99% relative to the expression, translation, or activity in an untreated or control sample. In certain embodiments, AGT expression, translation, or activity is reduced as measured by any suitable assay, including but not limited to, an immunoassay, a hybridization-based assay, or a sequencing-based assay (e.g., RNA-Seq).

In certain aspects, the disclosure relates to compounds targeted to a AGT nucleic acid. In certain embodiments, the AGT nucleic acid has the sequence set forth in GENBANK Accession No. NM_000029.4 (incorporated herein as SEQ ID NO: 1), the complement of nucleotides 230702523 to 230745583 of NC_000001.11 (incorporated herein as SEQ ID NO: 2), NM_001382817.3 (incorporated herein as SEQ ID NO: 3) and nucleotides 5469 to 17068 of NG_008836.2 (incorporated herein as SEQ ID NO: 4).

In certain embodiments, the compound is an oligomeric compound. In certain embodiments, the compound is single-stranded. In certain embodiments, the compound is double-stranded.

Certain embodiments provide a compound comprising a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20.

Certain embodiments provide a compound comprising a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20.

Certain embodiments provide a compound comprising a modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20.

In certain embodiments, the modified oligonucleotide is at least 80%, at least 85%, at least 90%, or at least 95% complementary to SEQ ID NO: 1 or 3. In certain embodiments, the modified oligonucleotide comprises at least one modification selected from a modified internucleoside linkage, a modified sugar, and a modified nucleobase. In certain embodiments, the compound is double-stranded.

Certain embodiments provide a compound comprising a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide.

In certain embodiments, the compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase

sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences provided in Tables 2-25, 42, 45, 50, and 51, and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide.

Certain embodiments provide a compound comprising a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide.

Certain embodiments provide a compound comprising a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.

In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain

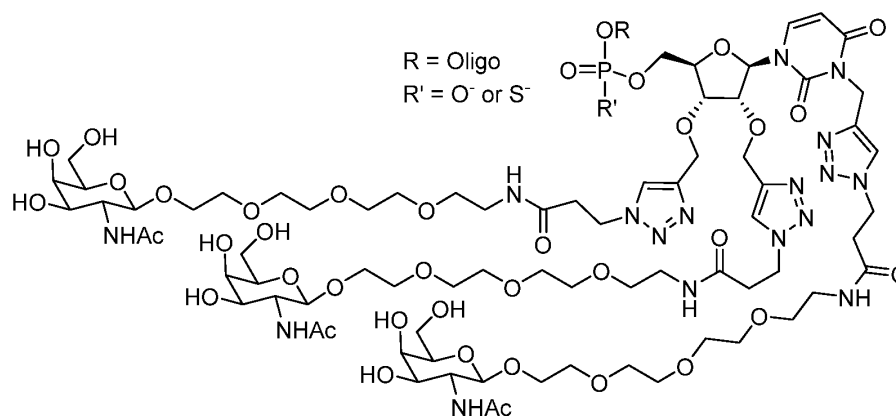
embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42.

In certain embodiments, the modified oligonucleotide or first modified oligonucleotide of any preceding compound has at least 80%, at least 85%, at least 90%, or at least 95% complementarity or identity to SEQ ID NO: 1 or 3 over its length. In certain embodiments, the modified oligonucleotide or first modified oligonucleotide has at least 1, at least 2, at least 3 mismatches to a region of SEQ ID NO: 1 or 3. In certain embodiments, the region of complementarity between the first modified oligonucleotide or first strand and the second modified oligonucleotide or second strand is 14 to 30 linked nucleosides in length. In certain embodiments, the region of complementarity between the first modified oligonucleotide or first strand and the second modified oligonucleotide or second strand is 14 to 23 linked nucleosides in length. In certain embodiments, the region of complementarity between the first modified oligonucleotide or first strand and the second modified oligonucleotide or second strand is 19 to 23 linked nucleosides in length. In certain embodiments, the region of complementarity between the first modified oligonucleotide or first strand and the second modified oligonucleotide or second strand is 21 to 23 linked nucleosides in length. In certain embodiments, the first modified oligonucleotide is fully complementary to the second modified oligonucleotide.

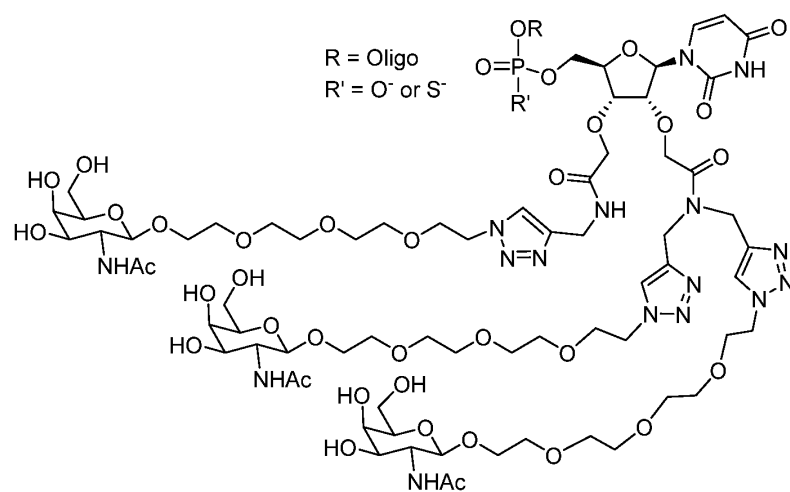
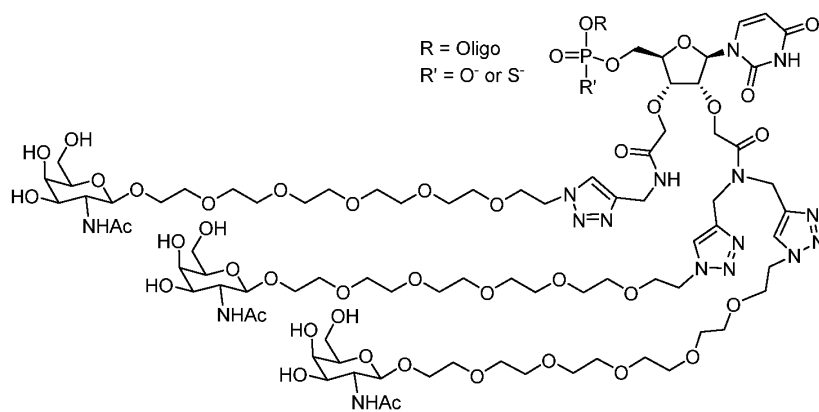
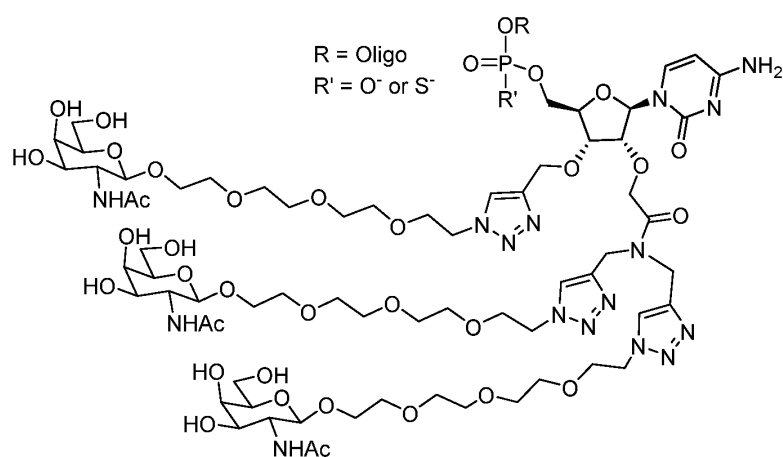
In certain embodiments, the modified oligonucleotide or first modified oligonucleotide of any preceding compound comprises at least one modification selected from a modified internucleoside linkage, a modified sugar, and a modified nucleobase. In certain embodiments, the second modified oligonucleotide of any preceding compound comprises at least one modification selected from the group consisting of a modified internucleoside linkage, a modified sugar, and a modified nucleobase. In certain embodiments, the modified internucleoside linkage is a phosphorothioate internucleoside linkage or a methylphosphonate internucleoside linkage. In certain embodiments, the phosphorothioate internucleoside linkage or methylphosphonate internucleoside linkage is at the 3' terminus of the first or second modified oligonucleotide or at the 5' terminus of the first modified oligonucleotide. In certain embodiments, the modified sugar comprises a modification selected from the group consisting of a halogen, an alkoxy group and a bicyclic sugar. In certain embodiments, the modified sugar comprises a 2'-F modification. In certain embodiments, the modified sugar comprises a 2'-OMe modification. In certain embodiments, each nucleoside of the first modified oligonucleotide comprises a modified sugar. In certain

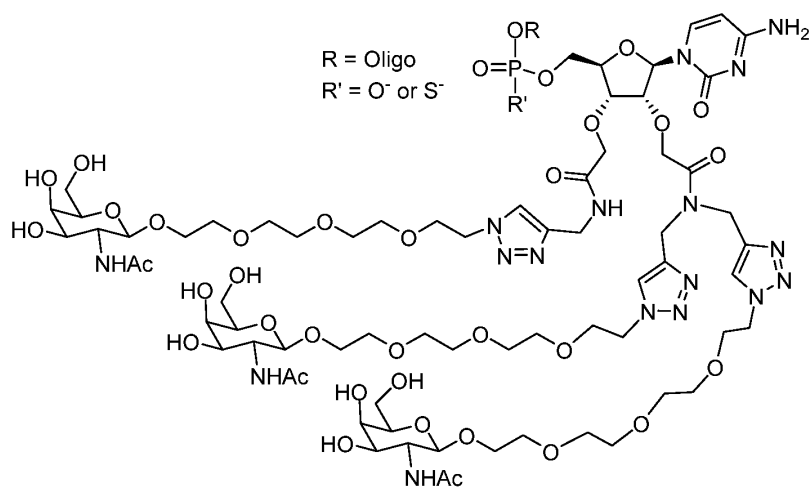
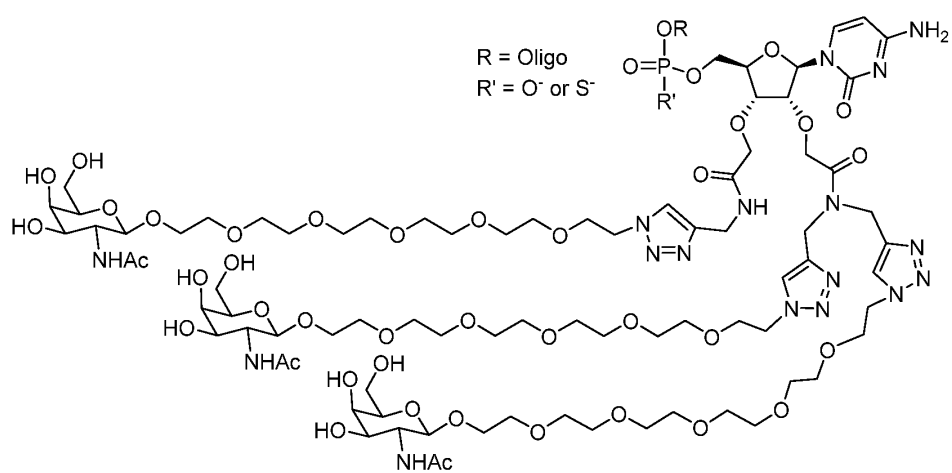
embodiments, each nucleoside of the second modified oligonucleotide comprises a modified sugar. In certain embodiments, the modified sugar comprises a modification selected from the group consisting of a halogen, an alkoxy group and a bicyclic sugar or a combination thereof. In certain embodiments, the modified sugar comprises a modification selected from the group consisting of 2'-MOE, 2'-F, and 2'-OMe or a combination thereof. In certain embodiments, the first modified oligonucleotide comprises no more than ten 2'-F sugar modifications. In certain embodiments, the second modified oligonucleotide comprises no more than five 2'-F sugar modifications.

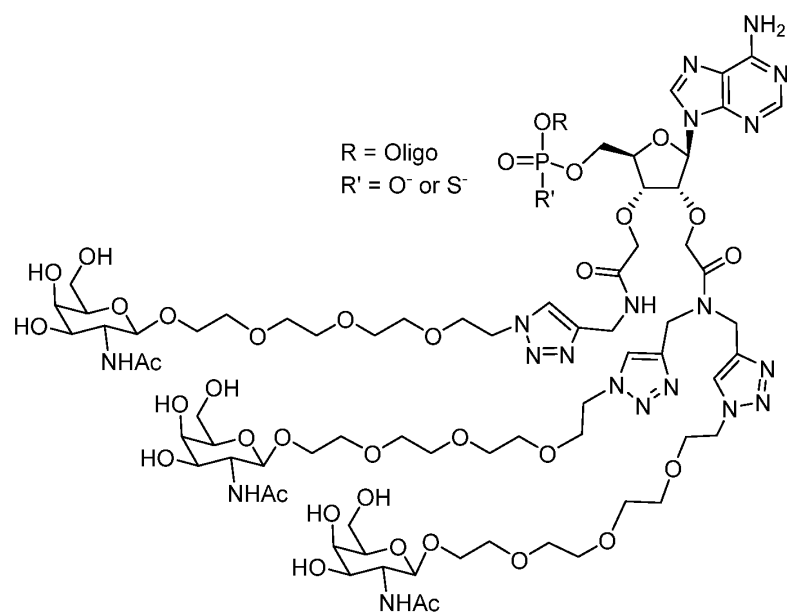
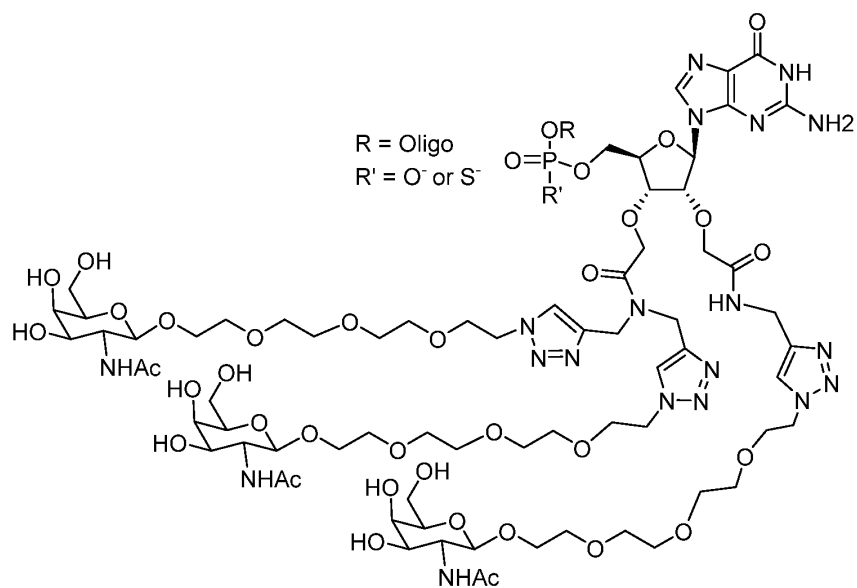
In certain embodiments, the compound of any preceding embodiment comprises a conjugate group. In certain embodiments, the conjugate group is attached to the 5' end of the modified oligonucleotide. In certain embodiments, the conjugate group is a targeting moiety. In certain embodiments, the targeting moiety comprises one or more GalNAc. In certain embodiments, the modified oligonucleotide is the second modified oligonucleotide or sense oligonucleotide. In certain embodiments, the one or more GalNAc is attached to the 2' or 3' position of the ribosyl ring. In certain embodiments, the one or more GalNAc is attached to the 5' nucleoside of the modified oligonucleotide. In certain embodiments, the 5' nucleoside of a modified oligonucleotide is selected from the following Formulae or a salt, solvate, or hydrate thereof, wherein R is the portion of the modified oligonucleotide other than the 5' nucleoside:



Formula I

**Formula II****Formula III****Formula IV**

**Formula V****Formula VI**

**Formula VII****Formula VIII**

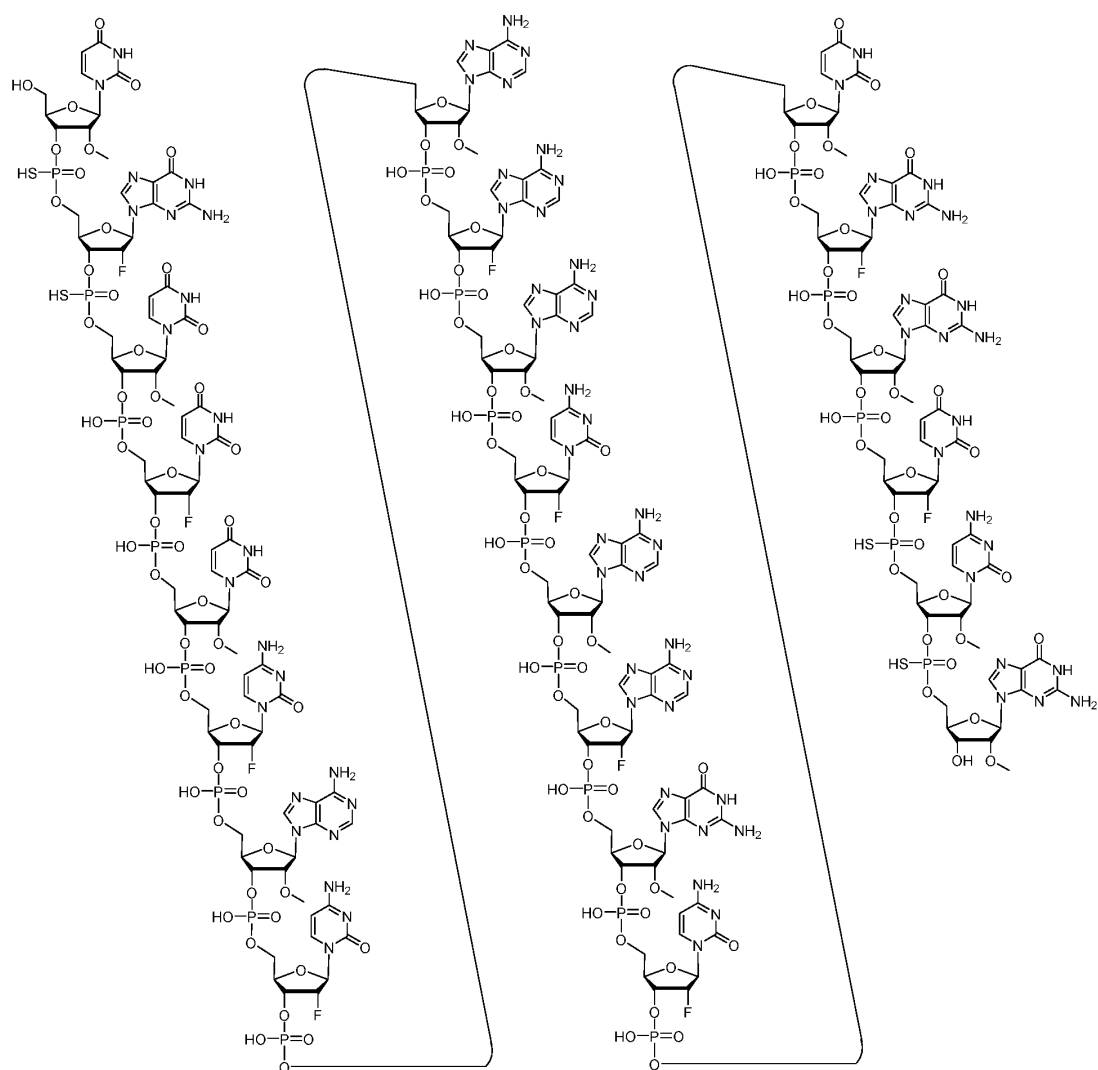
In certain embodiments, R' is O. In certain embodiments, R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula I and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula I and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula II

and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula II and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula III and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula III and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula IV and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula IV and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula V and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula V and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VI and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VI and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VII and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VII and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VIII and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VIII and R' is S.

Certain embodiments provide a compound comprising a first modified oligonucleotide selected from the group consisting of any one of Ref ID NOs: IA0500, IA1019, IA1022-1024, IA1027, IA1093-1095, and IA1103 and a second modified oligonucleotide 14 to 21 linked nucleosides in length fully complementary to the first modified oligonucleotide.

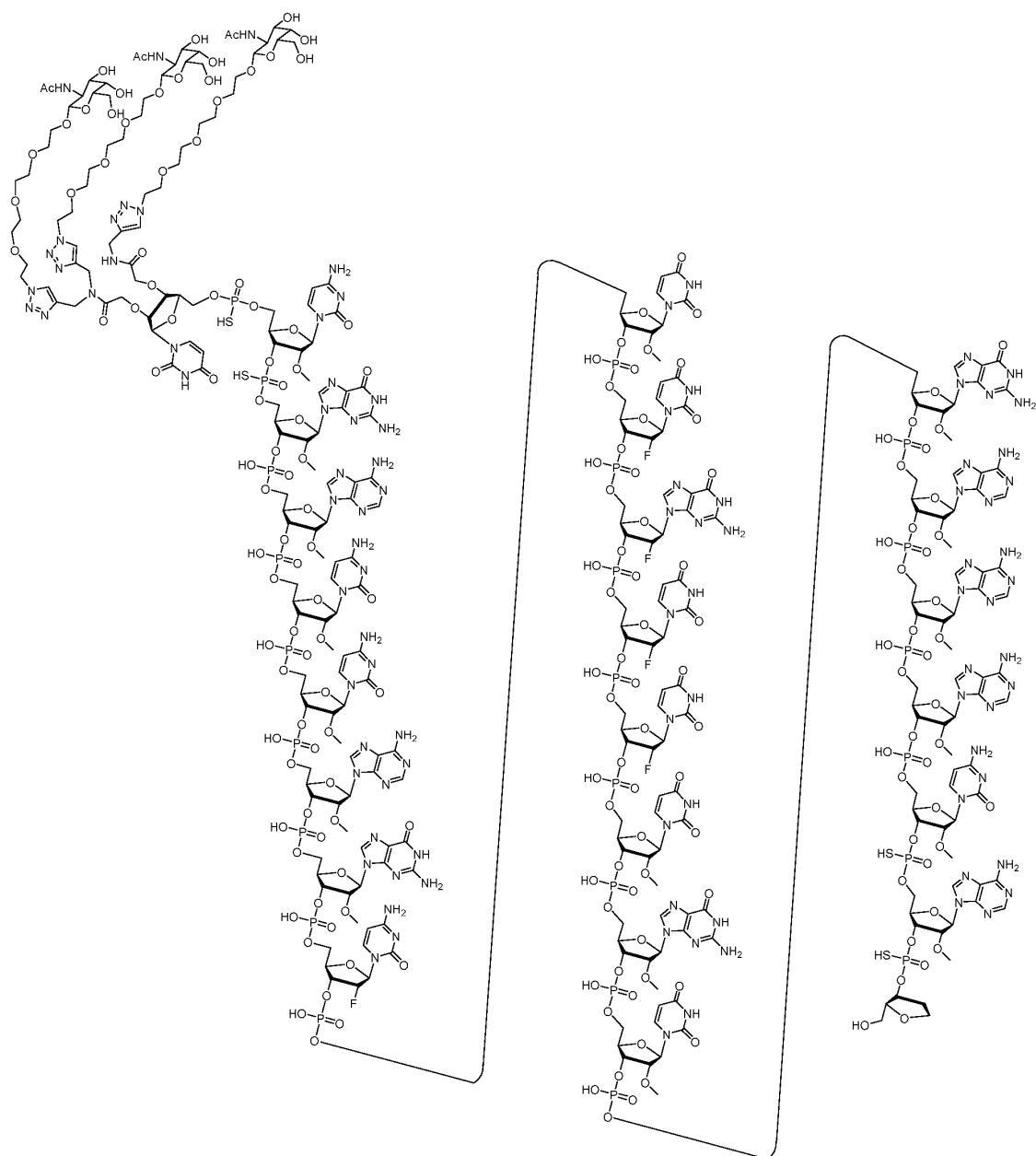
Certain embodiments provide a compound comprising a first modified oligonucleotide selected from the group consisting of any one of IA0500, IA1019, IA1022-1024, IA1027, IA1093-1095, and IA1103 and a second modified oligonucleotide selected from the group consisting of IS1255, IS1258, IS1259, IS1260, IS1279, IS1280, IS1372-1375, IS1381, and IS1382. In certain embodiments, the compound comprises a first modified oligonucleotide consisting of IA1024 and a second modified oligonucleotide consisting of IS1260. In certain embodiments, the compound comprises a first modified oligonucleotide consisting of IA1094 and a second modified oligonucleotide consisting of IS1374. In certain embodiments, the compound comprises a first modified oligonucleotide consisting of IA1103 and a second modified oligonucleotide consisting of IS1382.

In an aspect provided herein, is a modified oligonucleotide according to the following chemical structure:



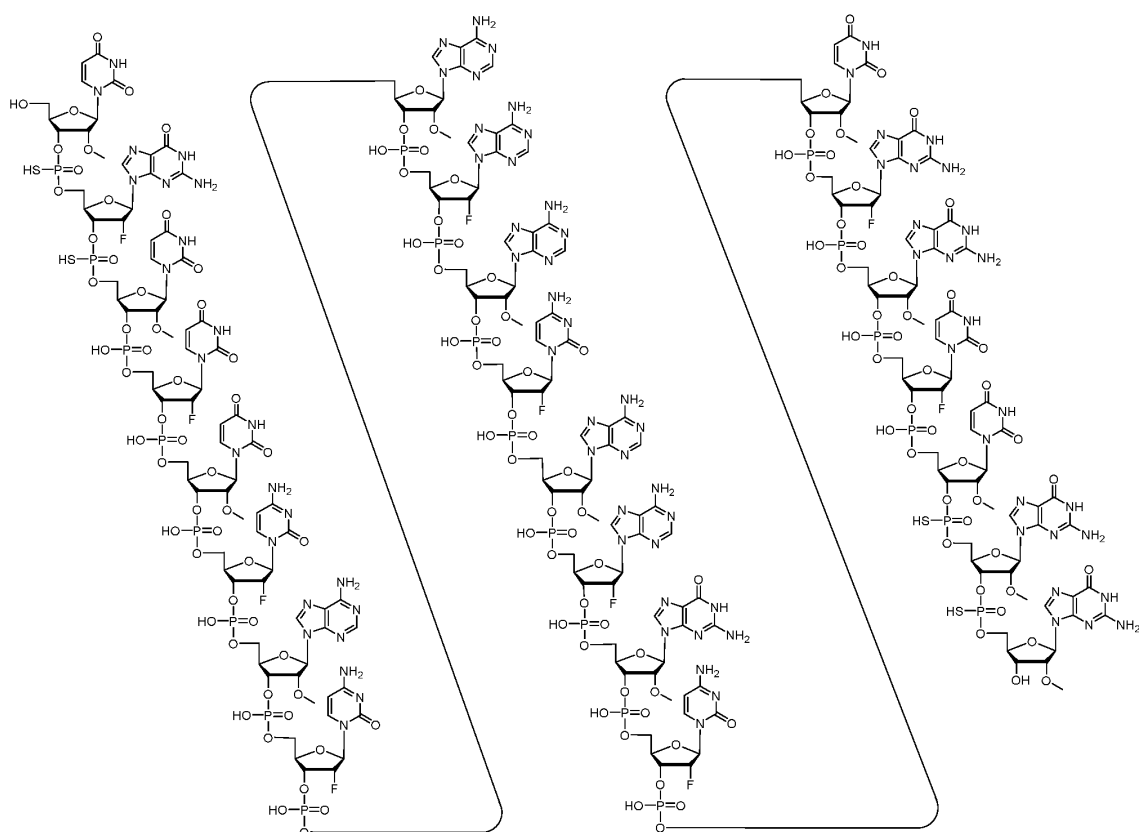
or a pharmaceutically acceptable salt or stereoisomer thereof. In certain embodiments, Ref ID NO: IA1094 is a modified oligonucleotide, or a pharmaceutically acceptable salt or stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a modified oligonucleotide according to the following chemical structure:



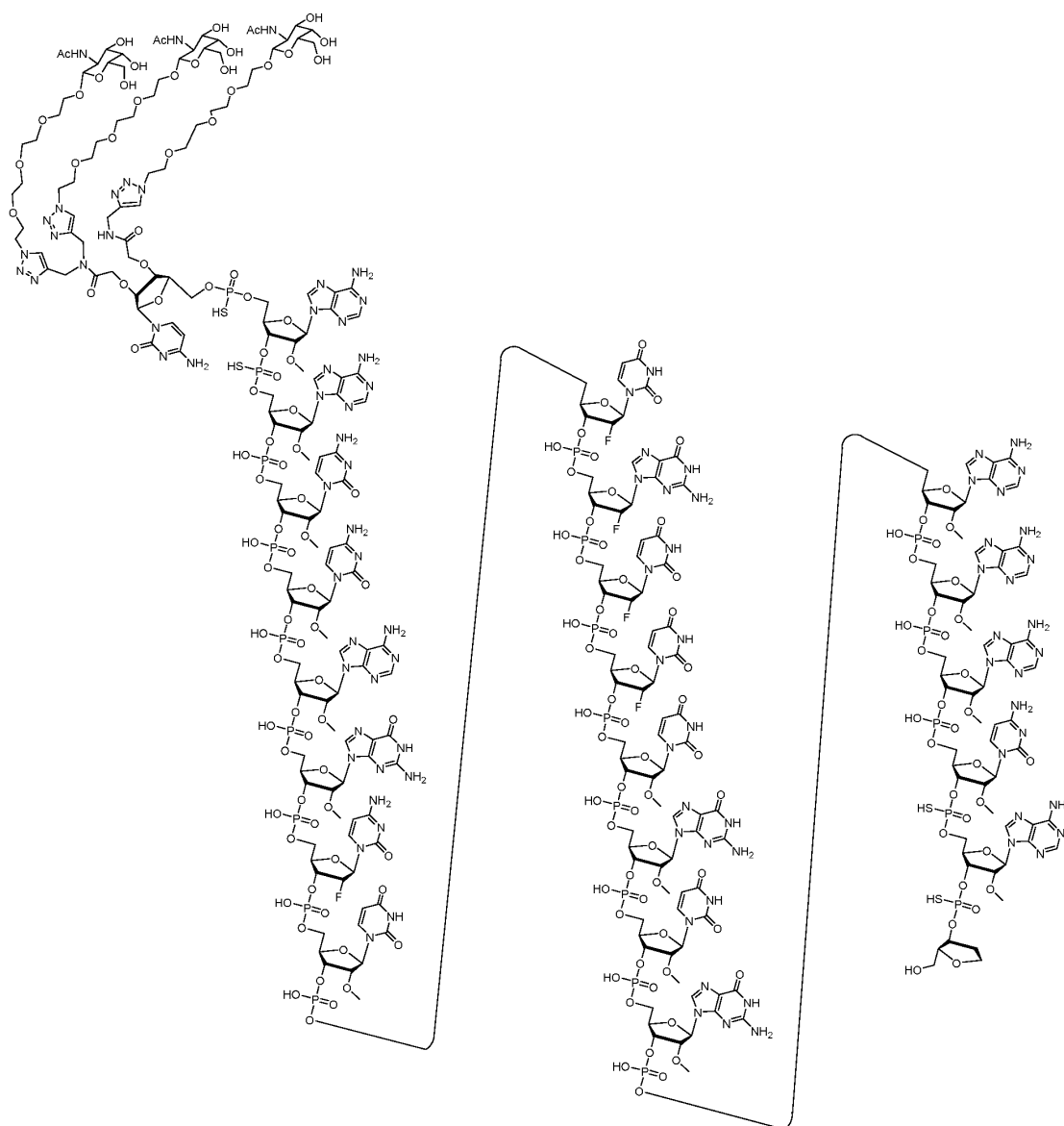
or a pharmaceutically acceptable salt or stereoisomer thereof. In certain embodiments, Ref ID NO: IS1374 is a modified oligonucleotide, or a pharmaceutically acceptable salt or stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a modified oligonucleotide according to the following chemical structure:



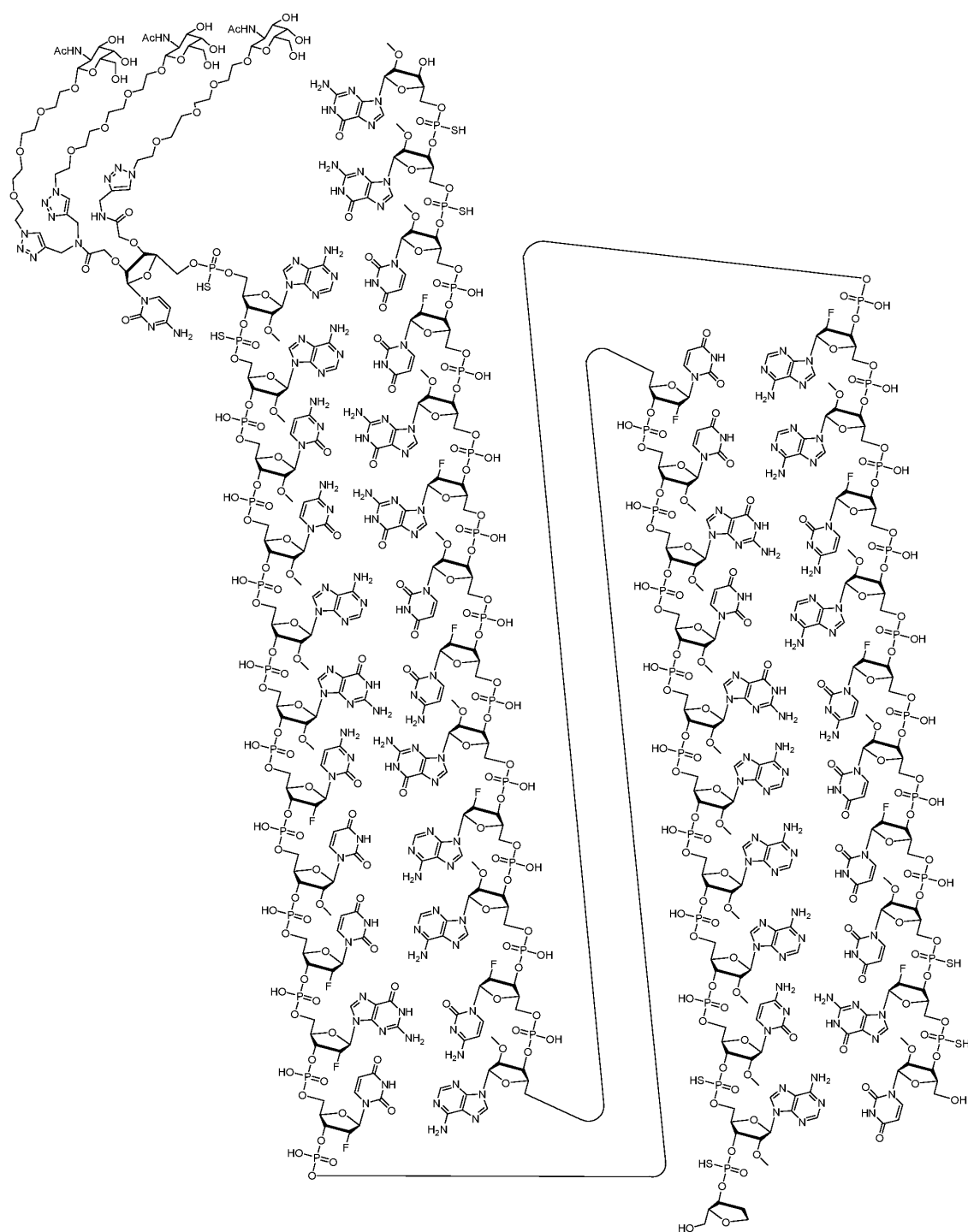
or a pharmaceutically acceptable salt or stereoisomer thereof. In certain embodiments, Ref ID NO: IA1103 is a modified oligonucleotide, or a pharmaceutically acceptable salt or stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a modified oligonucleotide according to the following chemical structure:



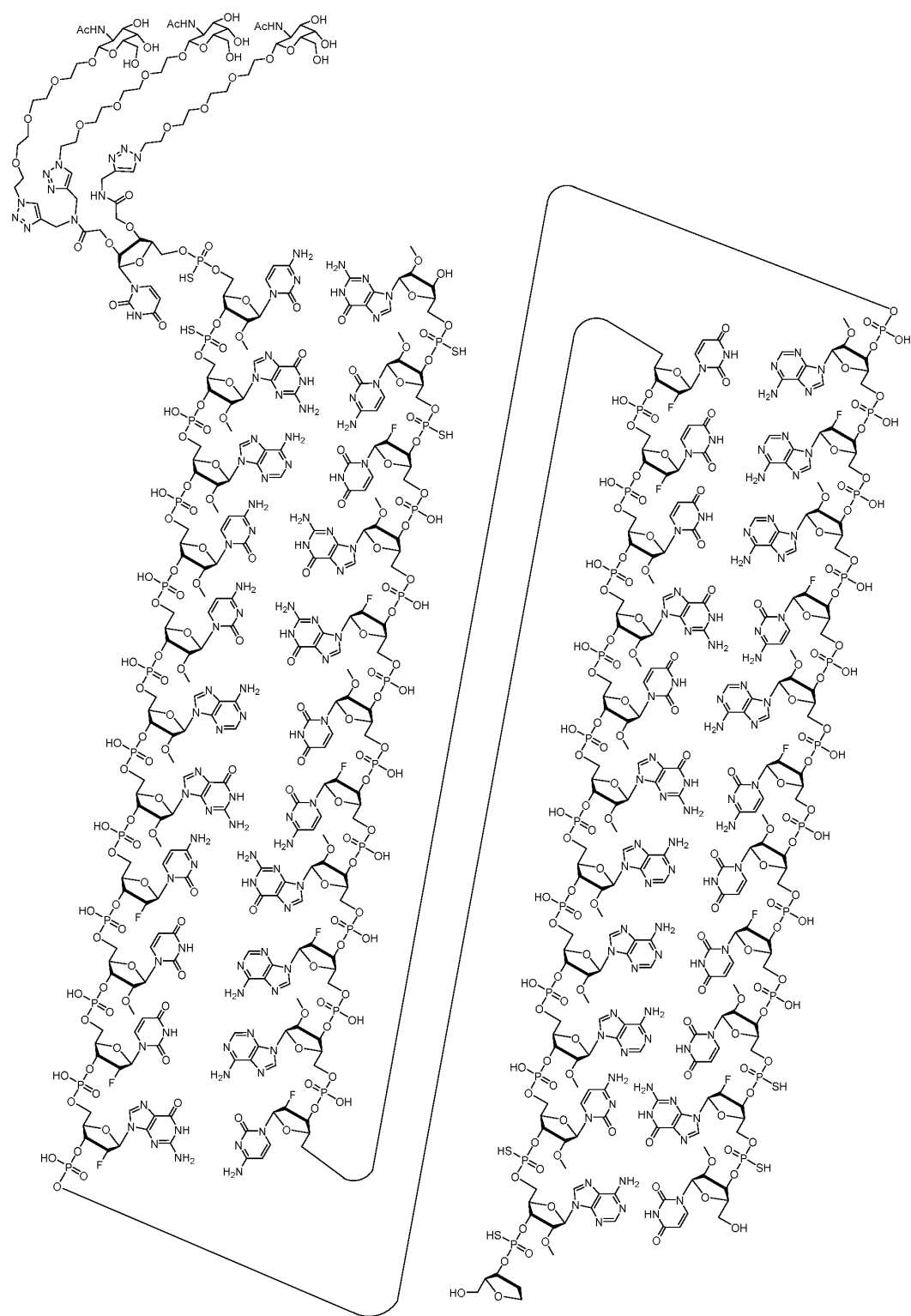
or a pharmaceutically acceptable salt or stereoisomer thereof. In certain embodiments, Ref ID NO: IS1382 is a modified oligonucleotide, or a pharmaceutically acceptable salt or stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a compound according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof. In certain embodiments, Compound Number RD3058 is a compound, or a pharmaceutically acceptable salt or stereoisomer thereof, according to the preceding chemical structure.

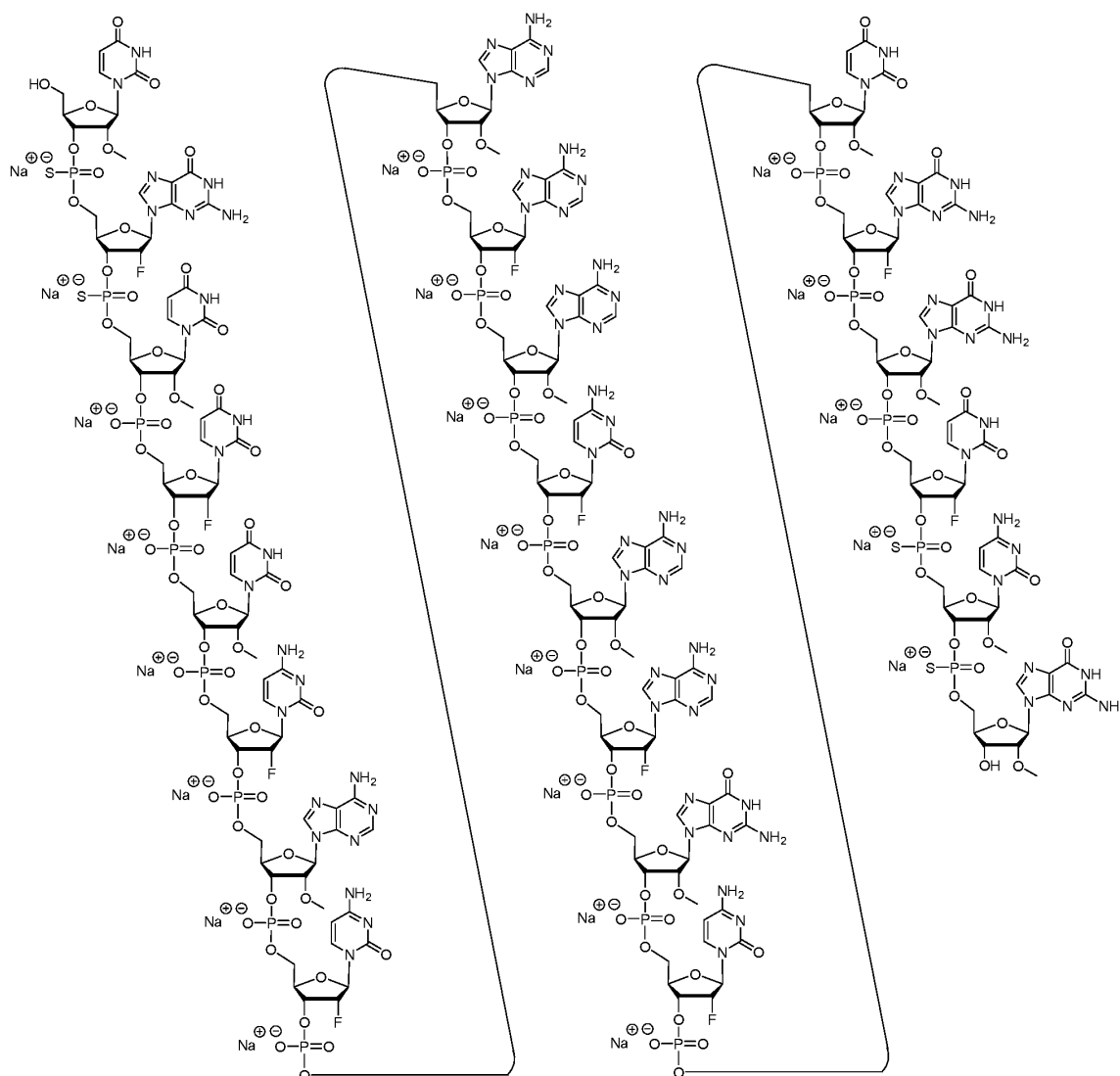
In an aspect provided herein, is a compound according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof. In certain embodiments, Compound Number RD3050 is a compound, or a pharmaceutically acceptable salt or stereoisomer thereof, according to the preceding chemical structure.

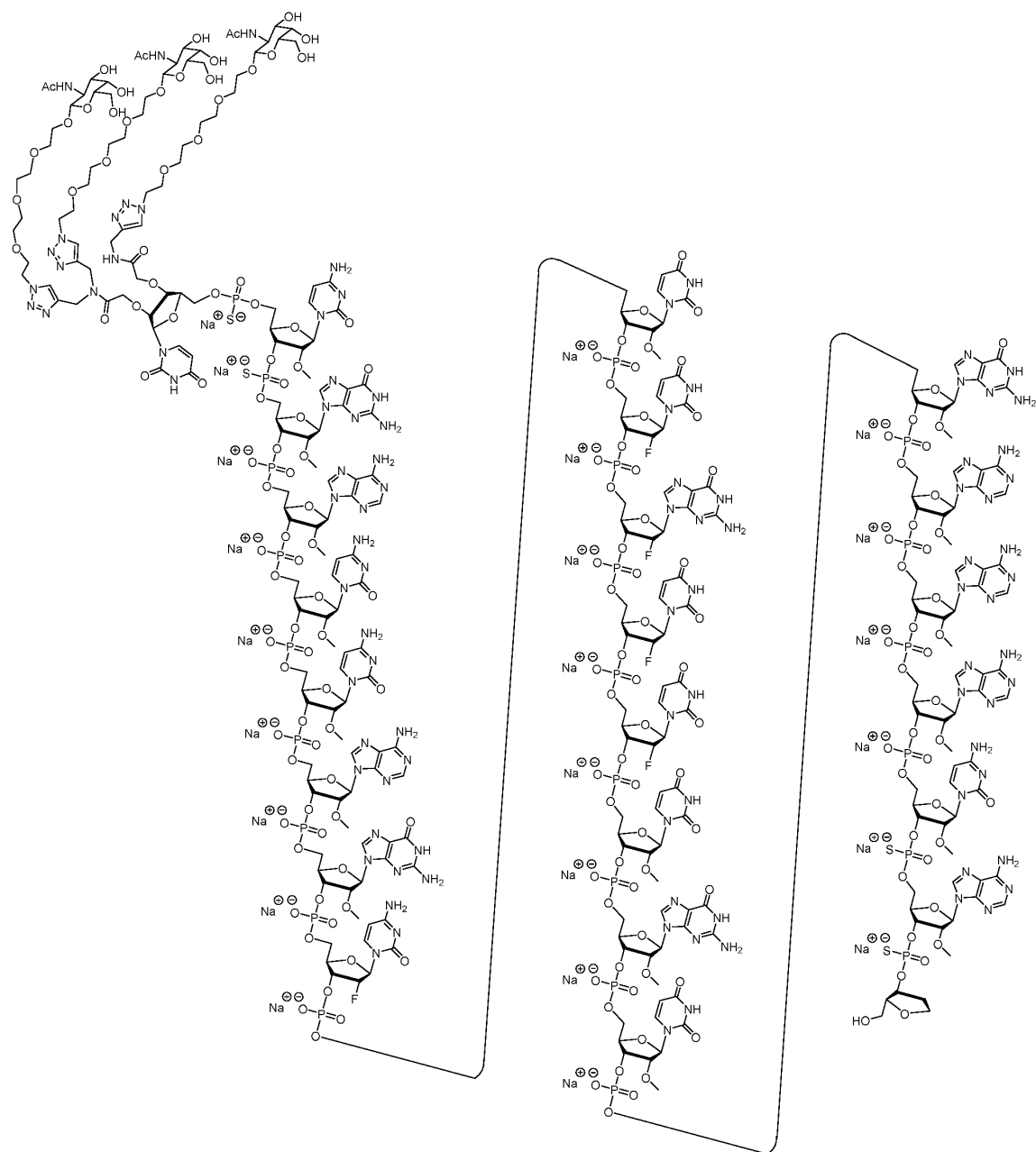
In certain embodiments, the pharmaceutically acceptable salt of the modified oligonucleotides provided herein is a sodium salt or a potassium salt. In certain embodiments, the pharmaceutically acceptable salt of the compounds provided herein is a sodium salt or a potassium salt.

In an aspect provided herein, is a sodium salt of a modified oligonucleotide according to the following chemical structure:



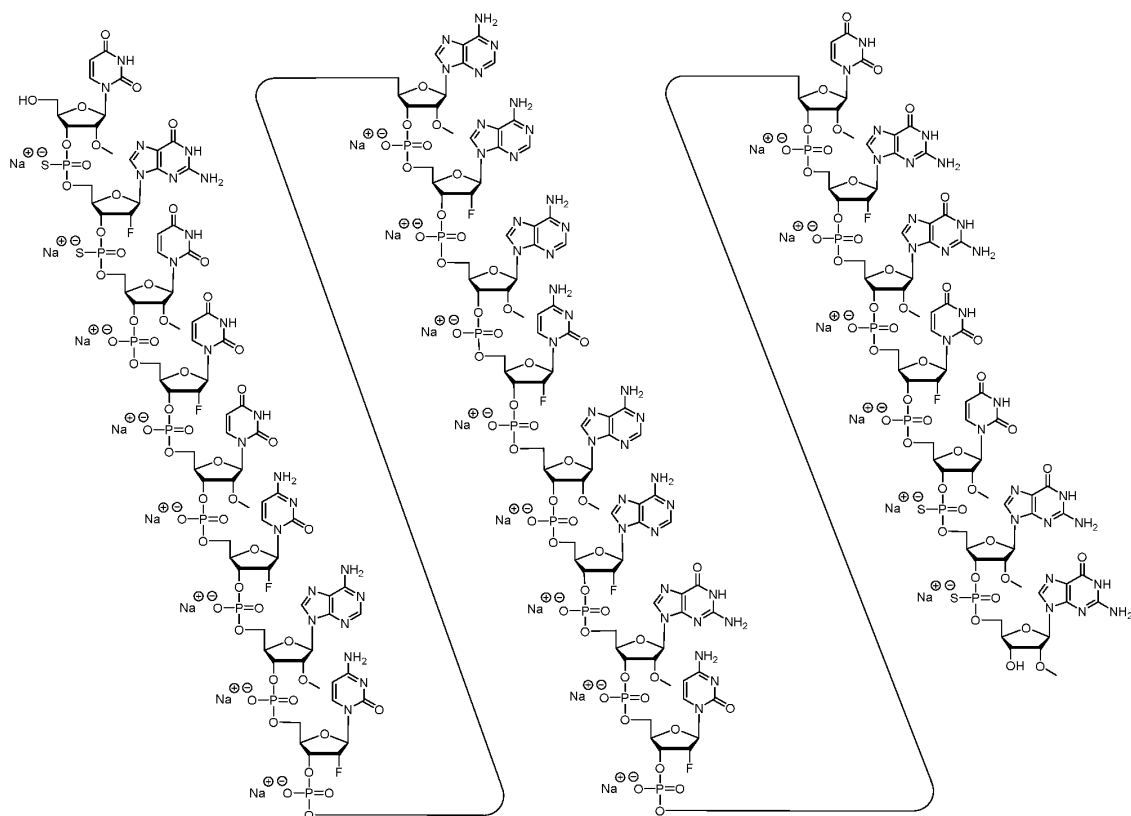
or a stereoisomer thereof. In certain embodiments, Ref ID NO: IA1094 is a modified oligonucleotide, or a stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a sodium salt of a modified oligonucleotide according to the following chemical structure:



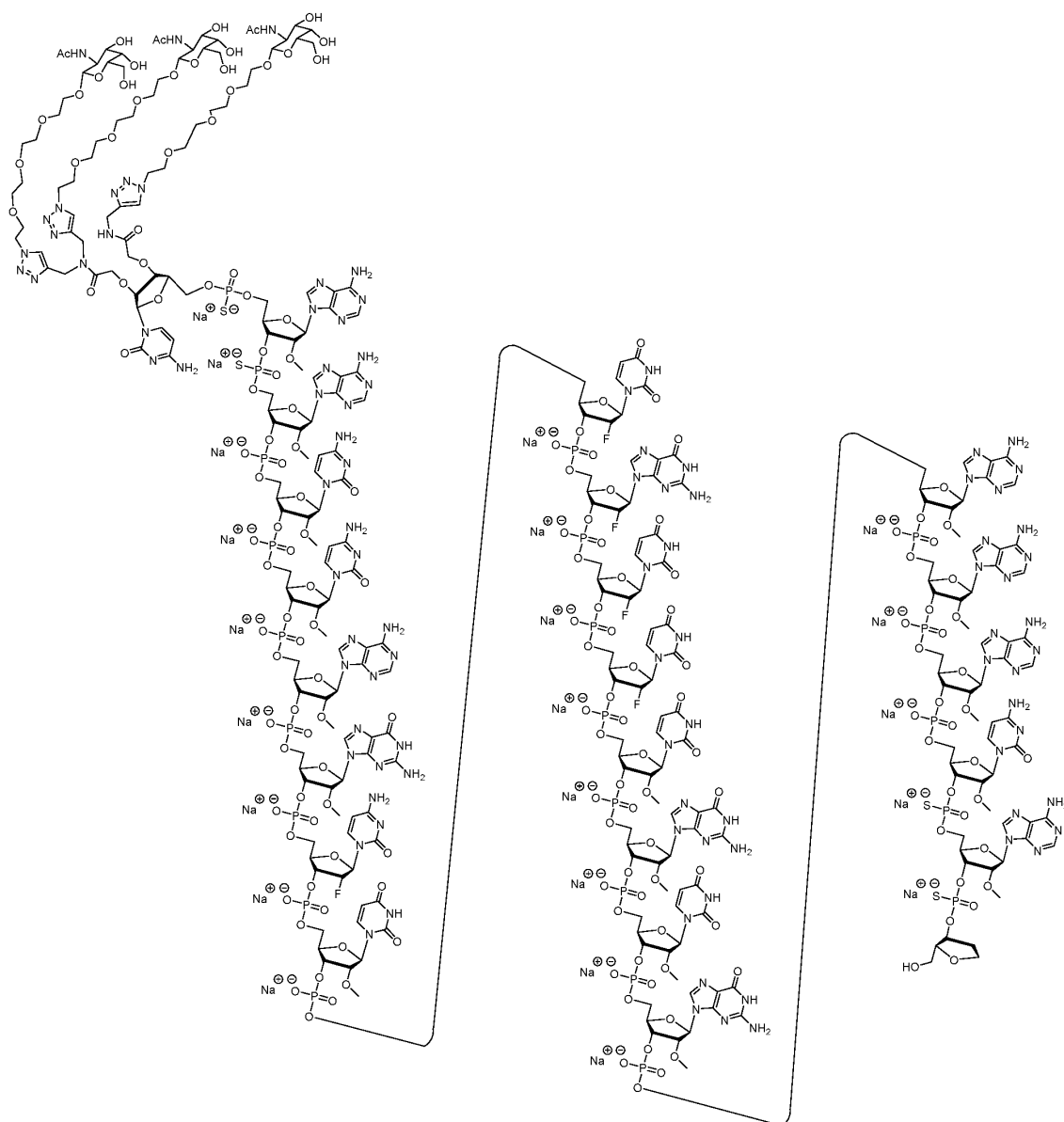
or a stereoisomer thereof. In certain embodiments, Ref ID NO: IS1374 is a modified oligonucleotide or a stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a sodium salt of a modified oligonucleotide according to the following chemical structure:



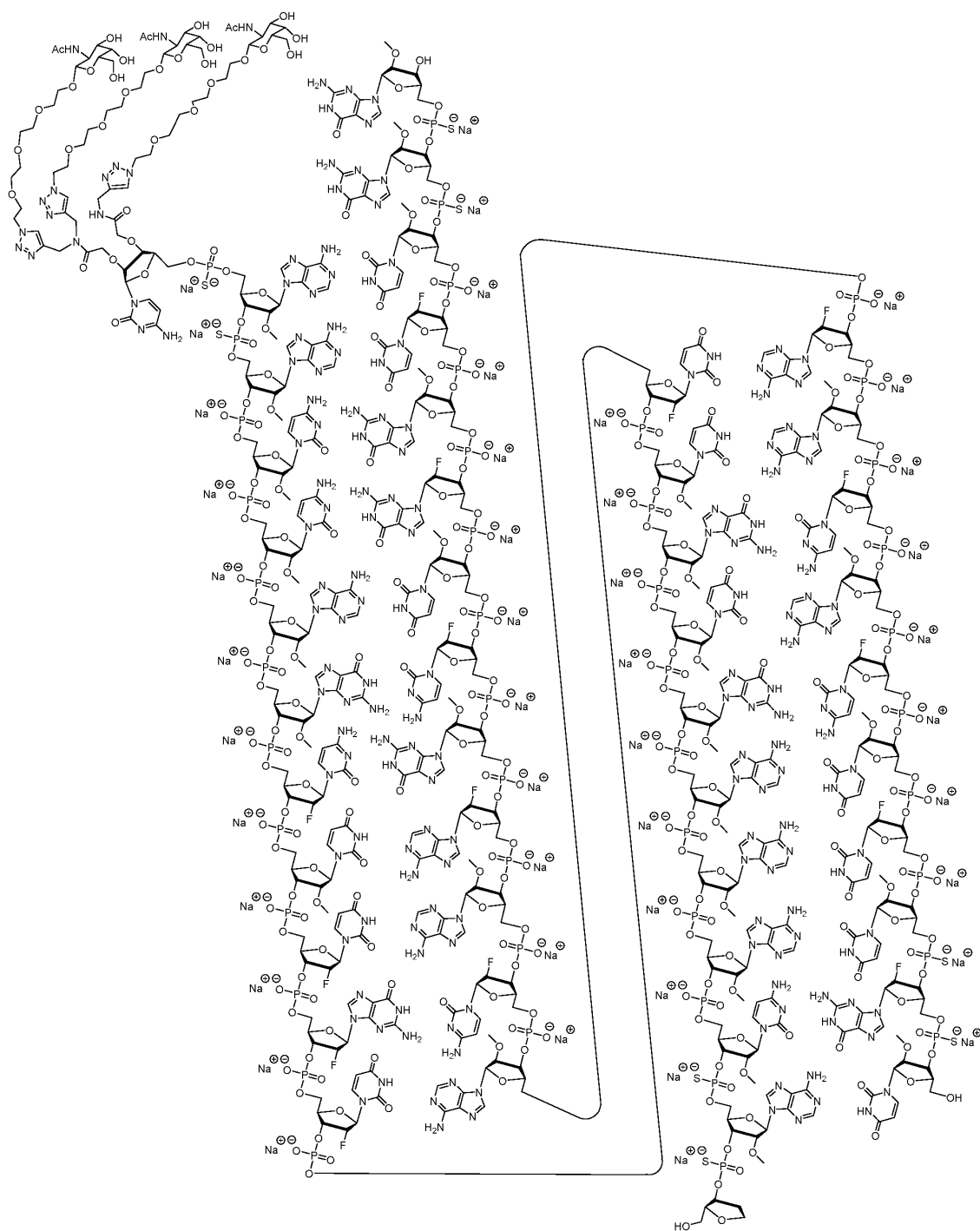
or a stereoisomer thereof. In certain embodiments, Ref ID NO: IA1103 is a modified oligonucleotide or a stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a sodium salt of a modified oligonucleotide according to the following chemical structure:



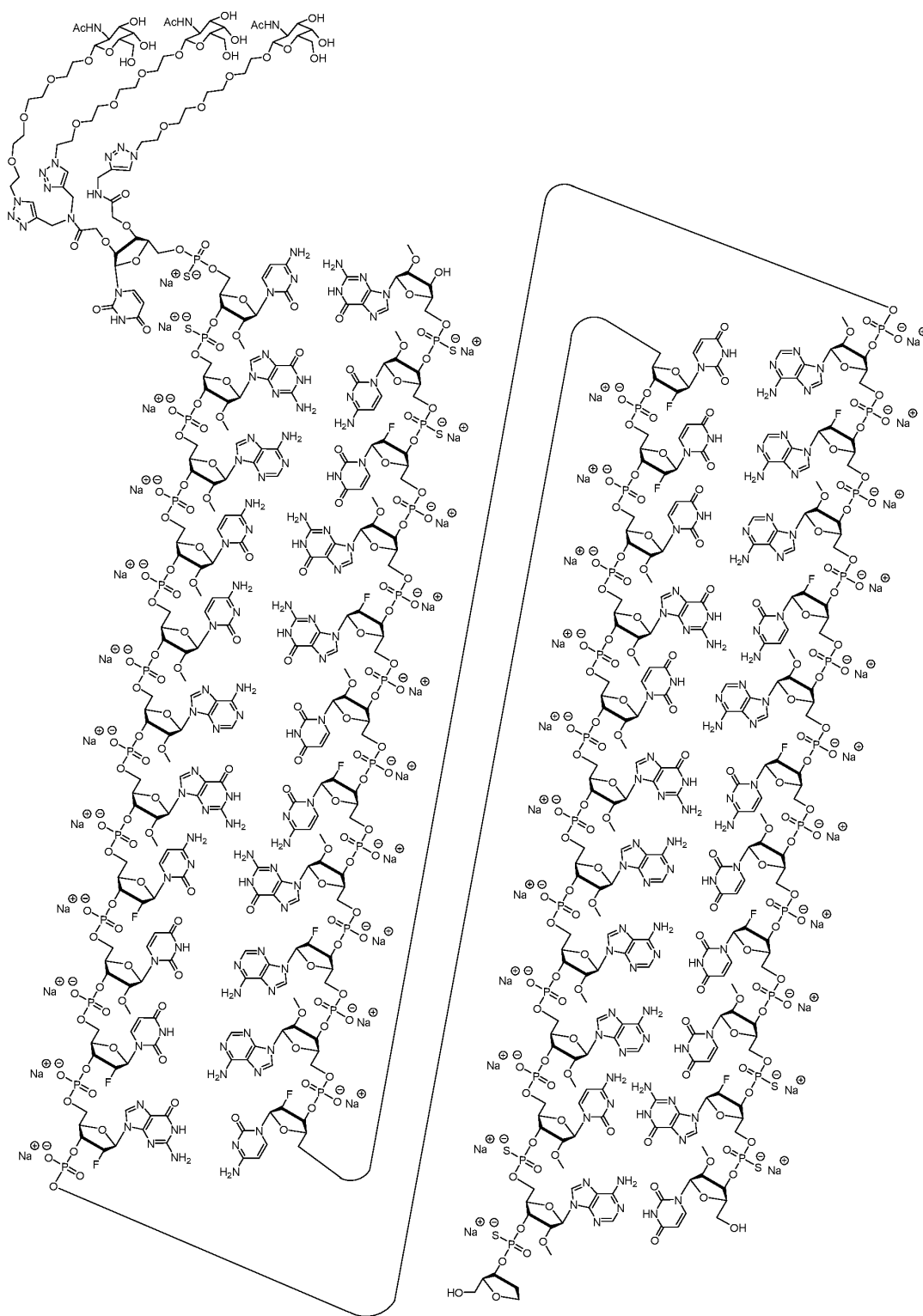
or a stereoisomer thereof. In certain embodiments, Ref ID NO: IS1382 is a modified oligonucleotide or a stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a sodium salt of a compound according to the following chemical structure:



or a stereoisomer thereof. In certain embodiments, Compound Number RD3058 is a compound, or a stereoisomer thereof, according to the preceding chemical structure.

In an aspect provided herein, is a sodium salt of a compound according to the following chemical structure:



or a stereoisomer thereof. In certain embodiments, Compound Number RD3050 is a compound, or a stereoisomer thereof, according to the preceding chemical structure.

In certain embodiments, provided herein is a population of modified oligonucleotides, wherein all of the phosphorothioate internucleoside linkages of the modified oligonucleotide are stereorandom. In certain embodiments, provided herein is a population of compounds, wherein all of the phosphorothioate internucleoside linkages of the modified oligonucleotide are stereorandom.

In certain embodiments, the compound of any foregoing embodiment is in a pharmaceutically acceptable salt form. In certain embodiments, the pharmaceutically acceptable salt is a sodium salt. In certain embodiments, the pharmaceutically acceptable salt is a potassium salt.

Certain embodiments provide a composition comprising the compound of any one of the foregoing embodiments and a pharmaceutically acceptable carrier.

Certain embodiments provide a composition comprising a compound of any preceding embodiment, for use in therapy.

Certain embodiments provide a method of treating, preventing, or ameliorating a disease, disorder or condition associated with AGT in an individual comprising administering to the individual a compound targeted to AGT, thereby treating, preventing, or ameliorating the disease.

In certain embodiments, the compound or composition of any foregoing embodiment is administered to an individual. In certain embodiments, the disease, disorder or condition is a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

In certain embodiments, administering the compound inhibits or reduces or improves a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual in a therapeutically effective amount. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual at a dosage level sufficient to deliver about 1 to 100 mg/kg of body weight of the individual. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual at a fixed dose of about 25 mg to about 1,000 mg. In certain embodiments, the compound or composition is administered to the individual one or more times in a day up to the dosage level or fixed dose.

In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual daily, weekly, monthly, quarterly or yearly. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual about once per quarter (i.e., once every three months) to about once per year. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual about once per quarter, about once every six months or about once per year.

Certain embodiments provide a method of inhibiting expression of AGT in a cell comprising contacting the cell with a compound targeted to AGT, thereby inhibiting expression of AGT in the cell. In certain embodiments, the cell is in the liver of an individual. In certain embodiments, the individual has, or is at risk of having, a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

Certain embodiments provide a method of reducing or inhibiting a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an individual, comprising administering a compound targeted to AGT to the individual, thereby reducing or inhibiting a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease,

heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in the individual. In certain embodiments, the individual has, or is at risk of having, a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound is a compound targeted to AGT. In certain embodiments, the compound is any of the foregoing compounds. In certain embodiments, the compound or composition is administered parenterally.

Certain embodiments provide use of a compound targeted to AGT for treating, preventing, or ameliorating a disease, disorder or condition associated with AGT. In certain embodiments, the disease, disorder or condition is a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound is a compound targeted to AGT. In certain embodiments, the compound is any of the foregoing compounds.

Certain embodiments provide use of a compound targeted to AGT in the manufacture of a medicament for treating, preventing, or ameliorating a disease, disorder or condition associated with AGT. In certain embodiments, the disease, disorder or condition is a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound is a compound targeted to AGT. In certain embodiments, the compound is any of the foregoing compounds.

Certain Indications

In certain aspects, the disclosure relates to methods of inhibiting AGT expression, which can be useful for treating, preventing, or ameliorating a disease associated with AGT

in an individual, by administration of a compound that targets AGT. In certain embodiments, the compound can be a AGT specific inhibitor. In certain embodiments, the compound can be an antisense oligonucleotide, an oligomeric compound, or an oligonucleotide targeted to AGT.

In certain aspects, the disclosure relates to treating, preventing, or ameliorating a disease, disorder or condition associated with AGT. In certain embodiments, diseases, disorders or conditions associated with AGT treatable, preventable, and/or ameliorable with the methods provided herein include a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. Certain compounds provided herein are directed to compounds and compositions that reduce a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an animal.

In certain embodiments, a method of treating, preventing, or ameliorating a disease associated with AGT in an individual comprises administering to the individual a compound comprising a AGT specific inhibitor, thereby treating, preventing, or ameliorating the disease. In certain embodiments, the individual is identified as having, or at risk of having, a disease associated with AGT. In certain embodiments, the disease is a RAAS related disease. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides) in length having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In

certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In certain embodiments, a single-stranded compound can be 14 to 30, 14 to 23, 14 to 20, 16 to 20, or 14 to 16, linked nucleosides in length. In certain embodiments, a single-stranded compound can be 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, or 30, linked nucleosides in length. In certain embodiments, a double-stranded compound can comprise two oligonucleotides of the same or different lengths, as described elsewhere herein. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified

oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide. In certain embodiments, the compound is administered to the individual parenterally. In certain embodiments, administering the compound improves, preserves, or prevents a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an animal.

In certain embodiments, a method of treating, preventing, or ameliorating a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an animal comprises administering to the individual a compound comprising a AGT specific inhibitor, thereby treating, preventing, or ameliorating a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of

SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified

oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide. In certain embodiments, administering the compound improves, preserves, or prevents a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an animal. In certain embodiments, the individual is identified as having, or at risk of having, a disease associated with AGT.

In certain embodiments, a method of inhibiting expression of AGT in an individual having, or at risk of having, a disease associated with AGT comprises administering to the individual a compound comprising a AGT specific inhibitor, thereby inhibiting expression of AGT in the individual. In certain embodiments, administering the compound inhibits expression of AGT in the liver. In certain embodiments, the disease is a RAAS related disease. In certain embodiments, the individual has, or is at risk of having, a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain

embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain

embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide. In certain embodiments, the compound is administered to the individual parenterally. In certain embodiments, administering the compound improves, preserves, or prevents a RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

In certain embodiments, a method of inhibiting expression of AGT in a cell comprises contacting the cell with a compound comprising a AGT specific inhibitor, thereby inhibiting expression of AGT in the cell. In certain embodiments, the cell is a hepatocyte. In certain embodiments, the cell is in the liver. In certain embodiments, the cell is in the liver of an individual who has, or is at risk of having, a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from

the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23,

linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.

In certain embodiments, a method of reducing or inhibiting a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an individual having, or at risk of having, a disease associated with AGT comprises administering to the individual a compound comprising a AGT specific inhibitor, thereby reducing or inhibiting a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in the individual. In certain embodiments, the individual has, or is at risk of having, a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of

SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of

complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide. In certain embodiments, the compound is administered to the individual parenterally. In certain embodiments, the individual is identified as having, or at risk of having, a disease associated with AGT.

Certain embodiments are drawn to a compound comprising a AGT specific inhibitor for use in treating a disease, disorder or condition associated with AGT. In certain embodiments, the disease, disorder or condition is a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In

certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide. In certain embodiments, the compound is administered to the individual parenterally.

Certain embodiments are drawn to a compound comprising a AGT specific inhibitor for use in reducing or inhibiting a RAAS related disease, disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney

disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.

Certain embodiments are drawn to the use of a compound comprising a AGT specific inhibitor for the manufacture or preparation of a medicament for treating a disease associated with AGT. Certain embodiments are drawn to the use of a compound comprising a AGT specific inhibitor for the preparation of a medicament for treating a disease, disorder or

condition associated with AGT. In certain embodiments, the disease, disorder or condition is a RAAS related disease, disorder or condition or a symptom thereof. In certain embodiments, the disease, disorder or condition is hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase

sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.

Certain embodiments are drawn to the use of a compound comprising a AGT specific inhibitor for the manufacture or preparation of a medicament for reducing or inhibiting a RAAS related disease, disorder or condition or a symptom thereof in an individual having, or at risk of having, a RAAS related disease, disorder or condition or a symptom thereof associated with AGT. In certain embodiments, the RAAS related disease, disorder or condition is hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. Certain embodiments are drawn to use of a compound comprising a AGT specific inhibitor for the preparation of a medicament for treating a disease, disorder or condition associated with AGT. In certain embodiments, the disease, disorder or condition is a RAAS related disease,

disorder or condition or a symptom thereof or hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment. In certain embodiments, the compound comprises an antisense oligonucleotide targeted to AGT. In certain embodiments, the compound comprises an oligonucleotide targeted to AGT. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of any one of SEQ ID NOs: 11-20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 16, 18, or 20. In certain embodiments, a compound comprises a modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 36, 39, or 42. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 16, SEQ ID NO: 18 and SEQ ID NO: 20. In certain embodiments, a compound comprises a modified oligonucleotide selected from the group consisting of the nucleobase sequences of SEQ ID NO: 36, SEQ ID NO: 39 and SEQ ID NO: 42. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 16 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 36. In certain embodiments, the compound comprises a first modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 18 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 39. In certain embodiments, the compound comprises a first

modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 20 and a second modified oligonucleotide having a nucleobase sequence of SEQ ID NO: 42. In any of the foregoing embodiments, the compound can be single-stranded or double-stranded. In any of the foregoing embodiments, the compound can be an antisense oligonucleotide or oligomeric compound. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide (e.g., of 14 to 30, for example, 14 to 23, linked nucleosides in length) having a region of complementarity to the first modified oligonucleotide. In certain embodiments, a compound comprises a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.

In any of the foregoing methods or uses, the compound can be an oligomeric compound. In any of the foregoing methods or uses, the compound can be single-stranded or double-stranded. In any of the foregoing methods or uses, the compound can be targeted to AGT. In certain embodiments, the compound comprises or consists of a modified oligonucleotide. In certain embodiments, the compound comprises one or more modified oligonucleotides. In certain embodiments, the compound comprises a first modified oligonucleotide and a second modified oligonucleotide. In certain embodiments, a modified oligonucleotide is 8 to 80 linked nucleosides in length, 10 to 30 linked nucleosides in length, 14 to 30 linked nucleosides in length, 14 to 23 linked nucleosides in length, or 19 to 23 linked nucleosides in length. In certain embodiments, a modified oligonucleotide is at least 80%, at least 85%, at least 90%, at least 95% or 100% complementary to any of the nucleobase sequences recited in SEQ ID NOs: 1 and 3 over its length. In certain embodiments, a modified oligonucleotide comprises at least one modified internucleoside linkage, at least one modified sugar and/or at least one modified nucleobase. In certain embodiments, the

modified internucleoside linkage is a phosphorothioate internucleoside linkage. In certain embodiments, the modified sugar is a bicyclic sugar, 2'-MOE, 2'-F, or 2'-OMe. In certain embodiments, the modified nucleobase is a 5-methylcytosine. In any of the foregoing embodiments, each modified oligonucleotide is independently 12 to 30, 14 to 30, 14 to 25, 14 to 24, 14 to 23, 16 to 23, 17 to 23, 18 to 23, 19 to 23, 19 to 22, or 19 to 20 linked nucleosides in length. In certain embodiments, a modified oligonucleotide has at least 1, at least 2, at least 3 mismatches to a region of SEQ ID NO: 1 and 3.

In any of the foregoing methods or uses, the compound comprises a first and second modified oligonucleotide, wherein there is a region of complementarity between a first modified oligonucleotide and a second modified oligonucleotide. In certain embodiments, the region of complementarity between the first oligonucleotide and the second oligonucleotide is 14 to 23, 19 to 23, or 21 to 23 linked nucleosides in length. In certain embodiments, the first modified oligonucleotide is fully complementary to the second modified oligonucleotide. In certain embodiments, the first modified oligonucleotide comprises at least one modification selected from a modified internucleoside linkage, a modified sugar, and a modified nucleobase. In certain embodiments, the second modified oligonucleotide comprises at least one modification selected from the group consisting of a modified internucleoside linkage, a modified sugar, and a modified nucleobase. In certain embodiments, the modified internucleoside linkage is a phosphorothioate internucleoside linkage or a methylphosphonate internucleoside linkage. In certain embodiments, the modified internucleoside linkage is at the 3' terminus of the first or second modified oligonucleotide or at the 5' terminus of the first or second modified oligonucleotide. In certain embodiments, the first or second modified oligonucleotide comprises one or more modified sugars. In certain embodiments, each nucleoside of the first or second modified oligonucleotide comprises a modified sugar. In certain embodiments, the modified sugar comprises a modification selected from the group consisting of a halogen, an alkoxy group and a bicyclic sugar. In certain embodiments, the modified sugar comprises a modification selected from group consisting of 2'-MOE, 2'-F, and 2'-OMe or a combination thereof. In certain embodiments, the first or second modified oligonucleotide comprises no more than ten 2'-F sugar modifications. In certain embodiments, the first or second modified oligonucleotide comprises no more than five 2'-F sugar modifications.

In any of the foregoing methods or uses, a compound comprises a conjugate group. In certain embodiments, the conjugate group is attached to the 5' end of a modified oligonucleotide. In certain embodiments, the conjugate group is a targeting moiety. In

certain embodiments, the targeting moiety comprises one or more GalNAc. In certain embodiments, the one or more GalNAc is attached to the 2' or 3' position of the ribosyl ring. In certain embodiments, the one or more GalNAc is attached to the 5' nucleoside of the modified oligonucleotide. In certain embodiments, the 5' nucleoside of a modified oligonucleotide is selected from Formulae I -VIII, or a salt, solvate, or hydrate thereof, wherein R is the modified oligonucleotide other than the 5' nucleoside. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula I and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula I and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula II and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula II and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula III and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula III and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula IV and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula IV and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula V and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula V and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VI and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VI and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VII and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VII and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VIII and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VIII and R' is S.

In any of the foregoing methods or uses, the compound comprises a first modified oligonucleotide selected from the group consisting of any one of Ref ID NOs: IA0500, IA1019, IA1022-1024, IA1027, IA1093-1095, and IA1103, and a second modified oligonucleotide 14 to 23 linked nucleosides in length fully complementary to the first modified oligonucleotide. In certain embodiments, the compound comprises a first modified oligonucleotide selected from the group consisting of IA0500, IA1019, IA1022-1024, IA1027, IA1093-1095, and IA1103 and a second modified oligonucleotide selected from the group consisting of IS1255, IS1258, IS1259, IS1260, IS1279, IS1280, IS1372-1375, IS1381, and IS1382. In certain embodiments, the compound comprises a first modified

oligonucleotide consisting of IA1024 and a second modified oligonucleotide consisting of IS1260. In certain embodiments, the compound comprises a first modified oligonucleotide consisting of IA1094 and a second modified oligonucleotide consisting of IS1374. In certain embodiments, the compound comprises a first modified oligonucleotide consisting of IA1103 and a second modified oligonucleotide consisting of IS1382. In certain embodiments, the compound is in a pharmaceutically acceptable salt form. In certain embodiments, the pharmaceutically acceptable salt is a sodium salt. In certain embodiments, the pharmaceutically acceptable salt is a potassium salt. In certain embodiments, a composition comprises the compound of any one of the foregoing embodiments and a pharmaceutically acceptable carrier.

In any of the foregoing methods or uses, a compound or composition comprising a compound of any preceding embodiment is administered to an individual in a therapeutically effective amount. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual at a dosage level sufficient to deliver about 1 to 100 mg/kg of body weight of the individual. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual at a fixed dose of about 25 mg to about 1,000 mg. In certain embodiments, the composition is administered to the individual one or more times in a day up to the dosage level or fixed dose.

In any of the foregoing methods or uses, a compound or composition comprising a compound of any preceding embodiment is administered to an individual daily, weekly, monthly, quarterly or yearly. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual about once per quarter (i.e., once every three months) to about once per year. In certain embodiments, a compound or composition comprising a compound of any preceding embodiment is administered to an individual about once per quarter, about once every six months or about once per year.

Certain Compounds

In certain aspects, the disclosure relates to a compound that comprises or consists of an oligomeric compound. In certain embodiments, the oligomeric compound comprises a nucleobase sequence complementary to that of a target nucleic acid.

In certain aspects, the disclosure relates to a compound that comprises or consists of a modified oligonucleotide. In certain embodiments, the modified oligonucleotide has a nucleobase sequence complementary to that of a target nucleic acid.

In certain aspects, the disclosure relates to a compound that comprises or consists of an antisense oligonucleotide. In certain embodiments, the antisense oligonucleotide has a nucleobase sequence complementary to that of a target nucleic acid.

In certain aspects, the disclosure relates to a compound that is a single-stranded compound. In certain embodiments, the single-stranded compound comprises or consists of an oligomeric compound. In certain embodiments, such an oligomeric compound comprises or consists of an oligonucleotide and optionally a conjugate group. In certain embodiments, the oligonucleotide is a modified oligonucleotide. In certain embodiments, the oligonucleotide is an antisense oligonucleotide. In certain embodiments, the oligonucleotide or modified oligonucleotide of a single-stranded compound comprises a self-complementary nucleobase sequence.

In certain aspects, the disclosure relates to a compound that is a double-stranded compound. In certain embodiments, the double-stranded compound comprises or consists of an oligomeric compound. In certain embodiments, the double-stranded compound comprises a first oligonucleotide and a second oligonucleotide. In certain embodiments, the first oligonucleotide has a region complementarity to a target nucleic acid and the second oligonucleotide has a region complementarity to the first modified oligonucleotide. In certain embodiments, the double-stranded compound comprises a modified oligonucleotide. In certain embodiments, the modified oligonucleotide has a region complementarity to a target nucleic acid. In certain embodiments, the double-stranded compound comprises a first modified oligonucleotide and a second modified oligonucleotide. In certain embodiments, the first modified oligonucleotide has a region complementarity to a target nucleic acid and the second modified oligonucleotide has a region complementarity to the first modified oligonucleotide. In certain embodiments, an oligonucleotide or modified oligonucleotide of a double-stranded compound is an RNA oligonucleotide. In such embodiments, the thymine nucleobase in the modified oligonucleotide is replaced by a uracil nucleobase.

In certain embodiments, a compound described herein comprises a conjugate group. In certain embodiments, the first oligonucleotide or first modified oligonucleotide of a double-stranded compound comprises a conjugate group. In certain embodiments, the second oligonucleotide or second modified oligonucleotide of a double-stranded compound comprises a conjugate group. In certain embodiments, a first oligonucleotide or first modified

oligonucleotide and a second oligonucleotide or second modified oligonucleotide of a double-stranded compound each comprises a conjugate group.

In certain embodiments, a compound is 14-30 linked nucleosides in length. In certain embodiments, the first oligonucleotide or first modified oligonucleotide of a double-stranded compound is 14-30 linked nucleosides in length. In certain embodiments, the second oligonucleotide or second modified oligonucleotide is 14-30 linked nucleosides in length. In certain embodiments, the oligonucleotides or modified oligonucleotides of a double-stranded compound are blunt ended at one or both ends of the compound. In certain embodiments, the oligonucleotides or modified oligonucleotides of a double-stranded compound include non-complementary overhanging nucleosides at one or both ends of the compound.

In certain embodiments, a compound has a nucleobase sequence comprising at least 14 contiguous nucleobases of any of SEQ ID NOs: 11-20. In certain embodiments, one of the oligonucleotides or modified oligonucleotides of a double-stranded compound has a nucleobase sequence comprising at least 14 contiguous nucleobases of any of SEQ ID NOs: 11-20.

Examples of single-stranded and double-stranded compounds include, but are not limited to, oligonucleotides, antisense oligonucleotides, siRNAs, microRNA targeting oligonucleotides, occupancy-based compounds (e.g., mRNA processing or translation blocking compounds and splicing compounds), and single-stranded RNAi compounds (e.g. small hairpin RNAs (shRNAs), single stranded siRNAs (ssRNAs) and microRNA mimics).

In certain embodiments, a compound described herein has a nucleobase sequence that, when written in the 5' to 3' direction, comprises the reverse complement of the target region of a target nucleic acid to which it is targeted.

In certain embodiments, a compound described herein comprises an oligonucleotide 12 to 30 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 12 to 23 linked subunits in length. In certain embodiments, compound described herein comprises an oligonucleotide 14 to 30 linked subunits in length. In certain embodiments, compound described herein comprises an oligonucleotide 14 to 23 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 15 to 30 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 15 to 23 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 16 to 30 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 16 to 23 linked subunits in length. In certain embodiments, a compound

described herein comprises an oligonucleotide 17 to 30 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 17 to 23 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 18 to 30 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 18 to 23 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 19 to 30 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 19 to 23 linked subunits in length. In other words, such oligonucleotides are 12 to 30 linked subunits, 12 to 23 linked subunits, 14 to 30 linked subunits, 14 to 23 linked subunits, 15 to 30 linked subunits, 15 to 23 linked subunits, 16 to 30 linked subunits, 16 to 23 linked subunits, 17 to 30 linked subunits, 17 to 23 linked subunits, 18 to 30 linked subunits, 18 to 23 linked subunits, 19 to 30 linked subunits or 19 to 23 linked subunits, respectively. In certain embodiments, a compound described herein comprises an oligonucleotide 14 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 16 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 17 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 18 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 19 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 20 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 21 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 22 linked subunits in length. In certain embodiments, a compound described herein comprises an oligonucleotide 23 linked subunits in length. In other embodiments, a compound described herein comprises an oligonucleotide 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 23, 18 to 24, 18 to 25, 18 to 50, 19 to 23, 19 to 30, 19 to 50, 20 to 23 or 20 to 30 linked subunits. In certain such embodiments, the compound described herein comprises an oligonucleotide 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, or 30 linked subunits in length, or a range defined by any two of the above values.

In certain embodiments, the compound may further comprise an additional moiety, such as a conjugate group or delivery moiety. In certain embodiments, such compounds are oligomeric compounds, and the additional moiety is attached to an oligonucleotide. In certain embodiments, a conjugate group is attached to a nucleoside of an oligonucleotide.

In certain embodiments, compounds may be shortened or truncated. For example, one or more subunits may be deleted from the 5' end (5' truncation), or alternatively from the 3' end (3' truncation) of an oligonucleotide.

In certain embodiments, compounds may be lengthened. For example, one or more subunits may be attached to the 3' end or 5' end of an oligonucleotide. In certain embodiments, at least one subunit (e.g., 1, 2, 3, 4, 5, 6, 7, 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, or more subunits) is attached to the 5' end of an oligonucleotide. In certain embodiments, at least one subunit (e.g., 1, 2, 3, 4, 5, 6, 7, 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, or more subunits) is attached to the 3' end of an oligonucleotide. In certain embodiments, at least one or more subunits may be attached to the 3' end or 5' end of an oligonucleotide of a double-stranded compound creating a 3' and/or 5' end overhang. In certain embodiments, at least one subunit (e.g., 1, 2, 3, 4, 5, 6, 7, 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, or more subunits) is attached to the 5' end of both oligonucleotides of a double-stranded compound. In certain embodiments, at least one subunit (e.g., 1, 2, 3, 4, 5, 6, 7, 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, or more subunit) is attached to the 3' end of both oligonucleotides of a double-stranded compound. In certain embodiments, subunits are attached to both oligonucleotides of a double-stranded compound at the same end (e.g., that subunits are attached to the 3' end of one of the oligonucleotides and subunits are attached to the 5' end of the other oligonucleotide). In certain embodiments, when subunits are attached to both oligonucleotides of a double-stranded compound at the same end, the number of subunits attached to each oligonucleotide may be the same or may be different. In certain embodiments, when subunits are attached to both oligonucleotides of a double-stranded compound at the same end, the number of subunits attached to each oligonucleotide is the same. In certain embodiments, when subunits are attached to both oligonucleotides of a double-stranded compound at the same end, the number of subunits attached to each oligonucleotide is different. This scenario, where subunits are attached to both oligonucleotides of a double-stranded compound at the same end, may occur at one or both ends of a double-stranded compound. In certain embodiments, the subunits attached to the 3' and/or 5' end are modified.

In certain embodiments, compounds described herein are oligonucleotides. In certain embodiments, compounds described herein are modified oligonucleotides. In certain embodiments, compounds described herein are antisense oligonucleotides. In certain embodiments, compounds described herein are oligomeric compounds. In certain embodiments, compounds described herein are RNAi compounds. In certain embodiments, compounds described herein are siRNA compounds.

In certain embodiments, a compound described herein can comprise any of the oligonucleotide sequences targeted to AGT described herein. In certain embodiments, the compound can be double-stranded.

In certain embodiments, the compound comprises an oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of any one of SEQ ID NOs: 11-20. In certain embodiments, the compound comprises an oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of any one of SEQ ID NOs: 16, 18, or 20. In certain embodiments, the compound comprises a second oligonucleotide. In certain embodiments, the compound comprises an oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of any one of SEQ ID NOs: 36, 39, or 42. In certain embodiments, the compound comprises a first oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of SEQ ID NO: 16 and a second oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of SEQ ID NO: 36. In certain embodiments, the compound comprises a first oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of SEQ ID NO: 18 and a second oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of SEQ ID NO: 39. In certain embodiments, the compound comprises a first oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of SEQ ID NO: 20 and a second oligonucleotide comprising at least an 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 contiguous nucleobase portion of SEQ ID NO: 42.

In certain embodiments, the compound comprises ribonucleotides in which the oligonucleotide has uracil (U) in place of thymine (T) for any of the sequences provided here. In certain embodiments, the compound comprises deoxyribonucleotides in which the oligonucleotide has thymine (T) in place of uracil (U) for any of the sequences provided here.

Certain Mechanisms

In certain embodiments, compounds described herein comprise or consist of modified oligonucleotides. In certain embodiments, compounds described herein comprise or consist of antisense oligonucleotides. In certain embodiments, compounds comprise or consist of oligomeric compounds. In certain embodiments, compounds described herein are capable of hybridizing to a target nucleic acid. In certain embodiments, compounds described herein selectively affect one or more target nucleic acid. Such compounds comprise a nucleobase sequence that hybridizes to one or more target nucleic acid, resulting in one or more desired activity and does not hybridize to one or more non-target nucleic acid or does not hybridize to one or more non-target nucleic acid in such a way that results in a significant undesired activity.

In certain embodiments, hybridization of a compound described herein to a target nucleic acid results in recruitment of one or more proteins that cause the cleavage of the target nucleic acid. For example, certain compounds described herein or a portion of the compound is loaded into an RNA-induced silencing complex (RISC), ultimately resulting in cleavage of the target nucleic acid. For example, certain compounds described herein result in cleavage of the target nucleic acid by Argonaute. Compounds that are loaded into RISC are RNAi compounds. RNAi compounds may be double-stranded (siRNA) or single-stranded (ssRNA).

In certain embodiments, hybridization of compounds described herein to a target nucleic acid does not result in recruitment of a protein that cleaves that target nucleic acid. In certain such embodiments, hybridization of the compound to the target nucleic acid results in the alteration of splicing of the target nucleic acid. In certain embodiments, hybridization of the compound to a target nucleic acid results in inhibition of a binding interaction between the target nucleic acid and a protein or other nucleic acid. In certain such embodiments, hybridization of the compound to the target nucleic acid results in the alteration of RNA processing. In certain such embodiments, hybridization of the compound to a target nucleic acid results in alteration of translation of the target nucleic acid.

Activities resulting from the hybridization of a compound to a target nucleic acid may be observed directly or indirectly. In certain embodiments, observation or detection of an activity involves observation or detection of a change in an amount of a target nucleic acid or protein encoded by such target nucleic acid, a change in the ratio of splice variants of a nucleic acid or protein, and/or a phenotypic change in a cell or animal.

Certain Modifications

In certain aspects, the disclosure relates to compounds that comprise or consist of oligonucleotides. Oligonucleotides consist of linked nucleosides. In certain embodiments, oligonucleotides may be unmodified RNA or DNA or may be modified. In certain embodiments, the oligonucleotides are modified oligonucleotides. In certain embodiments, the modified oligonucleotides comprise at least one modified sugar, modified nucleobase or modified internucleoside linkage relative to an unmodified RNA or DNA. In certain embodiments, an oligonucleotide has a modified nucleoside. A modified nucleoside may comprise a modified sugar, a modified nucleobase or both a modified sugar and a modified nucleobase. Modified oligonucleotides may also include end modifications, e.g., 5'-end modifications and 3'-end modifications.

Sugar Modifications and Motifs

In certain embodiments, a modified sugar is a substituted furanosyl sugar or non-bicyclic modified sugar. In certain embodiments, a modified sugar is a bicyclic or tricyclic modified sugar. In certain embodiments, a modified sugar is a sugar surrogate. A sugar surrogate may comprise one or more substitutions described herein.

In certain embodiments, a modified sugar is a substituted furanosyl or non-bicyclic modified sugar. In certain embodiments, the furanosyl sugar is a ribosyl sugar. In certain embodiments, the furanosyl sugar comprises one or more substituent groups, including, but not limited to, substituent groups at the 2', 3', 4', and 5' positions.

In certain embodiments, substituents at the 2' position include, but are not limited to, F and OCH₃ ("OMe", "O-methyl" or "methoxy"). In certain embodiments, substituent groups at the 2' position suitable for non-bicyclic modified sugars include, but are not limited to, halo, allyl, amino, azido, SH, CN, OCN, CF₃, OCF₃, F, Cl, Br, SCH₃, SOCH₃, SO₂CH₃, ONO₂, NO₂, N₃, and NH₂. In certain embodiments, substituent groups at the 2' position include, but are not limited to, O-(C₁-C₁₀) alkoxy, alkoxyalkyl, O-alkyl, S-alkyl, N-alkyl, O-alkenyl, S-alkenyl, N-alkenyl, O-alkynyl, S-alkynyl, N-alkynyl, O-alkyl-O-alkyl, alkynyl, wherein the alkyl, alkenyl and alkynyl can be substituted or unsubstituted C₁ to C₁₀ alkyl or C₂ to C₁₀ alkenyl and alkynyl. In certain embodiments, substituent groups at the 2' position include, but are not limited to, alkaryl, aralkyl, O-alkaryl, and O-aralkyl. In certain embodiments, these 2' substituent groups can be further substituted with one or more substituent groups independently selected from hydroxyl, alkoxy, carboxy, benzyl, phenyl, nitro (NO₂), thiol, thioalkoxy, thioalkyl, halogen, alkyl, aryl, alkenyl, and alkynyl. In certain embodiments, substituent groups at the 2' position include, but are not limited to, O[(CH₂)_nO]_mCH₃, O(CH₂)_nOCH₃, O(CH₂)_nCH₃, O(CH₂)_nONH₂, O(CH₂)_nNH₂,

$O(CH_2)_nSCH_3$, and $O(CH_2)_nON[(CH_2)_mCH_3]_2$, where n and m are independently from 1 to about 10. In certain embodiments, substituent groups at the 2' position include, but are not limited to, $OCH_2CH_2OCH_3$ ("MOE"), $O(CH_2)_2ON(CH_3)_2$ ("DMAOE"), $O(CH_2)_2O(CH_2)_2N(CH_3)_2$ ("DMAEOE"), and $OCH_2C(=O)-N(H)CH_3$ ("NMA").

In certain embodiments, substituent groups at the 4' position suitable for non-bicyclic modified sugars include, but are not limited to, alkoxy (e.g., methoxy), alkyl, and those described in Manoharan et al., WO 2015/106128. In certain embodiments, substituent groups at the 5' position suitable for non-bicyclic modified sugars include, but are not limited to, methyl ("Me") (R or S), vinyl, and methoxy. In certain embodiments, substituents described herein for the 2', 4' and 5' position can be added to other specific positions on the sugar. In certain embodiments, such substituents may be added to the 3' position of the sugar on the 3' terminal nucleoside or the 5' position of the 5' terminal nucleoside. In certain embodiments, a non-bicyclic modified sugar may comprise more than one non-bridging sugar substituent. In certain such embodiments, non-bicyclic modified sugars substituents include, but are not limited to, 5'-Me-2'-F, 5'-Me-2'-OMe (including both R and S isomers). In certain embodiments, modified sugar substituents include those described in Migawa et al., WO 2008/101157 and Rajeev et al., US2013/0203836.

In certain embodiments, a modified sugar is a bicyclic sugar. A bicyclic sugar is a modified sugar comprising two rings, wherein the second ring is formed via a bridge connecting two of the atoms in the first ring thereby forming a bicyclic structure. In certain embodiments, a bicyclic sugar comprises a bridging substituent that bridges two atoms of the furanosyl ring to form a second ring. In certain embodiments, a bicyclic sugar does not comprise a furanosyl moiety. A "bicyclic nucleoside" ("BNA") is a nucleoside having a bicyclic sugar. In certain embodiments, the bicyclic sugar comprises a bridge between the 4' and 2' furanose ring atoms. In certain embodiments, the bicyclic sugar comprises a bridge between the 5' and 3' furanose ring atoms. In certain such embodiments, the furanose ring is a ribose ring. In certain embodiments, 4' to 2' bridging substituents include, but are not limited to, 4'-CH₂-2', 4'-(CH₂)₂-2', 4'-(CH₂)₃-2', 4'-CH₂-O-2' ("LNA"), 4'-CH₂-S-2', 4'-(CH₂)₂-O-2' ("ENA"), 4'-CH(CH₃)-O-2' ("constrained ethyl" or "cEt" when in the S configuration), 4'-CH₂-O-CH₂-2', 4'-CH₂-N(R)-2', 4'-CH(CH₂OCH₃)-O-2' ("constrained MOE" or "cMOE") and analogs thereof (e.g., U.S. Patent No. 7,399,845), 4'-C(CH₃)(CH₃)-O-2' and analogs thereof (e.g., U.S. Patent No. 8,278,283), 4'-CH₂-N(OCH₃)-2' and analogs thereof (e.g., U.S. Patent No. 8,278,425), 4'-CH₂-O-N(CH₃)-2' (e.g., U.S. Patent Publication No. 2004/0171570), 4'-CH₂-N(R)-O-2', wherein R is H, C₁-C₁₂ alkyl, or a protecting group

(e.g., U.S. Patent No. 7,427,672), 4'-CH₂-C(H)(CH₃)-2' (e.g., Chattopadhyaya et al., J. Org. Chem., 2009, 74, 118-134), and 4'-CH₂-C(=CH₂)-2' and analogs thereof (e.g., U.S. Patent No. 8,278,426). The entire contents of each of the foregoing are hereby incorporated herein by reference. Additional representative U.S. Patents and U.S. Patent Publications that teach the preparation of bicyclic nucleic acid nucleotides include, but are not limited to, the following: U.S. Patent Nos. 6,268,490; 6,525,191; 6,670,461; 6,770,748; 6,794,499; 6,998,484; 7,053,207; 7,034,133; 7,084,125; 7,399,845; 7,427,672; 7,569,686; 7,741,457; 8,022,193; 8,030,467; 8,278,425; 8,278,426; 8,278,283; US 2008/0039618; and US 2009/0012281, US 2013/0190383; and WO 2013/036868, the entire contents of each of which are hereby incorporated herein by reference. Any 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 e.g., WO 99/14226). Specified bicyclic nucleosides herein are in the β -D configuration, unless otherwise specified.

In certain embodiments, a modified sugar is a sugar surrogate. In certain embodiments, a sugar surrogate has the oxygen atom replaced, e.g., with a sulfur, carbon or nitrogen atom. In certain such embodiments, the sugar surrogate may also comprise bridging and/or non-bridging substituents as described herein. In certain embodiments, sugar surrogates comprise rings having other than 5 atoms. In certain such embodiments, the sugar surrogate comprises a cyclobutyl moiety in place of the pentofuranosyl sugar. In certain embodiments, the sugar surrogate comprises a six membered ring in place of the pentofuranosyl sugar. In certain embodiments, the sugar surrogate comprises a tetrahydropyran ("THP") in place of the pentofuranosyl sugar. In certain embodiments, the sugar surrogate comprises a morpholino in place of the pentofuranosyl sugar. Representative US patents that teach the preparation of such modified sugar structures include, but are not limited to, U.S. Patent Nos. 4,981,957; 5,118,800; 5,166,315; 5,185,444; 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; 5,658,873; 5,670,633; 5,700,920; 7,875,733; 7,939,677; 8,088,904; 8,440,803; and 9,005,906, the entire contents of each of the foregoing are hereby incorporated herein by reference.

In some embodiments, sugar surrogates comprise acyclic moieties. In certain embodiments, the sugar surrogate is an unlocked nucleic acid ("UNA"). A UNA is unlocked acyclic nucleic acid, wherein any of the bonds of the sugar has been removed, forming an unlocked "sugar" residue. In one example, UNA also encompasses a monomer where the bonds between C1'-C4' have been removed (i.e. the covalent carbon-oxygen-carbon bond

between the C1' and C4' carbons). In another example, the C2'-C3' bond (i.e. the covalent carbon-carbon bond between the C2' and C3' carbons) of the sugar has been removed. Representative U.S. publications that teach the preparation of UNA include, but are not limited to, U.S. Patent No. 8,314,227; and U.S. Patent Publication Nos. 2013/0096289; 2013/0011922; and 2011/0313020, the entire contents of each of which are hereby incorporated herein by reference. In certain embodiments, sugar surrogates comprise peptide nucleic acid ("PNA"), acyclic butyl nucleic acid (see, e.g., Kumar et al., *Org. Biomol. Chem.*, 2013, 11, 5853-5865), and nucleosides and oligonucleotides described in Manoharan et al., US2013/130378, the entire contents of which is hereby incorporated herein by reference. Many other bicyclic and tricyclic sugar and sugar surrogate ring systems are known in the art that can be used in modified nucleosides.

In certain aspects, the disclosure relates to compounds comprising at least one oligonucleotide wherein the nucleosides of such oligonucleotide comprise one or more types of modified sugars and/or unmodified sugars arranged along the oligonucleotide or region thereof in a defined pattern or "sugar motif". In certain instances, such sugar motifs include, but are not limited to, any of the patterns of sugar modifications described herein.

In certain embodiments, an oligonucleotide comprises a gapmer sugar motif. A gapmer oligonucleotide comprises or consists of a region having two external "wing" regions and a central or internal "gap" region. The gap and wing regions form a contiguous sequence of nucleosides, wherein the majority of nucleoside sugars of each of the wings differ from the majority of nucleoside sugars of the gap. In certain embodiments, the wing regions comprise a majority of modified sugars and the gap comprises a majority of unmodified sugars. In certain embodiments, the nucleosides of the gap are deoxynucleosides. Compounds with a gapmer sugar motif are described in, for example US Patent 8,790,919, the entire contents of which is hereby incorporated herein by reference.

In certain embodiments, one or both oligonucleotides of a double-stranded compound comprise a triplet sugar motif. An oligonucleotide with a triplet sugar motif comprises three identical sugar modifications on three consecutive nucleosides. In certain embodiments, the triplet is at or near the cleavage site of the oligonucleotide. In certain embodiments, an oligonucleotide of a double-stranded compound may contain more than one triplet sugar motif. In certain embodiments, the identical sugar modification of the triplet sugar motif is a 2'-F modification. Compounds with a triplet sugar motif are disclosed, for example, in US Patent 10,668,170, the entire contents of which is incorporated herein by reference.

In certain embodiments, one or both oligonucleotides of a double-stranded compound comprise a quadruplet sugar motif. An oligonucleotide with a quadruplet sugar motif comprises four identical sugar modifications on four consecutive nucleosides. In certain embodiments, the quadruplet is at or near the cleavage site. In certain embodiments, an oligonucleotide of a double-stranded compound may contain more than one quadruplet sugar motif. In certain embodiments, the identical sugar modification of the quadruplet sugar motif is a 2'-F modification. For a double-stranded compound having a duplex region of 19-23 nucleotides in length, the cleavage site of the antisense oligonucleotide is typically around the 10, 11, and 12 positions from the 5'-end. In certain embodiments, the quadruplet sugar motif is at the 8, 9, 10, 11 positions; the 9, 10, 11, 12 positions; the 10, 11, 12, 13 positions; the 11, 12, 13, 14 positions; or the 12, 13, 14, 15 positions of the sense oligonucleotide, counting from the first nucleoside of the 5'-end of the sense oligonucleotide, or, the count starting from the first paired nucleotide within the duplex region from the 5'-end of the sense oligonucleotide. In certain embodiments, the quadruplet sugar motif is at the 8, 9, 10, 11 positions; the 9, 10, 11, 12 positions; the 10, 11, 12, 13 positions; the 11, 12, 13, 14 positions; or the 12, 13, 14, 15 positions of the antisense oligonucleotide, counting from the first nucleoside of the 5'-end of the antisense oligonucleotide, or, the count starting from the first paired nucleotide within the duplex region from the 5'-end of the antisense oligonucleotide. The cleavage site may change according to the length of the duplex region of the double-stranded compound and may change the position of the quadruplet accordingly.

In certain embodiments, an oligonucleotide comprises an alternating sugar motif. In certain embodiments, one or both oligonucleotides of a double-stranded compound comprise an alternating sugar motif. An oligonucleotide with an alternating sugar motif comprises at least two different sugar modifications wherein one or more consecutive nucleosides comprising a first sugar modification alternates with one or more consecutive nucleosides comprising a second sugar modification and one or more consecutive nucleosides comprising a third sugar modification, etc. For example, if A, B and C each represent one type of modification to the nucleoside, the alternating motif can be "ABABABABABAB...", "AABBAABBAABB...", "AABAABAABAAB...", "AAABAABAAAB...", "AAABBBAAABBB...", or "ABCABCABCABC..." etc. In certain embodiments, the alternating sugar motif is repeated for at least 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, or 23 contiguous nucleobases along an oligonucleotide. In certain embodiments, the alternating sugar motif is comprised of two different sugar modifications.

In certain embodiments, the alternating sugar motif comprises 2'-OMe and 2'-F sugar modifications.

In certain embodiments, each nucleoside of an oligonucleotide is independently modified with one or more sugar modifications provided herein. In certain embodiments, each oligonucleotide of a double-stranded compound independently has one or more sugar motifs provided herein. In certain embodiments, an oligonucleotide containing a sugar motif, is fully modified in that each nucleoside other than the nucleosides comprising the sugar motif comprises a sugar modification.

Nucleobase Modifications and Motifs

In certain embodiments, compounds described herein comprise modified oligonucleotides. In certain embodiments, modified oligonucleotides comprise one or more nucleosides comprising a modified nucleobase. In certain embodiments, modified oligonucleotides comprise one or more nucleosides that do not comprise a nucleobase, referred to as an abasic nucleoside.

In certain embodiments, modified nucleobases are selected from: 5-substituted pyrimidines, 6-azapyrimidines, alkyl or alkynyl substituted pyrimidines, alkyl substituted purines, and N-2, N-6 and O-6 substituted purines. In certain embodiments, modified nucleobases are selected from: 2-aminopropyladenine, 5-hydroxymethyl cytosine, 5-methylcytosine, xanthine, hypoxanthine, 2-aminoadenine, 6-N-methylguanine, 6-N-methyladenine, 2-propyladenine, 2-thiouracil, 2-thiothymine and 2-thiocytosine, 5-propynyl ($C\equiv C-CH_3$) uracil, 5-propynylcytosine, 6-azouracil, 6-azocytosine, 6-azothymine, 5-ribosyluracil (pseudouracil), 4-thiouracil, 8-halo, 8-amino, 8-thiol, 8-thioalkyl, 8-hydroxyl, 8-aza and other 8-substituted purines, 5-halo, particularly, 5-bromo, 5-trifluoromethyl, 5-halouracil, and 5-halocytosine, 7-methylguanine, 7-methyladenine, 2-F-adenine, 2-aminoadenine, 7-deazaguanine, 7-dezaadenine, 3-deazaguanine, 3-dezaadenine, 6-N-benzoyladenine, 2-N-isobutyrylguanine, 4-N-benzoylcytosine, 4-N-benzoyluracil, 5-methyl 4-N-benzoylcytosine, 5-methyl 4-N-benzoyluracil, universal bases, hydrophobic bases, promiscuous bases, size expanded bases, and fluorinated bases. Further modified nucleobases include tricyclic pyrimidines, such as 1,3-diazaphenoxazine-2-one, 1,3-diazaphenothiazine-2-one, and 9-(2-aminoethoxy)-1,3-diazaphenoxazine-2-one (G-clamp). Modified nucleobases may 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.

Further nucleobases include those disclosed in U.S. Patent 3,687,808; Modified Nucleosides in Biochemistry, Biotechnology and Medicine, Herdewijn, P. ed. Wiley-VCH, 2008; The Concise Encyclopedia Of Polymer Science And Engineering, pages 858-859; Kroschwitz, J.L., Ed., John Wiley & Sons, 1990, 858-859; Englisch et al., Angewandte Chemie, International Edition, 1991, 30, 613; Sanghvi, Y.S., Chapter 15, dsRNA Research and Applications, pages 289-302; Antisense Research and Applications, Crooke, S.T. and Lebleu, B., Eds., CRC Press, 1993, 273-288; Antisense Drug Technology, Crooke S.T., Ed., CRC Press, 2008, 163-166 and 442-443 (Chapters 6 and 15), each of which are hereby incorporated herein by reference.

Publications that teach the preparation of certain of the above noted modified nucleobases, as well as other modified nucleobases include without limitation, US Applications 2003/0158403 and 2003/0175906; U.S. Patents 4,845,205; 5,130,302; 5,134,066; 5,175,273; 5,367,066; 5,432,272; 5,434,257; 5,457,187; 5,459,255; 5,484,908; 5,502,177; 5,525,711; 5,552,540; 5,587,469; 5,594,121; 5,596,091; 5,614,617; 5,645,985; 5,681,941; 5,811,534; 5,750,692; 5,948,903; 5,587,470; 5,457,191; 5,763,588; 5,830,653; 5,808,027; 6,005,096. 6,015,886; 6,147,200; 6,166,197; 6,166,199; 6,222,025; 6,235,887; 6,380,368; 6,528,640; 6,639,062; 6,617,438; 7,045,610; 7,427,672; and 7,495,088, the entire contents of each of which are hereby incorporated herein by reference.

In certain embodiments, compounds described herein comprise oligonucleotides. In certain embodiments, oligonucleotides comprise modified and/or unmodified nucleobases arranged along the oligonucleotide or region thereof in a defined pattern or motif. In certain embodiments, each nucleobase is modified. In certain embodiments, none of the nucleobases are modified. In certain embodiments, each purine or each pyrimidine is modified. In certain embodiments, each adenine is modified. In certain embodiments, each guanine is modified. In certain embodiments, each thymine is modified. In certain embodiments, each uracil is modified. In certain embodiments, each cytosine is modified. In certain embodiments, some or all of the cytosine nucleobases in a modified oligonucleotide are 5-methylcytosines.

In certain embodiments, modified oligonucleotides comprise a block of modified nucleobases. In certain such embodiments, the block is at the 3'-end of the oligonucleotide. In certain embodiments, the block is within 3 nucleosides of the 3'-end of the oligonucleotide. In certain embodiments, the block is at the 5'-end of the oligonucleotide. In certain embodiments, the block is within 3 nucleosides of the 5'-end of the oligonucleotide.

Internucleoside Linkage Modifications and Motifs

A 3' to 5' phosphodiester linkage is the naturally occurring internucleoside linkage of RNA and DNA. In certain embodiments, compounds described herein have one or more modified, i.e. non-naturally occurring, internucleoside linkages. Certain non-naturally occurring internucleoside linkages may impart desirable properties such as, for example, enhanced cellular uptake, enhanced affinity for target nucleic acids, and increased stability in the presence of nucleases. Representative phosphorus-containing modified internucleoside linkages include, but are not limited to, phosphotriesters, alkylphosphonates (e.g. methylphosphonates), phosphoramidates, and phosphorothioates ("P=S"), and phosphorodithioates ("HS-P=S"). Representative non-phosphorus containing internucleoside linking groups include, but are not limited to, methylenemethylimino (-CH₂-N(CH₃)-O-CH₂), thiodiester, thionocarbamate (-O-C(=O)(NH)-S-); siloxane (-O-SiH₂-O-); and N,N'-dimethylhydrazine (-CH₂-N((CH₃))-N((CH₃))-). Methods of preparation of phosphorous-containing and non-phosphorous-containing internucleoside linkages are well known to those skilled in the art. Neutral internucleoside linkages include, without limitation, phosphotriesters, methylphosphonates, MMI (3'-CH₂-N(CH₃)-O-5'), amide-3 (3'-CH₂-C(=O)-N(H)-5'), amide-4 (3'-CH₂-N(H)-C(=O)-5'), formacetal (3'-O-CH₂-O-5'), methoxypropyl, and thioformacetal (3'-S-CH₂-O-5'). Further neutral internucleoside linkages include nonionic linkages comprising siloxane (dialkylsiloxane), carboxylate ester, carboxamide, sulfide, sulfonate ester and amides (See, for example: Carbohydrate Modifications in Antisense Research; Y.S. Sanghvi and P.D. Cook, Eds., ACS Symposium Series 580; Chapters 3 and 4, 40-65). Further neutral internucleoside linkages include nonionic linkages comprising mixed N, O, S and CH₂ component parts.

In certain embodiments, compounds provided herein comprise at least one modified internucleoside linkage. A modified internucleoside linkage may be placed at any position of an oligonucleotide. For double-stranded compounds, a modified internucleoside linkage may be placed within the sense oligonucleotide, antisense oligonucleotide, or both oligonucleotides of the double-stranded compound.

In certain embodiments, the internucleoside linkage modification may occur on every nucleoside of an oligonucleotide. In certain embodiments, internucleoside linkage modifications may occur in an alternating pattern along an oligonucleotide. In certain embodiments, essentially each internucleoside linking group is a phosphate internucleoside linkage (P=O). In certain embodiments, each internucleoside linking group of a modified oligonucleotide is a phosphorothioate (P=S). In certain embodiments, each internucleoside linking group of a modified oligonucleotide is independently selected from a

phosphorothioate and phosphate internucleoside linkage. In certain embodiments, the pattern of the internucleoside linkage modification on each oligonucleotide of a double-stranded compound is the same. In certain embodiments, the pattern of the internucleoside linkage modification on each oligonucleotide of a double-stranded compound is different. In certain embodiments, a double-stranded compound comprises 6-8 modified internucleoside linkages. In certain embodiments, the 6-8 modified internucleoside linkages are phosphorothioate internucleoside linkages or alkylphosphonate internucleoside linkages. In certain embodiments, the sense oligonucleotide comprises at least two modified internucleoside linkages at either or both the 5'-end and the 3'-end. In certain such embodiments, the modified internucleoside linkages are phosphorothioate internucleoside linkages or alkylphosphonate internucleoside linkages. In certain embodiments, the antisense oligonucleotide comprises at least two modified internucleoside linkages at either or both the 5'-end and the 3'-end. In certain such embodiments, the modified internucleoside linkages are phosphorothioate internucleoside linkages or alkylphosphonate internucleoside linkages.

In certain embodiments, a double-stranded compound comprises an overhang region. In certain embodiments, a double-stranded compound comprises a phosphorothioate or alkylphosphonate internucleoside linkage modification in the overhang region. In certain embodiments, a double-stranded compound comprises a phosphorothioate or alkylphosphonate internucleotide linkage linking the overhang nucleotide with a paired nucleotide that is next to the overhang nucleotide. For instance, there may be at least two phosphorothioate internucleoside linkages between the terminal three nucleosides, in which two of the three nucleosides are overhang nucleosides, and the third is a paired nucleoside next to the overhang nucleoside. These terminal three nucleosides may be at the 3'-end of the antisense oligonucleotide, the 3'-end of the sense oligonucleotide, the 5'-end of the antisense oligonucleotide, or the 5' end of the antisense oligonucleotide.

In certain embodiments, modified oligonucleotides comprise one or more internucleoside linkages having chiral centers. Representative chiral internucleoside linkages include, but are not limited to, alkylphosphonates and phosphorothioates. Modified oligonucleotides comprising internucleoside linkages having chiral centers can be prepared as populations of modified oligonucleotides comprising stereorandom internucleoside linkages, or as populations of modified oligonucleotides comprising phosphorothioate linkages in particular stereochemical configurations. In certain embodiments, populations of modified oligonucleotides comprise phosphorothioate internucleoside linkages wherein all of the phosphorothioate internucleoside linkages are stereorandom. Such modified oligonucleotides

can be generated using synthetic methods that result in random selection of the stereochemical configuration of each phosphorothioate linkage. As is well understood by those of skill in the art, each individual phosphorothioate of each individual oligonucleotide molecule has a defined stereoconfiguration. In certain embodiments, populations of modified oligonucleotides are enriched for modified oligonucleotides comprising one or more particular phosphorothioate internucleoside linkages in a particular, independently selected stereochemical configuration. In certain embodiments, the particular configuration of the particular phosphorothioate linkage is present in at least 65% of the molecules in the population. In certain embodiments, the particular configuration of the particular phosphorothioate linkage is present in at least 70% of the molecules in the population. In certain embodiments, the particular configuration of the particular phosphorothioate linkage is present in at least 80% of the molecules in the population. In certain embodiments, the particular configuration of the particular phosphorothioate linkage is present in at least 90% of the molecules in the population. In certain embodiments, the particular configuration of the particular phosphorothioate linkage is present in at least 99% of the molecules in the population. Such enriched populations of modified oligonucleotides can be generated using synthetic methods known in the art, e.g., methods described in Oka et al., JACS 125, 8307 (2003), Wan et al. Nuc. Acid. Res. 42, 13456 (2014), and WO 2017/015555. In certain embodiments, a population of modified oligonucleotides is enriched for modified oligonucleotides having at least one indicated phosphorothioate in the (Sp) configuration. In certain embodiments, a population of modified oligonucleotides is enriched for modified oligonucleotides having at least one phosphorothioate in the (Rp) configuration.

Conjugate Groups

In certain embodiments, the compounds described herein comprise or consist of one or more oligonucleotides and, optionally, one or more conjugate groups. Conjugate groups may be attached to either or both ends of an oligonucleotide and/or at any internal position. In certain embodiments, a conjugate group is attached at the 3' end of an oligonucleotide. In certain embodiments, a conjugate group is attached at the 5' end of an oligonucleotide. In certain embodiments, oligonucleotides are covalently attached to one or more conjugate groups.

In certain embodiments, conjugate groups are terminal groups attached to either or both ends of an oligonucleotide. In certain such embodiments, terminal groups are attached at the 3' end of an oligonucleotide. In certain such embodiments, terminal groups are attached at the 5' end of an oligonucleotide. In certain embodiments, terminal groups include, but are not

limited to, capping groups, phosphate moieties, protecting groups, modified or unmodified nucleosides, and two or more nucleosides that are independently modified or unmodified, such as an overhang.

In certain embodiments, conjugate groups modify one or more properties of the attached oligonucleotide, including, but not limited to, pharmacodynamics, pharmacokinetics, stability, activity, half-life, binding, absorption, tissue distribution, cellular distribution, cellular uptake, charge and clearance. In certain embodiments, conjugate groups enhance the affinity of a compound for a selected target, e.g., molecule, cell or cell type, compartment, e.g., a cellular or organ compartment, tissue, organ or region of the body, as, e.g., compared to a compound absent such a conjugate group. In certain embodiments, conjugate groups impart a new property on the attached oligonucleotide, e.g., fluorophores or reporter groups that enable detection of the oligonucleotide.

In certain embodiments, conjugate groups include, but are not limited to, intercalators, reporter molecules, polyamines, polyamides, peptides, carbohydrates, vitamin moieties, polyethylene glycols, thioethers, polyethers, cholesterol, thiocholesterols, cholic acid moieties, folate, lipids, phospholipids, biotin, phenazine, phenanthridine, anthraquinone, adamantane, acridine, fluoresceins, rhodamines, coumarins, fluorophores, and dyes.

In certain embodiments, conjugate groups include an active drug substance, for example, aspirin, warfarin, phenylbutazone, ibuprofen, suprofen, fen-bufen, ketoprofen, (S)-(+)-pranoprofen, carprofen, dansylsarcosine, 2,3,5-triiodobenzoic acid, fingolimod, flufenamic acid, folinic acid, a benzothiadiazide, chlorothiazide, a diazepam, indo-methicin, a barbiturate, a cephalosporin, a sulfa drug, an antidiabetic, an antibacterial, or an antibiotic.

In certain embodiments, conjugate groups are targeting moieties. In certain embodiments, a targeting moiety includes, but is not limited to, a lectin, glycoprotein, lipid, protein, peptide, peptide mimetic, receptor ligand, antibody, thyrotropin, melanotropin, surfactant protein A, carbohydrate, carbohydrate derivative, modified carbohydrate, carbohydrate cluster, polysaccharide, modified polysaccharide, or polysaccharide derivative, mucin carbohydrate, multivalent lactose, multivalent galactose, N-acetyl-galactosamine (GalNAc), N-acetylglucosamine multivalent mannose, multivalent fucose, glycosylated polyaminoacids, multivalent galactose, transferrin, bisphosphonate, polyglutamate, polyaspartate, a lipid, cholesterol, a steroid, bile acid, folate, vitamin B12, vitamin A, biotin, or an RGD peptide or RGD peptide mimetic.

In certain embodiments, conjugate groups may include, but are not limited to, the conjugate groups described in the following references such as cholesterol (e.g., Letsinger et

al., *Proc. Natl. Acad. Sci. USA*, 1989, 86: 6553-6556), cholic acid (e.g., Manoharan et al., *Biorg. Med. Chem. Lett.*, 1994, 4:1053-1060), thioether, e.g., hexyl-S-tritylthiol (e.g., Manoharan et al., *Ann. NY. Acad. Sci.*, 1992, 660:306-309; Manoharan et al., *Biorg. Med. Chem. Lett.*, 1993, 3:2765-2770), thiocholesterol (e.g., Oberhauser et al., *Nucl. Acids Res.*, 1992, 20:533-538), aliphatic chains, e.g., do-decan-diol or undecyl residues (e.g., 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), phospholipids, e.g., di-hexadecyl-rac-glycerol or triethyl-ammonium 1,2-di-O-hexadecyl-rac-glycero-3-H-phosphonate (e.g., Manoharan et al., *Tetrahedron Lett.*, 1995, 36:3651-3654; Shea et al., *Nucl. Acids Res.*, 1990, 18:3777-3783), polyamines or a polyethylene glycol chains (e.g., Manoharan et al., *Nucleosides & Nucleotides*, 1995, 14:969-973), adamantane acetic acid (e.g., Manoharan et al., *Tetrahedron Lett.*, 1995, 36:3651-3654), palmityl (e.g., Mishra et al., *Biochim. Biophys. Acta*, 1995, 1264:229-237), octadecylamine or hexylamino-carbonyloxychole sterol moiety (e.g., Crooke et al. *J. Pharmacol. Exp. Ther.*, 1996, 277:923-937), tocopherol (e.g., Nishina et al., *Molecular Therapy Nucleic Acids*, 2015, 4, e220 and Nishina et al., *Molecular Therapy*, 2008, 16:734-740), GalNAc and other carbohydrates (e.g., Maier et al., *Bioconjugate Chemistry*, 2003, 14, 18-29; Rensen et al., *J. Med. Chem.* 2004, 47, 5798-5808; WO2009/073809 and US Patents 8,106,022; 8,450,467 and 8,828,957; and WO2014/179445; WO2014/179620 and US Patents 9,127,276; 9,181,549 and 10,844,379) each of which is incorporated herein by reference in its entirety.

Conjugate groups may be attached to oligonucleotides through conjugate linkers. In certain embodiments, a conjugate linker comprises a chain structure, such as a hydrocarbonyl chain, or an oligomer of repeating units or combination of such repeating units. In certain embodiments, a conjugate linker comprises one or more groups selected from alkyl, amino, oxo, amide, disulfide, polyethylene glycol, ether, thioether, and hydroxylamino. In certain embodiments, a conjugate linker comprises at least one phosphorus group. In certain embodiments, a conjugate linker comprises at least one phosphate group. In certain embodiments, a conjugate linker includes at least one neutral linking group. In certain embodiments, conjugate linkers include, but are not limited to, pyrrolidine, 8-amino-3,6-dioxaoctanoic acid (ADO), succinimidyl 4-(N-maleimidomethyl) cyclohexane-1-carboxylate (SMCC) and 6-aminohexanoic acid (AHEx or AHA). Other conjugate linkers include, but are not limited to, substituted or unsubstituted C₁-C₁₀ alkyl, substituted or unsubstituted C₂-C₁₀ alkenyl, or substituted or unsubstituted C₂-C₁₀ alkynyl, wherein a nonlimiting list of preferred substituent groups includes hydroxyl, amino, alkoxy, carboxy, benzyl, phenyl,

nitro, thiol, thioalkoxy, halogen, alkyl, aryl, alkenyl, and alkynyl. In certain embodiments, conjugate linkers comprise 1-10 linker-nucleosides. In certain embodiments, such linker-nucleosides may be modified or unmodified nucleosides. It is typically desirable for linker-nucleosides to be cleaved from the compound after it reaches a target tissue. Accordingly, linker-nucleosides herein can be linked to one another and to the remainder of the compound through cleavable bonds. Herein, linker-nucleosides are not considered to be part of the oligonucleotide. Accordingly, in embodiments in which a compound comprises an oligonucleotide consisting of a specified number or range of linked nucleosides and/or a specified percent complementarity to a reference nucleic acid and the compound also comprises a conjugate group comprising a conjugate linker comprising linker-nucleosides, those linker-nucleosides are not counted toward the length of the oligonucleotide and are not used in determining the percent complementarity of the oligonucleotide for the reference nucleic acid.

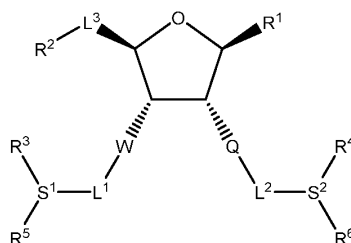
In certain embodiments, conjugate groups and conjugate linkers as well as other modifications include, without limitation, those described in the following references: US 5,994,517; US 6,300,319; US 6,660,720; US 6,906,182; US 7,262,177; US 7,491,805; US 8,106,022; US 7,723,509; US 9,127,276; US 2006/0148740; US 2011/0123520; WO2013/033230; WO2012/037254, Biessen et al., *J. Med. Chem.* 1995, 38, 1846-1852; Lee et al., *Bioorganic & Medicinal Chemistry* 2011, 19, 2494-2500; Rensen et al., *J. Biol. Chem.* 2001, 276, 37577-37584; Rensen et al., *J. Med. Chem.* 2004, 47, 5798-5808; Slidregt et al., *J. Med. Chem.* 1999, 42, 609-618; Valentijn et al., *Tetrahedron*, 1997, 53, 759-770; Lee, *Carbohydr Res*, 1978, 67, 509-514; Connolly et al., *J Biol Chem*, 1982, 257, 939-945; Pavia et al., *Int J Pep Protein Res*, 1983, 22, 539-548; Lee et al., *Biochem*, 1984, 23, 4255-4261; Lee et al., *Glycoconjugate J*, 1987, 4, 317-328; Toyokuni et al., *Tetrahedron Lett*, 1990, 31, 2673-2676; Biessen et al., *J Med Chem*, 1995, 38, 1538-1546; Valentijn et al., *Tetrahedron*, 1997, 53, 759-770; Kim et al., *Tetrahedron Lett*, 1997, 38, 3487-3490; Lee et al., *Bioconjug Chem*, 1997, 8, 762-765; Kato et al., *Glycohiol*, 2001, 11, 821-829; Rensen et al., *J Biol Chem*, 2001, 276, 37577-37584; Lee et al., *Methods Enzymol*, 2003, 362, 38-43; Westerlind et al., *Glycoconj J*, 2004, 21, 227-241; Lee et al., *Bioorg Med Chem Lett*, 2006, 16(19), 5132-5135; Maierhofer et al., *Bioorg Med Chem*, 2007, 15, 7661-7676; Khorev et al., *Bioorg Med Chem*, 2008, 16, 5216-5231; Lee et al., *Bioorg Med Chem*, 2011, 19, 2494-2500; Kornilova et al., *Analyt Biochem*, 2012, 425, 43-46; Pujol et al., *Angew Chemie Int Ed Engl*, 2012, 51, 7445-7448; Biessen et al., *J Med Chem*, 1995, 38, 1846-1852; Slidregt et al., *J Med Chem*, 1999, 42, 609-618; Rensen et al., *J Med Chem*, 2004, 47, 5798-5808; Rensen et

al., *Arterioscler Thromb Vase Biol*, 2006, 26, 169-175; van Rossenberg et al., *Gene Ther*, 2004, 11, 457-464; Sato et al., *J Am Chem Soc*, 2004, 126, 14013-14022; Lee et al., *J Org Chem*, 2012, 77, 7564-7571; Biessen et al., *FASEB J*, 2000, 14, 1784-1792; Rajur et al., *Bioconjug Chem*, 1997, 8, 935-940; Duff et al., *Methods Enzymol*, 2000, 313, 297-321; Maier et al., *Bioconjug Chem*, 2003, 14, 18-29; Jayaprakash et al., *Org Lett*, 2010, 12, 5410-5413; Manoharan, *Antisense Nucleic Acid Drug Dev*, 2002, 12, 103-128; Merwin et al., *Bioconjug Chem*, 1994, 5, 612-620; Tomiya et al., *Bioorg Med Chem*, 2013, 21, 5275-5281; International applications WO1998/013381; WO2011/038356; WO1997/046098; WO2008/098788; WO2004/101619; WO2012/037254; WO2011/120053; WO2011/100131; WO2011/163121; WO2012/177947; WO2013/033230; WO2013/075035; WO2012/083185; WO2012/083046; WO2009/082607; WO2009/134487; WO2010/144740; WO2010/148013; WO1997/020563; WO2010/088537; WO2002/043771; WO2010/129709; WO2012/068187; WO2009/126933; WO2004/024757; WO2010/054406; WO2012/089352; WO2012/089602; WO2013/166121; WO2013/165816; U.S. Patents 4,751,219; 7,582,744; 8,552,163; 8,137,695; 6,908,903; 6,383,812; 7,262,177; 6,525,031; 5,994,517; 6,660,720; 6,300,319; 7,723,509; 8,106,022; 7,491,805; 7,491,805; 8,541,548; 8,344,125; 8,313,772; 8,349,308; 8,450,467; 8,501,930; 8,158,601; 7,262,177; 6,906,182; 6,620,916; 8,435,491; 8,404,862; 7,851,615; Published U.S. Patent Application Publications US2011/0097264; US2011/0097265; US2013/0004427; US2003/0119724; US2011/0207799; US2012/0035115; US2012/0230938; US2005/0164235; US2006/0183886; US2012/0136042; US2012/0095075; US2013/0109817; US2006/0148740; US2008/0206869; US2012/0165393; US2012/0101148; US2013/0121954; US2011/0123520; US2003/0077829; US2008/0108801; and US2009/0203132; each of which is incorporated herein by reference in its entirety.

Certain Targeting Moieties

In certain embodiments, a compound provided herein comprises a conjugate group. In certain embodiments, an oligonucleotide provided herein comprises a conjugate group. In certain embodiments, the conjugate group is a targeting moiety. In certain embodiments, the targeting moiety comprises one or more GalNAc. In certain embodiments, the one or more GalNAc are attached to one or more positions on a furanose ring. In certain embodiments, the one or more GalNAc are attached to the 2' or 3' position on a furanose ring. In certain embodiments, the furanose ring is a subunit of the oligonucleotide. In certain embodiments, the furanose ring is the 5' nucleoside sugar of an oligonucleotide. In certain embodiments, the furanose ring is the 5' nucleoside sugar of a sense oligonucleotide. In certain

embodiments, a compound or oligonucleotide comprises one or more subunits with the following formula or a salt, solvate, or hydrate thereof:



Formula IX

wherein:

R^1 is H, adenine, guanine, thymine, cytosine, uracil, carbocyclyl, heterocyclyl, aryl, heteroaryl, or a nucleobase isostere;

R^2 is the oligonucleotide sequence;

L^1 is alkyl, or alkyl-C(=O)-NH-alkyl;

L^2 is alkyl, or alkyl-C(=O)-NH-alkyl;

L^3 is a bond, a phosphodiester bond, a phosphorothioate bond, a triazole, a tetrazole, an amide, a reverse-amide, a carbamate, a carbonate, urea, O, S, S(=O), S(=O)₂, NH, substituted N group, alkyl, alkenyl, dienyl, alkynyl, heteroalkyl, phosphate;

R^3 is H, -C(=O)-NH-(CH₂CH₂O)_j-GalNAc, or -C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc;

R^4 is H, -C(=O)-NH-(CH₂CH₂O)_k-GalNAc, or -C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc;

R^5 is -C(=O)-NH-(CH₂CH₂O)_m-GalNAc, or -C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc;

R^6 is -C(=O)-NH-(CH₂CH₂O)_n-GalNAc, or -C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc;

W and Q are each independently O, NH, CH₂, or CH₂O;

S^1 and S^2 are each independently C(R^7) or N, wherein each instance of R^7 is independently H, alkyl, heteroalkyl, or halogen;

j is an integer 1-10, inclusive;

k is an integer 1-10, inclusive;

m is an integer 1-10, inclusive; and

n is an integer 1-10, inclusive.

In certain embodiments, R^3 , R^4 , R^5 , and R^6 are the same. In certain embodiments, R^3 , R^5 , and R^6 are the same. In certain embodiments, R^3 or R^4 is H.

In certain embodiments, L^1 and L^2 are the same.

In certain embodiments, L^1 and L^2 are each independently alkyl; R^3 is H, $-C(=O)-NH-(CH_2CH_2O)_j-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^4 is H, $-C(=O)-NH-(CH_2CH_2O)_k-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^5 is $-C(=O)-NH-(CH_2CH_2O)_m-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; and R^6 is $-C(=O)-NH-(CH_2CH_2O)_n-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$.

In certain embodiments, L^1 and L^2 are each independently alkyl- $C(=O)-NH-alkyl$; R^3 is H, $-C(=O)-NH-(CH_2CH_2O)_j-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^4 is H, $-C(=O)-NH-(CH_2CH_2O)_k-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^5 is $-C(=O)-NH-(CH_2CH_2O)_m-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; and R^6 is $-C(=O)-NH-(CH_2CH_2O)_n-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$.

In certain embodiments, R^4 is H.

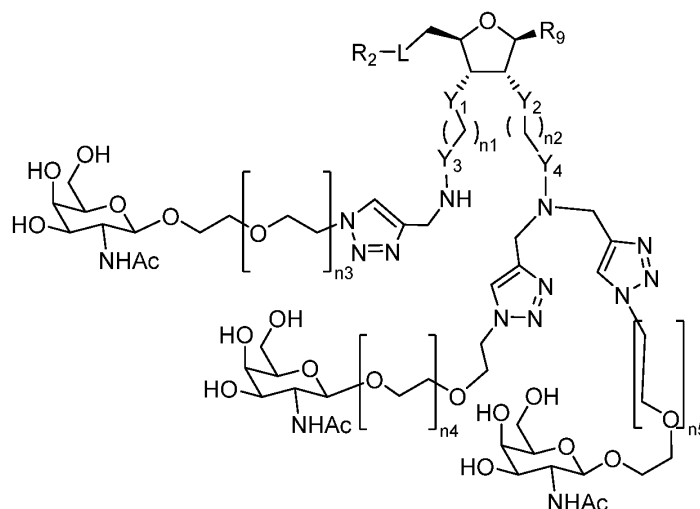
In certain embodiments, L^1 and L^2 are each independently alkyl; R^3 is $-C(=O)-NH-(CH_2CH_2O)_j-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^4 is H; R^5 is $-C(=O)-NH-(CH_2CH_2O)_m-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; and R^6 is $-C(=O)-NH-(CH_2CH_2O)_n-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$.

In certain embodiments, L^1 and L^2 are each independently alkyl- $C(=O)-NH-alkyl$; R^3 is $-C(=O)-NH-(CH_2CH_2O)_j-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^4 is H; R^5 is $-C(=O)-NH-(CH_2CH_2O)_m-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; and R^6 is $-C(=O)-NH-(CH_2CH_2O)_n-GalNAc$, or $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$.

In certain embodiments, R^3 is $-C(=O)-NH-(CH_2CH_2O)_j-GalNAc$; R^4 is H; R^5 is $-C(=O)-NH-(CH_2CH_2O)_m-GalNAc$; and R^6 is $-C(=O)-NH-(CH_2CH_2O)_n-GalNAc$.

In certain embodiments, R^3 is $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; R^4 is H; R^5 is $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$; and R^6 is $-C(=O)-NH-alkyl-NH-C(=O)-alkyl-O-GalNAc$.

In certain embodiments, a compound or oligonucleotide comprises one or more subunits with the following formula or a salt, solvate, or hydrate thereof:

**Formula X**

wherein:

R^9 is H, adenine, guanine, thymine, cytosine, or uracil, or adenine, guanine, thymine, cytosine, or uracil, each comprising a Protecting Group (PG), a modified nucleobase, optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted carbocyclyl, optionally substituted heterocyclyl, or a nucleobase isostere;

L is a bond, a phosphodiester bond, a phosphorothioate bond, a triazole, a tetrazole, an amide, a reverse-amide, a carbamate, a carbonate, urea, alkyl, or heteroalkyl;

R^2 is the oligonucleotide sequence;

Y_1 is O, CH_2 , CH_2O , or optionally substituted NH;

Y_2 is O, CH_2 , CH_2O , or optionally substituted NH;

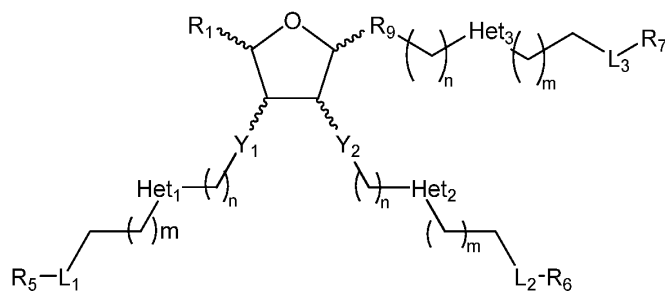
Y_3 is CO, SO_2 , $P(O)O$, $CH_2-O-C(O)$, $CH_2-NH-C(O)$, $CH_2-NH-SO_2$, or CH_2 ;

Y_4 is CO, SO_2 , $P(O)O$, $CH_2-O-C(O)$, $CH_2-NH-C(O)$, $CH_2-NH-SO_2$, or CH_2 ;

n_2 is 0, 1, 2, 3, 4, 5, or 6; and

each n_1 , n_3 , n_4 and n_5 is independently 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

In certain embodiments, a compound or oligonucleotide comprises one or more subunits with the following formula or a salt, solvate, or hydrate thereof:

**Formula XI**

wherein:

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

each m is independently 0, 1, 2, 3, 4, 5, or 6;

each o is independently 0, 1, 2, 3, 4, 5, or 6;

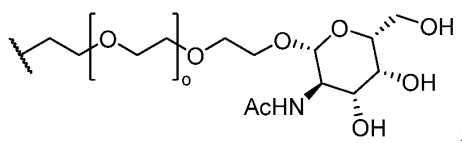
each of L₁, L₂, and L₃ is independently absent, C(=O), or C(=O)NH;

each Y₁ is independently O, CH(R^a), S, S(=O), S(=O)₂, NH, substituted N group, NHC(=O), C(=O)NH, P(=O)₂-O-, P(=O)(=S)-O, P(=S)₂-O, -O-P(=O)₂-O-, -O-P(=O)(=S)-O-, -O-P(=S)₂-O-, -O-P(=O)₂-, -O-P(=O)(=S)-, -O-P(=S)₂-;

each Y₂ is independently O, CH(R^b), S, S(=O), S(=O)₂, NH, substituted N group, NHC(=O), C(=O)NH, P(=O)₂-O-, P(=O)(=S)-O, P(=S)₂-O, -O-P(=O)₂-O-, -O-P(=O)(=S)-O-, -O-P(=S)₂-O-, -O-P(=O)₂-, -O-P(=O)(=S)-, -O-P(=S)₂-;

each of Het₁, Het₂, and Het₃ is independently optionally substituted heteroaryl or optionally substituted heterocyclyl;

R¹ is the oligonucleotide sequence linked by a bond, a phosphodiester bond, a phosphorothioate bond, a triazole, a tetrazole, an amide, a reverse-amide, a carbamate, a carbonate, urea, alkyl, or heteroalkyl;



each R₅, R₆, and R₇ is independently

R₉ is optionally substituted heterocyclyl;

each R^a is independently H, alkyl, halo, OR^c, or SR^c;

each R^b is independently H, alkyl, halo, OR^c, or SR^c; and

each R^c is independently H or alkyl.

In certain embodiments, the subunit is selected from Formulae I through VIII or a salt, solvate, or hydrate thereof, wherein R is the modified oligonucleotide other than the 5' nucleoside. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula I and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula I and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula II and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula II and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula III and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula III and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula IV and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula IV and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula V and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula V and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VI and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VI and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VII and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VII and R' is S. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VIII and R' is O. In certain embodiments, the 5' nucleoside of the modified oligonucleotide is Formula VIII and R' is S.

Target Nucleic Acids and Target Regions

In certain embodiments, compounds described herein comprise or consist of an oligonucleotide comprising a region that is complementary to a target nucleic acid. In certain embodiments, the target nucleic acid is an endogenous RNA molecule. In certain embodiments, the target nucleic acid encodes a protein. In certain embodiments, the target nucleic acid is non-coding. In certain such embodiments, the target nucleic acid is selected from an mRNA and a pre-mRNA, including intronic, exonic and untranslated regions. In certain embodiments, the target RNA is an mRNA. In certain embodiments, the target nucleic acid is a pre-mRNA. In certain such embodiments, the target region is entirely within an exon. In certain such embodiments, the target region is entirely within an intron. In certain embodiments, the target region spans an intron/exon junction. In certain embodiments, the target region is at least 50% within an intron.

In certain embodiments, compounds disclosed herein hybridize with a AGT nucleic acid. The most common mechanism of hybridization involves hydrogen bonding between complementary nucleobases of the nucleic acid molecules. Hybridization can occur under varying conditions. Hybridization 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 hybridizes specifically to a target nucleic acid are well known in the art. In certain embodiments, the compounds provided herein specifically hybridize with a AGT nucleic acid.

Nucleotide sequences that encode AGT include, without limitation, the following: GENBANK Accession Nos. NM_000029.4 (incorporated herein as SEQ ID NO: 1), the complement of nucleotides 230702523 to 230745583 of NC_000001.11 (incorporated herein as SEQ ID NO: 2), NM_001382817.3 (incorporated herein as SEQ ID NO: 3) and nucleotides 5469 to 17068 of NG_008836.2 (incorporated herein as SEQ ID NO: 4).

Complementarity

Oligonucleotides provided herein may have a defined percent complementarity to a particular nucleic acid, target region, oligonucleotide, or portion thereof. Non-complementary nucleobases may be tolerated provided that the oligonucleotide remains able to specifically hybridize to the nucleic acid, oligonucleotide, or portion thereof. In certain embodiments, the oligonucleotides provided herein, or a specified portion thereof are at least, or are up to 70%, 80%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or 100% complementary to a target nucleic acid, a target region, an oligonucleotide or specified portion thereof. In certain embodiments, the oligonucleotides provided herein, or a specified portion thereof, are 70% to 75%, 75% to 80%, 80% to 85%, 85% to 90%, 90% to 95%, 95% to 100%, or any number in between these ranges, complementary to a target nucleic acid, a target region, an oligonucleotide or specified portion thereof. Percent complementarity of an oligonucleotide with a target nucleic acid, a target region, an oligonucleotide or specified portion thereof can be determined using routine methods. For example, an oligonucleotide in which 18 of 20 nucleobases of the oligonucleotide are complementary to a target region, and would therefore specifically hybridize, would represent 90 percent complementarity. In this example, the remaining non-complementary nucleobases may be clustered or interspersed with complementary nucleobases and need not be contiguous to each other or to complementary nucleobases. As such, an oligonucleotide which is 18 nucleobases in length having four non-complementary 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. Percent complementarity of an oligonucleotide with a region of a target nucleic acid, a target region, an oligonucleotide or specified portion thereof can be determined routinely using BLAST programs (basic local alignment search tools) known in the art. In certain embodiments, oligonucleotides described herein, or specified portions thereof, are fully complementary (i.e. 100% complementary) to a target nucleic acid, a target region, an oligonucleotide or specified portion thereof. For example, an oligonucleotide may be fully complementary to a target nucleic acid, a target region, an oligonucleotide, or specified portion thereof. As used herein, “fully complementary” means each nucleobase of an oligonucleotide is complementary to the corresponding nucleobase of a target nucleic acid, a target region, an oligonucleotide, or a specified portion thereof. For example, a 20 nucleobase oligonucleotide 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 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 oligonucleotide can be “fully complementary” to a 20 nucleobase region of a target sequence that is 400 nucleobases long. The 20 nucleobase portion of the 30 nucleobase compound 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 compound. At the same time, the entire 30 nucleobase compound may or may not be fully complementary to the target sequence, depending on whether the remaining 10 nucleobases of the compound are also complementary to the target sequence.

In certain embodiments, oligonucleotides described herein comprise one or more mismatched nucleobases relative to a target nucleic acid, a target region, an oligonucleotide or a specified portion thereof. In certain embodiments, oligonucleotides described herein that are, or are up to 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, or 23 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, or specified portion thereof. In certain embodiments, oligonucleotides described herein that are, or are up to 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, a target region, an oligonucleotide, or specified portion thereof. In certain embodiments, the mismatch is at position 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14 from the 5'-end of the oligonucleotide. In

certain embodiments, the mismatch is at position 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12, 13 or 14 from the 3'-end of the oligonucleotide. In certain embodiments, the mismatch forms a wobble base pair with a corresponding nucleobase on the target nucleic acid. For example, in certain embodiments, the mismatch forms a wobble base pair selected from hypoxanthine (nucleobase of inosine) and uracil (I:U base pair); guanine and uracil (G:U base pair); hypoxanthine and adenine (I:A base pair); and hypoxanthine and cytosine (I:C base pair). Accordingly, in certain embodiments, a mismatched nucleobase on an oligonucleotide comprises hypoxanthine, guanine, or uracil.

In certain embodiments, oligonucleotides described herein may be complementary to a portion of a nucleic acid. As used herein, "portion" refers to a defined number of contiguous nucleobases within a region of a nucleic acid. A "portion" can also refer to a defined number of contiguous nucleobases of an oligonucleotide. In certain embodiments, the oligonucleotides are complementary to at least an 8 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 9 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 10 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least an 11 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 12 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 13 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 14 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 15 nucleobase portion of a nucleic acid. In certain embodiments, the oligonucleotides are complementary to at least a 16 nucleobase portion of a nucleic acid. Also contemplated are oligonucleotides that are complementary to at least a 9, 10, 17, 18, 19, 20, 21, 22, 23 or more nucleobase portion of a nucleic acid, or a range defined by any two of these values. In certain embodiments, the oligonucleotide is an antisense oligonucleotide. 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. In certain embodiments, the oligonucleotide is a sense oligonucleotide. In certain embodiments, a portion of the sense oligonucleotide is compared to an equal length portion of an antisense oligonucleotide. 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 of a sense oligonucleotide is compared to an equal length portion of an antisense oligonucleotide.

Identity

The oligonucleotides provided herein may also have a defined percent identity to a particular nucleic acid, target region, oligonucleotide, or specified portion thereof. As used herein, an oligonucleotide is identical to a sequence disclosed herein if it has the same nucleobase pairing ability. For example, a DNA which contains thymidine in place of uracil in a disclosed RNA sequence would be considered identical to the RNA sequence since both uracil and thymidine pair with adenine. Shortened and lengthened versions of the compounds described herein as well as compounds having non-identical bases relative to the compounds provided herein also are contemplated. The non-identical bases may be adjacent to each other or dispersed throughout the compound. Percent identity of an oligonucleotide is calculated according to the number of bases that have identical base pairing relative to the sequence to which it is being compared. In certain embodiments, oligonucleotides described herein, or portions thereof, are, or are at least, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or 100% identical to one or more of the nucleic acids, oligonucleotides, or a portion thereof, disclosed herein. In certain embodiments, oligonucleotides described herein are about 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical, or any percentage between such values, to a particular nucleic acid or oligonucleotide, or portion thereof.

In certain embodiments, an oligonucleotide may have one or more mismatched nucleobases. In certain such embodiments, the mismatch is at position 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14 from the 5'-end of the oligonucleotide. In certain such embodiments, the mismatch is at position 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12, 13 or 14 from the 3'-end of the oligonucleotide. In certain embodiments, a portion of the 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. In certain embodiments, the oligonucleotide is a sense oligonucleotides. In certain embodiments, a portion of the sense 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.

Pharmaceutical Compositions and Formulations

Compounds described herein may be admixed with pharmaceutically acceptable active or inert substances for the preparation of pharmaceutical compositions or formulations. Compositions and methods for the formulation of pharmaceutical compositions are dependent upon a number of criteria, including, but not limited to, route of administration, extent of disease, or dose to be administered. Certain embodiments provide pharmaceutical compositions comprising one or more compounds or a salt thereof. In certain embodiments, the compounds are antisense oligonucleotides. In certain embodiments, the compounds are oligomeric compounds. In certain embodiments, the compounds comprise or consist of one or more modified oligonucleotides. In certain such embodiments, the pharmaceutical composition comprises one or more compound and a suitable pharmaceutically acceptable diluent or carrier. In certain embodiments, a pharmaceutical composition comprises one or more compound and a sterile saline solution. In certain embodiments, such pharmaceutical composition consists of one compound and a sterile saline solution. In certain embodiments, the sterile saline is pharmaceutical grade saline. In certain embodiments, a pharmaceutical composition comprises one or more compound and sterile water. In certain embodiments, a pharmaceutical composition consists of one compound and sterile water. In certain embodiments, the sterile water is pharmaceutical grade water. In certain embodiments, a pharmaceutical composition comprises one or more compounds and phosphate-buffered saline (PBS). In certain embodiments, a pharmaceutical composition consists of one compound and sterile PBS. In certain embodiments, the sterile PBS is pharmaceutical grade PBS.

A compound described herein targeted to AGT can be utilized in pharmaceutical compositions by combining the compound with a suitable pharmaceutically acceptable diluent or carrier. In certain embodiments, a pharmaceutically acceptable diluent is water, such as sterile water suitable for injection. Accordingly, in one embodiment, employed in the methods described herein is a pharmaceutical composition comprising a compound targeted to AGT and a pharmaceutically acceptable diluent. In certain embodiments, the pharmaceutically acceptable diluent is water. In certain embodiments, the compound comprises or consists of one or more modified oligonucleotide provided herein.

Pharmaceutical compositions comprising compounds provided herein encompass any pharmaceutically acceptable salts, esters, or salts of such esters, or any other oligonucleotide which, upon administration to an animal, including a human, is capable of providing (directly or indirectly) the biologically active metabolite or residue thereof. In certain embodiments, the compounds are antisense oligonucleotides. In certain embodiments, the compounds are

oligomeric compounds. In certain embodiments, the compound comprises or consists of one or more modified oligonucleotide. Accordingly, for example, the disclosure is also drawn to pharmaceutically acceptable salts of compounds, prodrugs, pharmaceutically acceptable salts of such prodrugs, and other bioequivalents. Suitable pharmaceutically acceptable salts include, but are not limited to, sodium and potassium salts. A prodrug can include the incorporation of additional nucleosides at one or both ends of a compound which are cleaved by endogenous nucleases within the body, to form the active compound. In certain embodiments, the compounds or compositions further comprise a pharmaceutically acceptable carrier or diluent.

EXAMPLES

The following examples describe the process to identify lead compounds targeted to AGT. Certain compounds are distinguished as having high potency and tolerability.

The following examples serve only to illustrate the compounds described herein and are not intended to limit the same. The following examples and related sequence listing accompanying this filing may identify sequence as either “RNA” or “DNA”; however, as disclosed herein, those sequences may be modified with any combination of chemical modifications. One of skill in the art will readily appreciate that the designation of a sequence as “RNA” or “DNA” is, in certain instances, arbitrary. For example, an oligonucleotide comprising a nucleoside comprising a 2'-OH sugar moiety and a thymine base could be described as a DNA having a modified sugar (2'-OH for the natural 2'-H of DNA) or as an RNA having a modified base (methylated uracil for natural uracil of RNA). Accordingly, nucleic acid sequences provided herein, including, but not limited to, those in the sequence listing, are intended to encompass nucleic acids containing any combination of natural or modified RNA and/or DNA, including, but not limited to, such nucleic acids having modified nucleobases.

Each of the references recited in the present application is incorporated herein by reference in its entirety.

Table 1
Chemical Nomenclature

Abbreviation	Structure
'm'	2'-O-methyl sugar modification (e.g., mA, mG, mC, mU)
'f'	2'-F sugar modification (e.g., fA, fG, fC, fU)
'*'	phosphorothioate internucleoside linkage
'.'	Phosphate internucleoside linkage
'dQ'	inverted abasic deoxyribose

'H1'	Formula I
'H2'	Formula II
'H4'	Formula III
'H9'	Formula VI
"H7"	Formula V
"Hd"	Formula VII
HI"	Formula VIII

Table 2
Compound Sequence and Targeting Position on SEQ ID NO: 1

Compound Number	Seq ID NO: 1 Start Site	SEQ ID NO: 1 Stop Site	Antisense Sequence (5'-3')	SEQ ID NO:	Sense Sequence (5'-3')	SEQ ID NO:
RD2915	1418	1440	UGAUCAUACACAGUAAACAGGAA	11	UCCUGUUUACUGUGUAUGAUGA	31
RD2916	1418	1440	UGAUCAUACACAGUAAACAGGAA	11	CCUGUUUACUGUGUAUGAUGA	32
RD2917	1417	1440	UGAUCAUACACAGUAAACAGGAAU	12	CCUGUUUACUGUGUAUGAUGA	32
RD2833	393	415	UCAUAGCUCACUGUGCAUGCCAU	13	UGGCAUGCAGAGAGCUAUGA	33
RD2836	1124	1146	AUCCAGUUGAGGGAGUUUUGCUG	14	AGCAAAACUCCCUCAACUGGAU	34
RD2837	1808	1830	UAAACAAGCUGGUUGGUUGGAAU	15	UUGCAACCAACAGCUUGUUUA	35
RD2838	1815	1837	UGUUUCACAAACAAGCUGGUCGG	16	CGACCAGCUUGUUUGUGAAACA	36
RD3048	1124	1146	AUCCAGUUGAGGGAGUUUUGCUG	14	GCAAAACUCCCUCAACUGGAU	37
RD3049	1126	1146	AUCCAGUUGAGGGAGUUUUGC	17	UGCAAAACUCCCUCAACUGGAU	38
RD3050	1816	1837	UGUUUCACAAACAAGCUGGUCG	18	UCGACCAGCUUGUUUGUGAAACA	39
RD3051	1817	1837	UGUUUCACAAACAAGCUGGUC	19	UGACCAGCUUGUUUGUGAAACA	40
RD3057	1815	1837	UGUUUCACAAACAAGCUGGUCGG	16	GACCAGCUUGUUUGUGAAACA	41
RD3058	1815	1837	UGUUUCACAAACAAGCUGGUUGG	20	CAACCAGCUUGUUUGUGAAACA	42

Table 3
Compound Chemistry

Compound Number	Modified Strand (5'-3')	Ref ID NO:	SEQ ID NO:
RD2915	mU*fG*mA.fU.mC.fA.mU.fA.mC.fA.mC.fA.mG.fU.mA.fA.mA.fC.mA.fG.mG*mA*mA	IA0500	11
	H4*mC*mC.mU.mG.mU.mU.fU.mA.fC.fU.fG.fU.mG.mU.mA.mU.mG.mA.mU.mC*mA*dQ	IS1279	31
RD2916	mU*fG*mA.fU.mC.fA.mU.fA.mC.fA.mC.fA.mG.fU.mA.fA.mA.fC.mA.fG.mG*mA*mA	IA0500	11
	H9*mC*mU.mG.mU.mU.fU.mA.fC.fU.fG.fU.mG.mU.mA.mU.mG.mA.mU.mC*mA*dQ	IS1280	32
RD2917	mU*fG*mA.fU.mC.fA.mU.fA.mC.fA.mC.fA.mG.fU.mA.fA.mA.fC.mA.fG.mG.mA*mA*mU	IA1027	12
	H9*mC*mU.mG.mU.mU.fU.mA.fC.fU.fG.fU.mG.mU.mA.mU.mG.mA.mU.mC*mA*dQ	IS1280	32
RD2833	mU*fC*mA.fU.mA.fG.mC.fU.mC.fA.mC.fU.mG.fU.mG.fC.mA.fU.mG.fC.mC*mA*mU	IA1019	13
	H2*mG*mG.mC.mA.mU.mG.fC.mA.fC.fA.fG.fU.mG.mA.mG.mC.mU.mA.mU.mG*mA*dQ	IS1255	33
RD2836	mA*fU*mC.fC.mA.fG.mU.fU.mG.fA.mG.fG.mG.fA.mG.fU.mU.fU.mU.fG.mC*mU*mG	IA1022	14
	Hd*mG*mC.mA.mA.mA.mA.fC.mU.fC.fC.fU.mC.mA.mA.mC.mU.mG.mG.mA*mU*dQ	IS1258	34
RD2837	mU*fA*mA.fA.mC.fA.mA.fG.mC.fU.mG.fG.mU.fU.mG.fG.mU.fU.mG.fG.mA*mA*mU	IA1023	15
	H2*mU*mC.mC.mA.mA.mC.fC.mA.fA.fC.fC.fA.mG.mC.mU.mU.mG.mU.mU.mU*mA*dQ	IS1259	35
RD2838	mU*fG*mU.fU.mU.fC.mA.fC.mA.fA.mA.fC.mA.fA.mG.fC.mU.fG.mG.fU.mC*mG*mG	IA1024	16
	H7*mG*mA.mC.mC.mA.mG.fC.mU.fU.fG.fU.fU.mU.mG.mU.mG.mA.mA.mA.mC*mA*dQ	IS1260	36
RD3048	mA*fU*mC.fC.mA.fG.mU.fU.mG.fA.mG.fG.mG.fA.mG.fU.mU.fU.mU.fG.mC*mU*mG	IA1022	14
	HI*mC*mA.mA.mA.mA.fC.mU.fC.fC.fC.fU.mC.mA.mA.mC.mU.mG.mG.mA*mU*dQ	IS1372	37
RD3049	mA*fU*mC.fC.mA.fG.mU.fU.mG.fA.mG.fG.mG.fA.mG.fU.mU.fU.mU*fG*mC	IA1093	17

	H2*mG*mC.mA.mA.mA.mA.fC.mU.fC.fC.fC.fU.mC.mA.mA.mC.mU.mG.mG.mA*mU*dQ	IS1373	38
RD3050	mU*fG*mU.fU.mU.fC.mA.fC.mA.fA.mA.fC.mA.fA.mG.fC.mU.fG.mG.fU*mC*mG	IA1094	18
	H2*mC*mG.mA.mC.mC.mA.mG.fC.mU.fU.fG.fU.fU.mU.mG.mU.mG.mA.mA.mA.mC*mA*dQ	IS1374	39
RD3051	mU*fG*mU.fU.mU.fC.mA.fC.mA.fA.mA.fC.mA.fA.mG.fC.mU.fG.mG*fU*mC	IA1095	19
	H2*mG*mA.mC.mC.mA.mG.fC.mU.fU.fG.fU.fU.mU.mG.mU.mG.mA.mA.mA.mC*mA*dQ	IS1375	40
RD3057	mU*fG*mU.fU.mU.fC.mA.fC.mA.fA.mA.fC.mA.fA.mG.fC.mU.fG.mG.fU.mC*mG*mG	IA1024	16
	HI*mA*mC.mC.mA.mG.fC.mU.fU.fG.fU.fU.mU.mG.mU.mG.mA.mA.mA.mC*mA*dQ	IS1381	41
RD3058	mU*fG*mU.fU.mU.fC.mA.fC.mA.fA.mA.fC.mA.fA.mG.fC.mU.fG.mG.fU.mU*mG*mG	IA1103	20
	H7*mA*mA.mC.mC.mA.mG.fC.mU.fU.fG.fU.fU.mU.mG.mU.mG.mA.mA.mA.mC*mA*dQ	IS1382	42

Example 1: Effect of modified oligonucleotides targeting human AGT in hAGT transgenic mice

Compounds RD2836 and RD2838 were evaluated in hAGT transgenic mice. Two groups of 5 hAGT mice each were injected with a single 3mg/kg subcutaneous dose of oligonucleotide or PBS on Day 1 of the study. Serum collection was performed on days 1 (prior to dosing), 8, 15, 22, 29, 35, 43 and 57. Circulating AGT levels were quantified using an ELISA specific for human angiotensinogen, according to manufacturer's protocol (IBL America #27412). AGT inhibition data were expressed as percent of baseline value (Day 1 prior to dosing) and presented as a group average for each compound.

Table 4
Average AGT Inhibition

Compound	Days						
	8	15	22	29	35	43	57
RD2836	93	93	92	86	84	73	57
RD2838	89	89	91	87	82	72	57

Example 2: Dose response of modified oligonucleotides targeting human AGT in hAGT transgenic mice

Compounds RD2833, RD2836, RD2837, and RD2838 were evaluated in hAGT transgenic mice. Sixteen groups of 5 hAGT mice each were injected with a single subcutaneous dose of oligonucleotide or PBS on Day 1 of the study. Oligonucleotide was administered at three doses: 0.5 mg/kg, 1.5 mg/kg and 4.5 mg/kg. Serum collection was performed on days 1 (prior to dosing), 8, 15, and 22. Future collections will be performed on days 29, 36, and 43. Circulating AGT levels were quantified using an ELISA specific for human angiotensinogen, according to manufacturer's protocol (IBL America #27412). AGT inhibition data were expressed as percent of baseline value (Day 1 prior to dosing) and presented as a group average for each compound.

Table 5
Average AGT Inhibition

Compound	Dose mg/kg	Days		
		8	15	22
RD2833	0.5	0.5	39	53
	1.5	1.5	77	81
	4.5	4.5	80	84
RD2836	0.5	0.5	16	45
	1.5	1.5	52	67
	4.5	4.5	72	87
RD2837	0.5	0.5	36	19
	1.5	1.5	68	66
	4.5	4.5	79	81
RD2838	0.5	0.5	38	55
	1.5	1.5	78	87
	4.5	4.5	90	96

Example 3: Effect of modified oligonucleotides targeting human AGT in cynomolgus monkeys

Compounds RD2915, RD2916, RD2917, RD2833, RD2836, RD2837, and RD2838 were evaluated in cynomolgus monkeys. Prior to the study the monkeys were kept in quarantine during which the animals were observed daily for general health. Seven groups of 2 cynomolgus monkeys (or 3 for RD2838) each were injected with a single 5 mg/kg subcutaneous dose of oligonucleotide on Day 1 of the study. All animals were bled on day -6 and on days 1 (prior to dosing), 4, 8, 15, 22 and 29 for serum analysis. Future collections will be on day 36, 43, 50, 57 and 64. The protocols described were approved by the Institutional Animal Care and Use Committee (IACUC). Circulating AGT levels were quantified using an ELISA specific for human angiotensinogen (and cross-reactive with cynomolgus), according to manufacturer's protocol (IBL America #27412). AGT inhibition data were expressed as percent of baseline value (average of Day -6 and Day 1 prior to dosing) and presented as a group average for each compound. Clinical chemistry was performed on Day -6 and will be performed on Day 64.

Table 6
Average AGT Inhibition

Compound	Days				
	4	8	15	22	29

RD2915	16	38	48	59	61
RD2916	15	51	72	72	76
RD2917	12	19	39	35	44
RD2833	31	56	52	64	69
RD2836	36	65	63	75	75
RD2837	16	34	41	53	55
RD2838	24	65	75	84	85

Example 4: Effect of modified oligonucleotides targeting human AGT in cynomolgus monkeys

Compounds RD3048, RD3049, RD3050, RD3051, RD3057 and RD3058 are being evaluated in cynomolgus monkeys. Prior to the study the monkeys are kept in quarantine during which the animals are observed daily for general health. Six groups of 2 cynomolgus monkeys each will be injected with a single 5 mg/kg subcutaneous dose of oligonucleotide on Day 1 of the study. All animals will be bled on day -6 and on days 1 (prior to dosing), 4, 8, 15, 22, 29, 36, 43, 50, 57 and 64 for serum analysis. The protocols described are approved by the Institutional Animal Care and Use Committee (IACUC). Circulating AGT levels are quantified using an ELISA specific for human angiotensinogen (and cross-reactive with cynomolgus), according to manufacturer's protocol (IBL America #27412). AGT inhibition data will be evaluated. Clinical chemistry will be performed on Day -6 and 64.

Example 5: Effect of modified oligonucleotides targeting human AGT in cynomolgus monkeys

Compounds RD3051 and RD3057 were evaluated in cynomolgus monkeys. Prior to the study the monkeys were kept in quarantine during which the animals were observed daily for general health. Two groups of 2 cynomolgus monkeys each were injected with a single 5 mg/kg subcutaneous dose of oligonucleotide on Day 1 of the study. All animals were bled on day -6 and on days 1 (prior to dosing), 8, 15, 22, 29, 36, 43, 50, 57 and 64 for serum analysis. The protocols described are approved by the Institutional Animal Care and Use Committee (IACUC). Circulating AGT levels are quantified using an ELISA specific for human angiotensinogen (and cross-reactive with cynomolgus), according to manufacturer's protocol (IBL America #27412). AGT inhibition data were expressed as percent of baseline value (average of Day -6 and Day 1 prior to dosing) and presented as a group average for each compound. Clinical chemistry was performed on Day -6 and Day 64. There were no test article-related effects on body weight and all serum chemistry values were within reference ranges.

Table 7
Average AGT Inhibition

	Days								
Compound	8	15	22	29	36	43	50	57	64
RD3051	53	81	83	84	82	83	84	71	70
RD3057	57	76	77	78	77	72	69	55	55

Table 8
Body Weight (kg)

Compound	Day 1	Day 64
RD3051 Cyno#1	4.5	4.9
RD3051 Cyno#2	4.9	5.4
RD3057 Cyno#1	4.3	4.7
RD3057 Cyno#2	4.4	4.3

Table 9
Liver Function Markers

Compound	ALT Day -6 [U/L]	ALT Day 64 [U/L]	AST Day -6 [U/L]	AST Day 64 [U/L]	Bilirubin Day -6 [mg/dL]	Bilirubin Day 64 [mg/dL]	Albumin Day -6 [g/dL]	Albumin Day 64 [g/dL]
RD3051 Cyno#1	50	60	49	43	0.2	0.2	4.4	4.4
RD3051 Cyno#2	58	81	29	40	<0.2	0.2	4.7	4.4
RD3057 Cyno#1	74	85	55	45	0.2	<0.2	3.9	4.0
RD3057 Cyno#2	58	61	51	51	<0.2	0.3	4.7	5.1

Table 10
Kidney Function Markers

Compound	Bun Day -6 [mg/dL]	Bun Day 64 [mg/dL]	Creatinine Day -6 [mg/dL]	Creatinine Day 64 [mg/dL]
RD3051 Cyno#1	21	20	0.7	0.8
RD3051 Cyno#2	20	19	0.6	0.6
RD3057 Cyno#1	23	25	0.7	0.7
RD3057 Cyno#2	19	19	0.5	0.7

Example 6: Effect of modified oligonucleotides targeting human AGT in cynomolgus monkeys

Compounds RD3050 and RD3058 were evaluated in cynomolgus monkeys. Prior to the study the monkeys were kept in quarantine during which the animals were observed daily for general health. Two groups of 2 cynomolgus monkeys each were injected with a single 5 mg/kg subcutaneous dose of oligonucleotide on Day 1 of the study. All animals were bled on day -6 and on days 1 (prior to dosing), 8, 15, 22, 29, 36, 43, 50, 57, 64, 71, 78, 85, 92, 99, 106, 113 and 120 for serum analysis. The protocols described are approved by the Institutional Animal Care and Use Committee (IACUC). Circulating AGT levels are quantified using an ELISA specific for human angiotensinogen (and cross-reactive with cynomolgus), according to manufacturer's protocol (IBL America #27412). AGT inhibition data were expressed as percent of baseline value (average of Day -6 and Day 1 prior to dosing) and presented as a group average for each compound. Clinical chemistry was performed on Day -6 and Day 120 for RD3050 and RD3058. There were no test article-related effects on body weight and all serum chemistry values were within reference ranges.

Table 11
Average AGT Inhibition

	Days																
Compound	8	15	22	29	36	43	50	57	64	71	78	85	92	99	106	113	120
RD3050	64	89	89	94	91	93	91	89	83	88	79	82	66	64	68	55	55
RD3058	75	87	94	97	96	96	96	94	91	86	90	86	81	64	60	65	72

Table 12
Body Weight (kg)

Compound	Day 1	Day 120
RD3050 Cyno#1	4.2	4.9
RD3050 Cyno#2	2.5	2.8
RD3058 Cyno#1	4.8	5.5
RD3058 Cyno#2	4.4	4.8

Table 13
Liver Function Markers

Compound	ALT Day -6 [U/L]	ALT Day 120 [U/L]	AST Day -6 [U/L]	AST Day 120 [U/L]	Biliru bin Day -6 [mg/d L]	Bilirubin Day 120 [mg/dL]	Albumin Day -6 [g/dL]	Albumin Day 120 [g/dL]
RD3050 Cyno#1	47	43	35	32	0.2	0.2	4.1	4.4
RD3050 Cyno#2	40	36	40	38	0.2	0.2	3.2	4.7
RD3058 Cyno#1	40	42	27	28	0.3	0.3	4.2	4.2
RD3058 Cyno#2	35	48	30	33	0.2	0.3	4.5	4.6

Table 14
Kidney Function Markers

Compound	Bun Day -6 [mg/dL]	Bun Day 120 [mg/dL]	Creatinine Day -6 [mg/dL]	Creatinine Day 120 [mg/dL]
RD3050 Cyno#1	20	13	0.6	0.6
RD3050 Cyno#2	26	25	0.6	0.6
RD3058 Cyno#1	26	21	0.6	0.7
RD3058 Cyno#2	19	18	0.7	0.8

Example 7: Effect of modified oligonucleotides targeting human AGT in cynomolgus monkeys

Compound RD3058 was evaluated in cynomolgus monkeys. Prior to the study the monkeys were kept in quarantine during which the animals were observed daily for general health. Two groups of cynomolgus monkeys each were injected with a single subcutaneous dose of oligonucleotide on Day 1 of the study. In one group, 2 monkeys were dosed at 0.5 mg/kg. In the second, 3 monkeys were injected with 3 mg/kg. All animals were bled on day -6 and on days 1 (prior to dosing), 8, 15, 22, 29, 36, 43, 50, 57 and 64 for serum analysis. Additional collections were performed for the 3 mg/kg group at days 71, 78, 85 and 92. The protocols described are approved by the Institutional Animal Care and Use Committee (IACUC). Circulating AGT levels are quantified using an ELISA specific for human angiotensinogen (and cross-reactive with cynomolgus), according to manufacturer's protocol (IBL America #27412). AGT inhibition data were expressed as percent of baseline value (average of Day -6 and Day 1 prior to dosing) and presented as a group average for each

compound. Clinical chemistry was performed on Day -6 and Day 64 (0.5 mg/kg) or 92 (3 mg/kg) for RD3058.

Table 15

Average AGT Inhibition

	Days												
Compound	8	15	22	29	36	43	50	57	64	71	78	85	92
RD3058 0.5 mg/kg	31	41	38	42	31	36	34	29	24				
RD3058 3 mg/kg	67	84	91	88	85	79	71	66	62	41	46	45	47

Example 8: Effect of modified oligonucleotides targeting human AGT in cynomolgus monkeys

Compound RD3058 was evaluated in cynomolgus monkeys. Prior to the study the monkeys were kept in quarantine during which the animals were observed daily for general health. Three naïve animals were selected into the study and randomly assigned to 2 groups; control and dose group. RD3058 was administered to the dose group at a dose level of 30mg/kg/dose by two doses given at a 3-week interval (Day 1 and Day 22) via subcutaneous injection at a dose volume of 0.5mL/kg. Observations included viability, clinical observations (cageside observations and detailed clinical observations), body weights, food consumption, clinical pathology (clinical chemistry, hematology, and coagulation), organ weights and macro and microscopic pathology. Based upon the overall results, two repeat dose of RD3058 was well tolerated in cynomolgus monkeys at 30 mg/kg/dose.

SEQ ID NO: 1

GAAGAAGCTGCCGTTGTTCTGGGTACTACAGCAGAAGGGTATGCGGAAGCGAGCACCCCAGT
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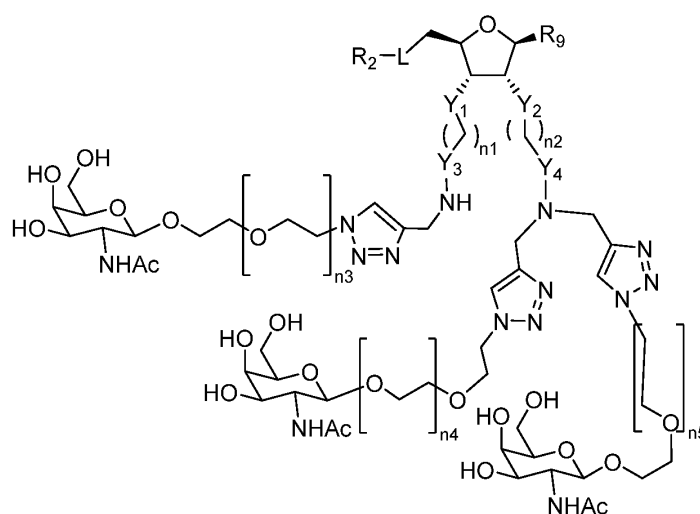
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TCCAAAAA

CLAIMS***What is claimed is:***

1. A compound comprising a modified oligonucleotide 14 to 23 linked nucleosides in length having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20.
2. A compound comprising a modified oligonucleotide 14 to 23 linked nucleosides in length having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20.
3. A compound comprising a modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20.
4. The compound of any one of claims 1-3, wherein the modified oligonucleotide is at least 80%, at least 85%, at least 90%, or at least 95% complementary to SEQ ID NO: 1 or 3.
5. The compound of any one of claims 1-4, wherein the modified oligonucleotide comprises at least one modification selected from a modified internucleoside linkage, a modified sugar, and a modified nucleobase.
6. The compound of any one of claims 1-5, wherein the compound is double-stranded.
7. A compound comprising a first modified oligonucleotide 14 to 23 linked nucleosides in length having a nucleobase sequence comprising at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, at least 21, at least 22, at least 23 contiguous nucleobases of any of the nucleobase sequences of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide 14 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.
8. A compound comprising a first modified oligonucleotide 14 to 23 linked nucleosides in length having a nucleobase sequence comprising the nucleobase sequence of any one of SEQ ID NOs: 11-20 or 31-42 and a second modified oligonucleotide 14 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.
9. A compound comprising a first modified oligonucleotide having a nucleobase sequence selected from the group consisting of any one of SEQ ID NOs: 11-20 and 31-42 and a second modified oligonucleotide 19 to 23 linked nucleosides in length having a region of complementarity to the first modified oligonucleotide.

10. The compound of any one of claims 7-9, wherein the first modified oligonucleotide has at least 80%, at least 85%, at least 90%, or at least 95% complementarity or identity to SEQ ID NO: 1 or 3 over its length.
11. The compound of any one of claims 7-10, wherein the first modified oligonucleotide has at least 1, at least 2, at least 3 mismatches to a region of SEQ ID NO: 1 or 3 that is the same length as the first modified oligonucleotide.
12. The compound of any one of claims 7-11, wherein the region of complementarity between the first modified oligonucleotide and the second modified oligonucleotide is 14 to 23 linked nucleosides in length.
13. The compound of any one of claims 7-11, wherein the region of complementarity between the first modified oligonucleotide and the second modified oligonucleotide is 19 to 23 linked nucleosides in length.
14. The compound of any one of claims 7-11, wherein the region of complementarity between the first modified oligonucleotide and the second modified oligonucleotide is 21 to 23 linked nucleosides in length.
15. The compound of any one of claims 7-11, wherein the first modified oligonucleotide is fully complementary to the second modified oligonucleotide.
16. The compound of any one of claims 7-15, wherein the first modified oligonucleotide comprises at least one modification selected from a modified internucleoside linkage, a modified sugar, and a modified nucleobase.
17. The compound of any one of claims 7-16, wherein the second modified oligonucleotide comprises at least one modification selected from the group consisting of a modified internucleoside linkage, a modified sugar, and a modified nucleobase.
18. The compound of any one of claims 5, 16 and 17, wherein the modified internucleoside linkage is a phosphorothioate internucleoside linkage or a methylphosphonate internucleoside linkage.
19. The compound of claim 18, wherein the phosphorothioate internucleoside linkage or methylphosphonate internucleoside linkage is at the 3' terminus of the first or second modified oligonucleotide or at the 5' terminus of the first modified oligonucleotide.
20. The compound of any one of claims 5, 16 and 17, wherein the modified sugar comprises a modification selected from the group consisting of a halogen, an alkoxy group and a bicyclic sugar.
21. The compound of claim 20, wherein the modified sugar comprises a 2'-F modification.

22. The compound of claim 20, wherein the modified sugar comprises a 2'-OMe modification.
23. The compound of any one of claims 7-15, wherein each nucleoside of the first modified oligonucleotide comprises a modified sugar.
24. The compound of any one of claims 7-15, wherein each nucleoside of the second modified oligonucleotide comprises a modified sugar.
25. The compound of claim 23 or 24, wherein the modified sugar comprises a modification selected from the group consisting of a halogen, an alkoxy group and a bicyclic sugar, or a combination thereof.
26. The compound of claim 25, wherein the modified sugar comprises a modification selected from group consisting of LNA, cEt, 2'-MOE, 2'-F, 2'-OMe, and 2'-deoxy, or a combination thereof.
27. The compound of claim 23, wherein the first modified oligonucleotide comprises no more than ten 2'-F sugar modifications.
28. The compound of claim 24, wherein the second modified oligonucleotide comprises no more than five 2'-F sugar modifications.
29. The compound of any preceding claim, comprising a conjugate group.
30. The compound of claim 29, wherein the conjugate group is attached to the 5' end of the modified oligonucleotide.
31. The compound of claim 29 or 30, wherein the conjugate group comprises a targeting moiety.
32. The compound of claim 31, wherein the targeting moiety comprises one or more GalNAc.
33. The compound of claim 32, wherein the modified oligonucleotide is the second modified oligonucleotide.
34. The compound of claim 32 or 33, wherein the one or more GalNAc are attached to the 2' or 3' position of the ribosyl ring of the 5' nucleoside of the modified oligonucleotide.
35. The compound of claim 34, wherein the 5' nucleoside is of the following formula:

**Formula X,**

wherein:

R^9 is H, adenine, guanine, thymine, cytosine, or uracil, or adenine, guanine, thymine, cytosine, or uracil, each comprising a Protecting Group (PG), a modified nucleobase, optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted carbocyclyl, optionally substituted heterocyclyl, or a nucleobase isostere;

L is a bond, a phosphodiester bond, a phosphorothioate bond, a triazole, a tetrazole, an amide, a reverse-amide, a carbamate, a carbonate, urea, alkyl, or heteroalkyl;

R^2 is the oligonucleotide sequence;

Y_1 is O, CH_2 , CH_2O , or optionally substituted NH;

Y_2 is O, CH_2 , CH_2O , or optionally substituted NH;

Y_3 is CO, SO_2 , $P(O)O$, $CH_2-O-C(O)$, $CH_2-NH-C(O)$, $CH_2-NH-SO_2$, or CH_2 ;

Y_4 is CO, SO_2 , $P(O)O$, $CH_2-O-C(O)$, $CH_2-NH-C(O)$, $CH_2-NH-SO_2$, or CH_2 ;

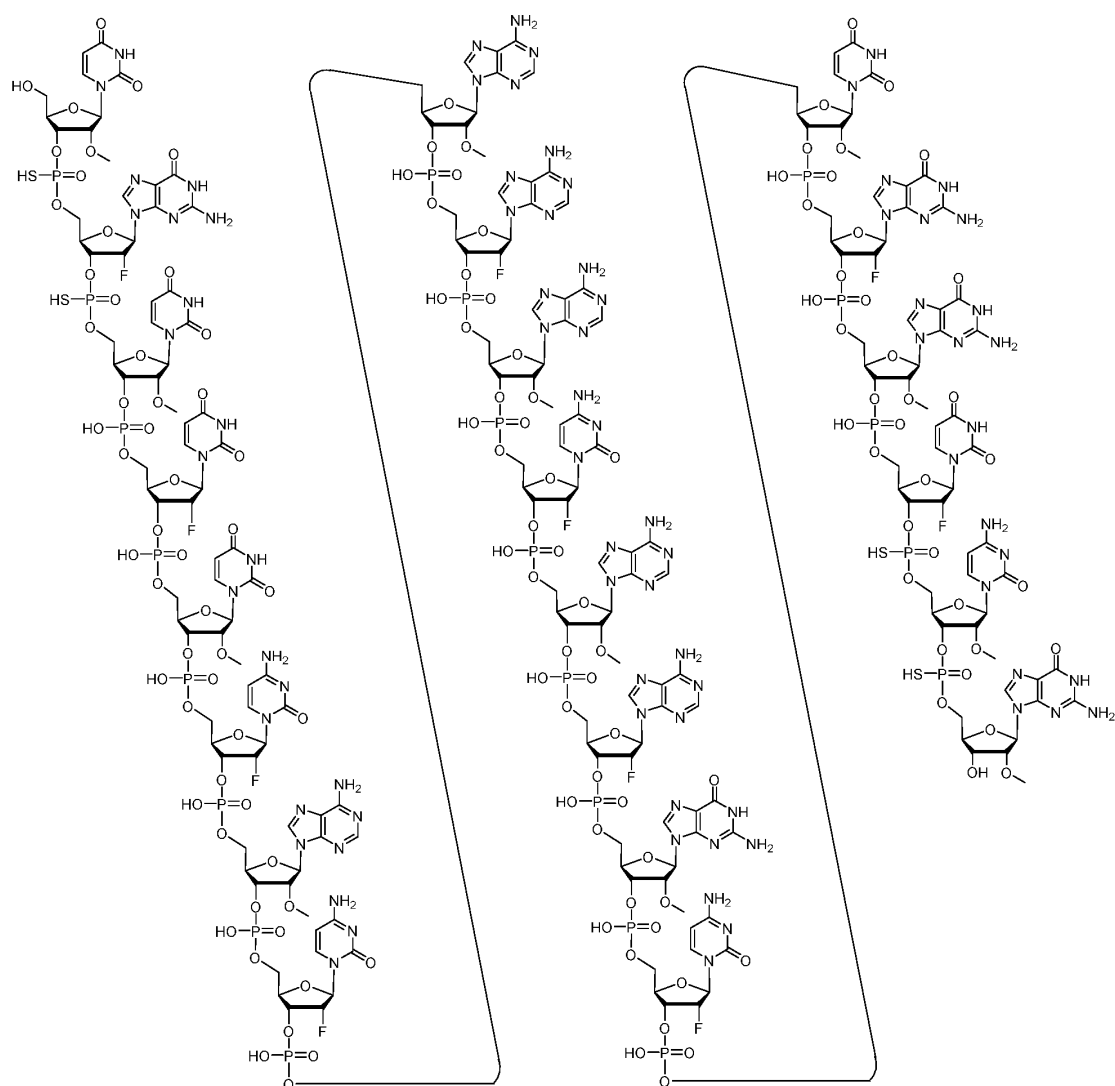
n_2 is 0, 1, 2, 3, 4, 5, or 6; and

each n_1 , n_3 , n_4 and n_5 is independently 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

36. The compound of claim 34, wherein the 5' nucleoside is selected from any one of Formulae I-VIII and wherein R' is S and R is the portion of the modified oligonucleotide other than the 5' nucleoside.

37. The compound of claim 34, wherein the 5' nucleoside is selected from any one of Formulae I-VIII and wherein R' is O and R is the portion of the modified oligonucleotide other than the 5' nucleoside.

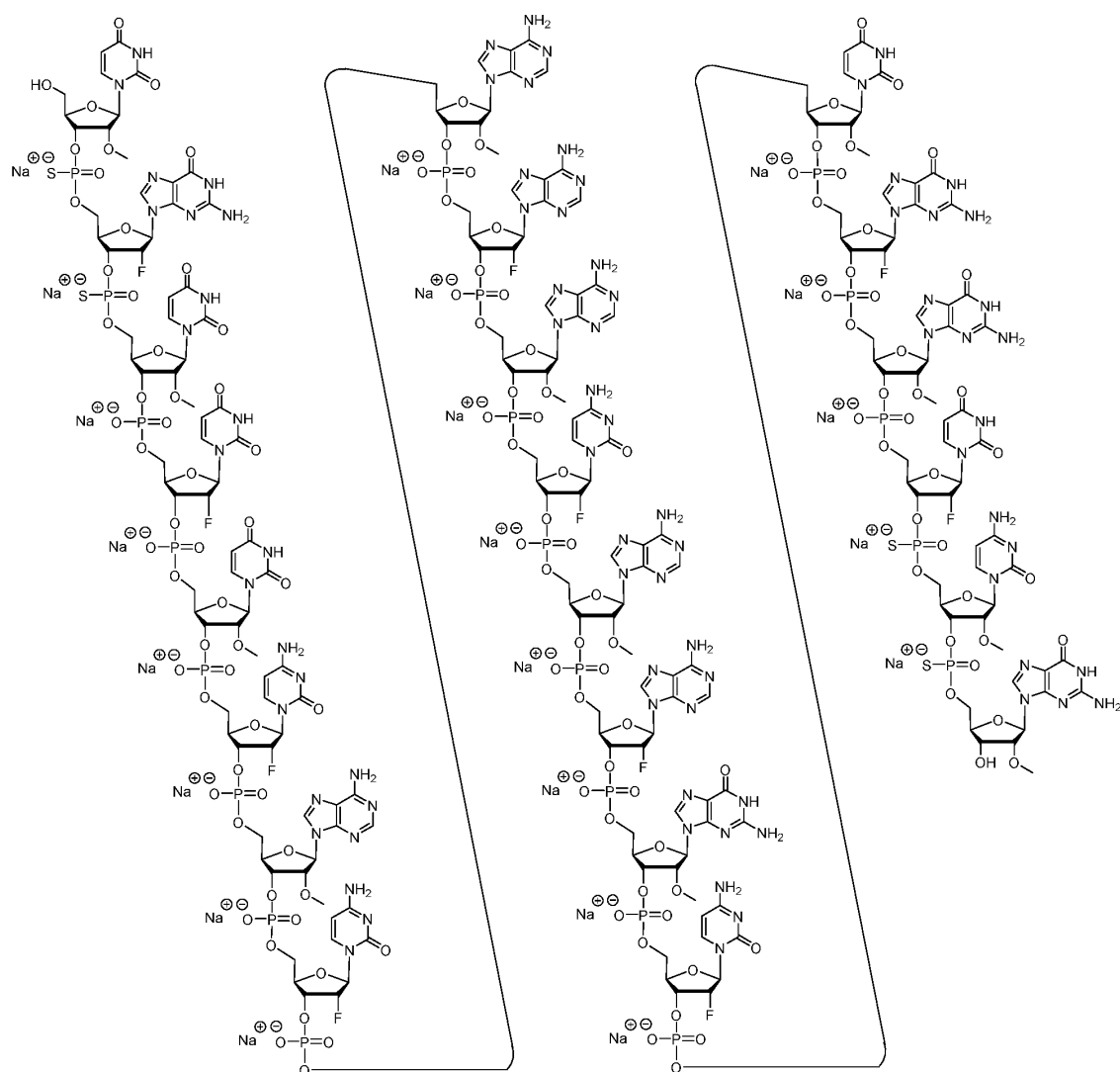
38. A compound comprising a first modified oligonucleotide selected from the group consisting of any one of Ref ID NOs: IA0500, IA1019, IA1022-1024, IA1027, IA1093-1095, and IA1103, and a second modified oligonucleotide 14 to 21 linked nucleosides in length fully complementary to the first modified oligonucleotide.
39. A compound comprising a first modified oligonucleotide selected from the group consisting of Ref ID NOs: IA0500, IA1019, IA1022-1024, IA1027, IA1093-1095, and IA1103 and a second modified oligonucleotide selected from the group consisting of Ref ID NOs: IS1255, IS1258, IS1259, IS1260, IS1279, IS1280, IS1372-1375, IS1381, and IS1382.
40. A compound comprising a first modified oligonucleotide selected from the group consisting of Ref ID NOs: IA1024, IA1094 and IA1103 and a second modified oligonucleotide selected from the group consisting of Ref ID NOs: IS1260, IS1374 and IS1382.
41. A compound of any one of claims 1-40, wherein the compound is in a pharmaceutically acceptable salt form.
42. The compound of claim 41, wherein the pharmaceutically acceptable salt is a sodium salt.
43. The compound of claim 41, wherein the pharmaceutically acceptable salt is a potassium salt.
44. A modified oligonucleotide according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof.

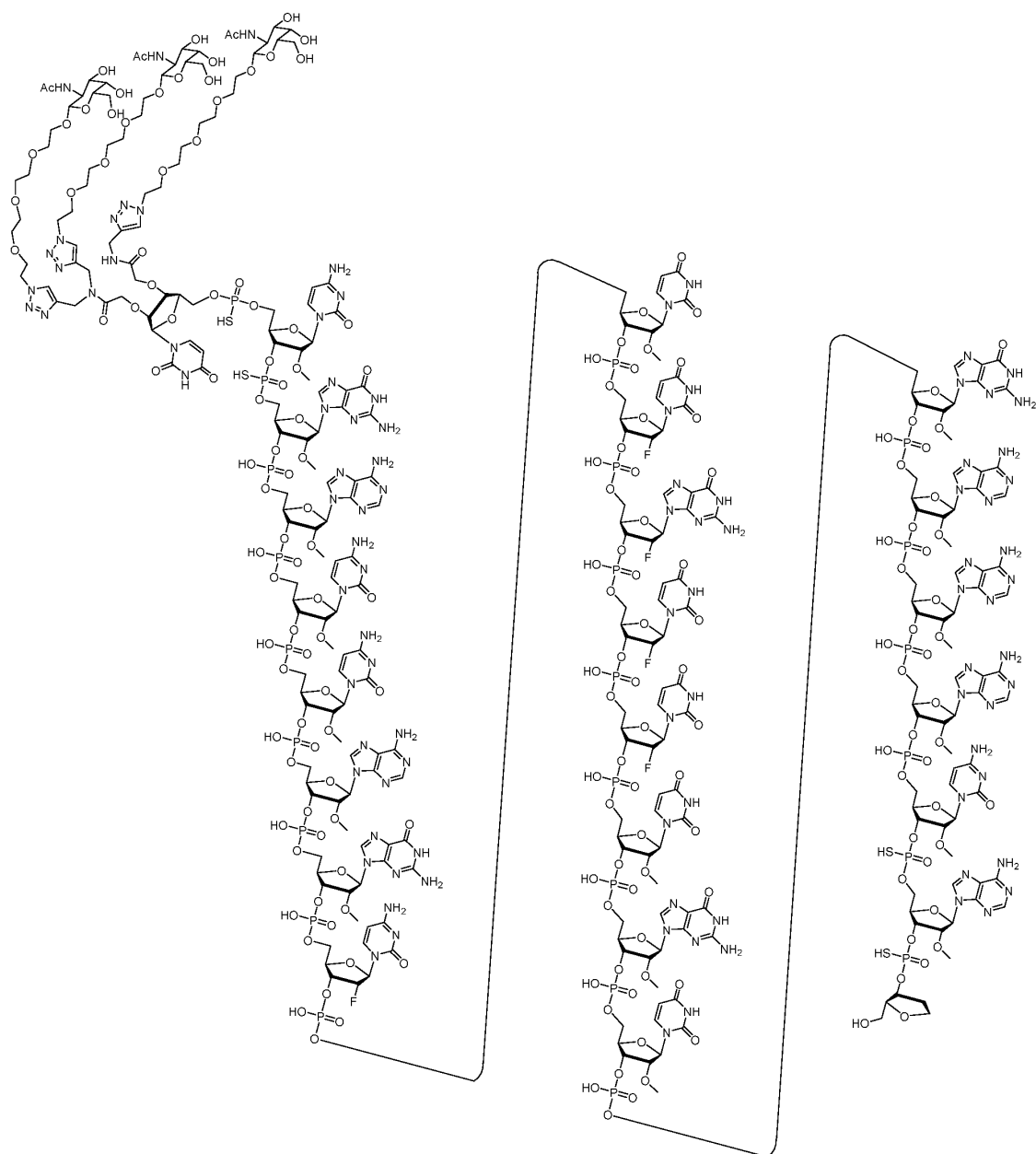
45. The modified oligonucleotide of claim 44, wherein the pharmaceutically acceptable salt is a sodium salt or a potassium salt.

46. The modified oligonucleotide of claim 45, which is a sodium salt according to the following chemical structure:



or a stereoisomer thereof.

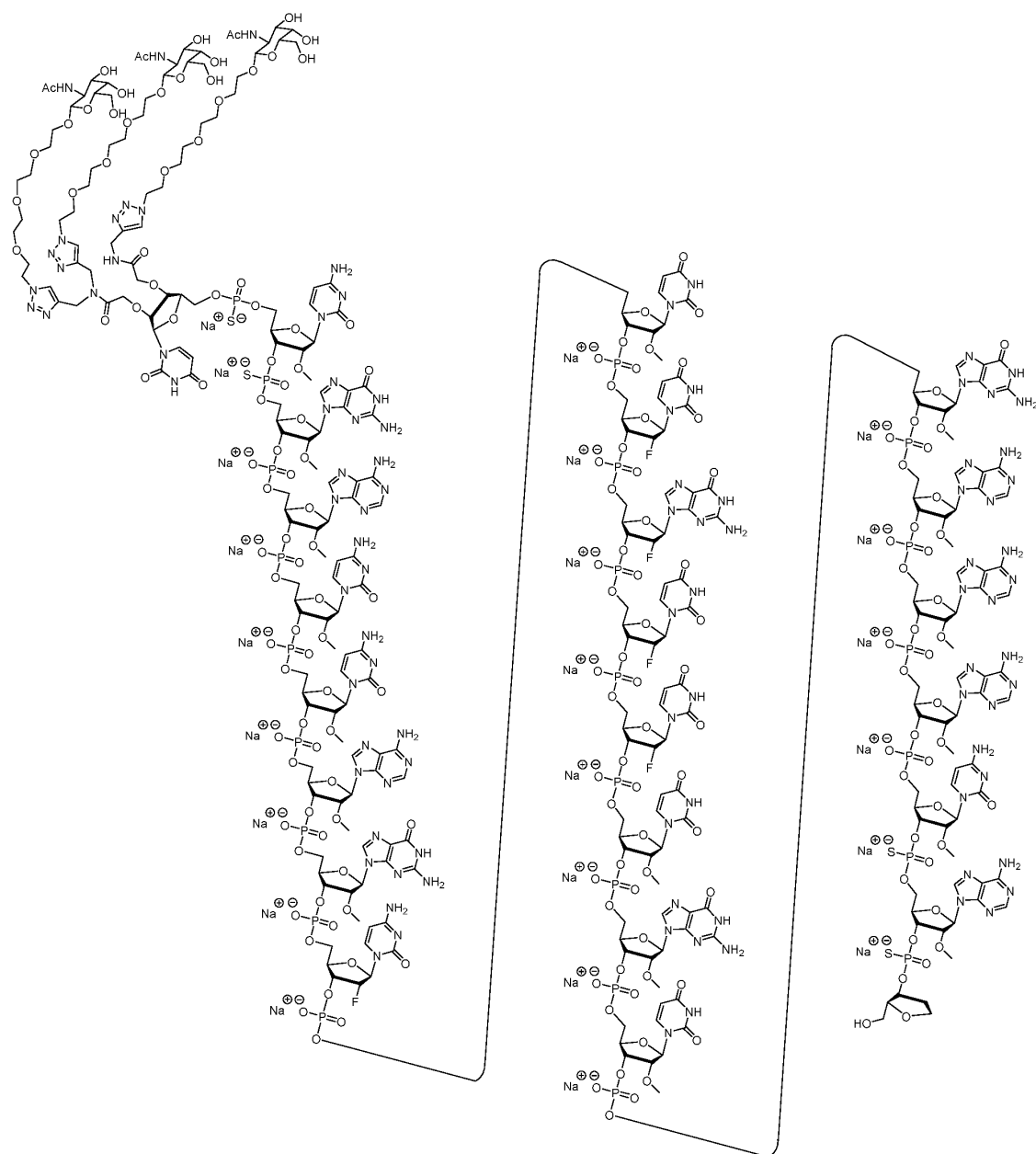
47. A modified oligonucleotide according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof.

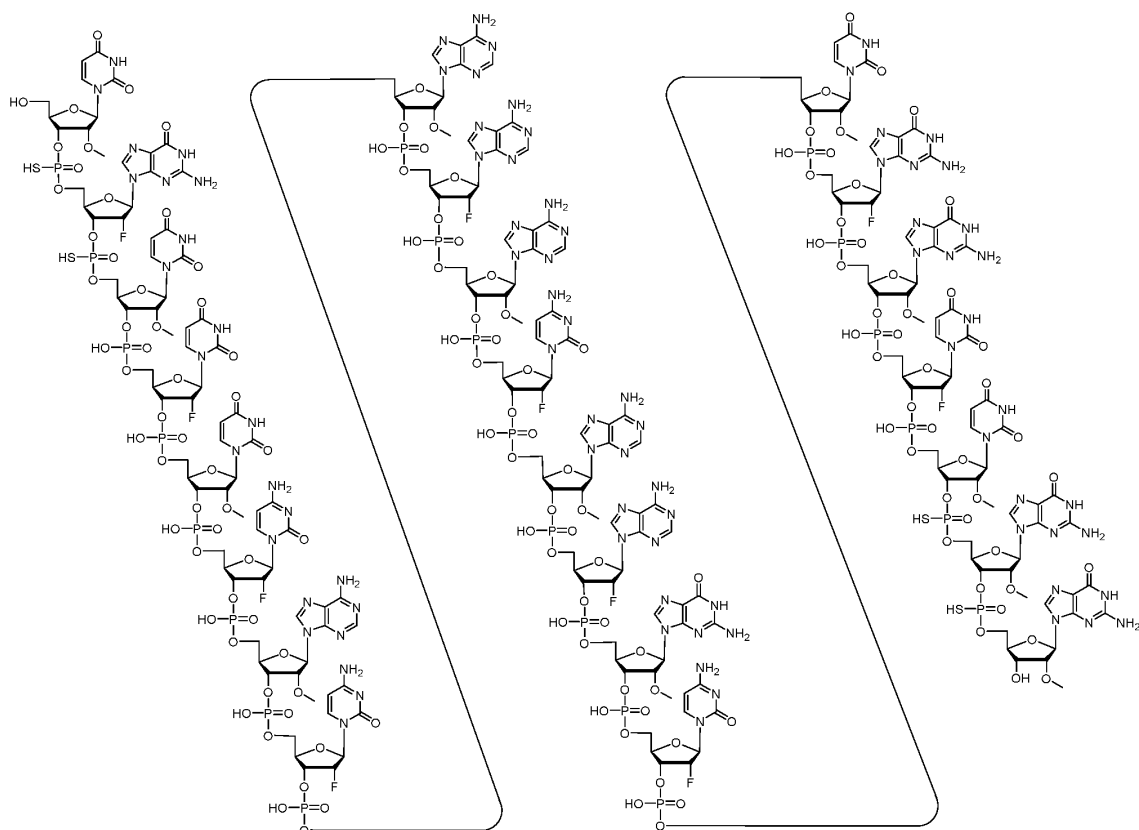
48. The modified oligonucleotide of claim 47, wherein the pharmaceutically acceptable salt is a sodium salt or a potassium salt.

49. The modified oligonucleotide of claim 48, which is a sodium salt according to the following chemical structure:



or a stereoisomer thereof.

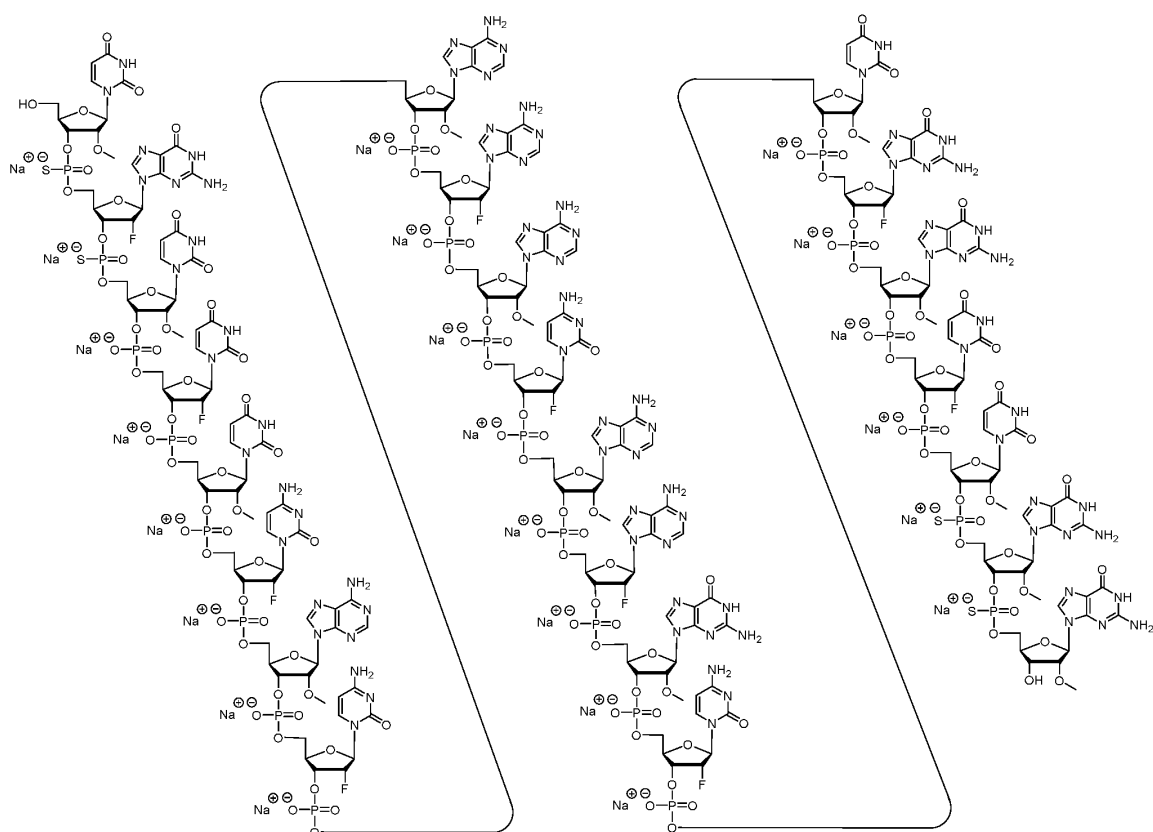
50. A modified oligonucleotide according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof.

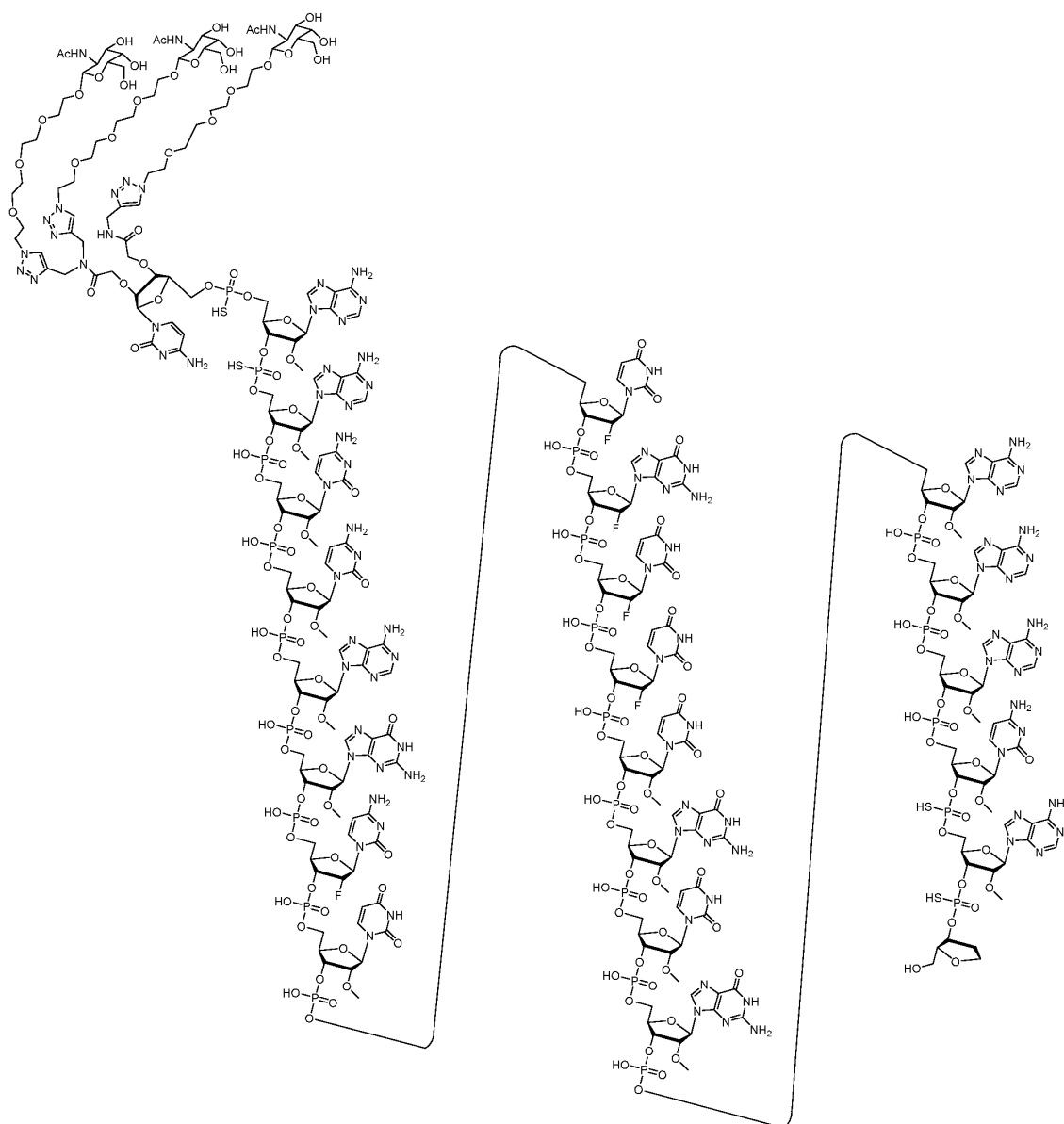
51. The modified oligonucleotide of claim 50, wherein the pharmaceutically acceptable salt is a sodium salt or a potassium salt.

52. The modified oligonucleotide of claim 51, which is a sodium salt according to the following chemical structure:



or a stereoisomer thereof.

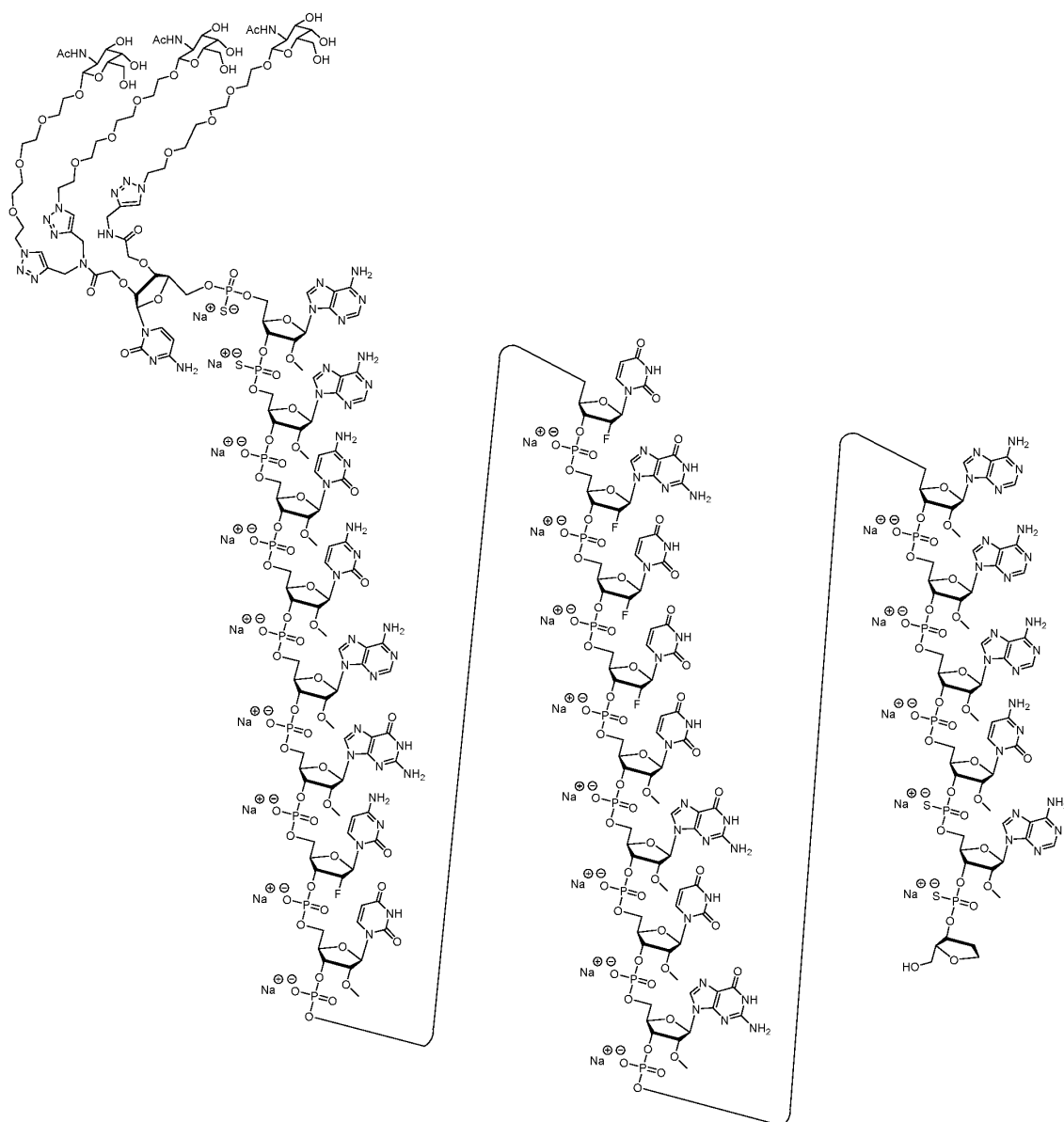
53. A modified oligonucleotide according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof.

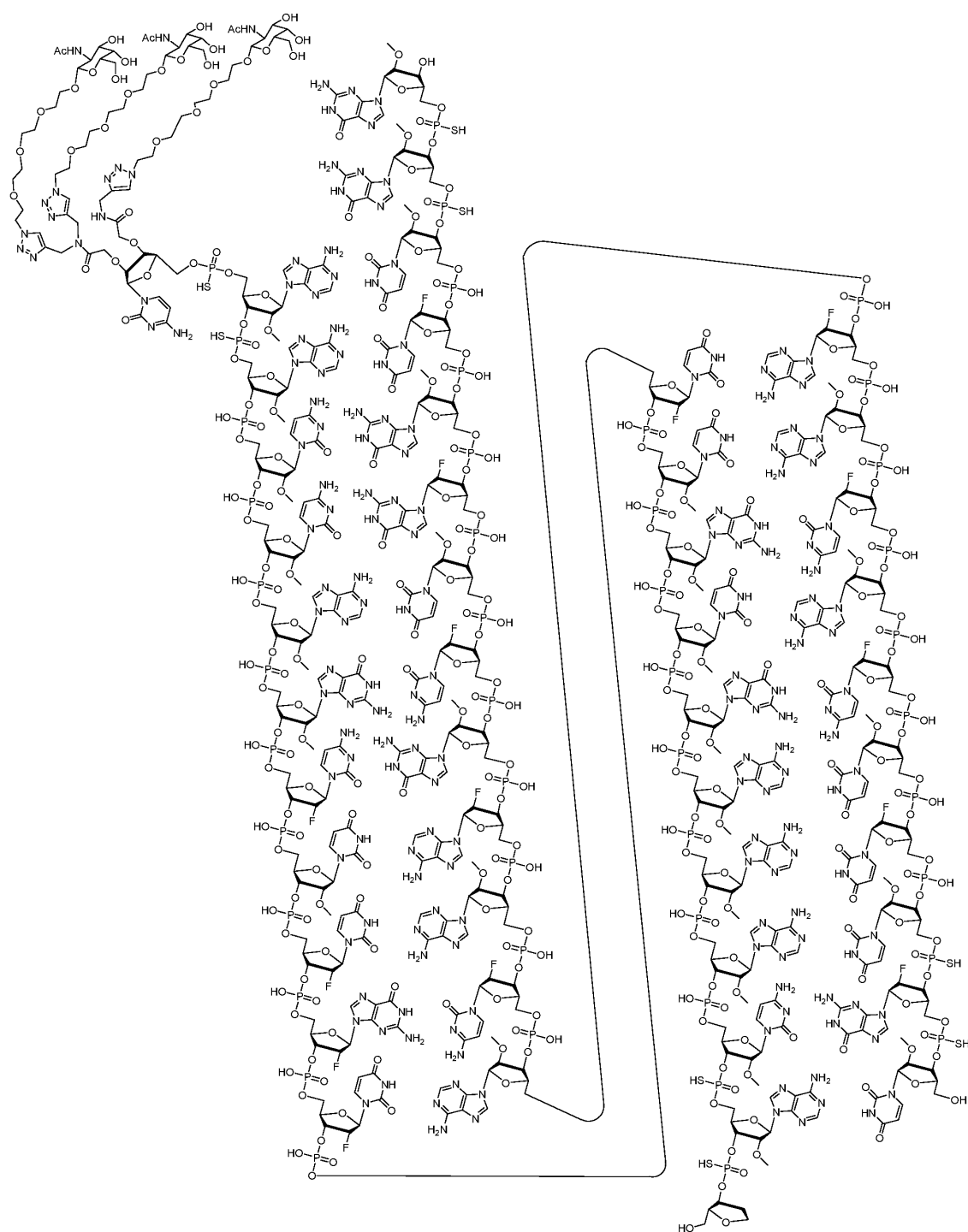
54. The modified oligonucleotide of claim 53, wherein the pharmaceutically acceptable salt is a sodium salt or a potassium salt.

55. The modified oligonucleotide of claim 54, which is a sodium salt according to the following chemical structure:



or a stereoisomer thereof.

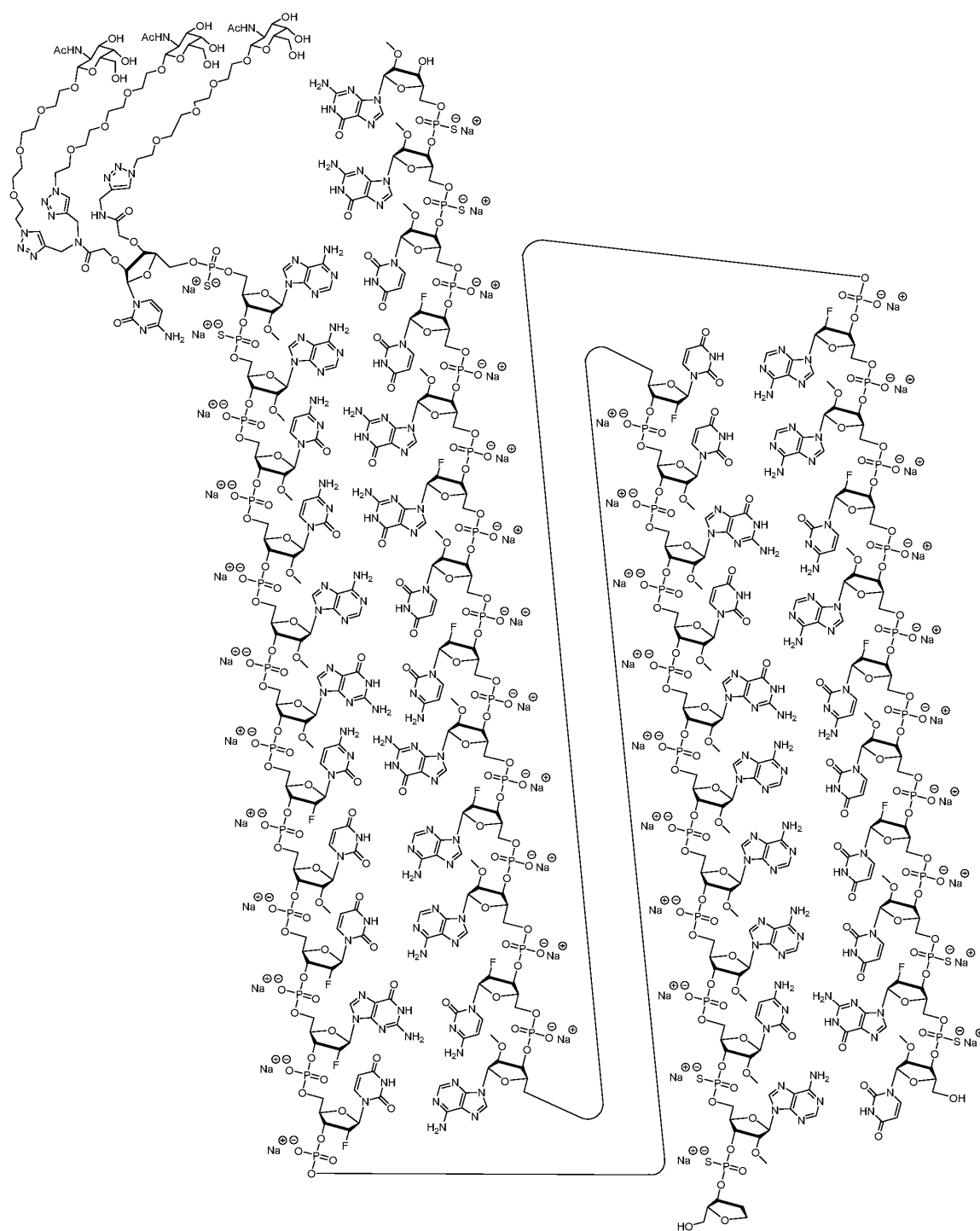
56. A compound according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof.

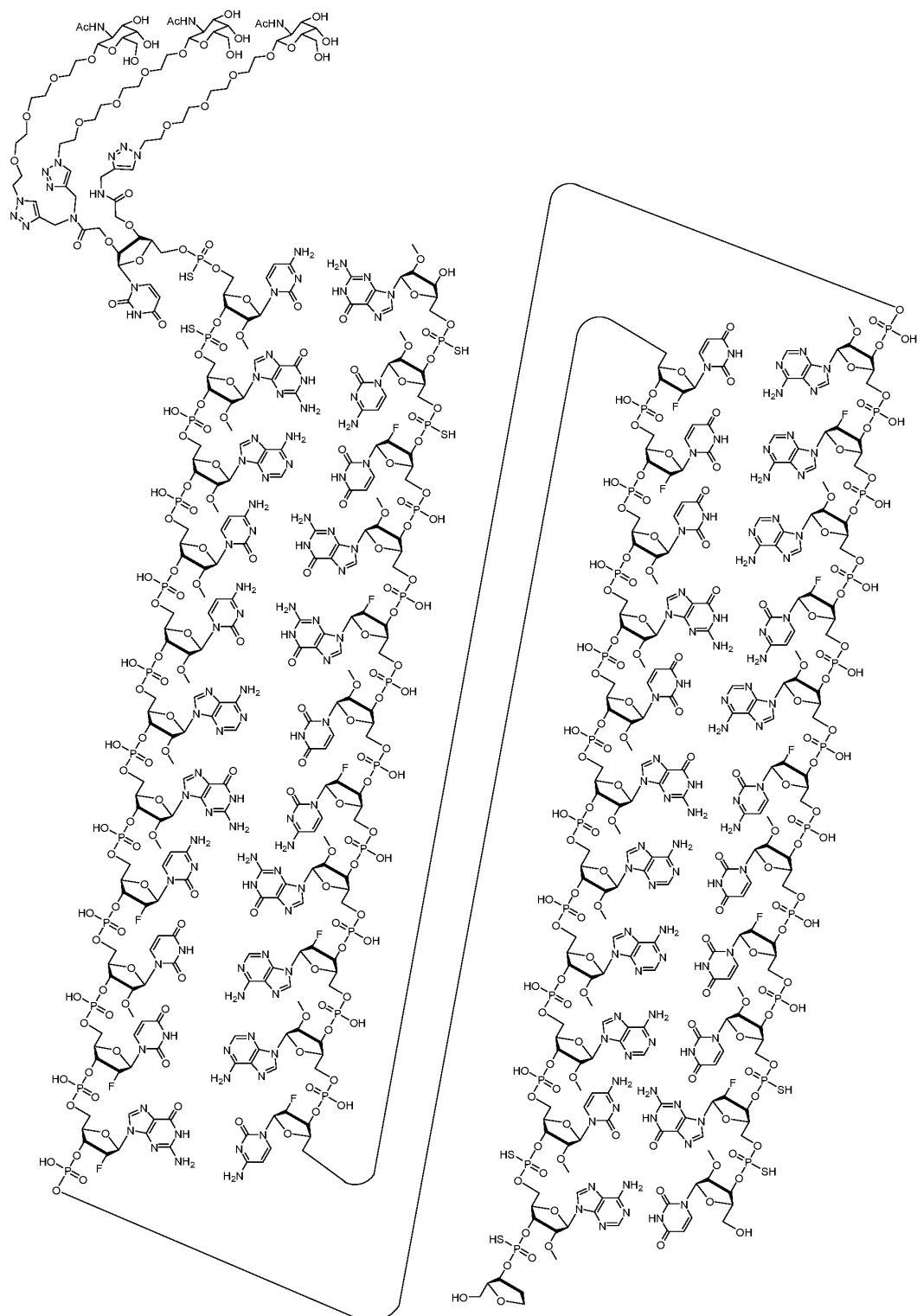
57. The compound of claim 56, wherein the pharmaceutically acceptable salt is a sodium salt or a potassium salt.

58. The compound of claim 57, which is a sodium salt according to the following chemical structure:



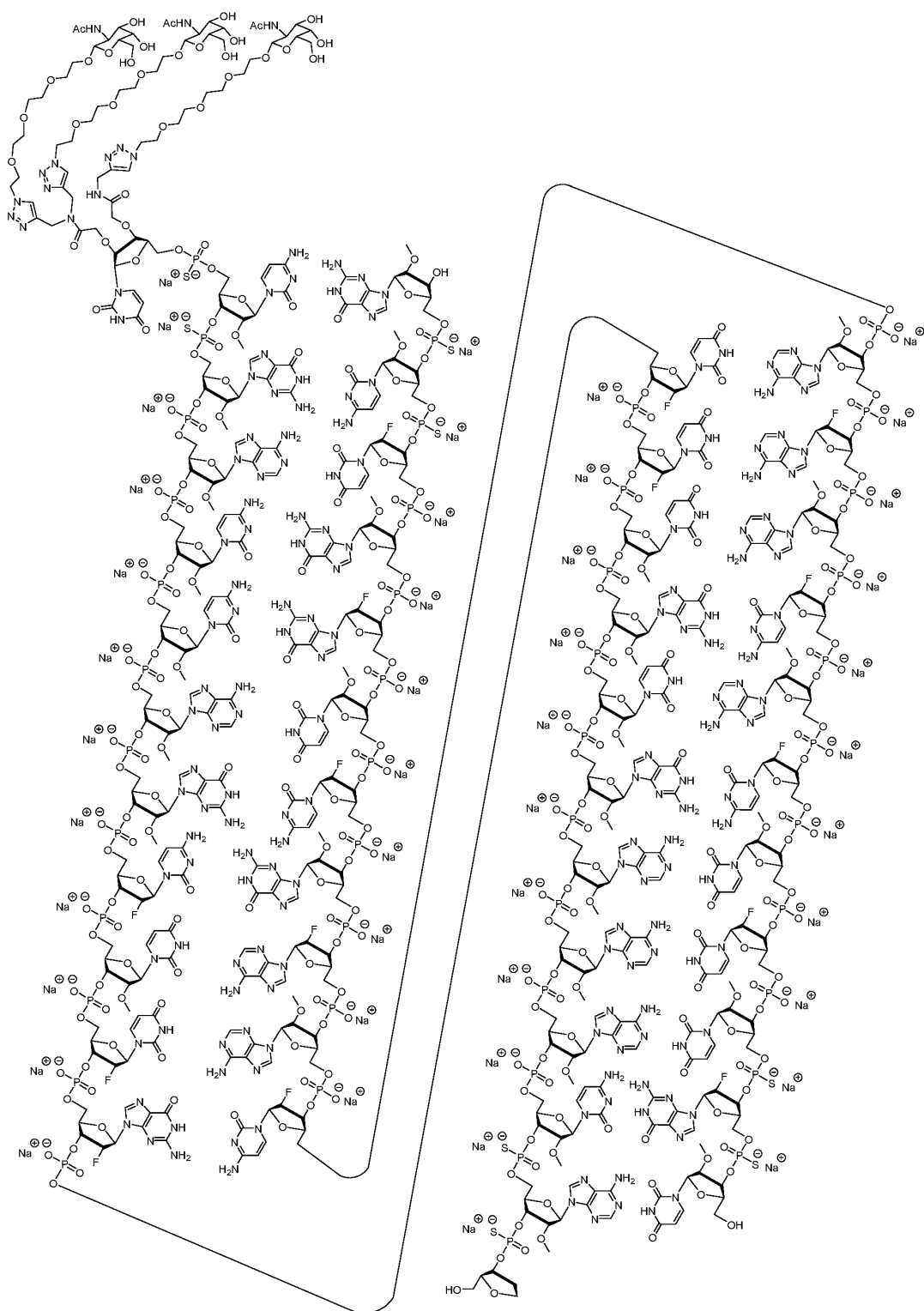
or a stereoisomer thereof.

59. A compound according to the following chemical structure:



or a pharmaceutically acceptable salt or stereoisomer thereof.

60. The compound of claim 59, wherein the pharmaceutically acceptable salt is a sodium salt or a potassium salt.
61. The compound of claim 60, which is a sodium salt according to the following chemical structure:



or a stereoisomer thereof.

62. A composition comprising the compound or modified oligonucleotide of any one of claims 1-61 and a pharmaceutically acceptable carrier.
63. A composition comprising a compound or modified oligonucleotide of any preceding claim, for use in therapy.
64. A method of treating, preventing or ameliorating a disease, disorder or condition associated with AGT in an individual comprising administering to the individual a compound targeted to AGT, thereby treating, preventing, or ameliorating the disease, disorder or condition.
65. A method of administering the compound or modified oligonucleotide of any one of claims 1-61 or composition of claim 62 or 63 to an individual.
66. The method of claim 64 or 65, wherein the disease, disorder or condition is RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.
67. The method of any one of claims 64-66, wherein administering the compound inhibits or reduces or improves RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.
68. A method of inhibiting expression of AGT in a cell comprising contacting the cell with a compound targeted to AGT, thereby inhibiting expression of AGT in the cell.
69. The method of claim 68, wherein the cell is in the liver of an individual.
70. The method of claim 69, wherein the individual has, or is at risk of having, RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.
71. A method of reducing or inhibiting RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke,

myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in an individual, comprising administering a compound targeted to AGT to the individual, thereby reducing or inhibiting RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment in the individual.

72. The method of claim 71, wherein the individual has, or is at risk of having, RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

73. The method of any one of claims 64-72, wherein the compound is a compound targeted to AGT.

74. The method of any one of claims 64-73, wherein the compound or modified oligonucleotide is the compound or modified oligonucleotide of any one of claims 1-61 or composition of claim 62 or 63.

75. The method of claim 74, wherein the compound or composition is administered parenterally.

76. Use of a compound targeted to AGT for treating, preventing, or ameliorating a disease, disorder or condition associated with AGT.

77. The use of claim 76, wherein the disease, disorder or condition is a RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.

78. The use of claim 76 or 77, wherein the compound is a compound targeted to AGT.

79. The use of any one of claims 76-78, wherein the compound or modified oligonucleotide is the compound or modified oligonucleotide of any one of claims 1-61 or composition of claim 62 or 63.

80. Use of a compound targeted to AGT in the manufacture of a medicament for treating, preventing, or ameliorating a disease, disorder or condition associated with AGT.
81. The use of claim 80, wherein the disease is a RAAS related disease, disorder or condition or a symptom thereof, hypertension, resistant hypertension, fibrosis, kidney disease, chronic kidney disease, cardiovascular disease (e.g., coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, aneurysm and peripheral artery disease), organ damage (e.g., heart, liver or kidney), inflammatory bowel disease or cognitive impairment.
82. The use of claim 80 or 81, wherein the compound is a compound targeted to AGT.
83. The use of any one of claims 80-82, wherein the compound or modified oligonucleotide is the compound or modified oligonucleotide of any one of claims 1-61 or composition of claim 62 or 63.
84. The method or use of any preceding claim, wherein the compound or composition is administered to an individual about once every three months to about once every year.
85. The method or use of any preceding claim, wherein the compound or composition is administered to an individual about once every three months, about once every six months, or about once every year.