

COMPOSITIONS AND METHODS FOR MODULATING *SCAP* ACTIVITY

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[001]** The present application claims priority under 35 U.S.C. § 119(e) from U.S. Provisional Application No. 63/363,091, filed April 15, 2022, which is incorporated herein by reference in its entirety.

## TECHNICAL FIELD

**[002]** The disclosure relates generally to biology and medicine, and more particularly it relates to oligonucleotides and compositions including the same for modulating (*e.g.*, inhibiting or reducing) sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, as well as their use for treating conditions, diseases and/or disorders associated with *SCAP*.

## BACKGROUND

**[003]** *SCAP* is a cholesterol-binding endoplasmic reticulum (ER) membrane protein encoded by *SCAP* that binds and transports SREBP transcription factors from the ER to the Golgi apparatus for processing. Once processed in the Golgi apparatus, SREBP transcription factors migrate to the nucleus where they participate in regulating genes involved in lipid homeostasis. SREBP1a, SREBP1c and SREBP2 are regulated by the SREBP cleavage-activating protein (SCAP) encoded by the *SCAP* gene. SREBP1c is the most abundant SREBP in the liver and its regulation is important for maintaining lipid homeostasis. Specifically, SREBPs affect lipid homeostasis by modulating genes involved in lipid biosynthesis as well as modulating genes involved in lipid clearance (*e.g.*, low-density lipoprotein receptor (LDLR) and proprotein convertase subtilisin/kexin type (PCSK9)). *SCAP* also plays a role in NLR family pyrin domain containing 3 (NLRP3) inflammasome activation.

**[004]** Human *SCAP* is ubiquitously expressed throughout the body, but protein expression is highest in the bone marrow, brain, endocrine tissue, gastrointestinal tract, liver, lymphoid tissue, muscle tissue, pancreas, reproductive organs, and respiratory tract. The role *SCAP* plays in regulating the transcription of genes involved in lipid homeostasis make it a promising therapeutic target to attenuate NASH progression at various stages.

[005] Despite the existence of some therapeutics toward *SCAP*, there is a need for additional therapeutics for inhibiting or reducing *SCAP* activity for treating liver disease, especially NAFLD and non-alcoholic steatohepatitis (NASH).

#### BRIEF SUMMARY

[006] To address this need, the disclosure describes compositions for and methods of treating a disease, disorder and/or condition related to *SCAP* activity. The disclosure is based, in part, on discovering and developing double-stranded (ds) oligonucleotides (*e.g.*, RNAi oligonucleotides) for selectively modulating (*e.g.*, inhibiting and/or reducing) *SCAP* activity in, for example, the liver. Accordingly, target sequences within *SCAP* are identified, and RNAi oligonucleotides that bind to these target sequences and inhibit *SCAP* mRNA expression are generated. As shown herein, some oligonucleotides inhibit at least human and non-human primate (NHP) (*i.e.*, double-common), while others inhibit mouse, human and NHP (*i.e.*, triple-common) *SCAP* activity in the liver. Without being bound by theory, the RNAi oligonucleotides herein are useful for treating a disease, disorder and/or condition associated with *SCAP* activity (*e.g.*, liver diseases such as, for example, NAFLD, NASH, dyslipidemia, and/or atherosclerotic cardiovascular disease (ASCVD)).

[007] Accordingly, the disclosure describes RNAi oligonucleotides for reducing or inhibiting *SCAP* activity that include a sense strand (also known as a passenger strand) and/or an antisense strand (also known as a guide strand), where the sense strand has a sequence as set forth in Table 3, and where the antisense strand has a sequence as set forth in Table 3.

[008] In some embodiments, the sense strand has a sequence as set forth in Table 3 (*e.g.*, any one of the odd numbers of SEQ ID NOs: 9 to 392), especially any one of SEQ ID NOs: 139, 147, 221, 273, 321, 333, and 361.

[009] In some embodiments, the antisense strand has a sequence as set forth in Table 3 (*e.g.*, any one of the even numbers of SEQ ID NOs: 9 to 392), especially any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334, and 362.

[0010] Alternatively, the disclosure describes RNAi oligonucleotides for reducing or inhibiting *SCAP* activity that include a sense strand and/or an antisense strand, where the sense strand has a sequence as set forth in Table 4, and where the antisense strand has a sequence as set forth in Table 4.

**[0011]** In some embodiments, the sense strand has a sequence as set forth in Table 4 (*e.g.*, any one of the odd numbers of SEQ ID NOs: 393 to 776), especially any one of SEQ ID NOs: 523, 531, 605, 657, 705, 717, and 745.

**[0012]** In some embodiments, the antisense strand has a sequence as set forth in Table 4 (*e.g.*, any one of the even numbers of SEQ ID NOs: 393 to 776), especially any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718, and 746.

**[0013]** Alternatively, RNAi oligonucleotides are described for reducing or inhibiting *SCAP* activity that include a sense strand and an antisense strand, where the sense and antisense strands form a duplex region, and where the antisense strand has a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783.

**[0014]** In any of the embodiments above, the sense strand is from about 15 nucleotides to about 50 nucleotides in length. In some embodiments, the sense strand is from about 20 nucleotides to about 40 nucleotides in length. In some embodiments, the sense strand is 36 nucleotides in length.

**[0015]** In any of the embodiments above, the antisense strand is from about 15 nucleotides to about 30 nucleotides in length. In some embodiments, the antisense strand is from about 20 nucleotides to about 25 nucleotides. In some embodiments, the antisense strand is 22 nucleotides in length.

**[0016]** In any of the embodiments above, the duplex region is from about 19 nucleotides in length to about 21 nucleotides in length. In certain embodiment, the duplex region is 20 nucleotides in length.

**[0017]** In any of the embodiments above, the region of complementarity is at least 15 contiguous nucleotides in length. In some embodiments, the region of complementarity is from about 19 contiguous nucleotides in length to about 21 contiguous nucleotides in length. In other embodiments, the region of complementarity is 19 contiguous nucleotides in length or 21 contiguous nucleotides in length.

**[0018]** In any of the embodiments above, the RNAi oligonucleotides include on the sense strand a 3' end a stem-loop set forth as: S1-L-S2, where a first stem portion (S1) is complementary to a second stem portion (S2), and where L is a loop between S1 and S2 of about 3 to about 5 nucleotides in length.

**[0019]** In any of the embodiments above, the antisense strand, the sense strand, or both have an overhang sequence. In some embodiments, the antisense strand includes a 3' overhang of 1

or more nucleotides in length. In other embodiments, the 3' overhang sequence is 2 nucleotides in length such as, for example, GG.

**[0020]** Oligonucleotides also are described that include an antisense strand and a sense strand for reducing or inhibiting *SCAP* activity, where the antisense strand can be from about 21 nucleotides to about 27 nucleotides in length and has a region of complementarity to *SCAP* mRNA, wherein the sense strand includes a stem-loop at its 3' end set forth as: S1-L-S2, wherein S1 is complementary to S2, wherein L forms a loop between S1 and S2 from about 3 nucleotides to about 5 nucleotides in length, and wherein the antisense strand and the sense strand form a duplex structure of at least about 19 nucleotides in length but are not covalently linked.

**[0021]** In some embodiments, the loop L is a triloop (triL) or a tetraloop (tetraL). In some embodiments, L is a tetraL of 4 nucleotides in length. In certain embodiments, L is a tetraL having a sequence of 5'-GAAA-3'.

**[0022]** In some embodiments, S1 and S2 are 1-10 nucleotides in length and have the same length. In other embodiments, S1 and S2 are 1 nucleotide, 2 nucleotides, 3 nucleotides, 4 nucleotides, 5 nucleotides, 6 nucleotides, 7 nucleotides, 8 nucleotides, 9 nucleotides, or 10 nucleotides in length. In other embodiments, S1 and S2 are 6 nucleotides in length. In certain embodiments, the stem-loop comprises the sequence 5'-GCAGCCGAAAGGCUGC-3' (SEQ ID NO: 784).

**[0023]** In some embodiments, the sense strand is 25 nucleotides in length and the antisense strand is 27 nucleotides in length. In other embodiments, the sense strand is 36 nucleotides in length and the antisense strand is 22 nucleotides in length.

**[0024]** In the embodiments above, the duplex region includes a 3' overhang sequence on the antisense strand. In some embodiments, the 3' overhang sequence on the antisense strand is 2 nucleotides in length.

**[0025]** In any of the embodiments above, at least one nucleotide in an oligonucleotide is a modified nucleotide. In some embodiments, all nucleotides in the oligonucleotide are modified except for nucleotides in the stem-loop (*i.e.*, S1-L-S2). In other embodiments, all nucleotides in the oligonucleotide are modified except for nucleotides in the L.

**[0026]** In some embodiments, the modified nucleotide includes a 2'-modification such as, for example, 2'-aminoethyl (EA), 2'-fluoro (2'-F), 2'-O-methyl (2'-OMe), 2'-O-methoxyethyl (2'-MOE) and 2'-deoxy-2'-fluoro- $\beta$ -arabinonucleic acid (2'-FANA). In certain embodiments, all nucleotides in an oligonucleotide include a 2'-modification such as, for example, 2'-F or 2'-

OMe. In some embodiments, about 18% to about 23%, or 18%, 19%, 20%, 21%, 22%, or 23% of the nucleotides of the sense strand comprise a 2'-F modification. In other embodiments, about 38% to about 43%, or 38%, 39%, 40%, 41%, 42%, or 43% of the nucleotides of the sense strand comprise a 2'-F modification. In some embodiments, about 25% to about 35%, or 25%, 26%, 27%, 28%, 29%, 30%, 31%, 32%, 33%, 34%, or 35% of the nucleotides of the antisense strand comprise a 2'-F modification. In some embodiments, about 25% to about 35%, or 25%, 26%, 27%, 28%, 29%, 30%, 31%, 32%, 33%, 34%, or 35% of the nucleotides of the oligonucleotide comprise a 2'-F modification. In some embodiments, about 35% to about 45%, or 35%, 36%, 37%, 38%, 39%, 40%, 41%, 42%, 43%, 44%, or 45% of the nucleotides of the oligonucleotide comprise a 2'-F modification.

**[0027]** In any of the embodiments above, at least one nucleotide in an oligonucleotide includes a modified internucleotide linkage. In some embodiments, the modified internucleotide linkage is a phosphorothioate (PS) linkage.

**[0028]** In any of the embodiments above, a 4'-carbon of a sugar of a 5'-nucleotide of the antisense strand includes a phosphate analog such as, for example, an oxymethylphosphonate, vinylphosphonate or malonylphosphonate. Alternatively, or optionally, the phosphate analog is a 4'-phosphate analog including 5'-methoxyphosphonate-4'-oxy.

**[0029]** In any of the embodiments above, at least one nucleotide of an oligonucleotide is conjugated to one or more targeting ligands such as, for example, an amino sugar, carbohydrate, cholesterol, lipid, or polypeptide. In some embodiments, the targeting ligand is a N-acetylgalactosamine (GalNAc) moiety. In other embodiments, the GalNAc moiety is a monovalent GalNAc moiety, a bivalent GalNAc moiety, a trivalent GalNAc moiety, or a tetravalent GalNAc moiety.

**[0030]** In some embodiments, the targeting ligands are conjugated to one or more nucleotides of L of the stem loop. In certain embodiments, up to 4 nucleotides of L of the stem-loop are each conjugated to a monovalent GalNAc moiety.

**[0031]** In certain embodiments, one or more nucleotides at positions 8, 9, 10, or 11 of the sense strand are modified with a 2'-F. In other embodiments, the sugar moiety at each nucleotide at positions 1 to 7, 12 to 27 and 31 to 36 in the sense strand is modified with a 2'-OMe. In certain embodiments, nucleotides at positions 8 to 11 of the sense strand are modified with a 2'-F, and positions 1 to 7, 12 to 27 and 31 to 36 are modified with a 2'-OMe.

**[0032]** In certain other embodiments, one or more nucleotides at positions 2 to 5, 7, 10 and 14 of the antisense strand are modified with 2'-F, and one or more nucleotides at positions 1, 6, 8-

9, 11-13 and 15-22 modified with a 2'-OMe. In other embodiments, the antisense strand includes a 2'-F-modified nucleotide at positions 2 to 5, 7, 10 and 14, and a 2'-OMe-modified nucleotide at positions 1, 6, 8 to 9, 11 to 13 and 15 to 22.

**[0033]** In certain embodiments, the oligonucleotides have a modification pattern as shown in FIG. 1.

**[0034]** In any of the embodiments above, the oligonucleotide is a RNAi oligonucleotide. In some embodiments, the RNAi oligonucleotide includes a sense strand having a nucleotide sequence as set forth in Table 3, especially any one of SEQ ID NOs: 139, 147, 221, 273, 321, 333, and 361. In certain embodiments, the RNAi oligonucleotide includes a sense strand having a nucleotide sequence as set forth in Table 4, especially any one of SEQ ID NOs: 523, 531, 605, 657, 705, 717, and 745. In some embodiments, the RNAi oligonucleotide includes an antisense strand having a nucleotide sequence as set forth in Table 3, especially any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334, and 362. In certain embodiments, the RNAi oligonucleotide includes an antisense strand having a nucleotide sequence as set forth in Table 4, especially any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718, and 746.

**[0035]** In certain embodiments, the RNAi oligonucleotide includes a sense strand having a nucleotide sequence of any one of SEQ ID NOs: 139, 147, 221, 273, 321, 333, and 361, and an antisense strand having a nucleotide sequence of any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334, and 362.

**[0036]** In certain other embodiments, the sense strand and the antisense strand of the RNAi oligonucleotide, respectively, are selected from:

- (a) SEQ ID NOs: 139 and 140,
- (b) SEQ ID NOs: 147 and 148,
- (c) SEQ ID NOs: 221 and 222,
- (d) SEQ ID NOs :273 and 274,
- (e) SEQ ID NOs: 321 and 322,
- (f) SEQ ID NOs: 333 and 334, and
- (g) SEQ ID NOs: 361 and 362.

**[0037]** In certain embodiments, the RNAi oligonucleotide includes a sense strand having a nucleotide sequence of any one of SEQ ID NOs: 147 and 333, and an antisense strand having a nucleotide sequence of any one of SEQ ID NOs: 148 and 334 respectively.

**[0038]** In certain embodiments, the RNAi oligonucleotide includes a sense strand having a nucleotide sequence of any one of SEQ ID NOs: 523, 531, 605, 657, 705, 717, and 745, and an

antisense strand having a nucleotide sequence of any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718, and 746 respectively.

**[0039]** In certain other embodiments, the sense strand and the antisense strand of the RNAi oligonucleotide, respectively, are selected from:

- (a') SEQ ID NOs: 523 and 524,
- (b') SEQ ID NOs :531 and 532,
- (c') SEQ ID NOs: 605 and 606,
- (d') SEQ ID NOs: 657 and 658,
- (e') SEQ ID NOs: 705 and 706,
- (f') SEQ ID NOs: 717 and 718, and
- (g') SEQ ID NOs: 745 and 746.

**[0040]** In certain embodiments, the RNAi oligonucleotide includes a sense strand having a nucleotide sequence of any one of SEQ ID NOs: 531 and 717, and an antisense strand having a nucleotide sequence of any one of SEQ ID NOs: 532 and 718 respectively.

**[0041]** RNAi oligonucleotides also are described for inhibiting or reducing *SCAP* activity that include a sense strand and an antisense strand, where the sense strand and the antisense strand form a duplex region, where all nucleotides of the sense strand and the antisense strand include a modification of a base, a sugar and/or an internucleotide linkage, where the antisense strand includes a region of complementarity to a *SCAP* mRNA target sequence of one of SEQ ID NOs: 777 to 783, and where the region of complementarity is at least about 15 contiguous nucleotides in length.

**[0042]** In other aspects, pharmaceutical compositions are described that include at least one oligonucleotide herein, or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier, delivery agent or excipient. In some embodiments, the pharmaceutical compositions include an additional therapeutic agent such as, for example, a lipid-lowering agent, an antidiabetic agent, or anti-obesity agent.

**[0043]** In other aspects, methods are described for reducing *SCAP* activity in a cell, a population of cells, a tissue, an organ, or an individual that include at least a step of administering/contacting the cell, the population of cells, the tissue, the organ, or the individual with an oligonucleotide herein or a pharmaceutical composition herein. In some embodiments, reducing *SCAP* activity includes reducing an amount or level of *SCAP* mRNA, an amount or level of *SCAP* protein, *SCAP* activity or a combination thereof in the cell, the population of cells, the tissue, the organ, or the individual. In some embodiments, the cell, the cell population,

the tissue, the organ, or the individual has a disease, disorder, or condition associated with *SCAP* activity. In certain embodiments, the disease, disorder, or condition associated with *SCAP* activity is NAFLD, NASH, dyslipidemia, and/or ASCVD.

**[0044]** In other aspects, methods are described for treating an individual having or suspected of having a disease, disorder, or condition associated with *SCAP* activity. The methods include at least a step of administering to an individual in need thereof an effective amount of an oligonucleotide herein or a pharmaceutical composition herein. In some embodiments, the disease, disorder, or condition associated with *SCAP* activity is NAFLD, NASH, dyslipidemia, and/or ASCVD. In some embodiments, the oligonucleotide or pharmaceutical composition is administered daily, weekly, monthly, quarterly, yearly *via* subcutaneous (SQ) administration, especially monthly or quarterly.

**[0045]** In some embodiments, the individual has alcoholic hepatitis (AH), alcoholic liver disease (ALD), cholangiocarcinoma (CCA), cirrhosis, hepatic fibrosis, hepatic inflammation, hepatocellular carcinoma (HCC), liver steatosis, NAFLD, NASH, primary sclerosing cholangitis (PSC), hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, diabetes, and/or obesity, and/or ASCVD.

**[0046]** In any of the embodiments above, the methods may comprise additional steps such as measuring or obtaining genotype information, *SCAP* mRNA, *SCAP* protein levels, *SCAP* activity, the individual's weight and/or blood glucose and/or cholesterol and/or TG, and then comparing such obtained values to one or more baseline values or previously obtained values to assess the effectiveness of contacting or administering.

**[0047]** In any of the embodiments above, the methods include administering the RNAi oligonucleotide or pharmaceutical composition simultaneously, separately, or sequentially with a second composition or a second therapeutic agent. In some embodiments, the second composition or a second therapeutic agent is a *SCAP* antibody or fragment thereof, a lipid-lowering agent, an anti-diabetic agent or anti-obesity agent. In some embodiments, the second composition or second therapeutic agent is administered with a frequency same as the RNAi oligonucleotide (*i.e.*, every other day, twice a week, or even weekly). In other embodiments, the second composition or second therapeutic agent is administered with a frequency distinct from the RNAi oligonucleotide. Likewise, in other embodiments, the second composition or second therapeutic agent is administered *via* the same route as the RNAi oligonucleotide (*e.g.*, SQ). In still other embodiments, the second composition or second therapeutic agent is administered *via* a route that differs from the RNAi oligonucleotide).

[0048] In other aspects, uses are described for the RNAi oligonucleotides herein for treating a disease, disorder, or condition associated with *SCAP* activity, which optionally are administered simultaneously, separately, or sequentially (*i.e.*, in combination) with a second composition or second therapeutic agent.

[0049] In other aspects, uses are described for the RNAi oligonucleotides herein in manufacturing a medicament for treating a disease, disorder, or condition associated with *SCAP* activity, where the medicament optionally further includes a second composition or second therapeutic agent.

[0050] In other aspects, kits are described that include at least one oligonucleotide herein, an optional pharmaceutically acceptable carrier, and a package insert having instructions for administering the same to an individual having a disease, disorder, or condition associated with *SCAP* activity.

[0051] An advantage of the oligonucleotides and compositions herein is that suppressed *SCAP* activity exerts a beneficial effect on the entire spectrum of NAFLD, NASH, dyslipidemia and/or ASCVD.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0052] The advantages, effects, features, and objects other than those set forth above will become more readily apparent when consideration is given to the detailed description below. Such detailed description refers to the following drawing(s), where:

[0053] FIG. 1 discloses a schematic depicting the structure and chemical modification pattern for a generic GalNAc-conjugated *SCAP* oligonucleotides (modification pattern M1).

#### DETAILED DESCRIPTION

[0054] *Overview*

[0055] NAFLD and NASH are serious public health burdens as they are chronic liver disorders that begin with hepatic TG accumulation (steatosis) and progress to hepatic inflammation and fibrosis, cirrhosis and even liver cancer. *SCAP* is a transcription regulator that has been shown to be associated with NAFLD and NASH. Here, targeted silencing of *SCAP* mRNA *via* RNAi can prevent processing of active SREBP and downstream transcriptional changes in regulating *de novo* lipogenesis and TG accumulation within the liver.

**[0056]** RNAi is a process of introducing exogenous RNA into a cell leading to specific degradation of the mRNA encoding the targeted protein with a resultant decrease in target gene expression.

**[0057]** In humans, SCAP is 1279 amino acids in length with a predicted molecular weight of 140 kD. Exemplary nucleic acid sequences for *SCAP* can be found in NCBI Ref. Seq. No. NM\_012235 (isoform 1) and NM\_001320044 (isoform 2) (human); NM\_001001144 and NM\_001103162 (mouse); NM\_001100966 (rat); and XM\_001100342 (primate). Other exemplary nucleic acid sequences for *SCAP* include NCBI Ref. Seqs Nos. XM\_017005918 (human variant X1), XM\_011533501 (human variant X2), XM\_005264967 (human variant X3), XM\_005264968 (human variant X4), XM\_011533502 (human variant X5), XM\_005264971 (human variant X6), XM\_017005921 (human variant X7), XM\_006512083 (mouse variant X1), XM\_006512084 (mouse variant X2), XM\_006512085 (mouse variant X3), XM\_006243922 (rat variant X1), XM\_017595596 (rat variant X2), XM\_006243923 (rat variant X3), XM\_006243924 (rat variant X5), XM\_006243925 (rat variant X5), XM\_017595597 (rat variant X6), XM\_005546961 (primate variant X1), XM\_015445807 (primate variant X2), XM\_005546962 (primate variant X3), XM\_005546963 (primate variant X4), and XM\_015445808 (primate variant X5). One of skill in the art, however, understands that additional examples of SCAP mRNA sequences are readily available using publicly available databases such as, for example, GenBank and UniProt.

**[0058]** *Abbreviations and Definitions*

**[0059]** Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of skill in the art to which the disclosure pertains. Although any methods and materials similar to or equivalent to those described herein can be used in the practice or testing of the RNAi oligonucleotides herein, pharmaceutical compositions including the same and methods of making and using such RNAi oligonucleotides, the preferred methods and materials are described herein.

**[0060]** Moreover, reference to an element by the indefinite article “a” or “an” does not exclude the possibility that more than one element is present, unless the context clearly requires that there be one and only one element. The indefinite article “a” or “an” thus usually means “at least one.”

**[0061]** Furthermore, use of “including,” as well as other forms, such as “include,” “includes” and “included” is not limiting.

[0062] Certain definitions used herein are defined as follows:

[0063] As used herein, “about” means within a statistically meaningful range of a value or values such as, for example, a stated concentration, length, molecular weight, pH, sequence similarity, time frame, temperature, volume, *etc.* Such a value or range can be within an order of magnitude typically within 20%, more typically within 10%, and even more typically within 5% of a given value or range. The allowable variation encompassed by “about” will depend upon the particular system under study, and can be readily appreciated by one of skill in the art.

[0064] As used herein, “administer,” “administering,” “administration” and the like refers to providing a substance (*e.g.*, an oligonucleotide herein or a composition herein) to an individual in a manner that is pharmacologically useful (*e.g.*, to treat a disease, disorder, or condition in the individual).

[0065] As used herein, “antisense strand” means an oligonucleotide herein that is complimentary to a region of a target sequence. Likewise, and as used herein, “sense strand” means an oligonucleotide herein that is complimentary to a region of an antisense strand.

[0066] As used herein, “asialoglycoprotein receptor” or “ASGPR” means a bipartite C-type lectin formed by a major 48 kDa subunit (ASGPR-1) and minor 40 kDa subunit (ASGPR-2). ASGPR is primarily expressed on the sinusoidal surface of hepatocyte cells and has a major role in binding, internalizing and subsequent clearing of circulating glycoproteins that contain terminal galactose or GalNAc residues (asialoglycoproteins).

[0067] As used herein, “attenuate,” “attenuating,” “attenuation” and the like refers to reducing or effectively halting. As a non-limiting example, one or more of the treatments herein may reduce or effectively halt the onset or progression of AH, ALD, CCA, cirrhosis, hepatic fibrosis, hepatic inflammation, HCC, liver steatosis, NAFLD, NASH and PSC, as well as related diseases, disorders, and conditions in an individual such as, for example, hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, ASCVD, diabetes and/or obesity. This attenuation may be exemplified by, for example, a decrease in one or more aspects (*e.g.*, symptoms, tissue characteristics, and cellular, inflammatory, or immunological activity, *etc.*) of AH, ALD, CCA, cirrhosis, hepatic fibrosis, hepatic inflammation, HCC, liver steatosis, NAFLD, NASH and PSC, as well as related diseases, disorders, and conditions in an individual such as, for example, hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, ASCVD, diabetes and/or obesity; no detectable progression (worsening) of one or more aspects of AH, ALD, CCA, cirrhosis, hepatic fibrosis, hepatic inflammation, HCC, liver steatosis, NAFLD,

NASH and PSC, as well as related diseases, disorders, and conditions in an individual such as, for example hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, ASCVD, diabetes and/or obesity; or no detectable aspects of AH, ALD, CCA, cirrhosis, hepatic fibrosis, hepatic inflammation, HCC, liver steatosis, NAFLD, NASH and PSC, as well as related diseases, disorders, and conditions in an individual such as, for example, hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, ASCVD, diabetes and/or obesity in an individual when they might otherwise be expected.

**[0068]** As used herein, “complementary” means a structural relationship between two nucleotides (*e.g.*, on two opposing nucleic acids or on opposing regions of a single nucleic acid strand) that permits the two nucleotides to form base pairs with one another. For example, a purine nucleotide of one nucleic acid that is complementary to a pyrimidine nucleotide of an opposing nucleic acid may base pair together by forming hydrogen bonds with one another. Complementary nucleotides can base pair in the Watson-Crick manner or in any other manner that allows for the formation of stable duplexes. Likewise, two nucleic acids may have regions of multiple nucleotides that are complementary with each other to form regions of complementarity, as described herein.

**[0069]** As used herein, “contact,” “contacting” and the like means directly or indirectly introducing or delivering an oligonucleotide such as a RNAi oligonucleotide into, for example, a cell by facilitating or effecting uptake or absorption into the cell.

**[0070]** As used herein, “deoxyribonucleotide” means a nucleotide having a hydrogen in place of a hydroxyl at the 2' position of its pentose sugar when compared with a ribonucleotide. A modified deoxyribonucleotide has one or more modifications or substitutions of atoms other than at the 2' position, including modifications or substitutions in or of the nucleobase, sugar, or phosphate group.

**[0071]** As used herein, “double-stranded oligonucleotide” or “ds oligonucleotide” means an oligonucleotide that is substantially in a duplex form. The complementary base-pairing of duplex region(s) of a ds oligonucleotide can be formed between antiparallel sequences of nucleotides of covalently separate nucleic acid strands. Likewise, complementary base-pairing of duplex region(s) of a ds oligonucleotide can be formed between antiparallel sequences of nucleotides of nucleic acid strands that are covalently linked. Moreover, complementary base-pairing of duplex region(s) of a ds oligonucleotide can be formed from single nucleic acid strand that is folded (*e.g.*, *via* a hairpin) to provide complementary antiparallel sequences of nucleotides that base pair together. A ds oligonucleotide can include two covalently separate

nucleic acid strands that are fully duplexed with one another. However, a ds oligonucleotide can include two covalently separate nucleic acid strands that are partially duplexed (*e.g.*, having overhangs at one or both ends). A ds oligonucleotide can include an antiparallel sequence of nucleotides that are partially complementary, and thus, may have one or more mismatches, which may include internal mismatches or end mismatches.

**[0072]** As used herein, “duplex,” in reference to nucleic acids (*e.g.*, oligonucleotides), means a structure formed through complementary base pairing of two antiparallel sequences of nucleotides.

**[0073]** As used herein, “excipient” means a non-therapeutic agent that may be included in a composition herein, for example, to provide or contribute to a desired consistency or stabilizing effect.

**[0074]** As used herein, “hepatocyte” or “hepatocytes” means cells of the parenchymal tissues of the liver. These cells make up about 70%-85% of the liver’s mass and manufacture serum albumin, fibrinogen (FBN) and the prothrombin group of clotting factors (except for Factors 3 and 4). Markers for hepatocyte lineage cells include, but are not limited to, transthyretin (Ttr), glutamine synthetase (Glul), hepatocyte nuclear factor 1a (Hnf1a) and hepatocyte nuclear factor 4a (Hnf4a). Markers for mature hepatocytes may include, but are not limited to, cytochrome P450 (Cyp3a11), fumarylacetoacetate hydrolase (Fah), glucose 6-phosphate (G6p), albumin (Alb) and OC2-2F8. *See, e.g.*, Huch *et al.* (2013) *Nature* 494:247-250.

**[0075]** As used herein, a “hepatotoxic agent” means a chemical compound, virus or other substance that is itself toxic to the liver or can be processed to form a metabolite that is toxic to the liver. Hepatotoxic agents may include, but are not limited to, carbon tetrachloride (CCl<sub>4</sub>), acetaminophen (paracetamol), vinyl chloride, arsenic, chloroform, and nonsteroidal anti-inflammatory drugs (such as aspirin and phenylbutazone).

**[0076]** As used herein, “individual” means any mammal, including cats, dogs, mice, rats, and primates, especially humans. Moreover, “subject” or “patient” may be used interchangeably with “individual.”

**[0077]** As used herein, “labile linker” means a linker that can be cleaved (*e.g.*, by acidic pH). Likewise, “fairly stable linker” means a linker that cannot be cleaved.

**[0078]** As used herein, “liver inflammation” or “hepatitis” means a physical condition in which the liver becomes swollen, dysfunctional and/or painful, especially because of injury or infection, as may be caused by exposure to a hepatotoxic agent. Symptoms may include

jaundice, fatigue, weakness, nausea, vomiting, appetite reduction, and weight loss. Liver inflammation, if left untreated, may progress to fibrosis, cirrhosis, liver failure or liver cancer.

**[0079]** As used herein, “liver fibrosis,” “hepatic fibrosis” or “fibrosis of the liver” refers to an excessive accumulation in the liver of extracellular matrix proteins, which could include collagens (I, III, and IV), FBN, undulin, elastin, laminin, hyaluronan, and proteoglycans resulting from inflammation and liver cell death. Liver fibrosis, if left untreated, may progress to cirrhosis, liver failure, or liver cancer.

**[0080]** As used herein, “loop” means an unpaired region of a nucleic acid (*e.g.*, oligonucleotide) that is flanked by two antiparallel regions of the nucleic acid that are sufficiently complementary to one another, such that under appropriate hybridization conditions (*e.g.*, in a phosphate buffer, in a cells), the two antiparallel regions, which flank the unpaired region, hybridize to form a duplex (referred to as a “stem”).

**[0081]** As used herein, “modified internucleotide linkage” means an internucleotide linkage having one or more chemical modifications when compared with a reference internucleotide linkage having a phosphodiester bond. A modified nucleotide can be a non-naturally occurring linkage. Typically, a modified internucleotide linkage confers one or more desirable properties to a nucleic acid in which the modified internucleotide linkage is present. For example, a modified nucleotide may improve thermal stability, resistance to degradation, nuclease resistance, solubility, bioavailability, bioactivity, reduced immunogenicity, *etc.*

**[0082]** As used herein, “modified nucleotide” refers to a nucleotide having one or more chemical modifications when compared with a corresponding reference nucleotide selected from: adenine ribonucleotide, guanine ribonucleotide, cytosine ribonucleotide, uracil ribonucleotide, adenine deoxyribonucleotide, guanine deoxyribonucleotide, cytosine deoxyribonucleotide and thymidine deoxyribonucleotide. A modified nucleotide can be a non-naturally occurring nucleotide. A modified nucleotide can have, for example, one or more chemical modifications in its sugar, nucleobase and/or phosphate group. Additionally or alternatively, a modified nucleotide can have one or more chemical moieties conjugated to a corresponding reference nucleotide. Typically, a modified nucleotide confers one or more desirable properties to a nucleic acid in which the modified nucleotide is present. For example, a modified nucleotide may improve thermal stability, resistance to degradation, nuclease resistance, solubility, bioavailability, bioactivity, reduced immunogenicity, *etc.*

**[0083]** As used herein, “nicked tetraloop structure” mean a structure of a RNAi oligonucleotide that is characterized by separate sense and antisense strands, in which the sense strand has a

region of complementarity with the antisense strand, and in which at least one of the strands, generally the sense strand, has a tetraloop configured to stabilize an adjacent stem region formed within the at least one strand.

**[0084]** As used herein, “nucleoside” means a nucleobase-sugar combination, where the nucleobase portion is normally a heterocyclic base. The two most common classes of such heterocyclic bases are purines and pyrimidines. The sugar is normally a pentose sugar such as a ribose or a deoxyribose (*e.g.*, 2'-deoxyribose).

**[0085]** As used herein, “nucleotide” means an organic molecule having a nucleoside (a nucleobase such as, for example, adenine, cytosine, guanine, thymine, or uracil; and a pentose sugar such as, *e.g.*, ribose or 2'-deoxyribose) and a phosphate group, which can serve as a monomeric unit of nucleic acid polymers such as deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

**[0086]** As used herein, “oligonucleotide” means a short nucleic acid molecule (*e.g.*, less than about 100 nucleotides in length). An oligonucleotide may be single-stranded (ss) or ds. An oligonucleotide may or may not have duplex regions. As a set of non-limiting examples, an oligonucleotide may be, but is not limited to, a small interfering RNA (siRNA), microRNA (miRNA), short hairpin RNA (shRNA), Dicer substrate interfering RNA (DsiRNA), antisense oligonucleotide (ASO), short siRNA or ss siRNA. Typically, a ds oligonucleotide is a RNAi oligonucleotide.

**[0087]** As used herein, “overhang” means a terminal non-base pairing nucleotide(s) resulting from one strand or region extending beyond the terminus of a complementary strand with which the one strand or region forms a duplex. An overhang may include one or more unpaired nucleotides extending from a duplex region at the 5' terminus or 3' terminus of a ds oligonucleotide. The overhang can be a 3' or 5' overhang on the antisense strand or sense strand of a ds oligonucleotide.

**[0088]** As used herein, “phosphate analog” means a chemical moiety that mimics the electrostatic and/or steric properties of a phosphate group. In some embodiments, a phosphate analog is positioned at the 5' terminal nucleotide of an oligonucleotide in place of a 5'-phosphate, which is often susceptible to enzymatic removal. A 5' phosphate analog can include a phosphatase-resistant linkage. Examples of phosphate analogs include, but are not limited to, 5' phosphonates, such as 5' methylenephosphonate (5'-MP) and 5'-(E)-vinylphosphonate (5'-VP). An oligonucleotide can have a phosphate analog at a 4'-carbon position of the sugar (referred to as a “4'-phosphate analog”) at a 5'-terminal nucleotide. An example of a 4'-

phosphate analog is oxymethylphosphonate, in which the oxygen atom of the oxymethyl group is bound to the sugar moiety (*e.g.*, at its 4'-carbon) or analog thereof. *See, e.g.*, Intl. Patent Application Publication No. WO 2018/045317. Other modifications have been developed for the 5' end of oligonucleotides (*see, e.g.*, Intl. Patent Application No. WO 2011/133871; US Patent No. 8,927,513; and Prakash *et al.* (2015) *Nucleic Acids Res.* 43:2993-3011).

**[0089]** As used herein, or “SCAP-associated condition,” “SCAP-associated disease” or “SCAP-associated disorder” means such a disease, disorder, or condition having increased SCAP activity and/or the presence of, for example, a SCAP polymorphism. Exemplary SCAP-associated conditions, diseases or disorders include, but are not limited to, AH, ALD, CCA, cirrhosis, hepatic fibrosis, hepatic inflammation, HCC, liver steatosis, NAFLD, NASH and PSC, as well as related diseases, disorders, and conditions in an individual such as, for example hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, ASCVD, diabetes and/or obesity.

**[0090]** As used herein, “reduced expression” or “reduced activity,” and with respect to a gene (*e.g.*, *SCAP*), means a decrease in the amount or level of RNA transcript (*e.g.*, *SCAP* mRNA) or protein (*e.g.*, *SCAP* protein) encoded by the gene and/or a decrease in the amount or level of activity of the gene or protein in a cell, a population of cells, a sample or a subject, when compared to an appropriate reference (*e.g.*, a reference cell, population of cells, sample or individual). For example, the act of contacting a cell with an oligonucleotide herein (*e.g.*, an oligonucleotide having an antisense strand having a nucleotide sequence that is complementary to a nucleotide sequence including *SCAP* mRNA) may result in a decrease in the amount or level of mRNA, protein and/or activity (*e.g.*, *via* degradation of *SCAP* mRNA by the RNAi pathway) when compared to a cell that is not treated with the ds oligonucleotide. Similarly, and as used herein, “reducing expression” or “reducing activity” means an act that results in reduced expression of a gene (*e.g.*, *SCAP*). Specifically, and as used herein, “reduction of *SCAP* expression” or “reduction of *SCAP* activity” means a decrease in the amount or level of *SCAP* activity such as, for example, *SCAP* mRNA and/or *SCAP* protein and/or *SCAP* activity in a cell, a population of cells, a sample or a subject when compared to an appropriate reference (*e.g.*, a reference cell, population of cells, tissue or individual).

**[0091]** As used herein, “region of complementarity” means a sequence of nucleotides of a nucleic acid (*e.g.*, a ds oligonucleotide) that is sufficiently complementary to an antiparallel sequence of nucleotides to permit hybridization between the two sequences of nucleotides under appropriate hybridization conditions (*e.g.*, in a phosphate buffer, in a cell, *etc.*). An

oligonucleotide herein includes a targeting sequence having a region of complementary to a mRNA target sequence.

**[0092]** As used herein, “ribonucleotide” means a nucleotide having a ribose as its pentose sugar, which contains a hydroxyl group at its 2' position. A modified ribonucleotide is a ribonucleotide having one or more modifications or substitutions of atoms other than at the 2' position, including modifications or substitutions in or of the nucleobase, sugar, or phosphate group.

**[0093]** As used herein, “iRNA,” “iRNA agent,” “RNAi,” “RNAi agent” and “RNA interference agent” means an agent such as, for example, a RNAi oligonucleotide, which contains RNA and which mediates the targeted cleavage of an RNA transcript *via* a RNA-induced silencing complex (RISC) pathway to direct sequence-specific degradation of mRNA *via* RNA interference. The agent thus modulates, inhibits or reduces gene expression in a cell.

**[0094]** As used herein, “RNAi oligonucleotide” refers to either (a) a ds oligonucleotide having a sense strand and antisense strand, in which the antisense strand or part of the antisense strand is used by the Argonaute 2 (Ago2) endonuclease in the cleavage of a target mRNA or (b) a ss oligonucleotide having a single antisense strand, where that antisense strand (or part of that antisense strand) is used by the Ago2 endonuclease in the cleavage of a target mRNA.

**[0095]** As used herein, “strand” refers to a single, contiguous sequence of nucleotides linked together through internucleotide linkages (*e.g.*, phosphodiester linkages or phosphorothioate linkages). A strand can have two free ends (*e.g.*, a 5' end and a 3' end).

**[0096]** As used herein, “synthetic” refers to a nucleic acid or other molecule that is artificially synthesized (*e.g.*, using a machine such as, for example, a solid-state nucleic acid synthesizer) or that is otherwise not derived from a natural source (*e.g.*, a cell or organism) that normally produces the nucleic acid or other molecule.

**[0097]** As used herein, “targeting ligand” means a molecule (*e.g.*, an amino sugar, carbohydrate, cholesterol, lipid, or polypeptide) that selectively binds to a cognate molecule (*e.g.*, a receptor) of a tissue or cell of interest and that is conjugatable to another substance for targeting another substance to the tissue or cell of interest. For example, a targeting ligand may be conjugated to an oligonucleotide herein for purposes of targeting the oligonucleotide to a specific tissue or cell of interest. A targeting ligand can selectively bind to a cell surface receptor. Accordingly, a targeting ligand, when conjugated to an oligonucleotide, facilitates delivery of the oligonucleotide into a particular cell through selective binding to a receptor expressed on the surface of the cell and endosomal internalization by the cell of the complex

comprising the oligonucleotide, targeting ligand and receptor. Moreover, a targeting ligand can be conjugated to an oligonucleotide *via* a linker that is cleaved following or during cellular internalization such that the oligonucleotide is released from the targeting ligand in the cell.

**[0098]** As used herein, “tetraloop” or “teraL” means a loop that increases stability of an adjacent duplex formed by hybridization of flanking sequences of nucleotides. The increase in stability is detectable as an increase in melting temperature ( $T_m$ ) of an adjacent stem duplex that is higher than the  $T_m$  of the adjacent stem duplex expected, on average, from a set of loops of comparable length consisting of randomly selected sequences of nucleotides. For example, a tetraL can confer a  $T_m$  of at least about 50°C, at least about 55°C, at least about 56°C, at least about 58°C, at least about 60°C, at least about 65°C, or at least about 75°C in 10 mM NaHPO<sub>4</sub> to a hairpin comprising a duplex of at least 2 base pairs (bp) in length. A tetraL also may stabilize a bp in an adjacent stem duplex by stacking interactions. Additionally, interactions among the nucleotides in a tetraloop include, but are not limited to, non-Watson-Crick base pairing, stacking interactions, hydrogen bonding, and contact interactions (Cheong *et al.* (1990) NATURE 346:680-82; Heus & Pardi (1991) SCIENCE 253:191-94). Here, a tetraL can include or can have about 3 to about 6 nucleotides, and typically is about 4 to about 5 nucleotides. A tetraL therefore can have 3, 4, 5, or 6 nucleotides, which may or may not be modified (*e.g.*, which may or may not be conjugated to a targeting moiety), especially 4 nucleotides. Any nucleotide may be used in the tetraL, and standard IUPAC-IUB symbols for such nucleotides may be used as described in Cornish-Bowden (1985) NUCLEIC ACIDS RES. 13:3021-30. For example, the letter “N” may be used to mean that any base may be in that position, the letter “R” may be used to show that A (adenine) or G (guanine) may be in that position, and “B” may be used to show that C (cytosine), G (guanine), or T (thymine) may be in that position. Examples of tetraL include the UCG family of tetraloops (*e.g.*, UUCG), the GNRA family of tetraloops (*e.g.*, GAAA) and the CUUG tetraloop (Woese *et al.* (1990) PROC. NATL. ACAD. SCI. USA 87:8467-71; Antao *et al.* (1991) NUCLEIC ACIDS RES. 19:5901-05). Examples of DNA tetraloops include the d(GNNA) family of tetraloops (*e.g.*, d(GTTA)), the d(GNRA) family of tetraloops, the d(GNAB) family of tetraloops, the d(CNNG) family of tetraloops, and the d(TNCG) family of tetraloops (*e.g.*, d(TTCG)). *See, e.g.*, Nakano *et al.* (2002) BIOCHEM. 41:4281-92; and Shinji *et al.* (2000) NIPPON KAGAKKAI KOEN YOKOSHU 78:731. Here, the tetraL can be within a nicked tetraL structure.

**[0099]** As used herein, “treat” or “treating” means an act of providing care to an individual in need thereof, for example, by administering a therapeutic agent (*e.g.*, an oligonucleotide herein)

to the individual for purposes of improving the health and/or well-being of the individual with respect to an existing a disease, disorder, or condition, or to prevent or decrease the likelihood of the occurrence of a disease, disorder, or condition. Treating also can involve reducing the frequency or severity of at least one sign, symptom or contributing factor of a disease, disorder, or condition experienced by the individual.

**[00100]** *Compositions*

**[00101]** Oligonucleotide Inhibitors of *SCAP* Activity

**[00102]** I. *SCAP* Target Sequences: The oligonucleotides herein (*e.g.*, an antisense strand of a ds oligonucleotide such as a RNAi oligonucleotide) are targeted to a target sequence within *SCAP* mRNA. For example, an oligonucleotide, or a portion, fragment, or strand thereof binds or anneals to a target sequence within a *SCAP* mRNA, thereby inhibiting *SCAP* activity. In some embodiments, the oligonucleotide is targeted to a *SCAP* target sequence for inhibiting *SCAP* activity *in vivo*. In some embodiments, the amount or extent of inhibition of *SCAP* activity by an oligonucleotide targeted to a *SCAP* target sequence correlates with the potency of the oligonucleotide. In some embodiments, the amount or extent of inhibition of *SCAP* activity by an oligonucleotide targeted to a *SCAP* target sequence correlates with the amount or extent of therapeutic benefit in an individual having or suspected of having a disease, disorder, or condition associated with *SCAP* activity treated with the oligonucleotide.

**[00103]** Through examining and analyzing the nucleotide sequence of *SCAP* mRNAs, including mRNAs of multiple different species (*e.g.*, human, mouse and/or monkey; *see, e.g.*, Example 2) and because of *in vitro* and *in vivo* testing (*see, e.g.*, Examples 3 and 4), it is shown herein that certain nucleotide sequences of *SCAP* mRNA are more amenable than others to oligonucleotide-based inhibition of *SCAP* activity and are thus useful as target sequences for the oligonucleotides herein. In some embodiments, a sense strand of an oligonucleotide herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide; *e.g.*, in Table 3) includes a *SCAP* target sequence. In some instances, a portion or region of the sense strand of RNAi oligonucleotide herein (*e.g.*, in Table 3) includes a *SCAP* target sequence. In some embodiments, a *SCAP* target sequence comprises, or consists of, a sequence of any one of SEQ ID NOs: 777 to 783 or any one of the odd numbers of SEQ ID NOs: 785 to 1168 (especially any one of SEQ ID NOs: 915, 923, 997, 1049, 1097, 1109, and 1137).

**[00104]** II. SCAP mRNA Targeting Sequences: In some embodiments, the oligonucleotide herein (*e.g.*, an antisense strand of a ds oligonucleotide such as a RNAi oligonucleotide) has a region of complementarity to SCAP mRNA (*e.g.*, within a target sequence of SCAP mRNA) for targeting SCAP mRNA in cells and inhibiting *SCAP* activity. In some embodiments, the oligonucleotide comprises a SCAP targeting sequence (*e.g.*, an antisense strand of a ds oligonucleotide) having a region of complementarity that binds or anneals to a SCAP mRNA target sequence by complementary (Watson-Crick) base pairing. The targeting sequence or region of complementarity is of a suitable length and base content to enable binding or annealing of the oligonucleotide (or a strand thereof) to a SCAP mRNA for inhibiting its expression. In some embodiments, the targeting sequence or region of complementarity is at least about 12, at least about 13, at least about 14, at least about 15, at least about 16, at least about 17, at least about 18, at least about 19, at least about 20, at least about 21, at least about 22, at least about 23, at least about 24, at least about 25, at least about 26, at least about 27, at least about 28, at least about 29, or at least about 30 nucleotides in length. Alternatively, the targeting sequence or region of complementarity is about 12 to about 30 (*e.g.*, 12 to 30, 12 to 22, 15 to 25, 17 to 21, 18 to 27, 19 to 27, or 15 to 30) nucleotides in length. Alternatively, the targeting sequence or region of complementarity is about 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, or 30 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 18 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 19 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 20 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 21 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 22 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 23 nucleotides in length. In certain embodiments, the targeting sequence or region of complementarity is 24 nucleotides in length.

**[00105]** In some embodiments, the oligonucleotide herein comprises a targeting sequence or a region of complementarity (*e.g.*, an antisense strand of a ds oligonucleotide) that is fully complementary to a SCAP mRNA targeting sequence. In some embodiments, the targeting sequence or region of complementarity is partially complementary to a SCAP mRNA targeting sequence. In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity that is fully complementary to a sequence of any one of SEQ ID NOs: 777 to 783. In some embodiments, the oligonucleotide comprises a targeting sequence or region of

complementarity that is partially complementary to a sequence of any one of SEQ ID NOs: 777 to 783.

**[00106]** Alternatively, in some embodiments, the oligonucleotide herein comprises a targeting sequence or region of complementarity that is complementary to a contiguous sequence of nucleotides comprising a SCAP mRNA, where the contiguous sequence of nucleotides is about 12 to about 30 nucleotides in length (*e.g.*, 12 to 30, 12 to 28, 12 to 26, 12 to 24, 12 to 20, 12 to 18, 12 to 16, 14 to 22, 16 to 20, 18 to 20, or 18 to 19 nucleotides in length). In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity that is complementary to a contiguous sequence of nucleotides comprising a SCAP mRNA, where the contiguous sequence of nucleotides is 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, or 20 nucleotides in length. In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity that is complementary to a contiguous sequence of nucleotides comprising a SCAP mRNA, where the contiguous sequence of nucleotides is 19 nucleotides in length. In some embodiments, the oligonucleotides comprise a targeting sequence or region of complementarity that is complementary to a contiguous sequence of nucleotides comprising a SCAP mRNA, where the contiguous sequence of nucleotides is 20 nucleotides in length. In other embodiments, the oligonucleotides comprise a targeting sequence or a region of complementarity that is complementary to a contiguous sequence of nucleotides of any one of SEQ ID NOs: 777 to 783, optionally where the contiguous sequence of nucleotides is 19 nucleotides in length.

**[00107]** With regard to the targeting sequence or region of complementarity of the oligonucleotides herein, it is complementary to contiguous nucleotides of a sequence as set forth in any one of SEQ ID NOs: 777 to 783 and spans the entire length of an antisense strand. In some embodiments, the region of complementarity of the oligonucleotide is complementary to contiguous nucleotides of a sequence as set forth in any one of SEQ ID NOs: 777 to 783 and spans a portion of the entire length of an antisense strand. In some additional embodiments, the oligonucleotide includes a region of complementarity (*e.g.*, on an antisense strand of a ds oligonucleotide) that is at least partially (*e.g.*, fully) complementary to a contiguous stretch of nucleotides spanning nucleotides 1-20, 1-19, 1-18, *etc.* of a sequence as set forth in any one of SEQ ID NOs: 777 to 783.

**[00108]** Alternatively, the oligonucleotide comprises a targeting sequence or region of complementarity having one or more base pair (bp) mismatches with the corresponding SCAP mRNA target sequence. In some embodiments, the targeting sequence or region of

complementarity is up to about 1, up to about 2, up to about 3, up to about 4, up to about 5, *etc.* mismatches with the corresponding SCAP target sequence, provided that the ability of the targeting sequence or region of complementarity to bind or anneal to a SCAP mRNA under appropriate hybridization conditions and/or the ability of the oligonucleotide to reduce or inhibit *SCAP* activity is maintained. Stated differently, the targeting sequence or region of complementarity is no more than 1, no more than 2, no more than 3, no more than 4, or no more than 5 mismatches with the corresponding SCAP target sequence provided that the ability of the targeting sequence or region of complementarity to bind or anneal to a SCAP mRNA under appropriate hybridization conditions and/or the ability of the oligonucleotide to reduce or inhibit *SCAP* activity is maintained. In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity having 1 mismatch with the corresponding target sequence. In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity having 2 mismatches with the corresponding target sequence. In some embodiments, the oligonucleotide comprises a targeting sequence or a region of complementarity having 3 mismatches with the corresponding target sequence. In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity having 4 mismatches with the corresponding target sequence. In some embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity having 5 mismatches with the corresponding target sequence. In other embodiments, the oligonucleotide comprises a targeting sequence or a region of complementarity more than one mismatch (*e.g.*, 2, 3, 4, 5 or more mismatches) with the corresponding target sequence, where at least 2 (*e.g.*, all) of the mismatches are positioned consecutively (*e.g.*, 2, 3, 4, 5 or more mismatches in a row), or where the mismatches are interspersed in any position throughout the targeting sequence or region of complementarity. In other embodiments, the oligonucleotide comprises a targeting sequence or region of complementarity more than one mismatch (*e.g.*, 2, 3, 4, 5 or more mismatches) with the corresponding target sequence, where at least 2 (*e.g.*, all) of the mismatches are positioned consecutively (*e.g.*, 2, 3, 4, 5 or more mismatches in a row), or where at least one or more non-mismatched bp is located between the mismatches, or a combination thereof.

**[00109]** III. Types of Oligonucleotides: A variety of oligonucleotide types and/or structures are useful for targeting SCAP mRNA including, but not limited to, RNAi oligonucleotides, ASOs, miRNAs, *etc.* Any of the oligonucleotide types described herein or elsewhere are

contemplated for use as a framework to incorporate a targeting sequence herein for the purposes of inhibiting *SCAP* activity. In some embodiments, the oligonucleotide herein inhibits *SCAP* activity by engaging with RNAi pathways upstream or downstream of Dicer involvement. For example, RNAi oligonucleotides have been developed with each strand having sizes of about 19-25 nucleotides with at least one 3' overhang of 1 to 5 nucleotides (*see, e.g.*, US Patent No. 8,372,968). Longer oligonucleotides also have been developed that are processed by Dicer to generate active RNAi products (*see, e.g.*, US Patent No. 8,883,996). Further work produced extended ds oligonucleotides where at least one end of at least one strand is extended beyond a duplex targeting region, including structures where one of the strands includes a thermodynamically stabilizing tetraL (*see, e.g.*, US Patent Nos. 8,513,207 and 8,927,705, as well as Intl. Patent Application Publication No. WO 2010/033225). Such structures include ss extensions (on one or both sides of the molecule) as well as ds extensions.

**[00110]** The oligonucleotides herein engage with the RNAi pathway downstream of the involvement of Dicer (*e.g.*, Dicer cleavage). In some embodiments, the oligonucleotide has an overhang (*e.g.*, of 1, 2, or 3 nucleotides in length) in the 3' end of the sense strand. In some embodiments, the oligonucleotide (*e.g.*, siRNA) includes a 21-nucleotide antisense strand that is antisense to a target mRNA (*e.g.*, *SCAP* mRNA) and a complementary sense strand, in which both strands anneal to form a 19-bp duplex and 2 nucleotide overhangs at either or both 3' ends. Longer oligonucleotide designs also are contemplated, including oligonucleotides having an antisense strand of 23 nucleotides and a sense strand of 21 nucleotides, where there is a blunt end on the right side of the molecule (3' end of sense strand/5' end of antisense strand) and a two nucleotide 3' antisense strand overhang on the left side of the molecule (5' end of the sense strand/3' end of the antisense strand). In such molecules, there is a 21 bp duplex region. *See, e.g.*, US Patent Nos. 9,012,138; 9,012,621 and 9,193,753.

**[00111]** The oligonucleotide herein comprises sense and antisense strands that are both in the range of about 17 to about 26 (*e.g.*, 17 to 26, 20 to 25, or 21-23) nucleotides in length. In some embodiments, the oligonucleotide comprises a sense and antisense strand that are both in the range of about 19 to about 22 nucleotides in length. In some embodiments, the sense and antisense strands are of equal length. In some embodiments, the oligonucleotide comprises sense and antisense strands, such that there is a 3' overhang on either the sense strand or the antisense strand, or both the sense and antisense strand. In some embodiments, for an oligonucleotide having sense and antisense strands that are both in the range of about 21 to about 23 nucleotides in length, a 3' overhang on the sense, antisense or both sense and antisense

strands is 1 or 2 nucleotides in length. In some embodiments, the oligonucleotide comprises an antisense strand of 22 nucleotides and a sense strand of 20 nucleotides, where there is a blunt end on the right side of the molecule (3' end of sense strand/5' end of antisense strand) and a 2 nucleotide 3' antisense strand overhang on the left side of the molecule (5' end of the sense strand/3' end of the antisense strand). In such molecules, there is a 20-bp duplex region.

**[00112]** Other oligonucleotide designs for use herein include: 16-mer siRNAs (*see, e.g.*, “NUCLEIC ACIDS IN CHEMISTRY & BIOLOGY,” Blackburn (ed.), Royal Society of Chemistry, 2006), shRNAs (*e.g.*, having 19 bp or shorter stems; *see, e.g.*, Moore *et al.* (2010) METHODS MOL. BIOL. 629:141-58), blunt siRNAs (*e.g.*, of 19 bps in length; *see, e.g.*, Kraynack & Baker (2006) RNA 12:163-76), asymmetrical siRNAs (aiRNA; *see, e.g.*, Sun *et al.* (2008) NAT. BIOTECHNOL. 26:1379-82), asymmetric shorter-duplex siRNA (*see, e.g.*, Chang *et al.* (2009) MOL. THER. 17:725-32), fork siRNAs (*see, e.g.*, Hohjoh (2004) FEBS LETT. 557:193-98), ss siRNAs (*see, e.g.*, Elsner (2012) NAT. BIOTECHNOL. 30:1063), dumbbell-shaped circular siRNAs (*see, e.g.*, Abe *et al.* (2007) J. AM. CHEM. SOC. 129:15108-09), and small internally segmented interfering RNA (sisiRNA; *see, e.g.*, Bramsen *et al.* (2007) NUCLEIC ACIDS RES. 35:5886-97). Further non-limiting examples of oligonucleotide structures that may be used herein to reduce or inhibit SCAP activity are miRNA, shRNA, and short siRNA (*see, e.g.*, Hamilton *et al.* (2002) EMBO J. 21:4671-79; *see also*, US Patent No. 7,659,389).

**[00113]** Alternatively, the oligonucleotide herein is ss. Such structures include, but are not limited to, ss RNAi molecules. Recent efforts have demonstrated the activity of ss RNAi molecules (*see, e.g.*, Matsui *et al.* (2016) MOL. THER. 24:946-55). In some embodiments, the oligonucleotide is an ASOs. An ASO is a ss oligonucleotide that has a nucleobase sequence that, when written or depicted in the 5' to 3' direction, includes a reverse complement of a targeted segment of a particular nucleic acid and is suitably modified (*e.g.*, as a gapmer) to induce RNaseH-mediated cleavage of its target RNA in cells or (*e.g.*, as a mixmer) so as to inhibit translation of the target mRNA in cells. ASOs for use herein are modified in any suitable manner known in the art including, for example, as shown in US Patent No. 9,567,587 (including, for example, length, sugar moieties of the nucleobase (pyrimidine, purine), and alterations of the heterocyclic portion of the nucleobase). Further, ASOs have been used for decades to reduce expression of specific target genes (*see, e.g.*, Bennett *et al.* (2017) ANNU. REV. PHARMACOL. 57:81-105).

**[00114]** IV. ds RNAi Oligonucleotides: ds RNAi oligonucleotides for targeting SCAP mRNA and inhibiting *SCAP* activity (*e.g.*, *via* the RNAi pathway) comprise a sense strand and an antisense strand. In some embodiments, the sense strand and antisense strand are separate strands and are not covalently linked. In some embodiments, the sense strand and antisense strand are covalently linked.

**[00115]** In some embodiments, the sense strand comprises a first region (R1) and a second region (R2), where R2 comprises a first subregion (S1), a triL or a L, and a second subregion (S2), where triL or L is located between S1 and S2, and where S1 and S2 form a second duplex (D2). D2 has various lengths. In some embodiments, D2 is about 1 to about 6 bp in length. In other embodiments, D2 is 2-6, 3-6, 4-6, 5-6, 1-5, 2-5, 3-5 or 4-5 bp in length. In other embodiments, D2 is 1, 2, 3, 4, 5 or 6 bp in length. In certain embodiments, D2 is 6 bp in length.

**[00116]** In some embodiments, R1 of the sense strand and the antisense strand forms a first duplex (D1). In some embodiments, D1 is at least about 15 (*e.g.*, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20 or at least 21) nucleotides in length. In other embodiments, D1 is about 12 to about 30 nucleotides in length (*e.g.*, 12 to 30, 12 to 27, 15 to 22, 18 to 22, 18 to 25, 18 to 27, 18 to 30 or 21 to 30 nucleotides in length). In other embodiments, D1 is at least 12 nucleotides in length (*e.g.*, at least 12, at least 15, at least 20, at least 25 or at least 30 nucleotides in length). In other embodiments, D1 is 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 or 30 nucleotides in length. In certain embodiments, D1 is 20 nucleotides in length. In some embodiments, D1 does not span the entire length of the sense strand and/or antisense strand. In other embodiments, D1 spans the entire length of either the sense strand or antisense strand or both. In certain embodiments, D1 spans the entire length of both the sense strand and the antisense strand.

**[00117]** In certain embodiments, the disclosure describes RNAi oligonucleotides for reducing or inhibiting *SCAP* activity that include a sense strand comprising, or alternatively consisting of, a sequence as set forth in Table 3 (*e.g.*, any one of the odd numbers of SEQ ID NOs: 9 to 392), especially SEQ ID NOs: 139, 147, 221, 273, 321, 333, and 361.

**[00118]** In certain embodiments, the disclosure describes RNAi oligonucleotides for reducing or inhibiting *SCAP* activity that include an antisense strand comprising, or alternatively consisting of, a sequence as set forth in Table 3 (*e.g.*, any one of the even numbers of SEQ ID NOs: 9 to 392), especially SEQ ID NOs: 140, 148, 222, 274, 322, 334, and 362.

**[00119]** In certain other embodiments, the RNAi oligonucleotide includes a sense strand comprising, or alternatively consisting of, a nucleotide sequence of any one of SEQ ID NOs:

139, 147, 221, 273, 321, 333 and 361, and an antisense strand comprising, or alternatively consisting of, a nucleotide sequence of any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334 and 362.

**[00120]** In certain embodiments, the sense strand and the antisense strand of a RNAi oligonucleotide, respectively, are selected from:

- (a) SEQ ID NOs: 139 and 140,
- (b) SEQ ID NOs: 147 and 148,
- (c) SEQ ID NOs: 221 and 222,
- (d) SEQ ID NOs: 273 and 274,
- (e) SEQ ID NOs: 321 and 322,
- (f) SEQ ID NOs: 333 and 334, and
- (g) SEQ ID NOs: 361 and 362.

**[00121]** In certain additional embodiments, the RNAi oligonucleotide includes a sense strand comprising, or alternatively consisting of, a nucleotide sequence of SEQ ID NO: 147 or 333, and an antisense strand comprising, or alternatively consisting of, a nucleotide sequence of SEQ ID NO: 148 or 334. Alternatively, the sense strand is SEQ ID NO: 147 and the antisense strand is SEQ ID NO: 148. Alternatively, the sense strand is SEQ ID NO: 333 and the antisense strand is SEQ ID NO: 334.

**[00122]** In some embodiments, the RNAi oligonucleotide includes a sense strand comprising, or alternatively consisting of, a nucleotide sequence as set forth in Table 4 (*e.g.*, any one of the odd numbers of SEQ ID NOs: 393 to 776), especially SEQ ID NOs: 523, 531, 605, 657, 705, 717, and 745.

**[00123]** In certain embodiments, the RNAi oligonucleotide includes an antisense strand comprising, or alternatively consisting of, a nucleotide sequence as set forth in Table 4 (*e.g.*, any one of the even numbers of SEQ ID NOs: 393 to 776), especially SEQ ID NOs: 524, 532, 606, 658, 706, 718, and 746.

**[00124]** In certain other embodiments, the RNAi oligonucleotide includes a sense strand comprising, or alternatively consisting of, a nucleotide sequence of any one of SEQ ID NOs: 523, 531, 605, 657, 705, 717 and 745, and an antisense strand comprising, or alternatively consisting of, a nucleotide sequence of any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718 and 746.

**[00125]** In certain embodiments, the sense strand, and the antisense strand of the RNAi oligonucleotide, respectively, are selected from:

- (a') SEQ ID NOs: 523 and 524,
- (b') SEQ ID NOs: 531 and 532,
- (c') SEQ ID NOs: 605 and 606,
- (d') SEQ ID NOs: 657 and 658,
- (e') SEQ ID NOs: 705 and 706,
- (f') SEQ ID NOs: 717 and 718, and
- (g') SEQ ID NOs: 745 and 746.

**[00126]** In certain additional embodiments, the RNAi oligonucleotide includes a sense strand comprising, or alternatively consisting of, a nucleotide sequence of SEQ ID NO: 531 or 717, and an antisense strand comprising, or alternatively consisting of, a nucleotide sequence of SEQ ID NO: 532 or 718. Alternatively, the sense strand is SEQ ID NO: 531 and the antisense strand is SEQ ID NO: 532. Alternatively, the sense strand is SEQ ID NO: 717 and the antisense strand is SEQ ID NO: 718.

**[00127]** One of skill in the art appreciates that in some embodiments, the sequences presented in the Sequence Listing are referred to in describing the structure of an oligonucleotide (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) or other nucleic acid. In such embodiments, the actual oligonucleotide or other nucleic acid has one or more alternative nucleotides (*e.g.*, an RNA counterpart of a DNA nucleotide or a DNA counterpart of an RNA nucleotide) and/or one or more modified nucleotides and/or one or more modified internucleotide linkages and/or one or more other modification when compared with the specified sequence while retaining essentially same or similar complementary properties as the specified sequence.

**[00128]** In some embodiments, an oligonucleotide herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) includes a 25-nucleotide sense strand and a 27-nucleotide antisense strand that when acted upon by a Dicer enzyme results in an antisense strand that is incorporated into the mature RISC. In other embodiments, the sense strand of the ds oligonucleotide is longer than 25 nucleotides (*e.g.*, 26, 27, 28, 29, or 30 nucleotides). In other embodiments, the sense strand of the ds oligonucleotide is longer than 27 nucleotides (*e.g.*, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 nucleotides).

**[00129]** In some embodiments, the oligonucleotide has one 5' end that is thermodynamically less stable when compared to the other 5' end. In some embodiments, the oligonucleotide is asymmetric and includes a blunt end at the 3' end of a sense strand and a 3' overhang at the 3' end of an antisense strand. In some embodiments, the 3' overhang on the antisense strand is about 1 to about 8 nucleotides in length (*e.g.*, 1, 2, 3, 4, 5, 6, 7, or 8 nucleotides in length).

Typically, a ds oligonucleotide for RNAi has a two-nucleotide overhang on the 3' end of the antisense strand. However, other overhangs are possible. In some embodiments, an overhang is a 3' overhang having a length of between about 1 to about 6 nucleotides, optionally 1 to 5, 1 to 4, 1 to 3, 1 to 2, 2 to 6, 2 to 5, 2 to 4, 2 to 3, 3 to 6, 3 to 5, 3 to 4, 4 to 6, 4 to 5, 5 to 6 nucleotides, or 1, 2, 3, 4, 5, or 6 nucleotides. However, in other embodiments, the overhang is a 5' overhang comprising a length of between about 1 to about 6 nucleotides, optionally 1 to 5, 1 to 4, 1 to 3, 1 to 2, 2 to 6, 2 to 5, 2 to 4, 2 to 3, 3 to 6, 3 to 5, 3 to 4, 4 to 6, 4 to 5, 5 to 6 nucleotides, or 1, 2, 3, 4, 5, or 6 nucleotides.

**[00130]** In some embodiments, 2 terminal nucleotides on the 3' end of an antisense strand are modified. In some embodiments, the 2 terminal nucleotides on the 3' end of the antisense strand are complementary with the target mRNA (*e.g.*, SCAP mRNA). In other embodiments, the 2 terminal nucleotides on the 3' end of the antisense strand are not complementary with the target mRNA. In some embodiments, the 2 terminal nucleotides on the 3' end of the antisense strand of an oligonucleotide herein are unpaired. In some embodiments, 2 terminal nucleotides on each 3' end of an oligonucleotide in the nicked tetraL structure are GG. Typically, one or both of the 2 terminal GG nucleotides on each 3' end of a ds oligonucleotide are not complementary with the target mRNA.

**[00131]** In some embodiments, there is one or more (*e.g.*, 1, 2, 3, 4, or 5) mismatch(s) between the sense and antisense strand. If there is more than one mismatch between the sense and antisense strand, they may be positioned consecutively (*e.g.*, 2, 3, or more in a row), or interspersed throughout the region of complementarity. In some embodiments, the 3' end of the sense strand contains one or more mismatches. In certain embodiments, two mismatches are incorporated at the 3' end of the sense strand. In some embodiments, base mismatches, or destabilization of segments at the 3' end of the sense strand of the oligonucleotide improves or increases the potency of the ds oligonucleotide.

**[00132]** In some embodiments, there is one or more (*e.g.*, 1, 2, 3, 4, or 5) mismatch(s) between a sense and antisense strand comprising an oligonucleotide herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide). If there is more than one mismatch between a sense and antisense strand, they may be positioned consecutively (*e.g.*, 2, 3 or more in a row), or interspersed throughout the region of complementarity. In some embodiments, the 3' end of the sense strand comprises one or more mismatches. In some embodiments, two (2) mismatches are incorporated at the 3' end of the sense strand. In some embodiments, base mismatches, or destabilization of segments at the 3' end of the sense strand of an oligonucleotide herein

improves or increases the potency of the oligonucleotide. In some embodiments, the sense and antisense strands of an oligonucleotide herein comprise nucleotides sequences selected from Table 3, optionally from the group consisting of:

- (a) SEQ ID NOs: 139 and 140,
- (b) SEQ ID NOs: 147 and 148,
- (c) SEQ ID NOs: 221 and 222,
- (d) SEQ ID NOs: 273 and 274,
- (e) SEQ ID NOs: 321 and 322,
- (f) SEQ ID NOs: 333 and 334, and
- (g) SEQ ID NOs: 361 and 362,

wherein there is one or more (*e.g.*, 1, 2, 3, 4 or 5) mismatch(s) between the sense and antisense strands.

**[00133]** A. Sense Strands: The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) include a sense strand sequence including a sequence as set forth in the sense strands of Table 3 or Table 4. In some embodiments, the oligonucleotide includes a sense strand that having at least about 12 (*e.g.*, at least 12, at least 13, 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, or at least 23) contiguous nucleotides of a sequence as set forth in in any one of SEQ ID NOs: 139, 147, 221, 273, 321, 333 and 361, or a sense strand having a nucleotide sequence of any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334 and 362.

**[00134]** Further, the oligonucleotide can include a sense strand of up to about 50 nucleotides in length (*e.g.*, up to 50, up to 40, up to 36, up to 30, up to 27, up to 25, up to 21, up to 19, up to 17, or up to 12 nucleotides in length). In some embodiments, the oligonucleotide can have a sense strand of at least about 12 nucleotides in length (*e.g.*, at least 12, at least 15, at least 19, at least 21, at least 25, at least 27, at least 30, at least 36, or at least 38 nucleotides in length). Alternatively, the oligonucleotide can have a sense strand in a range of about 12 to about 40 (*e.g.*, 12 to 40, 12 to 36, 12 to 32, 12 to 28, 15 to 40, 15 to 36, 15 to 32, 15 to 28, 17 to 21, 17 to 25, 19 to 27, 19 to 30, 20 to 40, 22 to 40, 25 to 40, or 32 to 40) nucleotides in length. In certain embodiments, the oligonucleotide can have a sense strand of 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, or 40 nucleotides in length.

**[00135]** In some embodiments, the sense strand comprises a stem-loop structure at its 3' end. In other embodiments, the sense strand comprises a stem-loop structure at its 5' end. In some embodiments, the stem-loop is formed by intrastrand base pairing. In additional embodiments, the stem is a duplex of about 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 bp in length. In some embodiments, the stem of the stem-loop comprises a duplex of 2 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 3 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 4 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 5 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 6 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 7 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 8 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 9 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 10 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 11 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 12 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 13 nucleotides in length. In some embodiments, the stem of the stem-loop comprises a duplex of 14 nucleotides in length.

**[00136]** In some embodiments, the stem-loop provides the oligonucleotide protection against degradation (*e.g.*, enzymatic degradation) and facilitates or improves targeting and/or delivery to a target cell, tissue, or organ (*e.g.*, the liver), or both. For example, the L of the stem-loop provides nucleotides having one or more modifications that facilitate, improve, or increase targeting to a target mRNA (*e.g.*, a SCAP mRNA), inhibiting of target gene expression (*e.g.*, SCAP activity), and/or delivering to a target cell, tissue, or organ (*e.g.*, the liver), or both. In some embodiments, the stem-loop itself or modification(s) to the stem-loop do not substantially affect the inherent gene expression inhibition activity of the oligonucleotide, but facilitates, improves, or increases stability (*e.g.*, provides protection against degradation) and/or delivery of the oligonucleotide to a target cell, tissue, or organ (*e.g.*, the liver). In certain embodiments, the oligonucleotide comprises a sense strand including (*e.g.*, at its 3' end) a stem-loop set forth as: S1-L-S2, in which S1 is complementary to S2, and in which L forms a ss loop between S1 and S2 of up to about 10 nucleotides in length (*e.g.*, 3, 4, 5, 6, 7, 8, 9, or 10 nucleotides in length). In some embodiments, L is 3 nucleotides in length (referred to herein as “triloop” or “triL”). In some embodiments, L is 4 nucleotides in length (referred to herein as “tetraloop” or

“tetraL”). In some embodiments, L is 5 nucleotides in length. In some embodiments, L is 6 nucleotides in length. In some embodiments, L is 7 nucleotides in length. In some embodiments, L is 8 nucleotides in length. In some embodiments, L is 9 nucleotides in length. In some embodiments, L is 10 nucleotides in length. In certain embodiments, L is 4 nucleotides in length. FIG. 1 depicts a non-limiting example of such an oligonucleotide. In some embodiments L of the stem-loop having the structure S1-L-S2 as described above is a tetraL (*e.g.*, within a nicked tetraL structure). In some embodiments, the tetraL comprises ribonucleotides, deoxyribonucleotides, modified nucleotides, delivery ligands and combinations thereof. In certain embodiments, the tetraL comprises the sequence 5'-GAAA-3'. In other certain embodiments, the stem-loop comprises the sequence 5'-GCAGCCGAAAGGCUGC-3' (SEQ ID NO: 784).

**[00137]** In some embodiments, the oligonucleotide comprises a targeting sequence or a region of complementary that is complementary to a contiguous sequence of nucleotides of any one of the odd numbers of SEQ ID NOs: 785-1168, especially any one of SEQ ID NOs: 915, 923, 997, 1049, 1097, 1109, and 1137, and the oligonucleotide comprises a sense strand comprising (*e.g.*, at its 3' end) a stem-loop set forth as: S1-L-S2, in which S1 is complementary to S2, and in which L forms a single-stranded loop between S1 and S2 of up to about 10 nucleotides in length (*e.g.*, 3, 4, 5, 6, 7, 8, 9, or 10 nucleotides in length). In some embodiments, the oligonucleotide comprises a targeting sequence or a region of complementary that is complementary to a contiguous sequence of nucleotides of any one of the odd numbers of SEQ ID NOs: 785-1168, especially any one of SEQ ID NOs: 915, 923, 997, 1049, 1097, 1109, and 1137, and the oligonucleotide comprises a sense strand comprising (*e.g.*, at its 3' end) a stem-loop set forth as: S1-L-S2, in which S1 is complementary to S2, and in which L forms a single-stranded loop between S1 and S2 of 4 nucleotides in length.

**[00138]** In some embodiments, L of a stem-loop having the structure S1-L-S2 as described herein is a triL. In some embodiments, the oligonucleotide comprises a targeting sequence or a region of complementary that is complementary to a contiguous sequence of nucleotides of any one of the odd numbers of SEQ ID NOs: 785-1168, especially any one of SEQ ID NOs: 915, 923, 997, 1049, 1097, 1109, and 1137 and a triL. In some embodiments, the triL comprises ribonucleotides, deoxyribonucleotides, modified nucleotides, ligands (*e.g.*, delivery ligands), and combinations thereof.

**[00139]** In some embodiments, L of a stem-loop having the structure S1-L-S2 as described above is a tetraL. In some embodiments, the oligonucleotide comprises a targeting sequence or

a region of complementary that is complementary to a contiguous sequence of nucleotides of any one of the odd numbers of SEQ ID NOs: 785-1168, especially any one of SEQ ID NOs: 915, 923, 997, 1049, 1097, 1109, and 1137 and a tetraL. In some embodiments, the tetraL comprises ribonucleotides, deoxyribonucleotides, modified nucleotides, ligands (*e.g.*, delivery ligands), and combinations thereof.

**[00140]** B. Antisense Strands: The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) include an antisense strand including a sequence as set forth in the antisense strands of Table 3 (unmodified) or Table 4 (modified). In some embodiments, the oligonucleotide includes an antisense strand having at least about 12 (*e.g.*, at least 12, at least 13, 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, or at least 23) contiguous nucleotides of a sequence as set forth in any one of SEQ ID NOs: 139, 147, 221, 273, 321, 333, and 361, or an antisense strand having a nucleotide sequence of any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334, and 362.

**[00141]** Further, the oligonucleotide can include an antisense strand of up to about 50 nucleotides in length (*e.g.*, up to 50, up to 40, up to 35, up to 30, up to 27, up to 25, up to 21, up to 19, up to 17 or up to 12 nucleotides in length). In some embodiments, an oligonucleotide comprises an antisense strand of at least about 12 nucleotides in length (*e.g.*, at least 12, at least 15, at least 19, at least 21, at least 22, at least 25, at least 27, at least 30, at least 35 or at least 38 nucleotides in length). In some embodiments, an oligonucleotide comprises an antisense strand in a range of about 12 to about 40 (*e.g.*, 12 to 40, 12 to 36, 12 to 32, 12 to 28, 15 to 40, 15 to 36, 15 to 32, 15 to 28, 17 to 22, 17 to 25, 19 to 27, 19 to 30, 20 to 40, 22 to 40, 25 to 40 or 32 to 40) nucleotides in length. In some embodiments, an oligonucleotide comprises antisense strand of 15 to 30 nucleotides in length. In some embodiments, an antisense strand of any one of the oligonucleotides disclosed herein is of 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 or 40 nucleotides in length. In some embodiments, an oligonucleotide comprises an antisense strand of 22 nucleotides in length.

**[00142]** In some embodiments, the oligonucleotide comprises an antisense strand comprising or consisting of a sequence as set forth in Table 3 (*e.g.*, any one of the even numbers of SEQ ID NOs: 9 to 392). In some embodiments, an oligonucleotide herein comprises an antisense strand comprising at least about 12 (*e.g.*, at least 12, at least 13, 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 or at least 23) contiguous

nucleotides of a sequence as set forth in Table 3 (*e.g.*, any one of the even numbers of SEQ ID NOs: 9 to 392). In some embodiments, an oligonucleotide disclosed herein for targeting *SCAP* comprises an antisense strand comprising or consisting of a sequence as set forth as set forth in Table 3 (*e.g.*, any one of the even numbers of SEQ ID NOs: 9 to 392), especially any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334, and 362. In some embodiments, an oligonucleotide herein comprises an antisense strand comprising at least about 12 (*e.g.*, at least 12, at least 13, 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 or at least 23) contiguous nucleotides of a sequence as set forth in Table 4 (*e.g.*, any one of the even numbers of SEQ ID NOs: 393 to 776). In some embodiments, an oligonucleotide disclosed herein for targeting *SCAP* comprises an antisense strand comprising or consisting of a sequence as set forth in any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718, and 746. In some embodiments, an oligonucleotide herein comprises an antisense strand comprising at least about 12 (*e.g.*, at least 12, at least 13, 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 or at least 23) contiguous nucleotides of a sequence as set forth in any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718, and 746.

**[00143]** C. Duplex Length: The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) include a duplex formed between the sense strand and the antisense strand, which is at least about 12 (*e.g.*, at least 12, at least 13, at least 14, at least 15, at least 16, at least 17, at least 18, at least 19, at least 20, or at least 21) nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is in the range of about 12 to about 30 nucleotides in length (*e.g.*, 12 to 30, 12 to 27, 12 to 22, 15 to 25, 18 to 30, 18 to 22, 18 to 25, 18 to 27, 18 to 30, 19 to 30, or 21 to 30 nucleotides in length). In some embodiments, the duplex formed between the sense strand and the antisense strand is 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, or 30 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 12 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 13 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 14 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 15 nucleotides in length. In some embodiments the duplex formed between the sense strand and the antisense strand is 16 nucleotides in length. In some embodiments, the duplex formed

between the sense strand and the antisense strand is 17 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 18 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 19 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 20 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 21 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 22 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 23 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 24 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 25 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 26 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 27 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 28 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 29 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand is 30 nucleotides in length. In some embodiments, the duplex formed between the sense strand and the antisense strand does not span the entire length of the sense strand and/or antisense strand. In some embodiments, the duplex formed between the sense strand and the antisense strand spans the entire length of either the sense strand or the antisense strand. In some embodiments, the duplex formed between the sense strand and the antisense strand spans the entire length of both the sense strand and the antisense strand.

**[00144]** D. Oligonucleotide Termini: The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) comprises a sense strand and an antisense strand, where a terminus of either or both strands comprise a blunt end. In some embodiments, the oligonucleotide comprises sense and antisense strands that are separate strands that form an asymmetric duplex region having an overhang at a 3' terminus of the antisense strand. In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, where a terminus of either or both strands comprise an overhang comprising one or more nucleotides. In some embodiments, the one or more nucleotides comprising the overhang are unpaired

nucleotides. In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, wherein the 3' terminus of the sense strand and the 5' terminus of the antisense strand comprise a blunt end. In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, wherein the 5' terminus of the sense strand and the 3' terminus of the antisense strand comprise a blunt end.

**[00145]** In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, wherein the 3' terminus of either or both strands comprise a 3' overhang comprising one or more nucleotides. In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, wherein the sense strand comprises a 3' overhang comprising one or more nucleotides. In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, wherein the antisense strand comprises a 3' overhang comprising one or more nucleotides. In some embodiments, the oligonucleotide comprises a sense strand and an antisense strand, wherein both the sense strand and the antisense strand comprises a 3' overhang comprising one or more nucleotides.

**[00146]** In some embodiments, the 3' overhang is about 1 to about 20 nucleotides in length (*e.g.*, about 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, or 20 nucleotides in length). In some embodiments, the 3' overhang is about 1 to 19, 1 to 18, 1 to 17, 1 to 16, 1 to 15, 1 to 14, 1 to 13, 1 to 12, 1 to 11, 1 to 10, 1 to 9, 1 to 8, 1 to 7, 1 to 6, 1 to 5, 1 to 4, 1 to 3, or 1 to 2 nucleotides in length. In some embodiments, the 3' overhang is 1 nucleotide in length. In some embodiments, the 3' overhang is 2 nucleotides in length. In some embodiments, the 3' overhang is 3 nucleotides in length. In some embodiments, the 3' overhang is 4 nucleotides in length. In some embodiments, the 3' overhang is 5 nucleotides in length. In some embodiments, the 3' overhang is 6 nucleotides in length. In some embodiments, the 3' overhang is 7 nucleotides in length. In some embodiments, the 3' overhang is 8 nucleotides in length. In some embodiments, the 3' overhang is 9 nucleotides in length. In some embodiments, the 3' overhang is 10 nucleotides in length. In some embodiments, the 3' overhang is 11 nucleotides in length. In some embodiments, the 3' overhang is 12 nucleotides in length. In some embodiments, the 3' overhang is 13 nucleotides in length. In some embodiments, the 3' overhang is 14 nucleotides in length. In some embodiments, the 3' overhang is 15 nucleotides in length. In some embodiments, the 3' overhang is 16 nucleotides in length. In some embodiments, the 3' overhang is 17 nucleotides in length. In some embodiments, the 3' overhang is 18 nucleotides in length. In some embodiments, the 3' overhang is 19 nucleotides in length. In some embodiments, the 3' overhang is 20 nucleotides in length.

**[00147]** In certain embodiments, the oligonucleotide comprises a sense strand and an antisense strand, where the antisense strand comprises a 3' overhang.

**[00148]** V. Oligonucleotide Modifications: The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) include at least one modification. The oligonucleotide may be modified in various ways to improve or control specificity, stability, delivery, bioavailability, resistance from nuclease degradation, immunogenicity, base-pairing properties, RNA distribution and cellular uptake and other features relevant to therapeutic or research use.

**[00149]** In some embodiments, the modification is a modified sugar. In some embodiments, the modification is a 5'-terminal phosphate group. In some embodiments, the modification is a modified internucleotide linkage. In some embodiments, the modification is a modified base. In some embodiments, the oligonucleotide comprises any one of the modifications described herein or any combination thereof. For example, in some embodiments, the oligonucleotide comprises at least one modified sugar, a 5'-terminal phosphate group, at least one modified internucleotide linkage, and at least one modified base. In some embodiments, the sense and antisense strands of the oligonucleotide comprise nucleotide sequences selected from Table 3, optionally the group consisting of:

- (a) SEQ ID NOs: 139 and 140,
- (b) SEQ ID NOs: 147 and 148,
- (c) SEQ ID NOs: 221 and 222,
- (d) SEQ ID NOs: 273 and 274,
- (e) SEQ ID NOs: 321 and 322,
- (f) SEQ ID NOs: 333 and 334, and
- (g) SEQ ID NOs: 361 and 362,

wherein the oligonucleotide comprises at least one modified sugar, a 5'-terminal phosphate group, at least one modified internucleotide linkage, and at least one modified base.

**[00150]** In other embodiments, the oligonucleotide comprises a sense strand and an antisense strand having a modification pattern according to:

Sense Strand: 5'-mX-S-mX-mX-mX-mX-mX-mX-fX-fX-fX-fX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-mX-[ademX-GalNAc]-[ademX-GalNAc]-[ademX-GalNAc]-mX-mX-mX-mX-mX-mX-3' hybridized to:

**[00151]** Antisense Strand: 5'-[MePhosphonate-4O-mX]-S-fX-S-fX-S-fX-fX-mX-fX-mX-mX-fX-mX-mX-mX-fX-mX-mX-mX-mX-mX-S-mX-S-mX-3', wherein mX = 2'-OMe-modified nucleotide, fX = 2'-F-modified nucleotide, -S- = phosphorothioate linkage, - = phosphodiester linkage, [MePhosphonate-4O-mX] = 4'-O-monomethylphosphonate-2'-O-methyl-modified nucleotide, and ademX-GalNAc = GalNAc attached to a nucleotide, and wherein the sense strand and the antisense strand comprise nucleotide sequences selected from Table 3, optionally from the group consisting of:

- (a) SEQ ID NOs:139 and 140,
- (b) SEQ ID NOs:147 and 148,
- (c) SEQ ID NOs:221 and 222,
- (d) SEQ ID NOs:273 and 274,
- (e) SEQ ID NOs:321 and 322,
- (f) SEQ ID NOs:333 and 334, and
- (g) SEQ ID NOs:361 and 362.

**[00152]** A. Sugar Modifications: A modified sugar (also referred to herein as a sugar analog) includes a modified deoxyribose or ribose moiety in which, for example, one or more modifications occur at the 2', 3', 4', and/or 5' carbon position of the sugar. A modified sugar also includes non-natural, alternative, carbon structures such as those present in locked nucleic acids ("LNA"; see, e.g., Koshkin *et al.* (1998) TETRAHEDRON 54:3607-30), unlocked nucleic acids ("UNA"; see, e.g., Snead *et al.* (2013) MOL. THER-NUC. ACIDS 2:e103) and bridged nucleic acids ("BNA"; see, e.g., Imanishi & Obika (2002) CHEM. COMMUN. 16:1653-59).

**[00153]** In some embodiments, the nucleotide modification in the sugar is a 2'-modification such as, for example, 2'-O-propargyl, 2'-O-propylamin, 2'-amino, 2'-ethyl, 2'-F, 2'-aminoethyl (EA), 2'-OMe, 2'-MOE, 2'-O-[2-(methylamino)-2-oxoethyl] (2'-O-NMA), or 2'-FANA. In certain embodiments, the modification is 2'-F, 2'-OMe, or 2'-MOE. In other embodiments, the modification in the sugar is a modification of the sugar ring, which includes modification of one or more carbons of the sugar ring. For example, the modification in the sugar is a 2'-oxygen of the sugar linked to a 1'-carbon or 4'-carbon of the sugar, or a 2'-oxygen linked to the 1'-carbon or 4'-carbon *via* an ethylene or methylene bridge. In other embodiments, the modification is an acyclic sugar that lacks a 2'-carbon to 3'-carbon bond. In other embodiments, the modification is a thiol group such as, for example, in the 4' position of the sugar.

**[00154]** The oligonucleotides herein include at least 1 modified nucleotide (*e.g.*, at least 1, at least 5, at least 10, at least 15, at least 20, at least 25, at least 30, at least 35, at least 40, at least 45, at least 50, at least 55, at least 60, or more). In some embodiments, the sense strand comprises at least 1 modified nucleotide (*e.g.*, at least 1, at least 5, at least 10, at least 15, at least 20, at least 25, at least 30, at least 35, or more). In some embodiments, the antisense strand comprises at least 1 modified nucleotide (*e.g.*, at least 1, at least 5, at least 10, at least 15, at least 20, or more).

**[00155]** In certain embodiments, all nucleotides of the sense strand except the tetraL are modified. Likewise, all nucleotides of the antisense strand are modified. In some embodiments, all the nucleotides of the oligonucleotide (*i.e.*, paired nucleotides of the sense strand and the antisense strand) are modified. As above, and in some embodiments, the modified nucleotide is a 2'-modification (*e.g.*, a 2'-F, 2'-OMe, 2'-MOE, and/or 2'-FANA. In certain embodiments, the modified nucleotide is a 2'-modification such as, for example, a 2'-F or a 2'-OMe.

**[00156]** In some embodiments, the oligonucleotide comprises a sense strand with about 10-15%, 10%, 11%, 12%, 13%, 14%, or 15% of the nucleotides of the sense strand comprising a 2'-F modification. In some embodiments, the oligonucleotide comprises a sense strand with about 18-23% (*e.g.*, 18%, 19%, 20%, 21%, 22%, or 23%) of the nucleotides of the sense strand comprising a 2'-F modification. In some embodiments, the oligonucleotide comprises a sense strand with about 38-43% (*e.g.*, 38%, 39%, 40%, 41%, 42%, or 43%) of the nucleotides of the sense strand comprising a 2'-F modification. In some embodiments, about 11% of the nucleotides of the sense strand comprise a 2'-F modification. In some embodiments, about 22% of the nucleotides of the sense strand comprise a 2'-F modification. In some embodiments, about 40% of the nucleotides of the sense strand comprise a 2'-F modification. In some embodiments, the oligonucleotide comprises an antisense strand with about 25% to about 35% (*e.g.*, 25%, 26%, 27%, 28%, 29%, 30%, 31%, 32%, 33%, 34%, or 35%) of the nucleotides of the antisense strand comprising a 2'-F modification. In some embodiments, about 32% of the nucleotides of the antisense strand comprise a 2'-F modification. In some embodiments, the oligonucleotide has about 15% to about 25% (*e.g.*, 15%, 16%, 17%, 18%, 19%, 20%, 21%, 22%, 23%, 24%, or 25%) of its nucleotides comprising a 2'-F modification. In some embodiments, the oligonucleotide has about 35-45% (*e.g.*, 35%, 36%, 37%, 38%, 39%, 40%, 41%, 42%, 43%, 44% or 45%) of its nucleotides comprising a 2'-F modification. In some embodiments, about 19% of the nucleotides in the oligonucleotide comprise a 2'-F modification. In some embodiments, about 29% of the nucleotides in the oligonucleotide

comprise a 2'-F modification. In some embodiments, about 40% of the nucleotides in the oligonucleotide comprise a 2'-F modification.

**[00157]** Moreover, the oligonucleotides herein can have different modification patterns. In some embodiments, the modified oligonucleotide comprise a sense strand sequence having a modification pattern as set forth in Table 4 (as well as FIG. 1) and an antisense strand having a modification pattern as set forth in Table 4. In some embodiments, one or more of positions 8, 9, 10, or 11 of the sense strand are modified with a 2'-F. In other embodiments, the sugar moiety at each nucleotide at positions 1 to 7, 12 to 27 and 31 to 36 in the sense strand is modified with a 2'-OMe. In certain embodiments, positions 8 to 11 of the sense strand are modified with a 2'-F and positions 1 to 7, 12 to 27 and 31 to 36 are modified with a 2'-OMe.

**[00158]** In certain additional embodiments, a sense strand comprising a 2'-F modified nucleotide at positions 8-11, a 2'-OMe modified nucleotide at positions 1 to 7, 12 to 27 and 31 to 36, a GalNAc-conjugated nucleotide at position 28, 29 and 30, and a phosphorothioate linkage between positions 1 and 2.

**[00159]** In some embodiments, the antisense strand comprises one or more nucleotides at positions 2-5, 7, 10 and 14 modified with 2'-F, and one or more nucleotides at positions 1, 6, 8 to 9, 11 to 13 and 15 to 22 modified with a 2'-OMe. Certain embodiments disclose an oligonucleotide with an antisense strand comprising a 2'-F-modified nucleotide at positions 2 to 5, 7, 10 and 14, and a 2'-OMe-modified nucleotide at positions 1, 6, 8 to 9, 11 to 13 and 15 to 22.

**[00160]** In certain embodiments, the antisense strand comprises a 2'-F modified nucleotide at positions 2 to 5, 7, 10 and 14, a 2'-OMe at positions 1, 6, 8 to 9, 11 to 13 and 15 to 22, a phosphorothioate linkage between positions 1 and 2, positions 2 and 3, positions 3 and 4, positions 20 and 21, and positions 21 and 22.

**[00161]** B. 5'-Terminal Phosphates: 5'-terminal phosphate groups can be used to enhance the interaction of the oligonucleotides herein with Ago2. However, oligonucleotides having a 5'-phosphate group may be susceptible to degradation *via* phosphatases or other enzymes, which can limit their bioavailability *in vivo*. In some embodiments, the oligonucleotides herein (*e.g.*, a ds oligonucleotide) comprise analogs of 5' phosphates that are resistant to such degradation. Examples of such phosphate analogs include, but are not limited to, oxymethyl phosphonate, vinyl phosphonate, malonyl phosphonate, or a combination thereof. In certain embodiments

the 3' end of a strand of the oligonucleotides is attached to a chemical moiety that mimics the electrostatic and steric properties of a natural 5'-phosphate group ("phosphate mimic").

**[00162]** Alternatively, or additionally, the oligonucleotides herein have a phosphate analog at a 4'-carbon position of the sugar (referred to as a "4'-phosphate analog"). *See, e.g.*, Intl. Patent Application Publication No. WO 2018/045317. In some embodiments, the oligonucleotides herein include a 4'-phosphate analog at a 5'-terminal nucleotide. In some embodiments, the phosphate analog is an oxymethyl phosphonate, in which the oxygen atom of the oxymethyl group is bound to the sugar moiety (*e.g.*, at its 4'-carbon) or analog thereof. In other embodiments, the 4'-phosphate analog is a thiomethylphosphonate or an aminomethylphosphonate, in which the sulfur atom of the thiomethyl group or the nitrogen atom of the amino methyl group is bound to the 4'-carbon of the sugar moiety or analog thereof. In certain embodiments, the 4'-phosphate analog is an oxymethylphosphonate, which is represented by the formula  $-O-CH_2-PO(OH)_2$  or  $-O-CH_2-PO(OR)_2$ , in which R is independently selected from H,  $CH_3$ , an alkyl group,  $CH_2CH_2CN$ ,  $CH_2OCOC(CH_3)_3$ ,  $CH_2OCH_2CH_2Si(CH_3)_3$ , or a protecting group. In certain embodiments, the alkyl group is  $CH_2CH_3$ . In certain other embodiments, R is independently selected from H,  $CH_3$ , or  $CH_2CH_3$ .

**[00163]** C. Modified Internucleotide Linkages: In addition to the above modifications, the oligonucleotides herein (*e.g.*, a ds oligonucleotide) comprise a modified internucleotide linkage. In some embodiments, phosphate modifications or substitutions result in oligonucleotides that comprise at least about 1 (*e.g.*, at least 1, at least 2, at least 3, or at least 5) modified internucleotide linkages. In some embodiments, the oligonucleotides herein (*e.g.*, a ds oligonucleotide) comprise about 1 to about 10 (*e.g.*, 1 to 10, 2 to 8, 4 to 6, 3 to 10, 5 to 10, 1 to 5, 1 to 3, or 1 to 2) modified internucleotide linkages. In other embodiments, the oligonucleotides comprise 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 modified internucleotide linkages.

**[00164]** Examples of modified internucleotide linkages include, but are not limited, to, a phosphorodithioate linkage, a phosphorothioate linkage, a phosphotriester linkage, a thionoalkylphosphonate linkage, a thionoalkylphosphotriester linkage, a phosphoramidite linkage, a phosphonate linkage, or a boranophosphate linkage. In some embodiments, at least one modified internucleotide linkage of any one of the oligonucleotides as disclosed herein is a phosphorothioate linkage.

**[00165]** In some embodiments, the oligonucleotides herein include a phosphorothioate linkage between one or more of positions 1 and 2 of the sense strand, positions 1 and 2 of the antisense

strand, positions 2 and 3 of the antisense strand, positions 3 and 4 of the antisense strand, positions 20 and 21 of the antisense strand, and positions 21 and 22 of the antisense strand. In other embodiments, the oligonucleotides comprise a phosphorothioate linkage between each of positions 1 and 2 of the sense strand, positions 1 and 2 of the antisense strand, positions 2 and 3 of the antisense strand, positions 3 and 4 of the antisense strand positions 20 and 21 of the antisense strand, and positions 21 and 22 of the antisense strand.

**[00166]** In certain embodiments, an oligonucleotide herein includes:

a sense strand having a 2'-F modified nucleotide at positions 8 to 11, a 2'-OMe modified nucleotide at positions 1 to 7, 12 to 27 and 31 to 36, a GalNAc-conjugated nucleotide at position 28, 29 and 30, and a phosphorothioate linkage between positions 1 and 2;

an antisense strand having a 2'-F modified nucleotide at positions 2 to 5, 7, 10 and 14, a 2'-OMe at positions 1, 6, 8 to 9, 11 to 13 and 15 to 22, a phosphorothioate linkage between positions 1 and 2, positions 2 and 3, positions 3 and 4, positions 20 and 21, and positions 21 and 22, and a 5'-terminal nucleotide at position 1 comprising a 4'-phosphate analog, optionally wherein the 5'-terminal nucleotide comprises 4-O-monomethylphosphonate-2'-O-methyl uridine [MePhosphonate-4O-mU]; where positions 1 to 20 of the antisense strand form a duplex region with positions 1 to 20 of the sense strand, where positions 21 to 36 of the sense strand form a stem-loop, where positions 27 to 30 form the loop of the stem-loop, optionally where positions 27 to 30 comprise a tetraL, where positions 21 and 22 of the antisense strand comprise an overhang, and where the sense strand and antisense strands are selected from Table 3, optionally from the group consisting of:

- (a) SEQ ID NOs: 139 and 140,
- (b) SEQ ID NOs: 147 and 148,
- (c) SEQ ID NOs: 221 and 222,
- (d) SEQ ID NOs: 273 and 274,
- (e) SEQ ID NOs: 321 and 322,
- (f) SEQ ID NOs: 333 and 334, and
- (g) SEQ ID NOs: 361 and 362.

**[00167]** In certain other embodiments, the modified sense strand and antisense strands are selected from Table 4, optionally from the group consisting of:

- (a') SEQ ID NOs: 523 and 524,
- (b') SEQ ID NOs: 531 and 532,
- (c') SEQ ID NOs: 605 and 606,

- (d') SEQ ID NOs: 657 and 658,
- (e') SEQ ID NOs: 705 and 706,
- (f') SEQ ID NOs: 717 and 718, and
- (g') SEQ ID NOs: 745 and 746.

**[00168]** D. Base Modifications: In addition to the above modifications, the oligonucleotides herein (*e.g.*, a ds oligonucleotide) also comprise one or more modified nucleobases. In some embodiments, modified nucleobases (also referred to herein as base analogs) are linked at the 1' position of a nucleotide sugar moiety. In some embodiments, the modified nucleobase is a nitrogenous base. In other embodiments, the modified nucleobase does not contain nitrogen atom. *See, e.g.*, US Patent Application Publication No. 2008/0274462. In certain other embodiments, the modified nucleotide is a universal base. However, in certain embodiments, the modified nucleotide does not contain a nucleobase (abasic).

**[00169]** With regard to universal bases, they comprise a heterocyclic moiety located at the 1' position of a nucleotide sugar moiety in a modified nucleotide, or the equivalent position in a nucleotide sugar moiety substitution, that, when present in a duplex, is positioned opposite more than one type of base without substantially altering structure of the duplex. Moreover, and compared to a reference ss nucleic acid (*e.g.*, oligonucleotide) that is fully complementary to a target nucleic acid, a ss nucleic acid having a universal base forms a duplex with the target nucleic acid that has a lower  $T_m$  than a duplex formed with the complementary nucleic acid. However, when compared to a reference ss nucleic acid in which the universal base has been replaced with a base to generate a single mismatch, the ss nucleic acid having the universal base forms a duplex with the target nucleic acid that has a higher  $T_m$  than a duplex formed with the nucleic acid having the mismatched base.

**[00170]** Exemplary universal-binding nucleotides include, but are not limited to, inosine, 1- $\beta$ -D-ribofuranosyl-5-nitroindole and/or 1- $\beta$ -D-ribofuranosyl-3-nitropyrrole (*see, e.g.*, US Patent Application Publication No. 2007/0254362; Van Aerschot *et al.* (1995) NUCLEIC ACIDS RES. 23:4363-70; Loakes *et al.* (1995) NUCLEIC ACIDS RES. 23:2361-66; and Loakes & Brown (1994) NUCLEIC ACIDS RES. 22:4039-403).

**[00171]** E. Reversible Modifications: While certain modifications can be made to protect the oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) from the *in vivo* environment before reaching target cells, they also can be made to reduce the potency or

activity of the oligonucleotides once they reach the cytosol of the target cell. Reversible modifications therefore can be made such that the oligonucleotide retains desirable properties outside of the cell, which are then removed upon entering the cytosolic environment of the cell. Reversible modification can be removed, for example, by the action of an intracellular enzyme or by the chemical conditions inside of a cell (*e.g.*, through reduction by intracellular glutathione).

**[00172]** In some embodiments, a reversibly modified nucleotide comprises a glutathione-sensitive moiety. Typically, oligonucleotides are chemically modified with cyclic disulfide moieties to mask the negative charge created by the internucleotide diphosphate linkages and to improve cellular uptake and nuclease resistance. *See*, US Patent Application Publication No. 2011/0294869, Intl. Patent Application Publication Nos. WO 2014/088920 and WO 2015/188197, and Meade *et al.* (2014) NAT. BIOTECHNOL. 32:1256-63. This reversible modification of the internucleotide diphosphate linkages is designed to be cleaved intracellularly by the reducing environment of the cytosol (*e.g.*, glutathione). Earlier examples include neutralizing phosphotriester modifications that are reported to be cleavable inside cells (*see, e.g.*, Dellinger *et al.* (2003) J. AM. CHEM. SOC. 125:940-50).

**[00173]** Some reversible modifications protect the oligonucleotide during *in vivo* administration (*e.g.*, transit through the blood and/or lysosomal/endosomal compartments of a cell) where the oligonucleotide will be exposed to nucleases and other harsh environmental conditions (*e.g.*, pH). When released into the cytosol of a cell where the levels of glutathione are higher compared to extracellular space, the modification is reversed, and the result is cleaved oligonucleotide. Using reversible, glutathione-sensitive moieties, it is possible to introduce sterically larger chemical groups into the oligonucleotide when compared to the options available using irreversible chemical modifications. This is because these larger chemical groups will be removed in the cytosol and, therefore, should not interfere with the biological activity of the oligonucleotide inside the cytosol of a cell. As a result, these larger chemical groups can be engineered to confer various advantages to the oligonucleotide, such as nuclease resistance, lipophilicity, charge, thermal stability, specificity, and reduced immunogenicity. In some embodiments, the structure of the glutathione-sensitive moiety can be engineered to modify the kinetics of its release.

**[00174]** In some embodiments, the glutathione-sensitive moiety is attached to the sugar of a nucleotide. In certain embodiments, the glutathione-sensitive moiety is attached to the 2'-carbon of the sugar of a modified nucleotide. Additionally, or alternatively, the glutathione-

sensitive moiety is attached to the 5'-carbon of a sugar, particularly when the modified nucleotide is the 5'-terminal nucleotide of the oligonucleotide. Additionally, or alternatively, the glutathione-sensitive moiety is attached to the 3'-carbon of sugar, particularly when the modified nucleotide is the 3'-terminal nucleotide of the oligonucleotide. In some embodiments, the glutathione-sensitive moiety includes a sulfonyl group (*see, e.g.*, Intl. Patent Application Publication No. WO 2018/039364).

**[00175]** VI. Targeting Ligands: It is desirable to target the oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) to one or more cells or one or more organs. Such a strategy can help to avoid undesirable effects in other organs or to avoid undue loss of the oligonucleotide to cells, tissue, or organs that would not benefit therefrom. Accordingly, the oligonucleotide can be modified to facilitate targeting and/or delivering to a tissue, cell, or organ (*e.g.*, to facilitate delivering the oligonucleotides to the liver). In some embodiments, the oligonucleotide is modified to facilitate its delivery to the hepatocytes of the liver. In some embodiments, the oligonucleotide comprises at least one nucleotide (*e.g.*, 1, 2, 3, 4, 5, 6, or more nucleotides) conjugated to one or more targeting ligand(s).

**[00176]** Exemplary targeting ligands include, but are not limited to, a carbohydrate, amino sugar, cholesterol, peptide, polypeptide, protein, or part of a protein (*e.g.*, an antibody or antibody fragment), or lipid. In some embodiments, the targeting ligand is an aptamer. For example, the targeting ligand is an Arg-Gly-Asp (RGD) peptide for targeting tumor vasculature or glioma cells, Cys-Arg-Glu-Lys-Ala (CREKA) peptide for targeting tumor vasculature or stoma, transferrin, lactoferrin, or an aptamer for targeting transferrin receptors expressed on central nervous system (CNS) vasculature, or an anti-epidermal growth factor receptor (EGFR) antibody for targeting EGFR on glioma cells. In certain embodiments, the targeting ligand is one or more GalNAc moieties.

**[00177]** In some embodiments, 1 or more (*e.g.*, 1, 2, 3, 4, 5, or 6) nucleotides of the oligonucleotides each can be conjugated to a separate targeting ligand. In some embodiments, 2 to 4 nucleotides of the oligonucleotide each are conjugated to a separate targeting ligand. In other embodiments, targeting ligands can be conjugated to 2 to 4 nucleotides at either ends of the sense strand or antisense strand (*e.g.*, targeting ligands are conjugated to a 2 to 4 nucleotide overhang or extension on the 5' or 3' end of the sense strand or antisense strand) such that the targeting ligands resemble bristles of a toothbrush, and the oligonucleotide resembles a toothbrush. For example, the oligonucleotide comprises a stem-loop at either the 5' or 3' end of

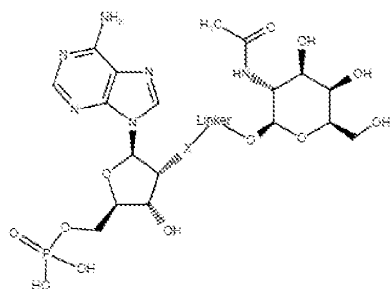
the sense strand and 1, 2, 3, or 4 nucleotides of the L of the stem-loop may be individually conjugated to a targeting ligand. In some embodiments, the oligonucleotide comprises a stem-loop at the 3' end of the sense strand, where the L of the stem-loop includes a triL or a tetraL, and where the 3 or 4 nucleotides of the triL or tetraL, respectfully, are individually conjugated to a targeting ligand.

**[00178]** GalNAc is a high affinity ligand for the ASGPR, which is primarily expressed on the sinusoidal surface of hepatocyte cells and has a major role in binding, internalizing, and subsequent clearing circulating glycoproteins that contain terminal galactose or GalNAc residues (asialoglycoproteins). Conjugation (either indirect or direct) of GalNAc moieties to the oligonucleotides herein are used to target them to the ASGPR expressed on cells. In some embodiments, the oligonucleotides are conjugated to at least one or more GalNAc moieties, where the GalNAc moieties target the oligonucleotides to an ASGPR expressed on human liver cells (*e.g.*, human hepatocytes).

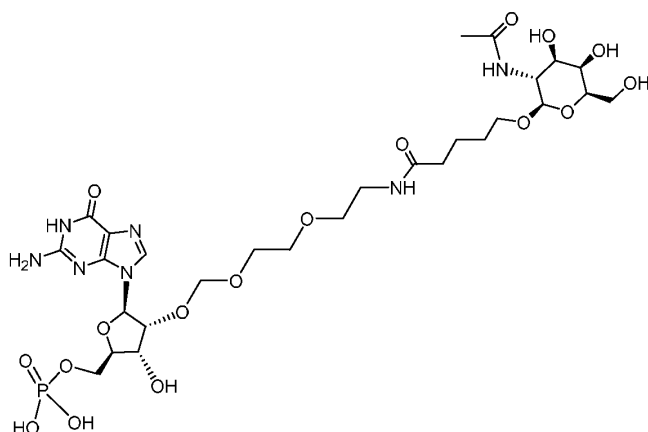
**[00179]** The oligonucleotides are conjugated directly or indirectly to a monovalent GalNAc. In some embodiments, the oligonucleotides are conjugated directly or indirectly to more than 1 monovalent GalNAc (*i.e.*, is conjugated to 2, 3, or 4 monovalent GalNAc moieties, and is typically conjugated to 3 or 4 monovalent GalNAc moieties). In some embodiments, the oligonucleotides are conjugated to one or more bivalent GalNAc, trivalent GalNAc, or tetravalent GalNAc moieties.

**[00180]** In some embodiments, 1 or more (*e.g.*, 1, 2, 3, 4, 5, or 6) nucleotides of the oligonucleotides each can be conjugated to a GalNAc moiety. In some embodiments, 2 to 4 nucleotides of a L each are conjugated to a separate GalNAc. In other embodiments, 1 to 3 nucleotides of a triL each are conjugated to a separate GalNAc. In some embodiments, the targeting ligands are conjugated to 2 to 4 nucleotides at either end of the sense or antisense strand (*e.g.*, ligands are conjugated to a 2 to 4 nucleotide overhang or extension on the 5' or 3' end of the sense or antisense strand) such that the GalNAc moieties resemble bristles of a toothbrush, and the oligonucleotide resembles a toothbrush. In some embodiments, the GalNAc moieties are conjugated to a nucleotide of the sense strand. For example, 4 GalNAc moieties are conjugated to nucleotides in the L of the sense strand, where each GalNAc moiety is conjugated to 1 nucleotide. In certain embodiments, 3 GalNAc moieties are conjugated to nucleotides in the L of the sense strand, where each GalNAc moiety is conjugated to 1 nucleotide.

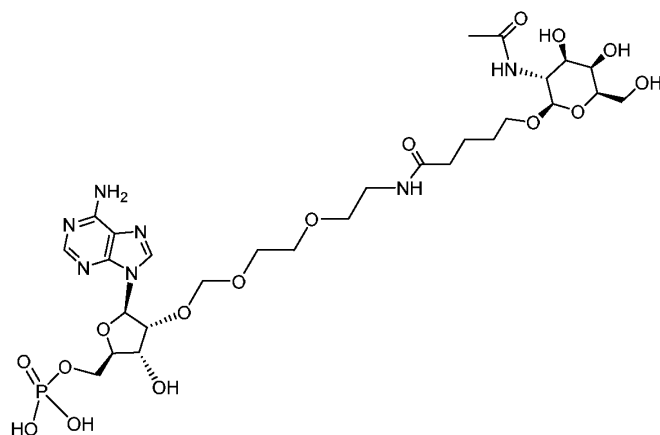
**[00181]** In some embodiments, the oligonucleotides herein comprise a GalNAc attached to any one or more nucleotides of a triL or tetraL via any linker described herein, as depicted below (X = heteroatom):



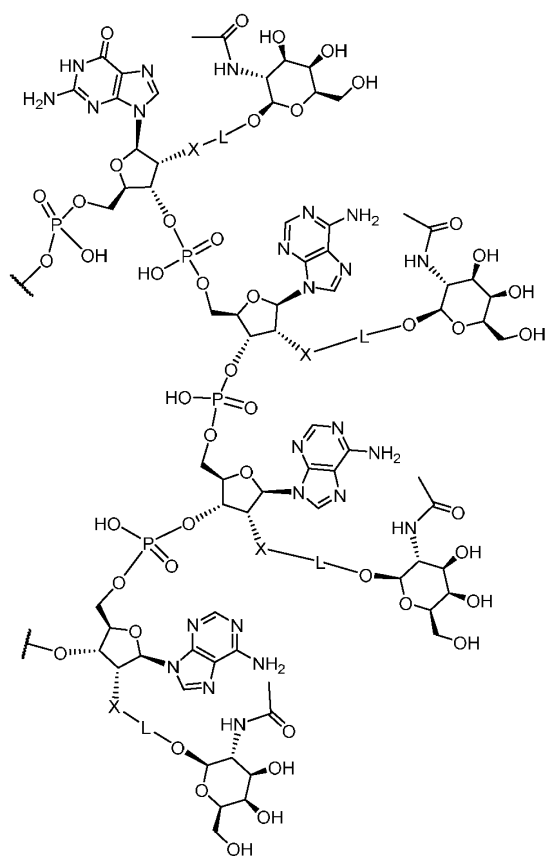
**[00182]** In certain embodiments, the oligonucleotides herein comprise a monovalent GalNAc attached to a guanine nucleotide referred to as 2'-aminodiethoxymethanol-Guanine-GalNAc or [ademG-GalNAc], as depicted below:



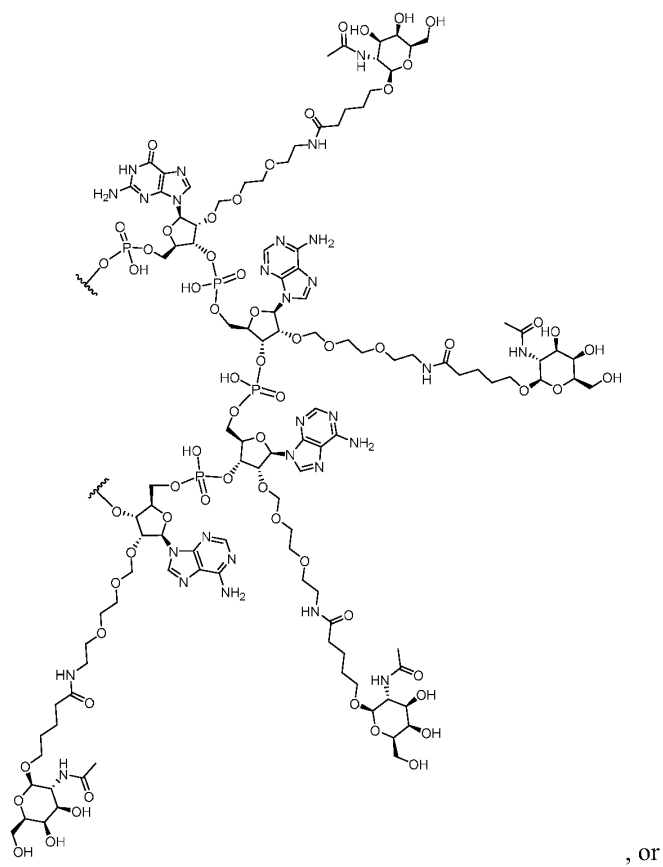
**[00183]** In certain embodiments, the oligonucleotides herein comprise a monovalent GalNAc attached to an adenine nucleotide, referred to as 2'-aminodiethoxymethanol-Adenine-GalNAc or [ademA-GalNAc], as depicted below:

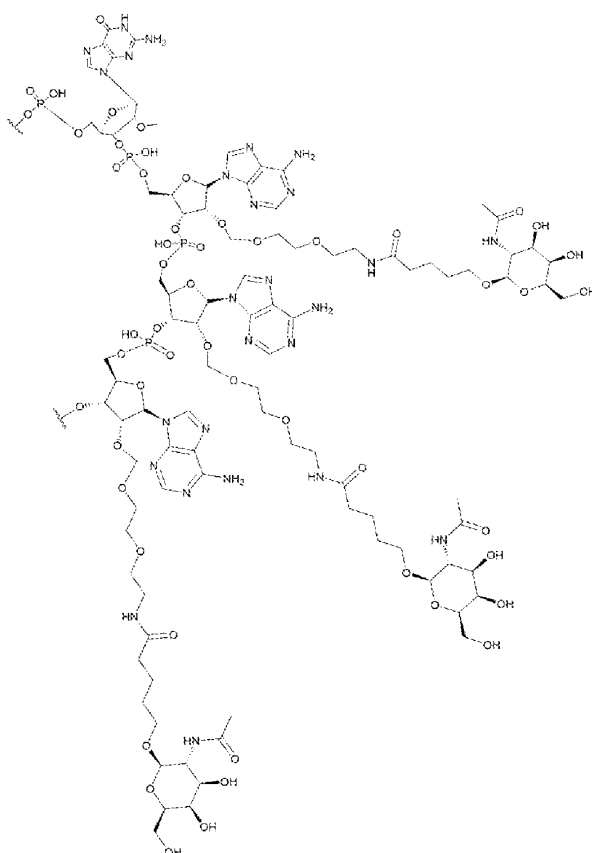


[00184] An example of such conjugation is shown below for a tetraL having from 5' to 3', the nucleotide sequence GAAA (L = linker, X = heteroatom), where stem attachment points are shown. Such a tetraL is present, for example, at positions 27-30 of the sense strand listed in Tables 3 and 4, and as shown in FIG. 1. In the chemical formula, ~~X~~ is used to describe an attachment point to the oligonucleotide strand:



[00185] Appropriate methods or chemistry (*e.g.*, click chemistry) are used to link a targeting ligand to a nucleotide. One way of conjugating the targeting ligand to a nucleotide is by using a click linker. In some embodiments, an acetal-based linker is used to conjugate the targeting ligand to a nucleotide of any one of the oligonucleotides herein. Acetal-based linkers are disclosed, for example, in Intl. Patent Application Publication No. WO 2016/100401. In some embodiments, the linker is a labile linker. However, in other embodiments, the linker is stable. An example is shown below for a teraL having from 5' to 3', the nucleotides GAAA, in which GalNAc moieties are attached to nucleotides of the loop using an acetal linker. Such a loop is present, for example, at positions 27-30 of the any one of the sense strands listed in Tables 3 or 4. In the chemical formula,  is an attachment point to the oligonucleotide strand:





[00186] In some embodiments, a duplex extension (*e.g.*, of up to 3, 4, 5, or 6 bp in length) is provided between the targeting ligand (*e.g.*, a GalNAc moiety), and the oligonucleotide. In other embodiments, the oligonucleotide does not have a GalNAc conjugated thereto.

#### [00187] Formulations and Pharmaceutical Compositions

[00188] The oligonucleotides herein (*e.g.*, a ds oligonucleotide), or a pharmaceutically acceptable salt thereof (*e.g.*, trifluoroacetate salts, acetate salts or hydrochloride salts), are incorporated into a formulation or pharmaceutical composition. Various formulations have been developed to facilitate oligonucleotide use. For example, oligonucleotides can be delivered to an individual or a cellular environment using a formulation that minimizes degradation, facilitates delivery and/or uptake, or provides another beneficial property to the oligonucleotides in the formulation. In some embodiments, the oligonucleotides are formulated

in buffer solutions such as phosphate buffered saline solutions, liposomes, micellar structures, and capsids.

**[00189]** To improve *in vivo* compatibility and effectiveness, the oligonucleotides may be reacted with any of a number of inorganic and organic acids/bases to form pharmaceutically acceptable acid/base addition salts. Pharmaceutically acceptable salts and common methodologies for preparing them are well known in the art (*see, e.g.*, Stahl *et al.*, “Handbook of Pharmaceutical Salts: Properties, Selection and Use,” 2<sup>nd</sup> Revised Edition (Wiley-VCH, 2011)). Pharmaceutically acceptable salts for use herein include sodium, trifluoroacetate, hydrochloride and acetate salts.

**[00190]** Formulations of oligonucleotides herein with cationic lipids are used to facilitate transfection of the oligonucleotides into cells. For example, cationic lipids, such as lipofectin, cationic glycerol derivatives, and polycationic molecules (*e.g.*, polylysine) can be used. Suitable lipids include Oligofectamine (ThermoFisher Technologies), Lipofectamine (Life Technologies), NC388 (Ribozyme Pharmaceuticals, Inc.), or FuGene 6 (Roche), all of which are used according to the manufacturer’s instructions.

**[00191]** Accordingly, in some embodiments, the formulations herein comprise a liposome, a lipid, a lipid complex, a microsphere, a microparticle, a nanosphere, or a nanoparticle (such as a lipid nanoparticle) or may be otherwise formulated for administration to the cells, tissues, organs, or body of an individual in need thereof (*see, e.g.*, Remington, “The Science and Practice of Pharmacy” (L.V. Allen Jr., ed., 22<sup>nd</sup> Edition, Pharmaceutical Press, 2013).

**[00192]** In some embodiments, the formulations herein further comprise an excipient, which can confer to a composition improved stability, improved absorption, improved solubility and/or therapeutic enhancement of the active ingredient. In some embodiments, the excipient is a buffering agent (*e.g.*, sodium citrate, sodium phosphate, a tris base, or sodium hydroxide) or a vehicle (*e.g.*, a buffered solution, petrolatum, dimethyl sulfoxide, or mineral oil). In some embodiments, the oligonucleotides herein are lyophilized for extending shelf-life and then made into a solution before use (*e.g.*, administration to an individual). Accordingly, the excipient in a pharmaceutical composition including one or more of the oligonucleotides is a lyoprotectant (*e.g.*, mannitol, lactose, polyethylene glycol, or polyvinylpyrrolidone) or a collapse temperature modifier (*e.g.*, dextran, Ficoll™, or gelatin).

**[00193]** Pharmaceutical compositions are formulated to be compatible with its intended route of administration. Routes of administration include, but are not limited to, parenteral (*e.g.*,

intravenous, intramuscular, intraperitoneal, intradermal, and subcutaneous), oral (*e.g.*, inhalation), transdermal (*e.g.*, topical), transmucosal, and rectal administration.

[00194] Pharmaceutical compositions suitable for injectable use comprise sterile aqueous solutions (where water soluble) or dispersions and sterile powders for the extemporaneous preparation of sterile injectable solutions or dispersion. For intravenous administration, suitable carriers include, but are not limited to, physiological saline, bacteriostatic water, Cremophor EL™ (BASF) or phosphate buffered saline (PBS). The carrier is a solvent or dispersion medium containing, for example, water, ethanol, polyol (*e.g.*, glycerol, propylene glycol, liquid polyethylene glycol, and the like), as well as suitable mixtures thereof. In many embodiments, it will be preferable to comprise in the compositions with isotonic agents such as, for example, sugars, polyalcohols such as mannitol, sorbitol and/or sodium chloride. Sterile injectable solutions are prepared by incorporating the oligonucleotides herein in a required amount in a selected solvent with one or a combination of ingredients enumerated above, as required, followed by filtered sterilization.

[00195] Moreover, the pharmaceutical compositions comprise at least about 0.1% of a therapeutic agent (*e.g.*, one or more of the oligonucleotides herein) or more, although the percentage of the therapeutic agent may be between about 1% to about 80% or more of the weight or volume of the total composition. Factors such as solubility, bioavailability, biological half-life, route of administration, product shelf life, as well as other pharmacological considerations will be contemplated by one of skill in the art of preparing such pharmaceutical formulations, and as such, a variety of dosages and treatment regimens may be desirable.

[00196] Even though several examples are directed toward liver-targeted delivery of at least one of the oligonucleotides herein, targeting of other tissues also is contemplated.

[00197] Kits

[00198] The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) can be incorporated into a kit comprising one or more of the oligonucleotides herein, and instructions for use. In some embodiments, the kit comprises one or more of the oligonucleotides, and a package insert containing instructions for use of the kit and/or any component thereof. In other embodiments, the kit comprises a suitable container, one or more of the oligonucleotides, one or more controls, and various buffers, reagents, enzymes, and other standard ingredients as are known in the art.

[00199] In some embodiments, the container can be at least one vial, well, test tube, flask, bottle, syringe, or other container means, into which the one or more oligonucleotides are placed, and in some embodiments, suitably aliquoted. In other embodiments, where an additional component is provided, the kit contains additional containers into which this component is placed. The kit also comprises a means for containing the one or more oligonucleotides and any other reagent in close confinement for commercial sale. Such containers include injection or blow-molded plastic containers into which the desired vials are retained. Containers and/or kits comprise labeling with instructions for use and/or warnings.

[00200] In some embodiments, the kit comprises one or more oligonucleotides herein, and a pharmaceutically acceptable carrier, or a pharmaceutical composition comprising one or more of the oligonucleotides and instructions for treating or delaying progression of a disease, disorder, or condition associated with *SCAP* activity in an individual in need thereof.

[00201] *Methods*

[00202] Methods of Making

[00203] The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) are made using methods and/or techniques known to one of skill in the art such as, for example, conventional nucleic acid solid-phase synthesis. The polynucleotides of the oligonucleotides are assembled on a suitable nucleic acid synthesizer utilizing standard nucleotide or nucleoside precursors (*e.g.*, phosphoramidites). Automated nucleic acid synthesizers, including DNA/RNA synthesizers, are commercially available from, for example, Applied Biosystems (Foster City, CA), BioAutomation (Irving, TX), and GE Healthcare Life Sciences (Pittsburgh, PA).

[00204] As one of skill in the art understands, other methods and/or techniques of synthesizing oligonucleotides may be used. Additionally, the various synthetic steps are performed in an alternate sequence or order to give the desired compounds. Other synthetic chemistry transformations, protecting groups (*e.g.*, for hydroxyl, amino, *etc.* present on the bases), and protecting group methodologies (protection and deprotection) useful in synthesizing the oligonucleotides are known in the art and are described in, for example, Larock, "Comprehensive Organic Transformations," VCH Publishers (1989); Greene & Wuts, PROTECTIVE GROUPS IN ORGANIC SYNTHESIS, 2<sup>nd</sup> Ed., John Wiley & Sons (1991); Fieser & Fieser, FIESER AND FIESER'S REAGENTS FOR ORGANIC SYNTHESIS, John Wiley & Sons (1994);

and Paquette, ed., *ENCYCLOPEDIA OF REAGENTS FOR ORGANIC SYNTHESIS*, John Wiley & Sons (1995).

**[00205]** Methods of Using

**[00206]** I. Methods of Reducing *SCAP* Activity in Cells, Tissue, Organs, and Organisms:

**[00207]** The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as RNAi oligonucleotides) are used to reduce *SCAP* mRNA, *SCAP* protein and/or *SCAP* activity in cells, tissues, organs, or individuals. The methods comprise the steps described herein, and these may be, but not necessarily, carried out in the sequence as described. Other sequences, however, also are conceivable. Moreover, individual, or multiple steps are carried out either in parallel and/or overlapping in time and/or individually or in multiply repeated steps. Furthermore, the methods comprise additional, unspecified steps.

**[00208]** The methods comprise contacting or delivering to a cell, population of cells, tissues, organs, or individuals an effective amount any of the oligonucleotides herein for reducing *SCAP* expression. In some embodiments, reduced *SCAP* activity is determined by measuring a reduction in the amount or level of *SCAP* mRNA, *SCAP* protein, and/or *SCAP* activity in a cell.

**[00209]** With regard to an appropriate cell type, the cell type is any cell that expresses mRNA (*e.g.*, hepatocytes, macrophages, monocyte-derived cells, prostate cancer cells, cells of the brain, endocrine tissue, bone marrow, lymph nodes, lung, gall bladder, liver, duodenum, small intestine, pancreas, kidney, gastrointestinal tract, bladder, adipose and soft tissue, and skin). In some embodiments, the cell is a primary cell obtained from an individual. In some embodiments, the primary cell has undergone a limited number of passages such that the cell substantially maintains its natural phenotypic properties. In some embodiments, the cell is an *ex vivo*, *in vivo*, or *in vitro* cell (*i.e.*, such that one or more of the oligonucleotides herein can be delivered to the cell in culture or to an organism in which the cell resides).

**[00210]** In some embodiments, the oligonucleotides herein are delivered to a cell or population of cells using a nucleic acid delivery method known in the art including, but not limited to, injecting a solution containing the oligonucleotides, bombarding by particles covered by the oligonucleotides, exposing the cell or population of cells to a solution containing the oligonucleotides, or electroporating cell membranes in the presence of the oligonucleotides. Other methods known in the art for delivering oligonucleotides to cells are used such as, for

example, lipid-mediated carrier transport, chemical-mediated transport, and cationic liposome transfection such as calcium phosphate, and others.

**[00211]** Reduced *SCAP* activity is determined by an assay or technique that evaluates one or more molecules, properties or characteristics of a cell or population of cells associated with *SCAP* gene expression (*e.g.*, using a *SCAP* expression biomarker) or by an assay or technique that evaluates molecules that are directly indicative of *SCAP* activity in a cell or population of cells (*e.g.*, *SCAP* mRNA, *SCAP* protein and/or *SCAP* activity). In some embodiments, the extent to which the oligonucleotides reduce *SCAP* activity are evaluated by comparing *SCAP* activity in a cell or population of cells contacted with the oligonucleotides to a control cell or population of cells (*e.g.*, a cell or population of cells not contacted with the oligonucleotides or contacted with a control oligonucleotide). In some embodiments, a control amount or level of *SCAP* activity in a control cell or population of cells is predetermined, such that the control amount or level need not be measured in every instance the assay or technique is performed. The predetermined level or value takes a variety of forms including, but not limited to, a single cut-off value, such as a median or mean.

**[00212]** Contacting or delivering the oligonucleotides herein to a cell or a population of cells result in reduced *SCAP* activity. In some embodiments, reduced *SCAP* activity is relative to a control amount or level of *SCAP* activity in the cell or the population of cells not contacted with the oligonucleotides or contacted with a control oligonucleotide. In some embodiments, reduced *SCAP* activity is about 1% or lower, about 5% or lower, about 10% or lower, about 15% or lower, about 20% or lower, about 25% or lower, about 30% or lower, about 35% or lower, about 40% or lower, about 45% or lower, about 50% or lower, about 55% or lower, about 60% or lower, about 70% or lower, about 80% or lower, or about 90% or lower relative to a control amount or level of *SCAP* activity. In some embodiments, the control amount or level of *SCAP* activity is an amount or level of *SCAP* mRNA, *SCAP* protein and/or *SCAP* activity in the cell or the population of cells that has not been contacted with oligonucleotides herein. In some embodiments, the effect of delivery of the oligonucleotides to the cell or the population of cells according to a method herein is assessed after any finite period or amount of time (*e.g.*, minutes, hours, days, weeks, and/or months). For example, *SCAP* activity is determined in the cell or the population of cells at least about 4 hours, about 8 hours, about 12 hours, about 18 hours, or about 24 hours. Alternatively, *SCAP* activity is determined in the cell or the population of cells at least about 1 day, about 2 days, about 3 days, about 4 days, about 5 days, about 6 days, about 7 days, about 8 days, about 9 days, about 10 days, about 11 days,

about 12 days, about 13 days, about 14 days, about 21 days, about 28 days, about 35 days, about 42 days, about 49 days, about 56 days, about 63 days, about 70 days, about 77 days, or about 84 days or more after contacting or delivering the oligonucleotides to the cell or population of cells. In other embodiments, *SCAP* activity is determined in the cell or the population of cells at least about 1 month, about 2 months, about 3 months, about 4 months, about 5 months, or about 6 months or more after contacting or delivering the oligonucleotides to the cell or the population of cells.

**[00213]** In some embodiments, the oligonucleotides herein are delivered in the form of a transgene that is engineered to express in a cell one or more of the oligonucleotides or strands (*e.g.*, sense and antisense strands). For example, the oligonucleotides are delivered using a transgene engineered to express any oligonucleotide herein. Transgenes may be delivered using viral vectors (*e.g.*, adenovirus, retrovirus, vaccinia virus, poxvirus, adeno-associated virus, or herpes simplex virus) or non-viral vectors (*e.g.*, plasmids or synthetic mRNAs). In some embodiments, the transgenes are injected directly to an individual.

**[00214]** II. Methods of Treatment:

**[00215]** Methods of treating an individual having, suspected of having, or at risk of developing a disease, disorder, or condition associated with *SCAP* activity comprise administering at least one or more of the oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) to the individual. Additionally, methods of treating or attenuating an onset or progression of a disease, disorder, or condition associated with *SCAP* activity in an individual comprise using one or more of the oligonucleotides herein. Furthermore, methods of achieving one or more therapeutic benefits in an individual having a disease, disorder, or condition associated with *SCAP* activity comprise providing one or more of the oligonucleotides herein. In some embodiments, the individual can be treated by administering a therapeutically effective amount of any one or more of the oligonucleotides herein. In some embodiments, the treatment comprises reducing *SCAP* activity. In some embodiments, the individual is treated therapeutically. In some embodiments, the individual is treated prophylactically. In all of these embodiments, the oligonucleotide of interest is selected from Table 3 or 4.

**[00216]** In some embodiments, the one or more oligonucleotides, or a pharmaceutical composition including the same, is administered to the individual having a disease, disorder, or condition associated with *SCAP* activity such that *SCAP* activity is reduced in the individual, thereby treating the individual. In some embodiments, an amount or level of *SCAP* mRNA is

reduced in the individual. In other embodiments, an amount or level of SCAP protein is reduced in the individual. In still other embodiments, an amount or level of SCAP activity is reduced in the individual. In yet other embodiments, an amount or level of liver TG (e.g., one or more TG(s) or total TGs in liver) and/or cholesterol is reduced in the individual, especially in the liver. In still other embodiments, an amount or level of liver inflammation can be reduced. In still other embodiments, an amount or level of liver fibrosis is reduced. In still other embodiments, an amount or level of plasma aspartate aminotransferase (AST), plasma alanine aminotransferase (ALT), plasma Cytokeratin 18 (CK-18), or even plasma N-terminal type III collagen propeptide (Pro-C3) is reduced. In any of the above disclosed embodiments, the oligonucleotides comprise a sense strand having a nucleotide sequence of any one of SEQ ID NOs:532, 531, 605, 657, 705, 717 and 745, and an antisense strand having a nucleotide sequence of any one of SEQ ID NOs:524, 532, 606, 658, 706, 718 and 746.

**[00217]** In some embodiments, *SCAP* activity is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to *SCAP* activity prior to administering the one or more oligonucleotides or pharmaceutical composition thereof. In other embodiments, *SCAP* activity is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to *SCAP* activity in an individual (e.g., a reference or control individual) not receiving the one or more oligonucleotides or pharmaceutical composition or receiving a control oligonucleotide, pharmaceutical composition or treatment.

**[00218]** In certain embodiments, an amount or level of SCAP mRNA is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of SCAP mRNA prior to administering the one or more oligonucleotides or pharmaceutical composition thereof. In some embodiments, the amount or level of SCAP mRNA is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of SCAP mRNA in an individual (e.g., a reference or control individual) not administered the one or more oligonucleotides or

pharmaceutical composition or administered a control oligonucleotide, pharmaceutical composition, or treatment.

**[00219]** In certain embodiments, an amount or level of SCAP protein is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of SCAP protein prior to administering the one or more oligonucleotides or pharmaceutical composition thereof. In other embodiments, an amount or level of SCAP protein is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of SCAP protein in an individual (*e.g.*, a reference or control individual) not administered the one or more oligonucleotides or pharmaceutical composition or administered a control oligonucleotide, pharmaceutical composition or treatment.

**[00220]** In certain embodiments, an amount or level of SCAP activity is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of SCAP activity prior to administering the one or more oligonucleotides or pharmaceutical composition thereof. In some embodiments, the amount or level of SCAP activity is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of SCAP activity in an individual (*e.g.*, a reference or control individual) not administered the one or more oligonucleotides or pharmaceutical composition or administered a control oligonucleotide, pharmaceutical composition or treatment.

**[00221]** In certain embodiments, an amount or level of TG, especially liver TG, can be reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of TG prior to administering the one or more oligonucleotides or pharmaceutical composition thereof. In some embodiments, the amount or level of TG is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about

70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of TG in an individual (*e.g.*, a reference or control individual) not administered the one or more oligonucleotides or pharmaceutical composition or administered a control oligonucleotide, pharmaceutical composition or treatment.

**[00222]** In certain embodiments, an amount or level of cholesterol, especially liver cholesterol, can be reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of cholesterol prior to administering the one or more oligonucleotides or pharmaceutical composition thereof. In some embodiments, the amount or level of cholesterol is reduced in the individual by at least about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about 99%, or greater than 99% when compared to an amount or level of cholesterol in an individual (*e.g.*, a reference or control individual) not administered the one or more oligonucleotides or pharmaceutical composition or administered a control oligonucleotide, pharmaceutical composition or treatment.

**[00223]** Here, *SCAP* activity, the amount or level of *SCAP* mRNA, *SCAP* protein, *SCAP* activity, liver TG, liver cholesterol, or any combination thereof, is reduced in a cell (*e.g.*, a hepatocyte), a population or a group of cells (*e.g.*, an organoid), a tissue (*e.g.*, liver tissue), a sample (*e.g.*, a liver biopsy sample), an organ (*e.g.*, liver), blood or a fraction thereof (*e.g.*, plasma), or any other biological material obtained or isolated from the individual. In some embodiments, *SCAP* activity, the amount or level of *SCAP* mRNA, *SCAP* protein, *SCAP* activity, TG, cholesterol, or any combination thereof, is reduced in more than one type of cell (*e.g.*, a hepatocyte and one or more other type(s) of cell), more than one groups of cells, more than one type of tissue (*e.g.*, liver tissue and one or more other type(s) of tissue), more than one type of sample (*e.g.*, a liver biopsy sample and one or more other type(s) of biopsy sample), more than one organ (*e.g.*, liver and one or more other organ(s)), more than one fraction of blood (*e.g.*, plasma and one or more other blood fraction(s)) obtained or isolated from the individual.

**[00224]** Examples of a disease, disorder, or condition associated with *SCAP* activity include, but are not limited to, AH, ALD, CCA, cirrhosis, hepatic fibrosis, hepatic inflammation, HCC, liver steatosis, NAFLD, NASH and PSC, as well as related diseases, disorders, and conditions

in an individual such as, for example, hypercholesterolemia, hyperlipidemia, hypertriglyceridemia, ASCVD, diabetes and/or obesity, or a combination thereof.

**[00225]** Because of their high specificity, the oligonucleotides herein specifically target mRNAs of target genes of cells, tissues, or organs (*e.g.*, liver). In preventing disease, the target gene is the one that is required for initiation or maintenance of the disease or that has been identified as being associated with a higher risk of contracting the disease. In treating disease, one or more of the oligonucleotides herein are brought into contact with the cells, tissue or organ exhibiting or responsible for mediating the disease. For example, an oligonucleotide substantially complementary to all or part of a wild-type (*i.e.*, native) or mutated gene associated with a disease, disorder, or condition associated with *SCAP* activity is brought into contact with or introduced into a cell or tissue type of interest such as a hepatocyte or other liver cell.

**[00226]** In some embodiments, the target gene is from any mammal, such as a human. Any gene may be silenced according to the methods herein. Moreover, the methods herein typically involve administering to an individual a therapeutically effective amount of one or more oligonucleotides herein, that is, an amount capable of producing a desirable therapeutic result. The therapeutically acceptable amount is an amount that therapeutically treats a disease or disorder or condition. The appropriate dosage for any one individual will depend on certain factors, including the individual's size, body surface area, age, the composition to be administered, the active ingredient(s) in the composition, time and route of administration, general health, and other therapeutic agents being administered concurrently.

**[00227]** In the methods, the individual is administered any one of the oligonucleotides or compositions herein either enterally (*e.g.*, orally, by gastric feeding tube, by duodenal feeding tube, *via* gastrostomy, or rectally), parenterally (*e.g.*, subcutaneous injection, intravenous injection or infusion, intra-arterial injection or infusion, intraosseous infusion, intramuscular injection, intracerebral injection, intracerebroventricular injection, or intrathecal), topically (*e.g.*, epicutaneous, inhalational, *via* eye drops, or through a mucous membrane), or by direct injection into a target organ (*e.g.*, the liver of an individual). Typically, the oligonucleotides or compositions are administered intravenously or subcutaneously.

**[00228]** As a non-limiting set of examples, the oligonucleotides or compositions herein typically are administered quarterly (once every three months), bi-monthly (once every two months), monthly or weekly. For example, the oligonucleotides or compositions are administered every week or at intervals of two, or three weeks. In certain embodiments, the

oligonucleotides, or compositions are administered daily. In some embodiments, an individual is administered one or more loading doses of the oligonucleotides or compositions followed by one or more maintenance doses of the oligonucleotides or compositions.

**[00229]** In some embodiments, the individual is a human, a NHP, or other mammal. In other embodiments, the individual is a domesticated animal such as a dog or a cats; livestock such as a horse, cattle, pig, sheep, goat, or chicken; and animals such as a mouse, rat, guinea pig or hamster.

**[00230]** III. Medical Uses: The oligonucleotides herein (*e.g.*, a ds oligonucleotide such as a RNAi oligonucleotide) can be used, or adapted for use, to treat an individual (*e.g.*, a human having a disease, disorder, or condition associated with *SCAP* activity) that would benefit from reducing *SCAP* activity. In some embodiments, the oligonucleotides are provided for use, or adapted for use, to treat an individual having a disease, disorder, or condition associated with *SCAP* activity. Also, the oligonucleotides are provided for use, or adaptable for use, in the manufacture of a medicament or pharmaceutical composition for treating a disease, disorder, or condition associated with *SCAP* activity. In other embodiments, the oligonucleotides are provided for use, or adaptable for use, in targeting *SCAP* mRNA and reducing *SCAP* activity (*e.g.*, *via* the RNAi pathway). In other embodiments, the oligonucleotides are provided for use, or adaptable for use, in targeting *SCAP* mRNA and reducing an amount or level of *SCAP* mRNA, *SCAP* protein, and/or *SCAP* activity (*i.e.*, reducing *SCAP* activity).

**[00231]** In some embodiments, the methods comprise selecting an individual for treatment based upon the individual having a marker (*e.g.*, a biomarker) for a disease, disorder, or condition associated with *SCAP* activity, or someone predisposed to the same, such as, but not limited to, *SCAP* mRNA, *SCAP* protein, *SCAP* activity, or a combination thereof. Likewise, and as detailed below, the methods also comprise additional steps such as, for example, measuring or obtaining a baseline value for a marker of *SCAP* activity (*e.g.*, *SCAP* protein or other biomarker) and then comparing such obtained value to one or more other baseline values or values obtained after the individual is administered one or more of the oligonucleotides to assess the effectiveness of treatment.

#### EXAMPLES

**[00232]** The following non-limiting examples are offered for purposes of illustration, not limitation.

**[00233]** SYNTHESIS OF OLIGONUCLEOTIDES**[00234]** Example 1: Preparing ds RNAi Oligonucleotides

**[00235]** *Oligonucleotide synthesizing and purifying:* ds RNAi oligonucleotides in the Examples are chemically synthesized using methods described herein. Generally, ds RNAi oligonucleotides are synthesized using solid phase oligonucleotide synthesis methods as described for 19-23mer siRNAs (*see, e.g.,* Scaringe *et al.* (1990) NUCLEIC ACIDS RES. 18:5433-41 and Usman *et al.* (1987) J. AM. CHEM. SOC. 109:7845-45; *see also,* US Patent Nos. 5,804,683; 5,831,071; 5,998,203; 6,008,400; 6,111,086; 6,117,657; 6,353,098; 6,362,323; 6,437,117 and 6,469,158).

**[00236]** Individual RNA strands are synthesized and HPLC purified according to standard methods (Integrated DNA Technologies). For example, RNA oligonucleotides are synthesized using solid phase phosphoramidite chemistry, deprotected, and desalted on NAP-5 columns (Amersham Pharmacia Biotech; Piscataway, NJ) using standard techniques (Damha & Olgivie (1993) METHODS MOL. BIOL. 20:81-114; Wincott *et al.* (1995) NUCLEIC ACIDS RES. 23:2677-84). The oligomers are purified using ion-exchange high performance liquid chromatography (IE-HPLC) on an Amersham Source 15Q column (1.0 cm×25 cm; Amersham Pharmacia Biotech) using a 15 min step-linear gradient. The gradient varies from 90:10 Buffers A:B to 52:48 Buffers A:B, where Buffer A is 100 mM Tris pH 8.5 and Buffer B is 100 mM Tris pH 8.5, 1 M NaCl. Samples are monitored at 260 nm and peaks corresponding to the full-length oligonucleotide species are collected, pooled, desalted on NAP-5 columns, and lyophilized.

**[00237]** The purity of each oligomer is determined by capillary electrophoresis (CE) on a Beckman PACE 5000 (Beckman Coulter, Inc.). The CE capillaries have a 100 µm inner diameter and contain ssDNA 100R Gel (Beckman-Coulter). Typically, about 0.6 nmole of oligonucleotide is injected into a capillary, is run in an electric field of 444 V/cm and is detected by UV absorbance at 260 nm. Denaturing Tris-Borate-7 M-urea running buffer is purchased from Beckman-Coulter. Oligoribonucleotides are obtained that are at least 90% pure as assessed by CE for use in experiments described below. Compound identity is verified by matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectroscopy on a Voyager DE™ Biospectrometry Work Station (Applied Biosystems) following the manufacturer's recommended protocol. Relative molecular masses of all oligomers are obtained, often within 0.2% of expected molecular mass.

**[00238]** *Preparing duplexes:* ss RNA oligomers are resuspended (*e.g.*, at 100  $\mu$ M concentration) in duplex buffer having 100 mM potassium acetate, 30 mM HEPES, pH 7.5. Complementary sense and antisense strands are mixed in equal molar amounts to yield a final solution of, for example, 50  $\mu$ M duplex. Samples are heated to 100°C for 5 min in RNA buffer (IDT) and are allowed to cool to room temperature before use. The ds RNA oligonucleotides are stored at -20°C. ss RNA oligomers are stored lyophilized or in nuclease-free water at -80°C.

**[00239]** *IN VITRO FUNCTION*

**[00240]** Example 2: RNAi Oligonucleotide Modulation of *SCAP* Activity *In Vitro* – DsiRNA-Based Compounds

**[00241]** *SCAP target sequence identifying:* To identify RNAi oligonucleotide inhibitors of *SCAP* expression, a computer-based algorithm is used to computationally generate *SCAP* target sequences suitable for assaying *SCAP* expression inhibition by the RNAi pathway. The algorithm provides RNAi oligonucleotide antisense strand sequences that are complementary to suitable *SCAP* target sequences of human *SCAP* mRNA (*e.g.*, SEQ ID NO:1). Some of the antisense strand sequences identified by the algorithm also are complementary to the corresponding *SCAP* target sequence of mouse and NHP *SCAP* mRNA (*e.g.*, SEQ ID NOs: 3 and 7, respectively). From this, 192 ds RNAi oligonucleotides (formatted as DsiRNA oligonucleotides) are generated, each with a unique antisense strand having a region of complementarity to a *SCAP* target sequence identified by the algorithm.

**[00242]** *In vitro cell-based assays:* The ability of each of the 192 DsiRNAs to inhibit *SCAP* expression is determined *via in vitro* cell-based assays. Further, and as shown herein, the nucleotide sequences for the sense strand and antisense strand of the DsiRNAs have a distinct pattern of modified nucleotides and phosphorothioate linkages. Briefly, Huh7 cells stably expressing *SCAP* are transfected with each of the DsiRNAs (1.0 nM) in separate wells of a multi-well cell culture plate. Cells are maintained for 24 hr following transfection, and then levels of remaining *SCAP* mRNA from the transfected cells are determined using TAQMAN®-based qPCR assays. Two qPCR assays, a 3' assay and a 5' assay, are used to determine mRNA levels as measured by HEX probes (*e.g.*, Hs HPRT-517-591 and Hs SFRS9-569-712).

**[00243]** The results of the Huh7 cell-based assay with the 192 DsiRNAs are shown in Table 1, where the 192 DsiRNAs have antisense strands that are complementary to human, mouse and NHP *SCAP* mRNA (“triple-common”) or that are complementary to human and NHP *SCAP* mRNA (“double-common”). Transfection of DsiRNA that results in less than or equal to 30%

SCAP mRNA remaining in the cells when compared to negative controls is considered a candidate *SCAP* expression inhibitor (referred to herein as a “hit”).

[00244] Table 1: Triple-Common and Double-Common DsiRNA SCAP mRNA Knockdown in Huh7 Cells, 1.0 nM 24 hr-5'and -3' Assays % mRNA Remaining (normalized to Hs HPRT-517 (HEX) and Hs SFRS9-569 (HEX) vs mock control).

| DsiRNA<br>Oligo | HPRT-517 (HEX)      |       | SFRS9-569 (HEX)     |       | Average             |       |
|-----------------|---------------------|-------|---------------------|-------|---------------------|-------|
|                 | % mRNA<br>Remaining | % SEM | % mRNA<br>Remaining | % SEM | % mRNA<br>Remaining | % SEM |
| 1*              | 107.4               | 21.4  | 106.0               | 23.5  | 106.7               | 1.0   |
| 2*              | 68.9                | 10.1  | 52.8                | 6.2   | 60.9                | 11.4  |
| 3*              | 46.4                | 5.0   | 39.5                | 4.7   | 42.9                | 4.9   |
| 4*              | 93.2                | 8.5   | 72.0                | 9.6   | 82.6                | 15.0  |
| 5*              | 89.3                | 14.2  | 69.2                | 15.6  | 79.2                | 14.2  |
| 6*              | 115.4               | 17.5  | 115.4               | 8.0   | 115.4               | 0.0   |
| 7*              | 80.3                | 6.4   | 76.4                | 5.8   | 78.4                | 2.8   |
| 8*              | 131.0               | 17.9  | 126.5               | 9.7   | 128.8               | 3.2   |
| 9*              | 46.8                | 12.7  | 42.3                | 11.1  | 44.6                | 3.2   |
| 10*             | 55.4                | 6.7   | 53.2                | 5.4   | 54.3                | 1.6   |
| 11*             | 150.4               | 10.7  | 125.7               | 9.2   | 138.1               | 17.5  |
| 12*             | 124.7               | 34.5  | 122.0               | 31.5  | 123.4               | 1.9   |
| 13*             | 47.8                | 9.7   | 47.8                | 6.0   | 47.8                | 0.0   |
| 14*             | 118.5               | 61.1  | 132.8               | 62.8  | 125.6               | 10.1  |
| 15*             | 126.7               | 13.6  | 125.4               | 12.5  | 126.0               | 0.9   |
| 16*             | 87.3                | 15.4  | 91.4                | 15.7  | 89.3                | 2.9   |
| 17*             | 107.4               | 13.6  | 105.4               | 11.8  | 106.4               | 1.4   |
| 18*             | 132.1               | 8.8   | 133.6               | 12.2  | 132.8               | 1.1   |
| 19*             | 121.1               | 24.3  | 109.8               | 23.5  | 115.4               | 8.0   |
| 20*             | 30.5                | 6.2   | 36.1                | 8.3   | 33.3                | 3.9   |
| 21*             | 34.4                | 5.0   | 42.4                | 4.4   | 38.4                | 5.7   |
| 22*             | 59.7                | 7.7   | 67.7                | 6.8   | 63.7                | 5.6   |
| 23*             | 106.6               | 10.5  | 111.8               | 9.8   | 109.2               | 3.7   |
| 24*             | 10.5                | 3.5   | 9.1                 | 4.4   | 9.8                 | 1.0   |
| 25*             | 246.5               | 29.4  | 152.6               | 23.9  | 199.6               | 66.4  |
| 26*             | 52.0                | 4.5   | 41.1                | 4.5   | 46.5                | 7.7   |
| 27*             | 222.2               | 49.6  | 175.3               | 31.2  | 198.8               | 33.2  |
| 28*             | 207.2               | 57.5  | 156.9               | 39.5  | 182.0               | 35.6  |
| 29*             | 102.7               | 7.3   | 96.0                | 4.8   | 99.4                | 4.7   |
| 30*             | 62.1                | 7.1   | 70.3                | 12.4  | 66.2                | 5.8   |
| 31*             | 157.0               | 25.1  | 121.6               | 19.7  | 139.3               | 25.0  |
| 32*             | 129.3               | 59.1  | 131.1               | 36.6  | 130.2               | 1.3   |
| 33*             | 28.1                | 4.4   | 24.0                | 3.4   | 26.1                | 2.9   |
| 34*             | 152.3               | 77.3  | 166.5               | 76.4  | 159.4               | 10.0  |
| 35*             | 129.4               | 21.7  | 124.1               | 16.7  | 126.7               | 3.8   |
| 36*             | 90.1                | 17.6  | 89.9                | 16.3  | 90.0                | 0.1   |
| 37*             | 111.7               | 40.0  | 111.5               | 30.2  | 111.6               | 0.2   |

|     |       |      |       |      |       |      |
|-----|-------|------|-------|------|-------|------|
| 38* | 66.9  | 11.5 | 73.6  | 12.5 | 70.2  | 4.7  |
| 39* | 122.1 | 24.4 | 123.0 | 24.7 | 122.6 | 0.6  |
| 40* | 100.7 | 11.1 | 93.5  | 15.4 | 97.1  | 5.1  |
| 41* | 54.0  | 6.9  | 54.0  | 7.9  | 54.0  | 0.0  |
| 42* | 29.3  | 12.8 | 39.4  | 14.5 | 34.3  | 7.1  |
| 43* | 21.0  | 6.1  | 18.2  | 5.5  | 19.6  | 1.9  |
| 44* | 25.5  | 5.1  | 29.8  | 6.3  | 27.6  | 3.0  |
| 45* | 81.3  | 39.1 | 89.7  | 47.4 | 85.5  | 6.0  |
| 46* | 73.8  | 23.5 | 83.3  | 25.4 | 78.5  | 6.7  |
| 47* | 89.6  | 31.0 | 96.1  | 37.1 | 92.9  | 4.6  |
| 48* | 86.4  | 34.3 | 87.6  | 37.9 | 87.0  | 0.8  |
| 49  | 40.9  | 7.0  | 33.8  | 5.5  | 37.3  | 5.0  |
| 50  | 131.1 | 15.2 | 102.5 | 12.7 | 116.8 | 20.2 |
| 51  | 62.6  | 28.3 | 52.6  | 24.2 | 57.6  | 7.1  |
| 52  | 44.0  | 4.8  | 45.3  | 5.4  | 44.6  | 0.9  |
| 53  | 46.5  | 9.0  | 50.6  | 9.9  | 48.6  | 2.9  |
| 54  | 57.5  | 5.0  | 58.5  | 4.8  | 58.0  | 0.7  |
| 55  | 58.7  | 7.7  | 63.2  | 10.2 | 61.0  | 3.2  |
| 56  | 74.2  | 14.3 | 60.2  | 13.8 | 67.2  | 9.9  |
| 57  | 28.8  | 4.3  | 24.5  | 3.0  | 26.6  | 3.0  |
| 58  | 87.5  | 9.6  | 82.0  | 8.8  | 84.7  | 3.9  |
| 59  | 117.5 | 28.7 | 123.7 | 27.6 | 120.6 | 4.4  |
| 60  | 59.3  | 12.1 | 51.5  | 9.5  | 55.4  | 5.5  |
| 61  | 40.5  | 11.0 | 39.4  | 8.6  | 39.9  | 0.8  |
| 62  | 56.0  | 26.9 | 64.0  | 29.2 | 60.0  | 5.7  |
| 63  | 41.1  | 6.3  | 43.3  | 6.7  | 42.2  | 1.5  |
| 64  | 29.9  | 6.3  | 39.1  | 7.3  | 34.5  | 6.5  |
| 65  | 29.4  | 5.2  | 28.1  | 4.6  | 28.8  | 0.9  |
| 66  | 29.3  | 5.6  | 27.8  | 5.5  | 28.6  | 1.1  |
| 67  | 41.6  | 24.9 | 41.7  | 22.6 | 41.6  | 0.1  |
| 68  | 59.5  | 8.6  | 60.2  | 7.3  | 59.8  | 0.5  |
| 69  | 33.4  | 6.7  | 37.9  | 7.3  | 35.7  | 3.2  |
| 70  | 16.0  | 3.9  | 17.1  | 4.3  | 16.6  | 0.8  |
| 71  | 111.7 | 22.9 | 105.5 | 21.7 | 108.6 | 4.4  |
| 72  | 88.8  | 48.5 | 45.9  | 30.6 | 67.4  | 30.3 |
| 73  | 34.4  | 7.9  | 37.9  | 8.5  | 36.2  | 2.5  |
| 74  | 129.9 | 11.4 | 113.4 | 11.4 | 121.6 | 11.6 |
| 75  | 64.9  | 7.7  | 65.3  | 6.7  | 65.1  | 0.3  |
| 76  | 187.1 | 75.1 | --    | --   | 187.1 | 75.1 |
| 77  | 218.5 | 65.1 | --    | --   | 218.5 | 65.1 |
| 78  | 98.7  | 7.9  | 98.8  | 6.7  | 98.8  | 0.1  |
| 79  | 31.8  | 15.2 | 62.2  | 18.1 | 47.0  | 21.6 |
| 80  | 161.4 | 27.9 | 149.7 | 26.5 | 155.6 | 8.3  |
| 81  | 68.5  | 5.4  | 65.2  | 3.9  | 66.9  | 2.4  |
| 82  | 71.5  | 4.9  | 70.0  | 5.0  | 70.8  | 1.0  |
| 83  | 111.5 | 8.3  | 103.3 | 6.8  | 107.4 | 5.8  |
| 84  | 76.0  | 4.1  | 73.1  | 3.6  | 74.5  | 2.1  |

|     |       |      |       |      |       |      |
|-----|-------|------|-------|------|-------|------|
| 85  | 93.6  | 9.8  | 94.7  | 11.5 | 94.1  | 0.7  |
| 86  | 78.3  | 11.1 | 83.3  | 12.0 | 80.8  | 3.5  |
| 87  | 100.8 | 13.4 | 95.3  | 12.6 | 98.1  | 3.9  |
| 88  | 114.1 | 42.1 | 167.9 | 40.7 | 141.0 | 38.0 |
| 89  | 35.2  | 3.6  | 39.7  | 4.6  | 37.4  | 3.2  |
| 90  | 62.8  | 7.7  | 59.1  | 6.1  | 61.0  | 2.6  |
| 91  | 95.4  | 9.1  | 76.2  | 6.8  | 85.8  | 13.6 |
| 92  | 149.2 | 11.9 | 111.5 | 12.5 | 130.4 | 26.7 |
| 93  | 61.1  | 7.4  | 54.1  | 7.5  | 57.6  | 5.0  |
| 94  | 78.7  | 7.0  | 82.0  | 7.2  | 80.4  | 2.3  |
| 95  | 67.0  | 10.3 | 62.0  | 9.6  | 64.5  | 3.5  |
| 96  | 51.1  | 5.2  | 52.1  | 4.2  | 51.6  | 0.7  |
| 97  | 103.5 | 16.2 | 97.9  | 20.3 | 100.7 | 3.9  |
| 98  | 83.0  | 7.7  | 81.6  | 6.1  | 82.3  | 1.0  |
| 99  | 103.2 | 12.4 | 98.9  | 11.6 | 101.0 | 3.0  |
| 100 | 90.9  | 22.9 | 116.3 | 28.3 | 103.6 | 18.0 |
| 101 | 44.4  | 12.9 | 35.9  | 9.7  | 40.1  | 6.0  |
| 102 | 70.1  | 7.3  | 78.0  | 9.6  | 74.0  | 5.5  |
| 103 | 41.6  | 10.9 | 35.8  | 11.0 | 38.7  | 4.1  |
| 104 | 25.2  | 7.6  | 29.7  | 9.3  | 27.5  | 3.2  |
| 105 | 31.5  | 4.7  | 33.1  | 4.8  | 32.3  | 1.1  |
| 106 | 20.4  | 4.3  | 23.5  | 4.6  | 21.9  | 2.2  |
| 107 | 20.4  | 1.5  | 21.8  | 2.4  | 21.1  | 1.0  |
| 108 | 28.4  | 6.6  | 30.6  | 5.2  | 29.5  | 1.5  |
| 109 | 40.1  | 3.3  | 42.2  | 3.7  | 41.1  | 1.5  |
| 110 | 34.9  | 3.7  | 35.7  | 3.8  | 35.3  | 0.5  |
| 111 | 89.0  | 5.5  | 85.6  | 6.0  | 87.3  | 2.4  |
| 112 | 54.3  | 5.4  | 54.5  | 7.7  | 54.4  | 0.2  |
| 113 | 30.5  | 2.0  | 32.6  | 2.1  | 31.6  | 1.5  |
| 114 | 51.3  | 3.3  | 64.5  | 4.2  | 57.9  | 9.3  |
| 115 | 33.9  | 2.4  | 36.5  | 2.6  | 35.2  | 1.8  |
| 116 | 86.1  | 6.6  | 94.7  | 7.1  | 90.4  | 6.1  |
| 117 | 29.5  | 3.8  | 35.5  | 2.4  | 32.5  | 4.2  |
| 118 | 74.0  | 8.6  | 81.1  | 6.3  | 77.6  | 5.1  |
| 119 | 33.3  | 2.7  | 37.5  | 3.2  | 35.4  | 3.0  |
| 120 | 19.3  | 2.2  | 20.1  | 3.0  | 19.7  | 0.6  |
| 121 | 42.7  | 8.0  | 39.7  | 5.4  | 41.2  | 2.1  |
| 122 | 78.4  | 14.0 | 70.7  | 12.2 | 74.5  | 5.5  |
| 123 | 34.1  | 3.6  | 32.2  | 4.4  | 33.1  | 1.3  |
| 124 | 59.9  | 7.0  | 66.0  | 6.9  | 62.9  | 4.3  |
| 125 | 64.1  | 7.9  | 59.2  | 7.2  | 61.6  | 3.4  |
| 126 | 127.6 | 23.1 | 148.6 | 19.6 | 138.1 | 14.9 |
| 127 | 152.4 | 26.3 | 139.9 | 20.1 | 146.1 | 8.8  |
| 128 | 209.1 | 65.6 | 150.9 | 44.7 | 180.0 | 41.2 |
| 129 | 91.9  | 9.2  | 78.7  | 7.3  | 85.3  | 9.3  |
| 130 | 91.0  | 17.5 | 88.2  | 20.2 | 89.6  | 2.0  |
| 131 | 54.3  | 5.3  | 52.7  | 3.6  | 53.5  | 1.1  |

|     |       |       |       |      |       |      |
|-----|-------|-------|-------|------|-------|------|
| 132 | 68.1  | 6.5   | 59.3  | 4.5  | 63.7  | 6.2  |
| 133 | 36.1  | 5.5   | 33.3  | 4.2  | 34.7  | 2.0  |
| 134 | 83.3  | 17.0  | 73.3  | 17.0 | 78.3  | 7.1  |
| 135 | 68.8  | 4.9   | 64.7  | 4.2  | 66.8  | 2.9  |
| 136 | 43.4  | 8.7   | 48.5  | 9.2  | 45.9  | 3.6  |
| 137 | 61.4  | 7.4   | 59.2  | 5.0  | 60.3  | 1.6  |
| 138 | 54.5  | 6.1   | 60.9  | 5.6  | 57.7  | 4.6  |
| 139 | 87.3  | 5.7   | 83.2  | 6.4  | 85.2  | 2.9  |
| 140 | 89.9  | 5.4   | 90.7  | 6.0  | 90.3  | 0.6  |
| 141 | 57.1  | 4.7   | 55.2  | 3.4  | 56.2  | 1.3  |
| 142 | 53.8  | 5.0   | 56.3  | 7.2  | 55.1  | 1.8  |
| 143 | 81.6  | 8.7   | 77.9  | 9.2  | 79.7  | 2.6  |
| 144 | 23.6  | 4.2   | 22.9  | 3.1  | 23.3  | 0.5  |
| 145 | 51.5  | 16.2  | 37.3  | 11.8 | 44.4  | 10.1 |
| 146 | 79.5  | 14.9  | 66.8  | 19.5 | 73.2  | 9.0  |
| 147 | 143.6 | 14.6  | 109.5 | 14.5 | 126.6 | 24.1 |
| 148 | 119.3 | 64.0  | 74.8  | 47.1 | 97.0  | 31.4 |
| 149 | 117.9 | 48.3  | 65.1  | 23.6 | 91.5  | 37.3 |
| 150 | 224.2 | 88.9  | 112.2 | 58.1 | 168.2 | 79.2 |
| 151 | 284.8 | 174.5 | 162.4 | 86.4 | 223.6 | 86.6 |
| 152 | 82.4  | 35.3  | 76.6  | 39.1 | 79.5  | 4.1  |
| 153 | 54.4  | 7.8   | 45.0  | 9.0  | 49.7  | 6.7  |
| 154 | 112.6 | 20.0  | 102.3 | 14.6 | 107.4 | 7.3  |
| 155 | 115.3 | 17.1  | 88.6  | 10.9 | 102.0 | 18.9 |
| 156 | 53.1  | 6.1   | 42.5  | 4.3  | 47.8  | 7.5  |
| 157 | 36.7  | 5.4   | 32.7  | 3.4  | 34.7  | 2.9  |
| 158 | 42.9  | 11.3  | 41.7  | 9.6  | 42.3  | 0.9  |
| 159 | 33.2  | 5.0   | 34.0  | 3.6  | 33.6  | 0.6  |
| 160 | 113.5 | 11.4  | 102.3 | 9.4  | 107.9 | 7.9  |
| 161 | 69.4  | 10.0  | 70.5  | 8.1  | 69.9  | 0.8  |
| 162 | 58.2  | 6.6   | 51.1  | 6.3  | 54.6  | 5.1  |
| 163 | 21.3  | 3.8   | 14.8  | 4.0  | 18.0  | 4.6  |
| 164 | 23.1  | 4.0   | 17.7  | 2.9  | 20.4  | 3.8  |
| 165 | 13.5  | 1.7   | 9.7   | 1.7  | 11.6  | 2.7  |
| 166 | 29.2  | 4.6   | 28.4  | 4.2  | 28.8  | 0.6  |
| 167 | 83.1  | 7.6   | 84.0  | 7.6  | 83.5  | 0.6  |
| 168 | 85.7  | 25.3  | 91.5  | 26.7 | 88.6  | 4.1  |
| 169 | 122.6 | 8.8   | 91.3  | 13.8 | 106.9 | 22.2 |
| 170 | 134.4 | 11.8  | 95.4  | 8.0  | 114.9 | 27.6 |
| 171 | 74.5  | 8.0   | 52.5  | 9.2  | 63.5  | 15.6 |
| 172 | 194.8 | 20.1  | 158.8 | 18.1 | 176.8 | 25.5 |
| 173 | 168.6 | 16.7  | 162.7 | 18.0 | 165.7 | 4.2  |
| 174 | 37.0  | 6.5   | 47.8  | 9.7  | 42.4  | 7.6  |
| 175 | 60.3  | 40.8  | 46.6  | 44.7 | 53.4  | 9.7  |
| 176 | 19.5  | 2.7   | 21.0  | 2.9  | 20.3  | 1.1  |
| 177 | 28.7  | 2.2   | 23.3  | 2.4  | 26.0  | 3.8  |
| 178 | 38.1  | 3.4   | 35.8  | 4.1  | 36.9  | 1.7  |

|     |       |      |       |      |       |      |
|-----|-------|------|-------|------|-------|------|
| 179 | 61.3  | 5.4  | 55.3  | 3.4  | 58.3  | 4.2  |
| 180 | 152.9 | 13.8 | 118.6 | 10.4 | 135.8 | 24.3 |
| 181 | 68.4  | 7.8  | 69.5  | 8.1  | 68.9  | 0.8  |
| 182 | 57.6  | 6.2  | 58.9  | 5.8  | 58.2  | 0.9  |
| 183 | 127.1 | 9.9  | 126.5 | 10.5 | 126.8 | 0.4  |
| 184 | 102.8 | 11.1 | 107.8 | 11.5 | 105.3 | 3.6  |
| 185 | 106.6 | 9.0  | 94.7  | 8.2  | 100.7 | 8.4  |
| 186 | 54.5  | 28.0 | 49.0  | 25.2 | 51.8  | 3.9  |
| 187 | 112.8 | 9.1  | 85.6  | 11.3 | 99.2  | 19.2 |
| 188 | 70.6  | 6.3  | 72.5  | 7.3  | 71.6  | 1.4  |
| 189 | 50.2  | 4.5  | 50.0  | 5.1  | 50.1  | 0.1  |
| 190 | 115.9 | 9.8  | 130.3 | 9.9  | 123.1 | 10.2 |
| 191 | 102.7 | 13.1 | 103.6 | 6.4  | 103.2 | 0.6  |
| 192 | 83.3  | 18.9 | 74.9  | 19.8 | 79.1  | 5.9  |

NOTE: \* denotes triple-common.

**[00245]** Additionally, primary human hepatocytes, such as 3D spheroids, are transfected with each of the DsiRNAs (100 nM) in separate wells of a multi-well cell culture plate. Cells are maintained for 7 days following transfection, and then levels of remaining SCAP mRNA from the transfected cells are determined using TAQMAN®-based qPCR assays. Two qPCR assays, a 3' assay and a 5' assay, are used to determine mRNA levels as measured by HEX probes (*e.g.*, Hs HPRT-517-591 and Hs SFRS9-569-712).

**[00246]** The results of the human hepatocyte 3D spheroid-based assay with the DsiRNAs are shown in Table 2. As above, transfection of a DsiRNA that results in less than or equal to 30% SCAP mRNA remaining in the cells when compared to negative controls is considered a candidate *SCAP* expression inhibitor (referred to herein as a “hit”).

**[00247]** Table 2: Triple-Common and Double-Common DsiRNA SCAP mRNA Knockdown in 3D Human Spheroids, 100 nM 7 days-5' and -3' Assays % mRNA Remaining (normalized to Hs HPRT-517 (HEX) and Hs SFRS9-569 (HEX) vs mock control).

| DsiRNA Oligo | HPRT-517 (HEX)   |       | SFRS9-569 (HEX)  |       | Average          |       |
|--------------|------------------|-------|------------------|-------|------------------|-------|
|              | % mRNA Remaining | % SEM | % mRNA Remaining | % SEM | % mRNA Remaining | % SEM |
| 1*           | 67.3             | 11.5  | 66.3             | 12.0  | 66.8             | 0.7   |
| 2*           | 26.3             | 12.1  | 17.7             | 7.8   | 22.0             | 6.1   |
| 3*           | 43.5             | 4.7   | 48.0             | 5.6   | 45.7             | 3.2   |
| 4*           | 64.2             | 12.4  | 55.8             | 13.6  | 60.0             | 6.0   |
| 5*           | 73.5             | 10.2  | 86.3             | 11.0  | 79.9             | 9.0   |
| 6*           | 59.8             | 10.1  | 94.1             | 11.3  | 77.0             | 24.3  |
| 7*           | 43.9             | 7.8   | 60.8             | 11.1  | 52.3             | 11.9  |
| 8*           | 94.4             | 26.7  | 110.7            | 19.3  | 102.6            | 11.5  |
| 9*           | 32.7             | 5.0   | 53.7             | 10.3  | 43.2             | 14.8  |

|     |       |       |       |      |       |      |
|-----|-------|-------|-------|------|-------|------|
| 10* | 44.1  | 3.3   | 61.7  | 5.1  | 52.9  | 12.4 |
| 11* | 77.1  | 21.9  | 97.5  | 18.5 | 87.3  | 14.4 |
| 12* | 64.3  | 54.4  | 72.5  | 53.6 | 68.4  | 5.8  |
| 13* | 6.4   | 1.9   | 36.3  | 6.9  | 21.4  | 21.1 |
| 14* | 80.4  | 16.1  | 104.2 | 17.8 | 92.3  | 16.8 |
| 15* | 87.1  | 10.4  | 111.2 | 12.5 | 99.2  | 17.0 |
| 16* | 91.3  | 19.6  | 106.5 | 23.2 | 98.9  | 10.8 |
| 17* | 64.3  | 6.3   | 101.3 | 14.1 | 82.8  | 26.2 |
| 18* | 99.0  | 18.7  | 101.6 | 28.4 | 100.3 | 1.8  |
| 19* | 75.7  | 11.1  | 90.1  | 16.0 | 82.9  | 10.2 |
| 20* | 35.2  | 7.4   | 45.6  | 12.1 | 40.4  | 7.3  |
| 21* | 32.7  | 7.0   | 35.0  | 11.0 | 33.9  | 1.6  |
| 22* | 49.3  | 4.8   | 61.6  | 5.2  | 55.4  | 8.7  |
| 23* | 76.2  | 16.4  | 86.0  | 20.5 | 81.1  | 6.9  |
| 24* | 22.7  | 4.6   | 38.0  | 7.1  | 30.4  | 10.8 |
| 25* | 110.6 | 19.0  | 103.6 | 19.7 | 107.1 | 4.9  |
| 26* | 57.2  | 16.0  | 67.9  | 16.1 | 62.6  | 7.6  |
| 27* | 66.4  | 11.2  | 78.6  | 11.9 | 72.5  | 8.6  |
| 28* | 100.0 | 22.1  | 134.8 | 21.6 | 117.4 | 24.6 |
| 29* | 53.2  | 13.3  | 58.1  | 13.8 | 55.6  | 3.5  |
| 30* | 42.7  | 10.6  | 66.5  | 15.3 | 54.6  | 16.8 |
| 31* | 46.2  | 5.8   | 89.9  | 12.6 | 68.0  | 31.0 |
| 32* | 59.9  | 12.1  | 73.3  | 11.8 | 66.6  | 9.5  |
| 33* | 29.4  | 5.5   | 38.5  | 7.4  | 33.9  | 6.4  |
| 34* | 92.3  | 19.3  | 127.0 | 18.3 | 109.7 | 24.6 |
| 35* | 95.5  | 25.6  | 120.3 | 27.5 | 107.9 | 17.5 |
| 36* | 69.9  | 20.9  | 102.1 | 33.2 | 86.0  | 22.8 |
| 37* | 57.1  | 20.6  | 82.3  | 22.0 | 69.7  | 17.8 |
| 38* | 53.7  | 12.9  | 70.4  | 14.8 | 62.1  | 11.8 |
| 39* | 87.5  | 19.1  | 107.1 | 26.1 | 97.3  | 13.8 |
| 40* | 67.7  | 16.2  | 93.7  | 26.9 | 80.7  | 18.4 |
| 41* | 78.5  | 16.1  | 94.7  | 14.0 | 86.6  | 11.5 |
| 42* | 43.0  | 5.8   | 39.2  | 5.7  | 41.1  | 2.7  |
| 43* | 25.8  | 4.7   | 29.7  | 5.4  | 27.7  | 2.8  |
| 44* | 55.4  | 7.6   | 72.2  | 8.6  | 63.8  | 11.9 |
| 45* | 78.0  | 7.7   | 101.9 | 7.2  | 89.9  | 16.9 |
| 46* | 53.4  | 38.0  | 118.6 | 56.2 | 86.0  | 46.1 |
| 47* | 69.1  | 10.8  | 87.4  | 13.8 | 78.2  | 12.9 |
| 48* | 155.7 | 107.9 | 73.6  | 57.4 | 114.7 | 58.0 |
| 49  | 57.1  | 9.2   | 62.7  | 11.9 | 59.9  | 3.9  |
| 50  | 61.2  | 6.3   | 76.6  | 7.7  | 68.9  | 10.9 |
| 51  | 37.8  | 6.3   | 38.1  | 7.6  | 38.0  | 0.2  |
| 52  | 32.6  | 5.7   | 35.9  | 8.4  | 34.2  | 2.3  |
| 53  | 50.4  | 3.8   | 60.5  | 6.5  | 55.4  | 7.1  |
| 54  | 41.8  | 9.4   | 51.4  | 12.0 | 46.6  | 6.8  |
| 55  | 58.5  | 8.0   | 57.5  | 11.4 | 58.0  | 0.7  |
| 56  | 82.7  | 14.0  | 86.3  | 17.9 | 84.5  | 2.5  |

|     |       |       |       |      |       |      |
|-----|-------|-------|-------|------|-------|------|
| 57  | 59.9  | 5.9   | 64.3  | 5.5  | 62.1  | 3.1  |
| 58  | 90.3  | 11.2  | 87.7  | 10.9 | 89.0  | 1.9  |
| 59  | 78.7  | 8.1   | 83.8  | 7.3  | 81.3  | 3.6  |
| 60  | 40.2  | 8.8   | 35.7  | 8.0  | 37.9  | 3.2  |
| 61  | 46.5  | 8.6   | 49.6  | 8.7  | 48.1  | 2.2  |
| 62  | 33.4  | 6.5   | 38.3  | 7.2  | 35.9  | 3.5  |
| 63  | 30.7  | 5.0   | 41.2  | 6.5  | 36.0  | 7.4  |
| 64  | 60.0  | 11.9  | 48.1  | 9.6  | 54.1  | 8.4  |
| 65  | 39.0  | 5.5   | 39.0  | 6.1  | 39.0  | 0.1  |
| 66  | 30.3  | 3.4   | 25.6  | 3.6  | 28.0  | 3.3  |
| 67  | 14.2  | 3.6   | 17.0  | 3.7  | 15.6  | 1.9  |
| 68  | 33.4  | 5.2   | 28.6  | 5.2  | 31.0  | 3.4  |
| 69  | 27.9  | 1.9   | 32.7  | 4.3  | 30.3  | 3.4  |
| 70  | 11.0  | 1.2   | 12.4  | 1.7  | 11.7  | 1.0  |
| 71  | 74.5  | 6.9   | 87.7  | 7.5  | 81.1  | 9.3  |
| 72  | 88.7  | 7.1   | 83.0  | 7.8  | 85.8  | 4.1  |
| 73  | 41.3  | 12.4  | 46.3  | 5.4  | 43.8  | 3.5  |
| 74  | 77.9  | 28.7  | 99.8  | 29.7 | 88.9  | 15.4 |
| 75  | 45.8  | 20.7  | 86.2  | 21.2 | 66.0  | 28.6 |
| 76  | 81.9  | 13.4  | 86.9  | 15.8 | 84.4  | 3.5  |
| 77  | 94.3  | 14.9  | 105.8 | 13.8 | 100.0 | 8.2  |
| 78  | 73.6  | 10.1  | 84.8  | 12.6 | 79.2  | 7.9  |
| 79  | 41.2  | 8.6   | 47.3  | 9.2  | 44.2  | 4.3  |
| 80  | 68.6  | 6.7   | 91.5  | 8.5  | 80.0  | 16.2 |
| 81  | 60.5  | 5.8   | 67.7  | 10.2 | 64.1  | 5.1  |
| 82  | 49.4  | 21.3  | 49.5  | 12.3 | 49.5  | 0.1  |
| 83  | 65.4  | 7.3   | 85.3  | 10.4 | 75.4  | 14.1 |
| 84  | 66.2  | 10.2  | 60.9  | 11.2 | 63.5  | 3.8  |
| 85  | 67.7  | 4.9   | 78.3  | 6.6  | 73.0  | 7.5  |
| 86  | 58.2  | 7.3   | 71.3  | 9.5  | 64.7  | 9.3  |
| 87  | 66.2  | 4.9   | 79.2  | 8.8  | 72.7  | 9.2  |
| 88  | 82.1  | 11.0  | 94.1  | 15.9 | 88.1  | 8.5  |
| 89  | 83.4  | 56.0  | 48.4  | 20.8 | 65.9  | 24.8 |
| 90  | 67.7  | 9.7   | 67.3  | 9.1  | 67.5  | 0.3  |
| 91  | 56.9  | 23.8  | 55.5  | 22.0 | 56.2  | 1.0  |
| 92  | 83.5  | 8.7   | 84.2  | 9.2  | 83.9  | 0.4  |
| 93  | 49.2  | 4.3   | 45.6  | 5.4  | 47.4  | 2.5  |
| 94  | 62.6  | 6.2   | 79.6  | 9.5  | 71.1  | 12.1 |
| 95  | 43.8  | 9.1   | 48.4  | 10.3 | 46.1  | 3.2  |
| 96  | 47.6  | 6.8   | 48.7  | 6.1  | 48.1  | 0.7  |
| 97  | 127.0 | 110.9 | 66.2  | 54.3 | 96.6  | 43.0 |
| 98  | 56.9  | 5.5   | 68.5  | 5.4  | 62.7  | 8.2  |
| 99  | 83.0  | 6.1   | 84.6  | 9.6  | 83.8  | 1.1  |
| 100 | 72.1  | 25.4  | 137.4 | 41.3 | 104.7 | 46.2 |
| 101 | 39.0  | 6.9   | 48.5  | 9.0  | 43.8  | 6.7  |
| 102 | 55.8  | 6.4   | 74.0  | 10.7 | 64.9  | 12.9 |
| 103 | 21.6  | 10.5  | 41.7  | 15.9 | 31.6  | 14.2 |

|     |       |      |       |      |      |      |
|-----|-------|------|-------|------|------|------|
| 104 | 12.6  | 7.3  | 15.9  | 11.4 | 14.2 | 2.3  |
| 105 | 17.6  | 3.1  | 60.0  | 6.8  | 38.8 | 30.0 |
| 106 | 3.3   | 0.6  | 13.9  | 5.1  | 8.6  | 7.5  |
| 107 | 6.4   | 1.5  | 22.9  | 5.2  | 14.7 | 11.7 |
| 108 | 17.7  | 2.9  | 44.6  | 8.3  | 31.1 | 19.1 |
| 109 | 15.8  | 10.0 | 57.0  | 30.9 | 36.4 | 29.2 |
| 110 | 12.1  | 1.4  | 49.2  | 5.2  | 30.6 | 26.2 |
| 111 | 27.8  | 6.9  | 50.5  | 12.1 | 39.2 | 16.1 |
| 112 | 28.8  | 15.5 | 64.5  | 27.3 | 46.7 | 25.2 |
| 113 | 20.7  | 3.0  | 40.6  | 5.4  | 30.6 | 14.1 |
| 114 | 37.7  | 17.1 | 71.2  | 22.6 | 54.4 | 23.7 |
| 115 | 17.5  | 6.2  | 30.2  | 11.8 | 23.9 | 9.0  |
| 116 | 63.9  | 9.2  | 86.9  | 11.8 | 75.4 | 16.3 |
| 117 | 30.5  | 2.9  | 39.4  | 4.1  | 34.9 | 6.3  |
| 118 | 43.9  | 10.9 | 61.8  | 14.2 | 52.9 | 12.7 |
| 119 | 44.0  | 5.2  | 57.4  | 8.7  | 50.7 | 9.5  |
| 120 | 38.1  | 12.1 | 55.8  | 15.3 | 46.9 | 12.5 |
| 121 | 59.4  | 29.3 | 86.1  | 35.7 | 72.8 | 18.9 |
| 122 | 62.6  | 12.2 | 81.9  | 13.3 | 72.3 | 13.7 |
| 123 | 55.7  | 19.8 | 85.2  | 30.5 | 70.5 | 20.8 |
| 124 | 35.2  | 8.0  | 80.9  | 21.6 | 58.1 | 32.4 |
| 125 | 57.3  | 8.2  | 71.1  | 7.1  | 64.2 | 9.7  |
| 126 | 86.3  | 21.0 | 88.9  | 25.2 | 87.6 | 1.8  |
| 127 | 83.4  | 15.4 | 106.5 | 22.9 | 94.9 | 16.3 |
| 128 | 119.6 | 61.8 | 78.2  | 59.0 | 98.9 | 29.3 |
| 129 | 88.0  | 14.9 | 94.3  | 16.8 | 91.2 | 4.4  |
| 130 | 94.3  | 68.0 | 83.8  | 54.1 | 89.1 | 7.5  |
| 131 | 50.2  | 17.0 | 66.4  | 14.8 | 58.3 | 11.5 |
| 132 | 50.9  | 5.1  | 47.6  | 4.6  | 49.3 | 2.4  |
| 133 | 33.1  | 18.1 | 45.3  | 13.4 | 39.2 | 8.6  |
| 134 | 38.7  | 21.1 | 61.9  | 25.4 | 50.3 | 16.4 |
| 135 | --    | --   | 52.6  | 31.5 | 52.6 | 31.5 |
| 136 | 34.2  | 10.0 | 37.6  | 10.1 | 35.9 | 2.4  |
| 137 | 92.8  | 24.3 | 92.7  | 21.9 | 92.8 | 0.1  |
| 138 | 49.7  | 14.6 | 48.9  | 11.4 | 49.3 | 0.6  |
| 139 | 74.2  | 11.0 | 86.8  | 11.9 | 80.5 | 8.9  |
| 140 | 91.6  | 25.4 | 92.3  | 27.1 | 91.9 | 0.5  |
| 141 | 61.9  | 7.5  | 64.1  | 8.2  | 63.0 | 1.6  |
| 142 | 60.3  | 10.8 | 72.7  | 17.4 | 66.5 | 8.8  |
| 143 | 136.6 | 56.4 | 55.2  | 41.9 | 95.9 | 57.6 |
| 144 | 121.2 | 42.0 | 59.0  | 29.7 | 90.1 | 44.0 |
| 145 | 83.5  | 10.9 | 87.6  | 12.3 | 85.5 | 2.9  |
| 146 | 73.6  | 7.3  | 67.9  | 4.9  | 70.7 | 4.0  |
| 147 | 104.3 | 16.4 | 77.3  | 8.5  | 90.8 | 19.1 |
| 148 | 84.2  | 12.7 | 81.0  | 10.8 | 82.6 | 2.3  |
| 149 | 53.4  | 9.7  | 58.5  | 11.8 | 55.9 | 3.6  |
| 150 | 77.3  | 25.8 | 69.8  | 23.9 | 73.5 | 5.4  |

|     |       |      |       |      |       |      |
|-----|-------|------|-------|------|-------|------|
| 151 | 108.2 | 43.9 | 120.3 | 39.8 | 114.3 | 8.5  |
| 152 | 66.5  | 12.1 | 56.5  | 11.2 | 61.5  | 7.1  |
| 153 | 43.3  | 6.4  | 57.9  | 11.6 | 50.6  | 10.4 |
| 154 | 78.7  | 8.2  | 78.4  | 9.0  | 78.5  | 0.2  |
| 155 | 86.6  | 8.1  | 69.9  | 7.7  | 78.3  | 11.8 |
| 156 | 36.0  | 4.9  | 40.7  | 4.3  | 38.3  | 3.3  |
| 157 | 39.6  | 3.7  | 31.2  | 3.2  | 35.4  | 5.9  |
| 158 | 25.2  | 11.5 | 26.4  | 11.8 | 25.8  | 0.8  |
| 159 | 24.6  | 7.4  | 22.5  | 6.1  | 23.6  | 1.5  |
| 160 | 101.4 | 17.4 | 86.1  | 16.5 | 93.7  | 10.8 |
| 161 | 90.3  | 12.2 | 65.3  | 16.3 | 77.8  | 17.7 |
| 162 | 74.4  | 11.1 | 66.2  | 12.6 | 70.3  | 5.8  |
| 163 | 19.5  | 2.8  | 10.2  | 2.2  | 14.8  | 6.6  |
| 164 | 23.3  | 2.6  | 18.1  | 3.6  | 20.7  | 3.6  |
| 165 | 16.7  | 7.7  | 10.4  | 4.2  | 13.6  | 4.5  |
| 166 | 27.2  | 4.2  | 23.2  | 2.7  | 25.2  | 2.8  |
| 167 | 87.0  | 10.1 | 77.9  | 8.7  | 82.5  | 6.4  |
| 168 | 116.7 | 39.9 | 89.4  | 27.8 | 103.1 | 19.3 |
| 169 | 100.9 | 7.7  | 87.6  | 5.3  | 94.2  | 9.4  |
| 170 | 95.2  | 22.4 | 83.3  | 18.1 | 89.3  | 8.4  |
| 171 | 47.4  | 10.3 | 42.2  | 9.8  | 44.8  | 3.7  |
| 172 | 63.3  | 14.3 | 43.2  | 10.7 | 53.2  | 14.2 |
| 173 | 55.6  | 10.5 | 48.9  | 8.3  | 52.2  | 4.7  |
| 174 | 45.5  | 6.5  | 38.9  | 7.5  | 42.2  | 4.6  |
| 175 | 45.5  | 15.1 | 33.2  | 13.4 | 39.4  | 8.7  |
| 176 | 30.7  | 7.3  | 30.2  | 6.2  | 30.4  | 0.3  |
| 177 | 46.4  | 7.4  | 45.0  | 5.9  | 45.7  | 1.0  |
| 178 | 38.9  | 4.9  | 41.3  | 5.2  | 40.1  | 1.7  |
| 179 | 63.6  | 12.7 | 49.6  | 14.6 | 56.6  | 9.9  |
| 180 | 80.4  | 9.9  | 72.2  | 8.1  | 76.3  | 5.8  |
| 181 | 68.2  | 7.5  | 50.7  | 7.1  | 59.4  | 12.4 |
| 182 | 37.9  | 22.9 | 53.0  | 24.5 | 45.5  | 10.7 |
| 183 | 93.8  | 20.0 | 89.0  | 17.9 | 91.4  | 3.4  |
| 184 | 95.3  | 21.4 | 132.1 | 24.0 | 113.7 | 26.0 |
| 185 | 77.4  | 5.5  | 79.3  | 9.4  | 78.3  | 1.4  |
| 186 | 55.1  | 3.5  | 39.1  | 4.1  | 47.1  | 11.4 |
| 187 | 69.3  | 37.6 | 78.8  | 30.9 | 74.0  | 6.7  |
| 188 | 81.2  | 15.0 | 66.2  | 14.1 | 73.7  | 10.6 |
| 189 | 57.2  | 15.8 | 58.6  | 12.4 | 57.9  | 1.0  |
| 190 | 69.4  | 29.6 | 70.6  | 28.9 | 70.0  | 0.9  |
| 191 | 77.3  | 8.0  | 62.2  | 7.6  | 69.7  | 10.7 |
| 192 | 79.9  | 42.5 | 67.8  | 28.7 | 73.9  | 8.5  |

NOTE: \* denotes triple-common.

[00248] These results show that DsiRNAs designed to target human SCAP mRNA can inhibit SCAP activity in cells (as determined by a reduced amount of SCAP mRNA in DsiRNA-

transfected cells) and that the nucleotide sequences including the DsiRNA hits are useful for generating RNAi oligonucleotides to inhibit *SCAP* activity. Further, these results demonstrate that multiple *SCAP* target sequences are suitable for the RNAi-mediated inhibition of *SCAP* activity.

**[00249]** Example 3: RNAi Oligonucleotide Inhibition of *SCAP* Activity *In Vitro* – GalXC™-Based Compounds

**[00250]** The DsiRNAs screened in Example 2 are selected for evaluation *in vitro* as GalXC™-based compounds. Briefly, the nucleotide sequences of the DsiRNAs are used to generate corresponding ds RNAi oligonucleotides including a nicked tetraloop GalNAc-conjugated structure (referred to herein as “GalXC™-SCAP oligonucleotides”) having a 36-mer sense strand and a 22-mer antisense strand. Further, the nucleotide sequences for the sense strand and antisense strand of the GalXC™-SCAP oligonucleotides have a distinct pattern of modified nucleotides and phosphorothioate linkages (*see, e.g.*, FIG. 1 for a schematic of the generic structure and chemical modification patterns of the GalXC™-SCAP oligonucleotides). The three adenosine nucleotides of the tetraloop each are conjugated to a GalNAc moiety (CAS#: 14131-60-3).

**[00251]** Table 3: GalXC™-SCAP Oligonucleotides (unmodified).

| GalXC-SCAP Oligo | Sense Strand (passenger; 36-mer)              | SEQ ID NO: | Antisense Strand (guide; 22-mer) | SEQ ID NO: |
|------------------|-----------------------------------------------|------------|----------------------------------|------------|
| 1                | UGUUUGCCUACAUC<br>UACUUAGCAGCCGA<br>AAGGCUGC  | 9          | UAAGUAGAUGUAGGCA<br>AACAGG       | 10         |
| 2                | GUUUUGCCUACAUCU<br>ACUUCAGCAGCCGA<br>AAGGCUGC | 11         | UGAAGUAGAUGUAGGC<br>AAACGG       | 12         |
| 3                | UUUGCCUACAUCUA<br>CUUCUAGCAGCCGA<br>AAGGCUGC  | 13         | UAGAAGUAGAUGUAGG<br>CAAAGG       | 14         |
| 4                | GCCUACAUCUACUU<br>CUCCAAGCAGCCGA<br>AAGGCUGC  | 15         | UUGGAGAAGUAGAUGU<br>AGGCGG       | 16         |
| 5                | AAGAUCGACAUGGU<br>CAAGUAGCAGCCGA<br>AAGGCUGC  | 17         | UACUUGACCAUGUCGA<br>UCUUGG       | 18         |
| 6                | AGAUCGACAUGGUC<br>AAGUCAGCAGCCGA<br>AAGGCUGC  | 19         | UGACUUGACCAUGUCG<br>AUCUGG       | 20         |

|    |                                               |    |                            |    |
|----|-----------------------------------------------|----|----------------------------|----|
| 7  | AUCGACAUGGUCAA<br>GUCCAAGCAGCCGA<br>AAGGCUGC  | 21 | UUGGACUUGACCAUGU<br>CGAUGG | 22 |
| 8  | GUGUUGGUGCUCAC<br>CAAGUAGCAGCCGA<br>AAGGCUGC  | 23 | UACUUGGUGAGCACCA<br>ACACGG | 24 |
| 9  | UGUUGGUGCUCACC<br>AAGUCAGCAGCCGA<br>AAGGCUGC  | 25 | UGACUUGGUGAGCACC<br>AACAGG | 26 |
| 10 | GAGAGCUGGUCCA<br>CAUGAAGCAGCCGA<br>AAGGCUGC   | 27 | UUCAUGAUGGACCAGC<br>UCUCGG | 28 |
| 11 | AGAGCUGGUCCAUC<br>AUGAAAGCAGCCGA<br>AAGGCUGC  | 29 | UUUCAUGAUGGACCAG<br>CUCUGG | 30 |
| 12 | GAGCUGGUCCAUCA<br>UGAAGAGCAGCCGA<br>AAGGCUGC  | 31 | UCUUCAUGAUGGACCA<br>GCUCGG | 32 |
| 13 | AGCUGGUCCAUCAU<br>GAAGAAGCAGCCGA<br>AAGGCUGC  | 33 | UUCUUCAUGAUGGACC<br>AGCUGG | 34 |
| 14 | GCUGGUCCAUCAUG<br>AAGAAAGCAGCCGA<br>AAGGCUGC  | 35 | UUUCUUCAUGAUGGAC<br>CAGCGG | 36 |
| 15 | CUGGUCCAUCAUGA<br>AGAACAGCAGCCGA<br>AAGGCUGC  | 37 | UGUUCUUCAUGAUGGA<br>CCAGGG | 38 |
| 16 | CCGUUGUCUGGAUU<br>GGCAUAGCAGCCGA<br>AAGGCUGC  | 39 | UAUGCCAAUCCAGACA<br>ACGGGG | 40 |
| 17 | UUGUCUGGAUUUGGC<br>AUCCUAGCAGCCGA<br>AAGGCUGC | 41 | UAGGAUGCCAAUCCAG<br>ACAAGG | 42 |
| 18 | UGUCUGGAUUUGGCA<br>UCCUGAGCAGCCGA<br>AAGGCUGC | 43 | UCAGGAUGCCAAUCCA<br>GACAGG | 44 |
| 19 | GUCUGGAUUUGGCAU<br>CCUGGAGCAGCCGA<br>AAGGCUGC | 45 | UCCAGGAUGCCAAUCC<br>AGACGG | 46 |
| 20 | CUGGAUUUGGCAUCC<br>UGGUAAGCAGCCGA<br>AAGGCUGC | 47 | UUACCAGGAUGCCAAU<br>CCAGGG | 48 |
| 21 | UGGAUUUGGCAUCCU<br>GGUAUAGCAGCCGA<br>AAGGCUGC | 49 | UAUACCAGGAUGCCAA<br>UCCAGG | 50 |
| 22 | GGAUUUGGCAUCCUG<br>GUAAUAGCAGCCGA<br>AAGGCUGC | 51 | UUAUACCAGGAUGCCA<br>AUCCGG | 52 |

|    |                                              |    |                            |    |
|----|----------------------------------------------|----|----------------------------|----|
| 23 | GAUUGGCAUCCUGG<br>UAUACAGCAGCCGA<br>AAGGCUGC | 53 | UGUAUACCAGGAUGCC<br>AAUCGG | 54 |
| 24 | AUUGGCAUCCUGGU<br>AUACAAGCAGCCGA<br>AAGGCUGC | 55 | UUGUAUACCAGGAUGC<br>CAAUGG | 56 |
| 25 | CUCCAUCUUCCAC<br>CUGAUAGCAGCCGA<br>AAGGCUGC  | 57 | UAUCAGGUGGGAAGAU<br>GGAGGG | 58 |
| 26 | CAUCUGCCUGUGGG<br>AUGUAAGCAGCCGA<br>AAGGCUGC | 59 | UUACAUCCCACAGGCA<br>GAUGGG | 60 |
| 27 | UCUGCCUGUGGGAU<br>GUACUAGCAGCCGA<br>AAGGCUGC | 61 | UAGUACAUCCCACAGG<br>CAGAGG | 62 |
| 28 | GUGGUGCAAGCUUG<br>GGUGUAGCAGCCGA<br>AAGGCUGC | 63 | UACACCCAAGCUUGCA<br>CCACGG | 64 |
| 29 | UGGUGCAAGCUUGG<br>GUGUCAGCAGCCGA<br>AAGGCUGC | 65 | UGACACCCAAGCUUGC<br>ACCAGG | 66 |
| 30 | GGUGCAAGCUUGGG<br>UGUCAAGCAGCCGA<br>AAGGCUGC | 67 | UUGACACCCAAGCUUG<br>CACCGG | 68 |
| 31 | GUGCAAGCUUGGGU<br>GUCAUAGCAGCCGA<br>AAGGCUGC | 69 | UAUGACACCCAAGCUU<br>GCACGG | 70 |
| 32 | GCAAGCUUGGGUGU<br>CAUCUAGCAGCCGA<br>AAGGCUGC | 71 | UAGAUGACACCCAAGC<br>UUGCGG | 72 |
| 33 | CAAGCUUGGGUGUC<br>AUCUCAGCAGCCGA<br>AAGGCUGC | 73 | UGAGAUGACACCCAAG<br>CUUGGG | 74 |
| 34 | AAGCUUGGGUGUCA<br>UCUCAAGCAGCCGA<br>AAGGCUGC | 75 | UUGAGAUGACACCCAA<br>GCUUGG | 76 |
| 35 | AGCUUGGGUGUCAU<br>CUCAGAGCAGCCGA<br>AAGGCUGC | 77 | UCUGAGAUGACACCCA<br>AGCUGG | 78 |
| 36 | GCUUGGGUGUCAUC<br>UCAGAAGCAGCCGA<br>AAGGCUGC | 79 | UUCUGAGAUGACACCC<br>AAGCGG | 80 |
| 37 | GUGUCUCCUUUUGG<br>GACCUAGCAGCCGA<br>AAGGCUGC | 81 | UAGGUCCCAAAAGGAG<br>ACACGG | 82 |
| 38 | UGUCUCCUUUUGGG<br>ACCUAAGCAGCCGA<br>AAGGCUGC | 83 | UUAGGUCCCAAAAGGA<br>GACAGG | 84 |

|    |                                               |     |                             |     |
|----|-----------------------------------------------|-----|-----------------------------|-----|
| 39 | GGGGACCUUUACA<br>GACAGAGCAGCCGA<br>AAGGCUGC   | 85  | UCUGUCUGUAAACAGGU<br>CCCCGG | 86  |
| 40 | GGGACCUUUACAG<br>ACAGUAGCAGCCGA<br>AAGGCUGC   | 87  | UACUGUCUGUAAACAGG<br>UCCCCG | 88  |
| 41 | GGACCUUUACAGA<br>CAGUCAGCAGCCGA<br>AAGGCUGC   | 89  | UGACUGUCUGUAAACAG<br>GUCCGG | 90  |
| 42 | GACCUUUACAGAC<br>AGUCUAGCAGCCGA<br>AAGGCUGC   | 91  | UAGACUGUCUGUAAACA<br>GGUCGG | 92  |
| 43 | ACCUGUUACAGACA<br>GUCUAAAGCAGCCGA<br>AAGGCUGC | 93  | UUAGACUGUCUGUAAAC<br>AGGUGG | 94  |
| 44 | UGCCAUUGUCUGCA<br>ACUUUAGCAGCCGA<br>AAGGCUGC  | 95  | UAAAGUUGCAGACAAU<br>GGCAGG  | 96  |
| 45 | GCCAUUGUCUGCAA<br>CUUUGAGCAGCCGA<br>AAGGCUGC  | 97  | UCAAAGUUGCAGACAA<br>UGGCGG  | 98  |
| 46 | CCAUUGUCUGCAAC<br>UUUGGAGCAGCCGA<br>AAGGCUGC  | 99  | UCCAAAGUUGCAGACA<br>AUGGGG  | 100 |
| 47 | AUUGUCUGCAACUU<br>UGGCAAGCAGCCGA<br>AAGGCUGC  | 101 | UUGCCAAAGUUGCAGA<br>CAAUGG  | 102 |
| 48 | UCUGCAACUUUGGC<br>AGUGAAGCAGCCGA<br>AAGGCUGC  | 103 | UUCACUGCCAAAGUUG<br>CAGAGG  | 104 |
| 49 | CUACCCACUGCUGA<br>AACUCAGCAGCCGA<br>AAGGCUGC  | 105 | UGAGUUUCAGCAGUGG<br>GUAGGG  | 106 |
| 50 | GCCAGGAACAGGAC<br>CUGUGAGCAGCCGA<br>AAGGCUGC  | 107 | UCACAGGUCCUGUUC<br>UGGCGG   | 108 |
| 51 | GAACAGGACCUUG<br>GAAUUAGCAGCCGA<br>AAGGCUGC   | 109 | UAAUUCCACAGGUCCU<br>GUUCGG  | 110 |
| 52 | ACAGGACCUUGGA<br>AUUCAAGCAGCCGA<br>AAGGCUGC   | 111 | UUGAAUUCCACAGGUC<br>CUGUGG  | 112 |
| 53 | UGGAAUUCACCACC<br>CCUGUAGCAGCCGA<br>AAGGCUGC  | 113 | UACAGGGGUGGUGAAU<br>UCCAGG  | 114 |
| 54 | CUUGUGACCACCUA<br>CAUCAAGCAGCCGA<br>AAGGCUGC  | 115 | UUGAUGUAGGUGGUCA<br>CAAGGG  | 116 |

|    |                                              |     |                            |     |
|----|----------------------------------------------|-----|----------------------------|-----|
| 55 | UUGUGACCACCUAC<br>AUCAUAGCAGCCGA<br>AAGGCUGC | 117 | UAUGAUGUAGGUGGUC<br>ACAAGG | 118 |
| 56 | UGUGACCACCUACA<br>UCAUCAGCAGCCGA<br>AAGGCUGC | 119 | UGAUGAUGUAGGUGGU<br>CACAGG | 120 |
| 57 | GUGACCACCUACAU<br>CAUCUAGCAGCCGA<br>AAGGCUGC | 121 | UAGAUGAUGUAGGUGG<br>UCACGG | 122 |
| 58 | UGACCACCUACAUC<br>AUCUUAGCAGCCGA<br>AAGGCUGC | 123 | UAAGAUGAUGUAGGUG<br>GUCAGG | 124 |
| 59 | GACCACCUACAUCA<br>UCUUGAGCAGCCGA<br>AAGGCUGC | 125 | UCAAGAUGAUGUAGGU<br>GGUCGG | 126 |
| 60 | ACCACCUACAUCAU<br>CUUGUAGCAGCCGA<br>AAGGCUGC | 127 | UACAAGAUGAUGUAGG<br>UGGUGG | 128 |
| 61 | CCACCUACAUCAUC<br>UUGUUAGCAGCCGA<br>AAGGCUGC | 129 | UAACAAGAUGAUGUAG<br>GUGGGG | 130 |
| 62 | CACCUACAUCAUCU<br>UGUUUAGCAGCCGA<br>AAGGCUGC | 131 | UAAACAAGAUGAUGUA<br>GGUGGG | 132 |
| 63 | ACCUACAUCAUCUU<br>GUUUGAGCAGCCGA<br>AAGGCUGC | 133 | UCAAACAAGAUGAUGU<br>AGGUGG | 134 |
| 64 | CCUACAUCAUCUUG<br>UUUGCAGCAGCCGA<br>AAGGCUGC | 135 | UGCAAACAAGAUGAUG<br>UAGGGG | 136 |
| 65 | CUACAUCAUCUUGU<br>UUGCCAGCAGCCGA<br>AAGGCUGC | 137 | UGGCAAACAAGAUGAU<br>GUAGGG | 138 |
| 66 | ACAUCAUCUUGUUU<br>GCCUAAGCAGCCGA<br>AAGGCUGC | 139 | UUAGGCAAACAAGAUG<br>AUGUGG | 140 |
| 67 | AUCAUCUUGUUUGC<br>CUACAAGCAGCCGA<br>AAGGCUGC | 141 | UUGUAGGCAAACAAGA<br>UGAUGG | 142 |
| 68 | UCAUCUUGUUUGCC<br>UACAUAGCAGCCGA<br>AAGGCUGC | 143 | UAUGUAGGCAAACAAG<br>AUGAGG | 144 |
| 69 | AUCUUGUUUGCCUA<br>CAUCUAGCAGCCGA<br>AAGGCUGC | 145 | UAGAUGUAGGCAAACA<br>AGAUGG | 146 |
| 70 | UCUUGUUUGCCUAC<br>AUCUAAGCAGCCGA<br>AAGGCUGC | 147 | UUAGAUGUAGGCAAAC<br>AAGAGG | 148 |

|    |                                              |     |                            |     |
|----|----------------------------------------------|-----|----------------------------|-----|
| 71 | UUUCCCCUACCUUG<br>UGGUGAGCAGCCGA<br>AAGGCUGC | 149 | UCACCACAAGGUAGGG<br>GAAAGG | 150 |
| 72 | UUCCCCUACCUUGU<br>GGUGGAGCAGCCGA<br>AAGGCUGC | 151 | UCCACCACAAGGUAGG<br>GGAAGG | 152 |
| 73 | CCCUACCUUGUGGU<br>GGUUAAGCAGCCGA<br>AAGGCUGC | 153 | UUAACCACCACAAGGU<br>AGGGGG | 154 |
| 74 | CUACCUUGUGGUGG<br>UUAUUAGCAGCCGA<br>AAGGCUGC | 155 | UAAUAACCACCACAAG<br>GUAGGG | 156 |
| 75 | UACCUUGUGGUGGU<br>UAUUGAGCAGCCGA<br>AAGGCUGC | 157 | UCAUAACCACCACAA<br>GGUAGG  | 158 |
| 76 | ACCUUGUGGUGGUU<br>AUUGGAGCAGCCGA<br>AAGGCUGC | 159 | UCCAAUAACCACCACA<br>AGGUGG | 160 |
| 77 | CCUUGUGGUGGUUA<br>UUGGGAGCAGCCGA<br>AAGGCUGC | 161 | UCCCAAUAACCACCACA<br>AGGGG | 162 |
| 78 | CUUGUGGUGGUUA<br>UUGGGUAGCAGCCG<br>AAAGGCUGC | 163 | UACCCAAUAACCACCAC<br>AAGGG | 164 |
| 79 | UUGUGGUGGUUAU<br>UGGGUUAGCAGCCG<br>AAAGGCUGC | 165 | UAACCCAAUAACCACC<br>ACAAGG | 166 |
| 80 | UGUGGUGGUUAU<br>GGGUUAAGCAGCCG<br>AAAGGCUGC  | 167 | UUAACCCAAUAACCAC<br>CACAGG | 168 |
| 81 | GUGGUGGUUAUUG<br>GGUUAGAGCAGCCG<br>AAAGGCUGC | 169 | UCUAACCCAAUAACCA<br>CCACGG | 170 |
| 82 | UGGUGGUUAUUGG<br>GUUAGAAGCAGCCG<br>AAAGGCUGC | 171 | UUCUAACCCAAUAACC<br>ACCAGG | 172 |
| 83 | GGUGGUUAUUGGG<br>UUAGAGAGCAGCCG<br>AAAGGCUGC | 173 | UCUCUAACCCAAUAAC<br>CACCGG | 174 |
| 84 | GUGGUUAUUGGGU<br>UAGAGAAGCAGCCG<br>AAAGGCUGC | 175 | UUCUCUAACCCAAUAA<br>CCACGG | 176 |
| 85 | UGGUUAUUGGGU<br>AGAGAAAGCAGCCG<br>AAAGGCUGC  | 177 | UUUCUCUAACCCAAUA<br>ACCAGG | 178 |
| 86 | GGUUAUUGGGUUA<br>GAGAAUAGCAGCCG<br>AAAGGCUGC | 179 | UAUUCUCUAACCCAAU<br>AACCGG | 180 |

|     |                                               |     |                            |     |
|-----|-----------------------------------------------|-----|----------------------------|-----|
| 87  | GUUAUUGGGUUAG<br>AGAAUGAGCAGCCG<br>AAAGGCUGC  | 181 | UCAUUCUCUAACCCAA<br>UAACGG | 182 |
| 88  | UUAUUGGGUUAGA<br>GAAUGUAGCAGCCG<br>AAAGGCUGC  | 183 | UACAUUCUCUAACCCA<br>AUAAGG | 184 |
| 89  | AUUGGGUUAGAGA<br>AUGUGUAGCAGCCG<br>AAAGGCUGC  | 185 | UACACAUUCUCUAACC<br>CAAUGG | 186 |
| 90  | UUGGGUUAGAGAA<br>UGUGUUAGCAGCCG<br>AAAGGCUGC  | 187 | UAACACAUUCUCUAAC<br>CCAAGG | 188 |
| 91  | GGUUAGAGAAUGU<br>GUUGGUAGCAGCCG<br>AAAGGCUGC  | 189 | UACCAACACAUUCUCU<br>AACCGG | 190 |
| 92  | GUUAGAGAAUGUG<br>UUGGUGAGCAGCCG<br>AAAGGCUGC  | 191 | UCACCAACACAUUCUC<br>UAACGG | 192 |
| 93  | UUAGAGAAUGUGU<br>UGGUGCAGCAGCCG<br>AAAGGCUGC  | 193 | UGCACCAACACAUUCU<br>CUAAGG | 194 |
| 94  | UAGAGAAUGUGUU<br>GGUGCUAGCAGCCG<br>AAAGGCUGC  | 195 | UAGCACCAACACAUUC<br>UCUAGG | 196 |
| 95  | AGAGAAUGUGUUG<br>GUGCUCAGCAGCCG<br>AAAGGCUGC  | 197 | UGAGCACCAACACAUU<br>CUCUGG | 198 |
| 96  | GAGAAUGUGUUGG<br>UGCUC AAGCAGCCG<br>AAAGGCUGC | 199 | UUGAGCACCAACACAU<br>UCUCGG | 200 |
| 97  | AGAAUGUGUUGGU<br>GCUCACAGCAGCCG<br>AAAGGCUGC  | 201 | UGUGAGCACCAACACA<br>UUCUGG | 202 |
| 98  | AAUGUGUUGGUGC<br>UCACCAAGCAGCCG<br>AAAGGCUGC  | 203 | UUGGUGAGCACCAACA<br>CAUUGG | 204 |
| 99  | AUGUGUUGGUGCUC<br>ACCAAAGCAGCCGA<br>AAGGCUGC  | 205 | UUUGGUGAGCACCAAC<br>ACAUGG | 206 |
| 100 | UGUGUUGGUGCUC<br>CCAAGAGCAGCCGA<br>AAGGCUGC   | 207 | UCUUGGUGAGCACCAA<br>CACAGG | 208 |
| 101 | UGGUCCAUCAUGAA<br>GAACAAGCAGCCGA<br>AAGGCUGC  | 209 | UUGUUCUUCAUGAUGG<br>ACCAGG | 210 |
| 102 | GGUCCAUCAUGAAG<br>AACAUAGCAGCCGA<br>AAGGCUGC  | 211 | UAUGUUCUUCAUGAUG<br>GACCGG | 212 |

|     |                                               |     |                            |     |
|-----|-----------------------------------------------|-----|----------------------------|-----|
| 103 | CUGACUUCUCCUU<br>CAGAUAGCAGCCGA<br>AAGGCUGC   | 213 | UAUCUGAAGGAAGAAG<br>UCAGGG | 214 |
| 104 | ACUUCUCCUUCAG<br>AUGCUAGCAGCCGA<br>AAGGCUGC   | 215 | UAGCAUCUGAAGGAAG<br>AAGUGG | 216 |
| 105 | UCCUUCAGAUGCUG<br>UUUUUAGCAGCCGA<br>AAGGCUGC  | 217 | UAAAAACAGCAUCUGA<br>AGGAGG | 218 |
| 106 | CCUUCAGAUGCUGU<br>UUUUCAGCAGCCGA<br>AAGGCUGC  | 219 | UGAAAAACAGCAUCUG<br>AAGGGG | 220 |
| 107 | CUUCAGAUGCUGUU<br>UUUCAAGCAGCCGA<br>AAGGCUGC  | 221 | UUGAAAAACAGCAUCU<br>GAAGGG | 222 |
| 108 | UUCAGAUGCUGUUU<br>UUCACAGCAGCCGA<br>AAGGCUGC  | 223 | UGUGAAAAACAGCAUC<br>UGAAGG | 224 |
| 109 | CAGAUGCUGUUUUU<br>CACCAAGCAGCCGA<br>AAGGCUGC  | 225 | UUGGUGAAAAACAGCA<br>UCUGGG | 226 |
| 110 | AGAUGCUGUUUUUC<br>ACCACAGCAGCCGA<br>AAGGCUGC  | 227 | UGUGGUGAAAAACAGC<br>AUCUGG | 228 |
| 111 | GAUGCUGUUUUUCA<br>CCACUAGCAGCCGA<br>AAGGCUGC  | 229 | UAGUGGUGAAAAACAG<br>CAUCGG | 230 |
| 112 | AUGCUGUUUUUCAC<br>CACUGAGCAGCCGA<br>AAGGCUGC  | 231 | UCAGUGGUGAAAAACA<br>GCAUGG | 232 |
| 113 | UGCUGUUUUUCACC<br>ACUGUAGCAGCCGA<br>AAGGCUGC  | 233 | UACAGUGGUGAAAAAC<br>AGCAGG | 234 |
| 114 | GCUGUUUUUCACCA<br>CUGUCAGCAGCCGA<br>AAGGCUGC  | 235 | UGACAGUGGUGAAAAA<br>CAGCGG | 236 |
| 115 | UGUUUUUCACCACU<br>GUCCUAGCAGCCGA<br>AAGGCUGC  | 237 | UAGGACAGUGGUGAAA<br>AACAGG | 238 |
| 116 | GUUUUUUCACCACUG<br>UCCUGAGCAGCCGA<br>AAGGCUGC | 239 | UCAGGACAGUGGUGAA<br>AAACGG | 240 |
| 117 | UUUUUCACCACUGU<br>CCUGUAGCAGCCGA<br>AAGGCUGC  | 241 | UACAGGACAGUGGUGA<br>AAAAGG | 242 |
| 118 | UUUUCACCACUGUC<br>CUGUCAGCAGCCGA<br>AAGGCUGC  | 243 | UGACAGGACAGUGGUG<br>AAAAGG | 244 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 119 | UUCACCACUGUCCU<br>GUCCAAGCAGCCGA<br>AAGGCUGC | 245 | UUGGACAGGACAGUGG<br>UGAAGG | 246 |
| 120 | CACCACUGUCCUGU<br>CCAUUAGCAGCCGA<br>AAGGCUGC | 247 | UAAUGGACAGGACAGU<br>GGUGGG | 248 |
| 121 | ACCACUGUCCUGUC<br>CAUUGAGCAGCCGA<br>AAGGCUGC | 249 | UCAAUGGACAGGACAG<br>UGGUGG | 250 |
| 122 | CCACUGUCCUGUCC<br>AUUGAAGCAGCCGA<br>AAGGCUGC | 251 | UUCAUGGACAGGACA<br>GUGGGG  | 252 |
| 123 | CACUGUCCUGUCCA<br>UUGACAGCAGCCGA<br>AAGGCUGC | 253 | UGUCAUUGGACAGGAC<br>AGUGGG | 254 |
| 124 | ACUGUCCUGUCCAU<br>UGACAAGCAGCCGA<br>AAGGCUGC | 255 | UUGUCAUUGGACAGGA<br>CAGUGG | 256 |
| 125 | CUAAGCUACCUGAG<br>AACCAAGCAGCCGA<br>AAGGCUGC | 257 | UUGGUUCUCAGGUAGC<br>UUAGGG | 258 |
| 126 | GAGGUCCAGCAGAG<br>GUUGUAGCAGCCGA<br>AAGGCUGC | 259 | UACAACCUCUGCUGGA<br>CCUCGG | 260 |
| 127 | GCAGAGGUUGUCCA<br>UGACAAGCAGCCGA<br>AAGGCUGC | 261 | UUGUCAUGGACAACCU<br>CUGCGG | 262 |
| 128 | CAGAGGUUGUCCAU<br>GACAGAGCAGCCGA<br>AAGGCUGC | 263 | UCUGUCAUGGACAACC<br>UCUGGG | 264 |
| 129 | GAGGAUGAGGAAC<br>UUUGGAAGCAGCCG<br>AAAGGCUGC | 265 | UUCCAAAGUUCCUCAU<br>CCUCGG | 266 |
| 130 | GAACUUUGGAGGA<br>AAUUGUAGCAGCCG<br>AAAGGCUGC | 267 | UACAAUUUCCUCCAAA<br>GUUCGG | 268 |
| 131 | GACGCUCUUCAGCU<br>AUUACAGCAGCCGA<br>AAGGCUGC | 269 | UGUAAUAGCUGAAGAG<br>CGUCGG | 270 |
| 132 | ACGCUCUUCAGCUA<br>UUACAAGCAGCCGA<br>AAGGCUGC | 271 | UUGUAAUAGCUGAAGA<br>GCGUGG | 272 |
| 133 | CGCUCUUCAGCUAU<br>UACAAAGCAGCCGA<br>AAGGCUGC | 273 | UUUGUAAUAGCUGAAG<br>AGCGGG | 274 |
| 134 | GCUCUUCAGCUAUU<br>ACAACAGCAGCCGA<br>AAGGCUGC | 275 | UGUUGUAAUAGCUGAA<br>GAGCGG | 276 |

|     |                                               |     |                            |     |
|-----|-----------------------------------------------|-----|----------------------------|-----|
| 135 | CUCUUCAGCUAUUA<br>CAACAAGCAGCCGA<br>AAGGCUGC  | 277 | UUGUUGUAAUAGCUGA<br>AGAGGG | 278 |
| 136 | UCUUCAGCUAUUAC<br>AACAUAGCAGCCGA<br>AAGGCUGC  | 279 | UAUGUUGUAAUAGCUG<br>AAGAGG | 280 |
| 137 | CUUCAGCUAUUACA<br>ACAUCAGCAGCCGA<br>AAGGCUGC  | 281 | UGAUGUUGUAAUAGCU<br>GAAGGG | 282 |
| 138 | UUCAGCUAUUACAA<br>CAUCAAGCAGCCGA<br>AAGGCUGC  | 283 | UUGAUGUUGUAAUAGC<br>UGAAGG | 284 |
| 139 | CCAGCCUGACCUCA<br>CCUGCAGCAGCCGA<br>AAGGCUGC  | 285 | UGCAGGUGAGGUCAGG<br>CUGGGG | 286 |
| 140 | CAGCCUGACCUCAC<br>CUGCUAGCAGCCGA<br>AAGGCUGC  | 287 | UAGCAGGUGAGGUCAG<br>GCUGGG | 288 |
| 141 | AGCCUGACCUCACC<br>UGC UUAGCAGCCGA<br>AAGGCUGC | 289 | UAAGCAGGUGAGGUCA<br>GGCUGG | 290 |
| 142 | GCCUGACCUCACCU<br>GCUUAAGCAGCCGA<br>AAGGCUGC  | 291 | UUAAGCAGGUGAGGUC<br>AGGCGG | 292 |
| 143 | CCUGACCUCACCUG<br>CUUAAAGCAGCCGA<br>AAGGCUGC  | 293 | UUUAAGCAGGUGAGGU<br>CAGGGG | 294 |
| 144 | CUGACCUCACCUGC<br>UUA AUAGCAGCCGA<br>AAGGCUGC | 295 | UAUUAAGCAGGUGAGG<br>UCAGGG | 296 |
| 145 | UGACCUCACCUGCU<br>UAAUUAAGCAGCCGA<br>AAGGCUGC | 297 | UAAUUAAGCAGGUGAG<br>GUCAGG | 298 |
| 146 | GACCUCACCUGCUU<br>AAUUGAGCAGCCGA<br>AAGGCUGC  | 299 | UCAAUUAAGCAGGUGA<br>GGUCGG | 300 |
| 147 | ACCUCACCUGCUUA<br>AUUGAAGCAGCCGA<br>AAGGCUGC  | 301 | UUCAAUUAAGCAGGUG<br>AGGUGG | 302 |
| 148 | CCUCACCUGCUUAA<br>UUGACAGCAGCCGA<br>AAGGCUGC  | 303 | UGUCAAUUAAGCAGGU<br>GAGGGG | 304 |
| 149 | CUCACCUGCUUAAU<br>UGACAAGCAGCCGA<br>AAGGCUGC  | 305 | UUGUCAAUUAAGCAGG<br>UGAGGG | 306 |
| 150 | UCACCUGCUUAAUU<br>GACACAGCAGCCGA<br>AAGGCUGC  | 307 | UGUGUCAAUUAAGCAG<br>GUGAGG | 308 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 151 | CACCUGCUUAAUUG<br>ACACCAGCAGCCGA<br>AAGGCUGC | 309 | UGGUGUCAAUUAAGCA<br>GGUGGG | 310 |
| 152 | ACCUGCUUAAUUGA<br>CACCAAGCAGCCGA<br>AAGGCUGC | 311 | UUGGUGUCAAUUAAGC<br>AGGUGG | 312 |
| 153 | CCUGCUUAAUUGAC<br>ACCAAAGCAGCCGA<br>AAGGCUGC | 313 | UUUGGUGUCAAUUAAG<br>CAGGGG | 314 |
| 154 | CUGCUUAAUUGACA<br>CCAACAGCAGCCGA<br>AAGGCUGC | 315 | UGUUGGUGUCAAUUA<br>GCAGGG  | 316 |
| 155 | UGC UAAUUGACAC<br>CAACUAGCAGCCGA<br>AAGGCUGC | 317 | UAGUUGGUGUCAAUUA<br>AGCAGG | 318 |
| 156 | GCUUAAUUGACACC<br>AACUAGCAGCCGA<br>AAGGCUGC  | 319 | UAAGUUGGUGUCAAUU<br>AAGCGG | 320 |
| 157 | CUUAAUUGACACCA<br>ACUUUAGCAGCCGA<br>AAGGCUGC | 321 | UAAAGUUGGUGUCAAU<br>UAAGGG | 322 |
| 158 | UUAUUGACACCAA<br>CUUUUAGCAGCCGA<br>AAGGCUGC  | 323 | UAAAAGUUGGUGUCA<br>UUAAGG  | 324 |
| 159 | UAAUUGACACCAAC<br>UUUUCAGCAGCCGA<br>AAGGCUGC | 325 | UGAAAAGUUGGUGUCA<br>AUUAGG | 326 |
| 160 | AUUGAAGGGGUGC<br>UGUGCUAGCAGCCG<br>AAAGGCUGC | 327 | UAGCACAGCACCCUUC<br>AAUGG  | 328 |
| 161 | CUUGGACAAAAGGA<br>UUGUGAGCAGCCGA<br>AAGGCUGC | 329 | UCACAAUCCUUUUGUC<br>CAAGGG | 330 |
| 162 | UUGGACAAAAGGA<br>UUGUGGAGCAGCCG<br>AAAGGCUGC | 331 | UCCACAAUCCUUUUGU<br>CCAAGG | 332 |
| 163 | UCAACGGUUCCCUU<br>GAUUUAGCAGCCGA<br>AAGGCUGC | 333 | UAAAUCAAGGGAACCG<br>UUGAGG | 334 |
| 164 | CAACGGUUCCCUUG<br>AUUUCAGCAGCCGA<br>AAGGCUGC | 335 | UGAAAUCAAGGGAACC<br>GUUGGG | 336 |
| 165 | AACGGUUCCCUUGA<br>UUUCUAGCAGCCGA<br>AAGGCUGC | 337 | UAGAAAUCAAGGGAAC<br>CGUUGG | 338 |
| 166 | ACGGUUCCCUUGAU<br>UUCUAGCAGCCGA<br>AAGGCUGC  | 339 | UAAGAAAUCAAGGGAA<br>CCGUGG | 340 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 167 | GUACAUUGACCAGA<br>CCAUGAGCAGCCGA<br>AAGGCUGC | 341 | UCAUGGUCUGGUCAAU<br>GUACGG | 342 |
| 168 | ACCUGUACCACCUC<br>CUGUGAGCAGCCGA<br>AAGGCUGC | 343 | UCACAGGAGGUGGUAC<br>AGGUGG | 344 |
| 169 | CCUGUACCACCUC<br>UGUGUAGCAGCCGA<br>AAGGCUGC  | 345 | UACACAGGAGGUGGUA<br>CAGGGG | 346 |
| 170 | GUACCACCUCUGU<br>GUCAUAGCAGCCGA<br>AAGGCUGC  | 347 | UAUGACACAGGAGGUG<br>GUACGG | 348 |
| 171 | GCACAGGCAUCAAG<br>UUCUAAGCAGCCGA<br>AAGGCUGC | 349 | UUAGAACUUGAUGCCU<br>GUGCGG | 350 |
| 172 | ACAGGCAUCAAGUU<br>CUACUAGCAGCCGA<br>AAGGCUGC | 351 | UAGUAGAACUUGAUGC<br>CUGUGG | 352 |
| 173 | CAGGCAUCAAGUUC<br>UACUCAGCAGCCGA<br>AAGGCUGC | 353 | UGAGUAGAACUUGAUG<br>CCUGGG | 354 |
| 174 | AGGCAUCAAGUUCU<br>ACUCCAGCAGCCGA<br>AAGGCUGC | 355 | UGGAGUAGAACUUGAU<br>GCCUGG | 356 |
| 175 | GGCAUCAAGUUCUA<br>CUCCAAGCAGCCGA<br>AAGGCUGC | 357 | UUGGAGUAGAACUUGA<br>UGCCGG | 358 |
| 176 | GCAUCAAGUUCUAC<br>UCCAUAGCAGCCGA<br>AAGGCUGC | 359 | UAUGGAGUAGAACUUG<br>AUGCGG | 360 |
| 177 | CAUCAAGUUCUACU<br>CCAUAAGCAGCCGA<br>AAGGCUGC | 361 | UAAUGGAGUAGAACUU<br>GAUGGG | 362 |
| 178 | AUCAAGUUCUACUC<br>CAUUCAGCAGCCGA<br>AAGGCUGC | 363 | UGAAUGGAGUAGAACU<br>UGAUGG | 364 |
| 179 | UCAAGUUCUACUCC<br>AUUCAAGCAGCCGA<br>AAGGCUGC | 365 | UUGAAUGGAGUAGAAC<br>UUGAGG | 366 |
| 180 | CAAGUUCUACUCCA<br>UUCAGAGCAGCCGA<br>AAGGCUGC | 367 | UCUGAAUGGAGUAGAA<br>CUUGGG | 368 |
| 181 | AAGUUCUACUCCA<br>UCAGCAGCAGCCGA<br>AAGGCUGC  | 369 | UGCUGAAUGGAGUAGA<br>ACUUGG | 370 |
| 182 | AGUUCUACUCCA<br>CAGCAAGCAGCCGA<br>AAGGCUGC   | 371 | UUGCUGAAUGGAGUAG<br>AACUGG | 372 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 183 | GUUCUACUCCAUUC<br>AGCAGAGCAGCCGA<br>AAGGCUGC | 373 | UCUGCUGAAUGGAGUA<br>GAACGG | 374 |
| 184 | GUGUCAUCUCAGAC<br>AACCUAGCAGCCGA<br>AAGGCUGC | 375 | UAGGUUGUCUGAGAUG<br>ACACGG | 376 |
| 185 | CAUCUCAGACAACC<br>UGCUGAGCAGCCGA<br>AAGGCUGC | 377 | UCAGCAGGUUGUCUGA<br>GAUGGG | 378 |
| 186 | UCAGACAACCUGCU<br>GGUGAAGCAGCCGA<br>AAGGCUGC | 379 | UUCACCAGCAGGUUGU<br>CUGAGG | 380 |
| 187 | CGGGGACCUGUUAC<br>AGACAAGCAGCCGA<br>AAGGCUGC | 381 | UUGUCUGUACAGGUC<br>CCCCGG  | 382 |
| 188 | GACAACGCUGCCAU<br>UGUCUAGCAGCCGA<br>AAGGCUGC | 383 | UAGACAAUGGCAGCGU<br>UGUCGG | 384 |
| 189 | GCUGCCUCCUGACU<br>GUAAUAGCAGCCGA<br>AAGGCUGC | 385 | UAUUACAGUCAGGAGG<br>CAGCGG | 386 |
| 190 | CUGCCUCCUGACUG<br>UAAUAAGCAGCCGA<br>AAGGCUGC | 387 | UUAUUACAGUCAGGAG<br>GCAGGG | 388 |
| 191 | UAAUAUUAAACUU<br>UUUUAAAGCAGCCG<br>AAAGGCUGC | 389 | UUUAAAAAAGUUUAAU<br>AUUAGG | 390 |
| 192 | AAUAUUAAACUUU<br>UUUAAAAGCAGCCG<br>AAAGGCUGC | 391 | UUUAAAAAAGUUUAA<br>UAUUGG  | 392 |

[00252] Table 4: GalXC™-SCAP Oligonucleotides (modified).

| GalXC-<br>SCAP<br>Oligo | Sense Strand<br>(passenger; 36-mer)                                                                                                                                                                                 | SEQ ID<br>NO: | Antisense Strand<br>(guide; 22-mer)                                                                                            | SEQ ID<br>NO: |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1                       | [mUs][mG][mU][mU][<br>mU][mG][mC][fC][fU][<br>fA][fC][mA][mU][mC][<br>mU][mA][mC][mU][m<br>U][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 393           | [MePhosphonate-4O-<br>mUs][fAs][fAs][fG][fU][mA<br>][fG][mA][mU][fG][mU][m<br>A][mG][fG][mC][mA][mA][<br>mA][mC][mAs][mGs][mG] | 394           |
| 2                       | [mGs][mU][mU][mU][<br>mG][mC][mC][fU][fA][<br>fC][fA][mU][mC][mU][                                                                                                                                                  | 395           | [MePhosphonate-4O-<br>mUs][fGs][fAs][fA][fG][mU<br>][fA][mG][mA][fU][mG][m                                                     | 396           |

|   |                                                                                                                                                                                  |     |                                                                                                                |     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|   | mA][mC][mU][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                           |     | U][mA][fG][mG][mC][mA][mA][mA][mCs][mGs][mG]                                                                   |     |
| 3 | [mUs][mU][mU][mG][mC][mC][mU][fA][fC][fA][fU][mC][mU][mA][mC][mU][mU][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 397 | [MePhosphonate-4O-mUs][fAs][fGs][fA][fA][mG][fU][mA][mG][fA][mU][mG][mU][fA][mG][mC][mA][mA][mAs][mGs][mG]     | 398 |
| 4 | [mGs][mC][mC][mU][mA][mC][mA][fU][fC][fU][fA][mC][mU][mU][mC][mU][mC][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 399 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fA][mG][fA][mA][mG][fU][mA][mG][mA][fU][mG][mU][mA][mG][mG][mCs][mGs][mG] | 400 |
| 5 | [mAs][mA][mG][mA][mU][mC][mG][fA][fC][fA][fU][mG][mG][mU][mC][mA][mA][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 401 | [MePhosphonate-4O-mUs][fAs][fCs][fU][fU][mG][fA][mC][mC][fA][mU][mG][mU][fC][mG][mA][mU][mC][mU][mUs][mGs][mG] | 402 |
| 6 | [mAs][mG][mA][mU][mC][mG][mA][fC][fA][fU][fG][mG][mU][mC][mA][mA][mG][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 403 | [MePhosphonate-4O-mUs][fGs][fAs][fC][fU][mU][fG][mA][mC][fC][mA][mU][mG][fU][mC][mG][mA][mU][mC][mUs][mGs][mG] | 404 |
| 7 | [mAs][mU][mC][mG][mA][mC][mA][fU][fG][fA][fU][mG][mC][mG][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                             | 405 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fA][mC]                                                                   | 406 |

|    |                                                                                                                                                                                  |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | fG][fU][mC][mA][mA][mG][mU][mC][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                       |     | ][fU][mU][mG][fA][mC][mC][mA][fU][mG][mU][mC][mG][mA][mUs][mGs][mG]                                            |     |
| 8  | [mGs][mU][mG][mU][mU][mG][mG][fU][fG][fC][fU][mC][mA][mC][mC][mA][mA][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 407 | [MePhosphonate-4O-mUs][fAs][fCs][fU][mG][fG][mU][mG][fA][mG][mC][mA][fC][mC][mA][mA][mC][mA][mCs][mGs][mG]     | 408 |
| 9  | [mUs][mG][mU][mU][mG][mG][mU][fG][fC][fU][fC][mA][mC][mC][mA][mA][mG][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 409 | [MePhosphonate-4O-mUs][fGs][fAs][fC][fU][mU][fG][mG][mU][fG][mA][mG][mC][fA][mC][mC][mA][mA][mC][mAs][mGs][mG] | 410 |
| 10 | [mGs][mA][mG][mA][mG][mC][mU][fG][fG][fU][fC][mC][mA][mU][mC][mA][mU][mG][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 411 | [MePhosphonate-4O-mUs][fUs][fCs][fA][fU][mG][fA][mU][mG][fG][mA][mC][mC][fA][mG][mC][mU][mC][mU][mCs][mGs][mG] | 412 |
| 11 | [mAs][mG][mA][mG][mC][mU][mG][fG][fU][fC][fC][mA][mU][mC][mA][mU][mG][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 413 | [MePhosphonate-4O-mUs][fUs][fUs][fC][fA][mU][fG][mA][mU][fG][mG][mA][mC][fC][mA][mG][mC][mU][mC][mUs][mGs][mG] | 414 |

|    |                                                                                                                                                                                      |     |                                                                                                                |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 12 | [mGs][mA][mG][mC][mU][mG][mG][fU][fC][fC][fA][mU][mC][mA][mU][mG][mA][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 415 | [MePhosphonate-4O-mUs][fCs][fUs][fU][fC][mA][fU][mG][mA][fU][mG][mG][mA][fC][mC][mA][mG][mC][mU][mCs][mGs][mG] | 416 |
| 13 | [mAs][mG][mC][mU][mG][mG][mU][fC][fC][fA][fU][mC][mA][mU][mG][mA][mA][mG][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 417 | [MePhosphonate-4O-mUs][fUs][fCs][fU][fU][mC][fA][mU][mG][fA][mU][mG][mG][fA][mC][mC][mA][mG][mC][mUs][mGs][mG] | 418 |
| 14 | [mGs][mC][mU][mG][mG][mU][mC][fC][fA][fU][fC][mA][mU][mG][mA][mA][mG][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 419 | [MePhosphonate-4O-mUs][fUs][fUs][fC][fU][mU][fC][mA][mU][fG][mA][mU][mG][fG][mA][mC][mC][mA][mG][mCs][mGs][mG] | 420 |
| 15 | [mCs][mU][mG][mG][mU][mC][mC][fA][fU][fC][fA][mU][mG][mA][mA][mG][mA][mA][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 421 | [MePhosphonate-4O-mUs][fGs][fUs][fU][fC][mU][fU][mC][mA][fU][mG][mA][mU][fG][mG][mA][mC][mC][mA][mGs][mGs][mG] | 422 |
| 16 | [mCs][mC][mG][mU][mU][mG][mU][fC][fU][fG][fG][mA][mU][mU][mG][mG][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-                                    | 423 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fC][mC][fA][mA][mU][fC][mC][mA][mG][fA][mC][mA][mA][mC][mG][mGs][mGs][mG] | 424 |

|    |                                                                                                                                                                                  |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][mG][mG][mC][mU][mG][mC]                                                                                                                                                  |     |                                                                                                                |     |
| 17 | [mUs][mU][mG][mU][mC][mU][mG][fG][fA][fU][fU][mG][mG][mC][mA][mU][mC][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 425 | [MePhosphonate-4O-mUs][fAs][fGs][fG][fA][mU][fG][mC][mC][fA][mA][mU][mC][fC][mA][mG][mA][mC][mA][mAs][mGs][mG] | 426 |
| 18 | [mUs][mG][mU][mC][mU][mG][mG][fA][fU][fU][fG][mG][mC][mA][mU][mC][mC][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 427 | [MePhosphonate-4O-mUs][fCs][fAs][fG][fG][mA][fU][mG][mC][fC][mA][mA][mU][fC][mC][mA][mG][mA][mC][mAs][mGs][mG] | 428 |
| 19 | [mGs][mU][mC][mU][mG][mG][mA][fU][fU][fG][fG][mC][mA][mU][mC][mC][mU][mG][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 429 | [MePhosphonate-4O-mUs][fCs][fCs][fA][fG][mG][fA][mU][mG][fC][mC][mA][mA][fU][mC][mC][mA][mG][mA][mCs][mGs][mG] | 430 |
| 20 | [mCs][mU][mG][mG][mA][mU][mU][fG][fG][fC][fA][mU][mC][mC][mU][mG][mG][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 431 | [MePhosphonate-4O-mUs][fUs][fAs][fC][fC][mA][fG][mG][mA][fU][mG][mC][mC][fA][mA][mU][mC][mC][mA][mGs][mGs][mG] | 432 |
| 21 | [mUs][mG][mG][mA][mU][mU][mG][fG][fC][fA][fU][mC][mC][mU][mG][mG][mU][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-                                              | 433 | [MePhosphonate-4O-mUs][fAs][fUs][fA][fC][mC][fA][mG][mG][fA][mU][mG][mC][fC][mA][mA][mU][mC][mC][mAs][mGs][mG] | 434 |

|    |                                                                                                                                                                             |     |                                                                                                                |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                                   |     |                                                                                                                |     |
| 22 | [mGs][mG][mA][mU][mU][mG][mG][fC][fA][fU][fC][mC][mU][mG][mG][mU][mA][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 435 | [MePhosphonate-4O-mUs][fUs][fAs][fU][fA][mC][fC][mA][mG][fG][mA][mU][mG][fC][mC][mA][mA][mU][mC][mCs][mGs][mG] | 436 |
| 23 | [mGs][mA][mU][mU][mG][mG][mC][fA][fU][fC][fC][mU][mG][mG][mU][mA][mU][mA][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 437 | [MePhosphonate-4O-mUs][fGs][fUs][fA][fU][mA][fC][mC][mA][fG][mG][mA][mU][fG][mC][mC][mA][mA][mU][mCs][mGs][mG] | 438 |
| 24 | [mAs][mU][mU][mG][mG][mC][mA][fU][fC][fC][fU][mG][mG][mU][mA][mU][mA][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 439 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fA][mU][fA][mC][mC][fA][mG][mG][mA][fU][mG][mC][mC][mA][mA][mUs][mGs][mG] | 440 |
| 25 | [mCs][mU][mC][mC][mA][mU][mC][fU][fU][fC][fC][mC][mA][mC][mC][mU][mG][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 441 | [MePhosphonate-4O-mUs][fAs][fUs][fC][fA][mG][fG][mU][mG][fG][mG][mA][mA][fG][mA][mU][mG][mG][mA][mGs][mGs][mG] | 442 |
| 26 | [mCs][mA][mU][mC][mU][mG][mC][fC][fU][fG][fU][mG][mG][mG][mA][mU][mG][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 443 | [MePhosphonate-4O-mUs][fUs][fAs][fC][fA][mU][fC][mC][mC][fA][mC][mA][mG][fG][mC][mA][mG][mA][mU][mGs][mGs][mG] | 444 |

|    |                                                                                                                                                                                     |     |                                                                                                                |     |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                          |     |                                                                                                                |     |
| 27 | [mUs][mC][mU][mG][mC][mC][mU][fG][fU][fG][fG][mG][mA][mU][mG][mU][mA][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 445 | [MePhosphonate-4O-mUs][fAs][fGs][fU][fA][mC][fA][mU][mC][fC][mC][mA][mC][fA][mG][mG][mC][mA][mG][mAs][mGs][mG] | 446 |
| 28 | [mGs][mU][mG][mG][mU][mG][mC][fA][fA][fG][fC][mU][mU][mG][mG][mG][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 447 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fC][mC][fC][mA][mA][fG][mC][mU][mU][fG][mC][mA][mC][mC][mA][mCs][mGs][mG] | 448 |
| 29 | [mUs][mG][mG][mU][mG][mC][mA][fA][fG][fC][fU][mU][mG][mG][mG][mU][mG][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 449 | [MePhosphonate-4O-mUs][fGs][fAs][fC][fA][mC][fC][mC][mA][fA][mG][mC][mU][fU][mG][mC][mA][mC][mC][mAs][mGs][mG] | 450 |
| 30 | [mGs][mG][mU][mG][mC][mA][mA][fG][fC][fU][fU][mG][mG][mG][mU][mG][mU][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 451 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fC][mA][fC][mC][mC][fA][mA][mG][mC][fU][mU][mG][mC][mA][mC][mCs][mGs][mG] | 452 |
| 31 | [mGs][mU][mG][mC][mA][mA][mG][fC][fU][fU][fG][mG][mG][mU][mG][mU][mC][mA][mU][mA][mG][mC][mA][mU][mA][mG][mC][mA][                                                                  | 453 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fA][mC][fA][mC][mC][fC][mA][mA][mG][fC][mU][mU][mG][mC][mA][mCs][mGs][mG] | 454 |

|    |                                                                                                                                                                                 |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                                                               |     |                                                                                                                |     |
| 32 | [mGs][mC][mA][mA][mG][mC][mU][fU][fG][fG][fG][mU][mG][mU][mC][mA][mU][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 455 | [MePhosphonate-4O-mUs][fAs][fGs][fA][fU][mG][fA][mC][mA][fC][mC][mC][mA][fA][mG][mC][mU][mU][mG][mCs][mGs][mG] | 456 |
| 33 | [mCs][mA][mA][mG][mC][mU][mU][fG][fG][fG][fU][mG][mU][mC][mA][mU][mC][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 457 | [MePhosphonate-4O-mUs][fGs][fAs][fG][fA][mU][fG][mA][mC][fA][mC][mC][mC][fA][mA][mG][mC][mU][mU][mGs][mGs][mG] | 458 |
| 34 | [mAs][mA][mG][mC][mU][mU][mG][fG][fG][fU][fG][mU][mC][mA][mU][mC][mU][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 459 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fG][mA][fU][mG][mA][fC][mA][mC][mC][fC][mA][mA][mG][mC][mU][mUs][mGs][mG] | 460 |
| 35 | [mAs][mG][mC][mU][mU][mG][mG][fG][fU][fG][fU][mC][mA][mU][mC][mU][mC][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 461 | [MePhosphonate-4O-mUs][fCs][fUs][fG][fA][mG][fA][mU][mG][fA][mC][mA][mC][fC][mC][mA][mA][mG][mC][mUs][mGs][mG] | 462 |
| 36 | [mGs][mC][mU][mU][mG][mG][mG][fU][fG][fU][fC][mA][mU][mC][mU][mC][mA][mG][m                                                                                                     | 463 | [MePhosphonate-4O-mUs][fUs][fCs][fU][fG][mA][fG][mA][mU][fG][mA][m                                             | 464 |

|    |                                                                                                                                                                                  |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | A][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                                            |     | C][mA][fC][mC][mC][mA][mA][mG][mCs][mGs][mG]                                                                   |     |
| 37 | [mGs][mU][mG][mU][mC][mU][mC][fC][fU][fU][fU][mU][mG][mG][mG][mA][mC][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 465 | [MePhosphonate-4O-mUs][fAs][fGs][fG][fU][mC][fC][mC][mA][fA][mA][mA][mG][fG][mA][mG][mA][mC][mA][mCs][mGs][mG] | 466 |
| 38 | [mUs][mG][mU][mC][mU][mC][mC][fU][fU][fU][fU][mG][mG][mG][mA][mC][mC][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 467 | [MePhosphonate-4O-mUs][fUs][fAs][fG][fG][mU][fC][mC][mC][fA][mA][mA][mA][mG][mG][mA][mG][mA][mC][mAs][mGs][mG] | 468 |
| 39 | [mGs][mG][mG][mG][mA][mC][mC][fU][fG][fU][fU][mA][mC][mA][mG][mA][mC][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 469 | [MePhosphonate-4O-mUs][fCs][fUs][fG][fU][mC][fU][mG][mU][fA][mA][mC][mA][fG][mG][mU][mC][mC][mC][mCs][mGs][mG] | 470 |
| 40 | [mGs][mG][mG][mA][mC][mC][mU][fG][fU][fU][fA][mC][mA][mG][mA][mC][mA][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 471 | [MePhosphonate-4O-mUs][fAs][fCs][fU][fG][mU][fC][mU][mG][fU][mA][mA][mC][fA][mG][mG][mU][mC][mC][mCs][mGs][mG] | 472 |
| 41 | [mGs][mG][mA][mC][mC][mU][mG][fU][fU][fA][fC][mA][mG][mA][                                                                                                                       | 473 | [MePhosphonate-4O-mUs][fGs][fAs][fC][fU][mG][fU][mC][mU][fG][mU][m                                             | 474 |

|    |                                                                                                                                                                                  |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | mC][mA][mG][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                           |     | A][mA][fC][mA][mG][mG][mU][mC][mCs][mGs][mG]                                                                   |     |
| 42 | [mGs][mA][mC][mC][mU][mG][mU][fU][fA][fC][fA][mG][mA][mC][mA][mG][mU][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 475 | [MePhosphonate-4O-mUs][fAs][fGs][fA][fC][mU][fG][mU][mC][fU][mG][mU][mA][fA][mC][mA][mG][mG][mU][mCs][mGs][mG] | 476 |
| 43 | [mAs][mC][mC][mU][mG][mU][mU][fA][fC][fA][fG][mA][mC][mA][mG][mU][mC][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 477 | [MePhosphonate-4O-mUs][fUs][fAs][fG][fA][mC][fU][mG][mU][fC][mU][mG][mU][fA][mA][mC][mA][mG][mG][mUs][mGs][mG] | 478 |
| 44 | [mUs][mG][mC][mC][mA][mU][mU][fG][fU][fC][fU][mG][mC][mA][mA][mC][mU][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 479 | [MePhosphonate-4O-mUs][fAs][fAs][fA][fG][mU][fU][mG][mC][fA][mG][mA][mC][fA][mA][mU][mG][mG][mC][mAs][mGs][mG] | 480 |
| 45 | [mGs][mC][mC][mA][mU][mU][mG][fU][fC][fU][fG][mC][mA][mA][mC][mU][mU][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 481 | [MePhosphonate-4O-mUs][fCs][fAs][fA][fA][mG][fU][mU][mG][fC][mA][mG][mA][fC][mA][mA][mU][mG][mG][mCs][mGs][mG] | 482 |
| 46 | [mCs][mC][mA][mU][mU][mG][mU][fC][fU][                                                                                                                                           | 483 | [MePhosphonate-4O-mUs][fCs][fCs][fA][fA][mA                                                                    | 484 |

|    |                                                                                                                                                                                  |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | fG][fC][mA][mA][mC][mU][mU][mU][mG][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                       |     | ][fG][mU][mU][fG][mC][mA][mG][fA][mC][mA][mA][mU][mG][mGs][mGs][mG]                                            |     |
| 47 | [mAs][mU][mU][mG][mU][mC][mU][fG][fC][fA][fA][mC][mU][mU][mU][mG][mG][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 485 | [MePhosphonate-4O-mUs][fUs][fGs][fC][fC][mA][fA][mA][mG][fU][mU][mG][mC][fA][mG][mA][mC][mA][mA][mUs][mGs][mG] | 486 |
| 48 | [mUs][mC][mU][mG][mC][mA][mA][fC][fU][fU][fU][mG][mG][mC][mA][mG][mU][mG][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 487 | [MePhosphonate-4O-mUs][fUs][fCs][fA][fC][mU][fG][mC][mC][fA][mA][mA][mG][fU][mU][mG][mC][mA][mG][mAs][mGs][mG] | 488 |
| 49 | [mCs][mU][mA][mC][mC][mC][mA][fC][fU][fG][fC][mU][mG][mA][mA][mA][mC][mU][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]             | 489 | [MePhosphonate-4O-mUs][fGs][fAs][fG][fU][mU][fU][mC][mA][fG][mC][mA][mG][fU][mG][mG][mG][mU][mA][mGs][mGs][mG] | 490 |
| 50 | [mGs][mC][mC][mA][mG][mG][mA][fA][fC][fA][fG][mG][mA][mC][mC][mU][mG][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 491 | [MePhosphonate-4O-mUs][fCs][fAs][fC][fA][mG][fG][mU][mC][fC][mU][mG][mU][fU][mC][mC][mU][mG][mG][mCs][mGs][mG] | 492 |

|    |                                                                                                                                                                                          |     |                                                                                                                    |     |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------|-----|
| 51 | [mGs][mA][mA][mC][mA][mG][mG][fA][fC][fC][fU][mG][mU][mG][mG][mA][mA][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]         | 493 | [MePhosphonate-4O-mUs][fAs][fAs][fU][mC][fC][mA][mC][fA][mG][mG][mU][fC][mC][mU][mG][mU][mU][mCs][mGs][mG]         | 494 |
| 52 | [mAs][mC][mA][mG][mG][mA][mC][fC][fU][fG][fU][mG][mG][mA][mA][mU][mU][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]         | 495 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fA][mU][fU][mC][mC][fA][mC][mA][mG][fG][mU][mC][mC][mU][mG][mUs][mGs][mG]     | 496 |
| 53 | [mUs][mG][mG][mA][mA][mU][mU][fC][fA][fC][fC][mA][mC][mC][mC][mC][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]         | 497 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fG][mG][fG][mG][mU][fG][mG][mU][mG][fA][mA][mU][mU][mC][mC][mAs][mGs][mG]     | 498 |
| 54 | [mCs][mU][mU][mG][mU][mG][mA][fC][fC][fA][fC][mC][mU][mA][mC][mA][mA][mU][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 499 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fU][mG][fU][mA][mG][fG][mU][mG][mG][fU][mC][mA][mC][mA][mA][mGs][mGs][mG]     | 500 |
| 55 | [mUs][mU][mG][mU][mG][mA][mC][fC][fA][fC][fC][mU][mA][mC][mA][mU][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-                                        | 501 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fA][mU][fG][mU][mA][fG][mG][mU][mG][fG][mU][mC][mA][mC][mA][mA][mAs][mGs][mG] | 502 |

|    |                                                                                                                                                                                  |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][mG][mG][mC][mU][mG][mC]                                                                                                                                                  |     |                                                                                                                |     |
| 56 | [mUs][mG][mU][mG][mA][mC][mC][fA][fC][fC][fU][mA][mC][mA][mU][mC][mA][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 503 | [MePhosphonate-4O-mUs][fGs][fAs][fU][fG][mA][fU][mG][mU][fA][mG][mG][mU][fG][mG][mU][mC][mA][mC][mAs][mGs][mG] | 504 |
| 57 | [mGs][mU][mG][mA][mC][mC][mA][fC][fC][fU][fA][mC][mA][mU][mC][mA][mU][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 505 | [MePhosphonate-4O-mUs][fAs][fGs][fA][fU][mG][fA][mU][mG][fU][mA][mG][mG][fU][mG][mG][mU][mC][mA][mCs][mGs][mG] | 506 |
| 58 | [mUs][mG][mA][mC][mC][mA][mC][fC][fU][fA][fC][mA][mU][mC][mA][mU][mC][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 507 | [MePhosphonate-4O-mUs][fAs][fAs][fG][fA][mU][fG][mA][mU][fG][mU][mA][mG][fG][mU][mG][mG][mU][mC][mAs][mGs][mG] | 508 |
| 59 | [mGs][mA][mC][mC][mA][mC][mC][fU][fA][fC][fA][mU][mC][mA][mU][mC][mU][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 509 | [MePhosphonate-4O-mUs][fCs][fAs][fA][fG][mA][fU][mG][mA][fU][mG][mU][mA][fG][mG][mU][mG][mG][mU][mCs][mGs][mG] | 510 |
| 60 | [mAs][mC][mC][mA][mC][mC][mU][fA][fC][fA][fU][mC][mA][mU][mC][mU][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-                                              | 511 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fA][mG][fA][mU][mG][fA][mU][mG][mU][fA][mG][mG][mU][mG][mG][mUs][mGs][mG] | 512 |

|    |                                                                                                                                                                             |     |                                                                                                                    |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                                   |     |                                                                                                                    |     |
| 61 | [mCs][mC][mA][mC][mC][mU][mA][fC][fA][fU][fC][mA][mU][mC][mU][mU][mG][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 513 | [MePhosphonate-4O-mUs][fAs][fAs][fC][fA][mA][fG][mA][mU][fG][mA][mU][mG][fU][mA][mG][mG][mU][mG][mGs][mGs][mG]     | 514 |
| 62 | [mCs][mA][mC][mC][mU][mA][mC][fA][fU][fC][fA][mU][mC][mU][mU][mG][mU][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 515 | [MePhosphonate-4O-mUs][fAs][fAs][fA][fC][mA][fA][mG][mA][fU][mG][mA][mU][fG][mU][mA][mG][mG][mU][mGs][mGs][mG]     | 516 |
| 63 | [mAs][mC][mC][mU][mA][mC][mA][fU][fC][fA][fU][mC][mU][mU][mG][mU][mU][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 517 | [MePhosphonate-4O-mUs][fCs][fAs][fA][fA][mC][fA][mA][mG][fA][mU][mG][mA][fU][mG][mU][mA][mG][mG][mUs][mGs][mG]     | 518 |
| 64 | [mCs][mC][mU][mA][mC][mA][mU][fC][fA][fU][fC][mU][mU][mG][mU][mU][mU][mG][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 519 | [MePhosphonate-4O-mUs][fGs][fCs][fA][fA][mA][fC][mA][mA][fG][mA][mU][mG][fA][mU][mG][mU][mA][mG][mGs][mGs][mG]     | 520 |
| 65 | [mCs][mU][mA][mC][mA][mU][mC][fA][fU][fC][fU][mU][mG][mU][mU][mU][mG][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]     | 521 | [MePhosphonate-4O-mUs][fGs][fGs][fC][fA][mA][fA][mC][mA][fA][mG][mA][mU][fG][mA][mU][mG][mU][mA][mG][mGs][mGs][mG] | 522 |

|    |                                                                                                                                                                                 |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                      |     |                                                                                                                |     |
| 66 | [mAs][mC][mA][mU][mC][mA][mU][fC][fU][fU][fG][mU][mU][mU][mG][mC][mC][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 523 | [MePhosphonate-4O-mUs][fUs][fAs][fG][fG][mC][fA][mA][mA][fC][mA][mA][mG][fA][mU][mG][mA][mU][mG][mUs][mGs][mG] | 524 |
| 67 | [mAs][mU][mC][mA][mU][mC][mU][fU][fG][fU][fU][mU][mG][mC][mC][mU][mA][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 525 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fA][mG][fG][mC][mA][fA][mA][mC][mA][fA][mG][mA][mU][mG][mA][mUs][mGs][mG] | 526 |
| 68 | [mUs][mC][mA][mU][mC][mU][mU][fG][fU][fU][fU][mG][mC][mC][mU][mA][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 527 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fU][mA][fG][mG][mC][fA][mA][mA][mC][fA][mA][mG][mA][mU][mG][mAs][mGs][mG] | 528 |
| 69 | [mAs][mU][mC][mU][mU][mG][mU][fU][fU][fG][fC][mC][mU][mA][mC][mA][mU][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 529 | [MePhosphonate-4O-mUs][fAs][fGs][fA][fU][mG][fU][mA][mG][fG][mC][mA][mA][fA][mC][mA][mA][mG][mA][mUs][mGs][mG] | 530 |
| 70 | [mUs][mC][mU][mU][mG][mU][mU][fU][fG][fC][fC][mU][mA][mC][mA][mU][mC][mU][mA][mA][mG][mC][mA][                                                                                  | 531 | [MePhosphonate-4O-mUs][fUs][fAs][fG][fA][mU][fG][mU][mA][fG][mG][mC][mA][fA][mA][mC][mA][mA][mG][mAs][mGs][mG] | 532 |

|    |                                                                                                                                                                                                                      |     |                                                                                                                                  |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------|-----|
|    | mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mC][mC]<br>][mU][mG][mC]                                                                                                                   |     |                                                                                                                                  |     |
| 71 | [mUs][mU][mU][mC][<br>mC][mC][mC][fU][fA][<br>fC][fC][mU][mU][mG][<br>mU][mG][mG][mU][m<br>G][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC]<br>][mU][mG][mC] | 533 | [MePhosphonate-4O-<br>mUs][fCs][fAs][fC][mC]<br>][fC][mA][mA][fG][mG][m<br>U][mA][fG][mG][mG][mG][<br>mA][mA][mAs][mGs][mG]      | 534 |
| 72 | [mUs][mU][mC][mC][<br>mC][mC][mU][fA][fC][<br>fC][fU][mU][mG][mU][<br>mG][mG][mU][mG][m<br>G][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC]<br>][mU][mG][mC] | 535 | [MePhosphonate-4O-<br>mUs][fCs][fCs][fA][fC][mC]<br>][fA][mC][mA][fA][mG][mG]<br>][mU][fA][mG][mG][mG][m<br>G][mA][mAs][mGs][mG] | 536 |
| 73 | [mCs][mC][mC][mU][m<br>A][mC][mC][fU][fU][f<br>G][fU][mG][mG][mU][<br>mG][mG][mU][mU][m<br>A][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC]<br>][mU][mG][mC] | 537 | [MePhosphonate-4O-<br>mUs][fUs][fAs][fA][fC][mC]<br>][fA][mC][mC][fA][mC][m<br>A][mA][fG][mG][mU][mA][<br>mG][mG][mGs][mGs][mG]  | 538 |
| 74 | [mCs][mU][mA][mC][<br>mC][mU][mU][fG][fU][<br>fG][fG][mU][mG][mG][<br>mU][mU][mA][mU][m<br>U][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC]<br>][mU][mG][mC] | 539 | [MePhosphonate-4O-<br>mUs][fAs][fAs][fU][fA][mA]<br>][fC][mC][mA][fC][mC][m<br>A][mC][fA][mA][mG][mG][<br>mU][mA][mGs][mGs][mG]  | 540 |
| 75 | [mUs][mA][mC][mC][<br>mU][mU][mG][fU][fG][<br>fG][fU][mG][mG][mU][<br>mU][mA][mU][mU][m                                                                                                                              | 541 | [MePhosphonate-4O-<br>mUs][fCs][fAs][fA][fU][mA]<br>][fA][mC][mC][fA][mC][m                                                      | 542 |

|    |                                                                                                                                                                                                                     |     |                                                                                                                                                                                                                        |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|    | G][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC]                                                                                            |     | C][mA][fC][mA][mA][mG]<br>[mG][mU][mAs][mGs][mG]                                                                                                                                                                       |     |
| 76 | [mAs][mC][mC][mU]<br>[mU][mG][mU][fG][fG]<br>[fU][fG][mG][mU][mU]<br>[mA][mU][mU][mG][m<br>G][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 543 | [MePhosphonate-4O-<br>mUs][fCs][fCs][fA][fA]<br>[mU][fA][mA][mC][fC][mA]<br>[mC][mC][fA][mC][mA]<br>[mG][mG][mUs][mGs][mG]                                                                                             | 544 |
| 77 | [mCs][mC][mU][mU]<br>[mG][mU][mG][fG][fU]<br>[fG][fG][mU][mU][mA]<br>[mU][mU][mG][mG][m<br>G][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 545 | [MePhosphonate-4O-<br>mUs][fCs][fCs][fC][fA]<br>[mA][fU][mA][mA][fC]<br>[mC][mA][mC][fC][mA]<br>[mC][mA][mG][mGs][mGs]<br>[mG]                                                                                         | 546 |
| 78 | [mCs][mU][mU][mG]<br>[mU][mG][mG][fU][fG]<br>[fG][fU][mU][mA][mU]<br>[mU][mG][mG][mG][m<br>U][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 547 | [MePhosphonate-4O-<br>mUs][fAs][fCs][fC][fC]<br>[mA][fA][mU][mA][fA]<br>[mC][mC][mA][fC][mC]<br>[mA][mA][mGs][mGs][mG]                                                                                                 | 548 |
| 79 | [mUs][mU][mG][mU]<br>[mG][mG][mU][fG][fG]<br>[fU][fU][mA][mU][mU]<br>[mG][mG][mG][mU][m<br>U][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 549 | [MePhosphonate-4O-<br>mUs][fAs][fAs][fC][fC]<br>[mC][fA][mA][mU][fA]<br>[mA][mC][mC][fA][mC]<br>[mC][mA][mAs][mGs][mG]                                                                                                 | 550 |
| 80 | [mUs][mG][mU][mG]<br>[mG][mU][mG][fG][fU]<br>[fU][fA][mU][mU][mG]<br>[mG][mG][mG][mU][m<br>U][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 551 | [MePhosphonate-4O-<br>mUs][fUs][fAs][fA][fC]<br>[mC][fC][mA][mA][fU]<br>[mA][mG][mG][mU][m<br>U][mA][mG][mC][mA]<br>[mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 552 |

|    |                                                                                                                                                                                      |     |                                                                                                                |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | mG][mG][mU][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                               |     | A][mC][fC][mA][mC][mC][mA][mC][mAs][mGs][mG]                                                                   |     |
| 81 | [mGs][mU][mG][mG][mU][mG][mG][fU][fU][fA][fU][mU][mG][mG][mG][mU][mU][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 553 | [MePhosphonate-4O-mUs][fCs][fUs][fA][fA][mC][fC][mC][mA][fA][mU][mA][mA][fC][mC][mA][mC][mC][mA][mCs][mGs][mG] | 554 |
| 82 | [mUs][mG][mG][mU][mG][mG][mU][fU][fA][fU][fU][mG][mG][mG][mU][mU][mA][mG][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 555 | [MePhosphonate-4O-mUs][fUs][fCs][fU][fA][mA][fC][mC][mC][fA][mA][mU][mA][fA][mC][mC][mA][mC][mC][mAs][mGs][mG] | 556 |
| 83 | [mGs][mG][mU][mG][mG][mU][mU][fA][fU][fU][fG][mG][mG][mU][mU][mA][mG][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 557 | [MePhosphonate-4O-mUs][fCs][fUs][fC][fU][mA][fA][mC][mC][fC][mA][mA][mU][fA][mA][mC][mC][mA][mC][mCs][mGs][mG] | 558 |
| 84 | [mGs][mU][mG][mG][mU][mU][mA][fU][fU][fG][fG][mG][mU][mU][mA][mG][mA][mG][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 559 | [MePhosphonate-4O-mUs][fUs][fCs][fU][fC][mU][fA][mA][mC][fC][mC][mA][mA][fU][mA][mA][mC][mC][mA][mCs][mGs][mG] | 560 |
| 85 | [mUs][mG][mG][mU][mU][mA][mU][fU][fG][fG]                                                                                                                                            | 561 | [MePhosphonate-4O-mUs][fUs][fUs][fC][fU][mC]                                                                   | 562 |

|    |                                                                                                                                                                                  |     |                                                                                                                    |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------|-----|
|    | fG][fG][mU][mU][mA][mG][mA][mG][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                       |     | ][fU][mA][mA][fC][mC][mC][mA][fA][mU][mA][mA][mC][mC][mAs][mGs][mG]                                                |     |
| 86 | [mGs][mG][mU][mU][mA][mU][mU][fG][fG][fG][fU][mU][mA][mG][mA][mG][mA][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 563 | [MePhosphonate-4O-mUs][fAs][fUs][fU][fC][mU][fC][mU][mA][fA][mC][mC][mC][fA][mA][mU][mA][mA][mC][mCs][mGs][mG]     | 564 |
| 87 | [mGs][mU][mU][mA][mU][mU][mG][fG][fG][fU][fU][mA][mG][mA][mG][mA][mA][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 565 | [MePhosphonate-4O-mUs][fCs][fAs][fU][fU][mC][fU][mC][mU][fA][mA][mC][mC][fC][mA][mA][mU][mA][mA][mCs][mGs][mG]     | 566 |
| 88 | [mUs][mU][mA][mU][mU][mG][mG][fG][fU][fU][fA][mG][mA][mG][mA][mA][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 567 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fU][mU][fC][mU][mC][fU][mA][mA][mC][mC][fC][mC][mA][mA][mU][mA][mAs][mGs][mG] | 568 |
| 89 | [mAs][mU][mU][mG][mG][mG][mU][fU][fA][fG][fA][mG][mA][mA][mU][mG][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 569 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fC][mA][fU][mU][mC][fU][mC][mU][mA][fA][mC][mC][mC][mA][mA][mUs][mGs][mG]     | 570 |

|    |                                                                                                                                                                                      |     |                                                                                                                |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 90 | [mUs][mU][mG][mG][mG][mU][mU][fA][fG][fA][fG][mA][mA][mU][mG][mU][mG][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 571 | [MePhosphonate-4O-mUs][fAs][fAs][fC][fA][mC][fA][mU][mU][fC][mU][mC][mU][fA][mA][mC][mC][mC][mA][mAs][mGs][mG] | 572 |
| 91 | [mGs][mG][mU][mU][mA][mG][mA][fG][fA][fA][fU][mG][mU][mG][mU][mU][mG][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 573 | [MePhosphonate-4O-mUs][fAs][fCs][fC][fA][mA][fC][mA][mC][fA][mU][mU][mC][fU][mC][mU][mA][mA][mC][mCs][mGs][mG] | 574 |
| 92 | [mGs][mU][mU][mA][mG][mA][mG][fA][fA][fU][fG][mU][mG][mU][mU][mU][mG][mG][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 575 | [MePhosphonate-4O-mUs][fCs][fAs][fC][fC][mA][fA][mC][mA][fC][mA][mU][mU][fC][mU][mC][mU][mA][mA][mCs][mGs][mG] | 576 |
| 93 | [mUs][mU][mA][mG][mA][mG][mA][fA][fU][fG][fU][mG][mU][mU][mG][mG][mU][mG][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 577 | [MePhosphonate-4O-mUs][fGs][fCs][fA][fC][mC][fA][mA][mC][fA][mC][mA][mU][fU][mC][mU][mC][mU][mA][mAs][mGs][mG] | 578 |
| 94 | [mUs][mA][mG][mA][mG][mA][mA][fU][fG][fU][fG][mU][mU][mG][mG][mU][mG][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-                                    | 579 | [MePhosphonate-4O-mUs][fAs][fGs][fC][fA][mC][fC][mA][mA][fC][mA][mC][mA][fU][mU][mC][mU][mC][mU][mAs][mGs][mG] | 580 |

|    |                                                                                                                                                                                      |     |                                                                                                                |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][mG][mG][mC][mU][mG][mC]                                                                                                                                                      |     |                                                                                                                |     |
| 95 | [mAs][mG][mA][mG][mA][mA][mU][fG][fU][fG][fU][mU][mG][mG][mU][mU][mG][mC][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 581 | [MePhosphonate-4O-mUs][fGs][fAs][fG][fC][mA][fC][mC][mA][fA][mC][mA][mC][fA][mU][mU][mC][mU][mC][mUs][mGs][mG] | 582 |
| 96 | [mGs][mA][mG][mA][mA][mA][mU][mG][fU][fG][fU][fU][mG][mG][mU][mG][mC][mU][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 583 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fG][mC][fA][mC][mC][fA][mA][mC][mA][fC][mA][mU][mU][mC][mU][mCs][mGs][mG] | 584 |
| 97 | [mAs][mG][mA][mA][mA][mU][mG][mU][fG][fU][fU][fG][mG][mU][mG][mC][mU][mC][mA][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 585 | [MePhosphonate-4O-mUs][fGs][fUs][fG][fA][mG][fC][mA][mC][fC][mA][mA][mC][fA][mC][mA][mU][mU][mC][mUs][mGs][mG] | 586 |
| 98 | [mAs][mA][mU][mG][mU][mG][mU][fU][fG][fG][fU][mG][mC][mU][mC][mA][mC][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 587 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fU][mG][fA][mG][mC][fA][mC][mC][mA][fA][mC][mA][mC][mA][mU][mUs][mGs][mG] | 588 |
| 99 | [mAs][mU][mG][mU][mG][mU][mU][fG][fG][fU][fG][mC][mU][mC][mA][mC][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-                                                      | 589 | [MePhosphonate-4O-mUs][fUs][fUs][fG][fG][mU][fG][mA][mG][fC][mA][mC][mC][fA][mA][mC][mA][mC][mA][mUs][mGs][mG] | 590 |

|     |                                                                                                                                                                                     |     |                                                                                                                |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                                           |     |                                                                                                                |     |
| 100 | [mUs][mG][mU][mG][mU][mU][mG][fG][fU][fG][fC][mU][mC][mA][mC][mC][mA][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 591 | [MePhosphonate-4O-mUs][fCs][fUs][fU][fG][mG][fU][mG][mA][fG][mC][mA][mC][fC][mA][mA][mC][mA][mC][mAs][mGs][mG] | 592 |
| 101 | [mUs][mG][mG][mU][mC][mC][mA][fU][fC][fA][fU][mG][mA][mA][mG][mA][mA][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 593 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fU][mC][fU][mU][mC][fA][mU][mG][mA][fU][mG][mG][mA][mC][mC][mAs][mGs][mG] | 594 |
| 102 | [mGs][mG][mU][mC][mC][mA][mU][fC][fA][fU][fG][mA][mA][mG][mA][mA][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 595 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fU][mU][fC][mU][mU][fC][mA][mU][mG][fA][mU][mG][mG][mA][mC][mCs][mGs][mG] | 596 |
| 103 | [mCs][mU][mG][mA][mC][mU][mU][fC][fU][fU][fC][mC][mU][mU][mC][mA][mG][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 597 | [MePhosphonate-4O-mUs][fAs][fUs][fC][fU][mG][fA][mA][mG][fG][mA][mA][mG][fA][mA][mG][mU][mC][mA][mGs][mGs][mG] | 598 |
| 104 | [mAs][mC][mU][mU][mC][mU][mU][fC][fC][fU][fU][mC][mA][mG][mA][mU][mU][mG][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 599 | [MePhosphonate-4O-mUs][fAs][fGs][fC][fA][mU][fC][mU][mG][fA][mA][mG][mG][fA][mA][mG][mA][mA][mG][mUs][mGs][mG] | 600 |

|     |                                                                                                                                                                                 |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                      |     |                                                                                                                |     |
| 105 | [mUs][mC][mC][mU][mU][mC][mA][fG][fA][fU][fG][mC][mU][mG][mU][mU][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 601 | [MePhosphonate-4O-mUs][fAs][fAs][fA][mA][fC][mA][mG][fC][mA][mU][mC][fU][mG][mA][mA][mG][mG][mAs][mGs][mG]     | 602 |
| 106 | [mCs][mC][mU][mU][mC][mA][mG][fA][fU][fG][fC][mU][mG][mU][mU][mU][mU][mU][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]             | 603 | [MePhosphonate-4O-mUs][fGs][fAs][fA][mA][fA][mC][mA][fG][mC][mA][mU][fC][mU][mG][mA][mA][mG][mGs][mGs][mG]     | 604 |
| 107 | [mCs][mU][mU][mC][mA][mG][mA][fU][fG][fC][fU][mG][mU][mU][mU][mU][mU][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 605 | [MePhosphonate-4O-mUs][fUs][fGs][fA][mA][fA][mA][mC][fA][mG][mC][mA][fU][mC][mU][mG][mA][mA][mGs][mGs][mG]     | 606 |
| 108 | [mUs][mU][mC][mA][mG][mA][mU][fG][fC][fU][fG][mU][mU][mU][mU][mU][mU][mC][mA][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]         | 607 | [MePhosphonate-4O-mUs][fGs][fUs][fG][fA][mA][fA][mA][mA][fC][mA][mG][mC][fA][mU][mC][mU][mG][mA][mAs][mGs][mG] | 608 |
| 109 | [mCs][mA][mG][mA][mU][mG][mC][fU][fG][fU][fU][mU][mU][mU][mU][mC][mA][mC][mC][mA][mA][mG][mC][mA][                                                                              | 609 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fU][mG][fA][mA][mA][fA][mA][mC][mA][fG][mC][mA][mU][mC][mU][mGs][mGs][mG] | 610 |

|     |                                                                                                                                                                                                                     |     |                                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------|-----|
|     | mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mC][mC<br>][mU][mG][mC]                                                                                                                   |     |                                                                                                                                |     |
| 110 | [mAs][mG][mA][mU][<br>mG][mC][mU][fG][fU][<br>fU][fU][mU][mU][mC][<br>mA][mC][mC][mA][mC<br>][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 611 | [MePhosphonate-4O-<br>mUs][fGs][fUs][fG][mU<br>][fG][mA][mA][fA][mA][m<br>A][mC][fA][mG][mC][mA][<br>mU][mC][mUs][mGs][mG]     | 612 |
| 111 | [mGs][mA][mU][mG][<br>mC][mU][mG][fU][fU][<br>fU][fU][mU][mC][mA][<br>mC][mC][mA][mC][mU<br>][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 613 | [MePhosphonate-4O-<br>mUs][fAs][fGs][fU][fG][mG<br>][fU][mG][mA][fA][mA][m<br>A][mA][fC][mA][mG][mC][<br>mA][mU][mCs][mGs][mG] | 614 |
| 112 | [mAs][mU][mG][mC][<br>mU][mG][mU][fU][fU][<br>fU][fU][mC][mA][mC][<br>mC][mA][mC][mU][m<br>G][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 615 | [MePhosphonate-4O-<br>mUs][fCs][fAs][fG][fU][mG<br>][fG][mU][mG][fA][mA][m<br>A][mA][fA][mC][mA][mG][<br>mC][mA][mUs][mGs][mG] | 616 |
| 113 | [mUs][mG][mC][mU][<br>mG][mU][mU][fU][fU][<br>fU][fC][mA][mC][mC][<br>mA][mC][mU][mG][m<br>U][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 617 | [MePhosphonate-4O-<br>mUs][fAs][fCs][fA][fG][mU<br>][fG][mG][mU][fG][mA][m<br>A][mA][fA][mA][mC][mA][<br>mG][mC][mAs][mGs][mG] | 618 |
| 114 | [mGs][mC][mU][mG][<br>mU][mU][mU][fU][fU][<br>fC][fA][mC][mC][mA][<br>mC][mU][mG][mU][m                                                                                                                             | 619 | [MePhosphonate-4O-<br>mUs][fGs][fAs][fC][fA][mG<br>][fU][mG][mG][fU][mG][m                                                     | 620 |

|     |                                                                                                                                                                                      |     |                                                                                                                    |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------|-----|
|     | C][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                                                |     | A][mA][fA][mA][mA][mC][mA][mG][mCs][mGs][mG]                                                                       |     |
| 115 | [mUs][mG][mU][mU][mU][mU][mU][fC][fA][fC][fC][mA][mC][mU][mG][mU][mC][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 621 | [MePhosphonate-4O-mUs][fAs][fGs][fG][fA][mC][fA][mG][mU][fG][mG][mU][mG][fA][mA][mA][mA][mA][mC][mAs][mGs][mG]     | 622 |
| 116 | [mGs][mU][mU][mU][mU][mU][mU][mC][fA][fC][fC][fA][mC][mU][mG][mU][mC][mC][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 623 | [MePhosphonate-4O-mUs][fCs][fAs][fG][fA][fC][mA][mG][fU][mG][mG][mU][fG][mA][mA][mA][mA][mA][mCs][mGs][mG]         | 624 |
| 117 | [mUs][mU][mU][mU][mU][mU][mC][mA][fC][fC][fA][fC][mU][mG][mU][mC][mC][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 625 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fG][mG][fA][mC][mA][fG][mU][mG][mG][fU][mG][mA][mA][mA][mA][mA][mAs][mGs][mG] | 626 |
| 118 | [mUs][mU][mU][mU][mC][mA][mC][fC][fA][fC][fU][mG][mU][mC][mC][mU][mG][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 627 | [MePhosphonate-4O-mUs][fGs][fAs][fC][fA][mG][fG][mA][mC][fA][mG][mU][mG][fG][mU][mG][mA][mA][mA][mA][mAs][mGs][mG] | 628 |
| 119 | [mUs][mU][mC][mA][mC][mC][mA][fC][fU][fG][fU][mC][mC][mU][                                                                                                                           | 629 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fA][mC][fA][mG][mG][fA][mC][m                                                 | 630 |

|     |                                                                                                                                                                                                                     |     |                                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------|-----|
|     | mG][mU][mC][mC][m<br>A][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC]                                                                       |     | A][mG][fU][mG][mG][mU][<br>mG][mA][mAs][mGs][mG]                                                                               |     |
| 120 | [mCs][mA][mC][mC][m<br>A][mC][mU][fG][fU][f<br>C][fC][mU][mG][mU][<br>mC][mC][mA][mU][m<br>U][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 631 | [MePhosphonate-4O-<br>mUs][fAs][fAs][fU][fG][mG<br>][fA][mC][mA][fG][mG][m<br>A][mC][fA][mG][mU][mG][<br>mG][mU][mGs][mGs][mG] | 632 |
| 121 | [mAs][mC][mC][mA][<br>mC][mU][mG][fU][fC][<br>fC][fU][mG][mU][mC][<br>mC][mA][mU][mU][m<br>G][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 633 | [MePhosphonate-4O-<br>mUs][fCs][fAs][fA][fU][mG<br>][fG][mA][mC][fA][mG][m<br>G][mA][fC][mA][mG][mU][<br>mG][mG][mUs][mGs][mG] | 634 |
| 122 | [mCs][mC][mA][mC][m<br>U][mG][mU][fC][fC][f<br>U][fG][mU][mC][mC][<br>mA][mU][mU][mG][m<br>A][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 635 | [MePhosphonate-4O-<br>mUs][fUs][fCs][fA][fA][mU<br>][fG][mG][mA][fC][mA][m<br>G][mG][fA][mC][mA][mG][<br>mU][mG][mGs][mGs][mG] | 636 |
| 123 | [mCs][mA][mC][mU][<br>mG][mU][mC][fC][fU][<br>fG][fU][mC][mC][mA][<br>mU][mU][mG][mA][m<br>C][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 637 | [MePhosphonate-4O-<br>mUs][fGs][fUs][fC][fA][mA<br>][fU][mG][mG][fA][mC][m<br>A][mG][fG][mA][mC][mA][<br>mG][mU][mGs][mGs][mG] | 638 |
| 124 | [mAs][mC][mU][mG][<br>mU][mC][mC][fU][fG][<br>fC][fU][mG][mU][mC][<br>mC][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC]                     | 639 | [MePhosphonate-4O-<br>mUs][fUs][fGs][fU][fC][mA<br>][fU][mG][mG][fA][mC][m<br>A][mG][fG][mA][mC][mA][<br>mG][mU][mGs][mGs][mG] | 640 |

|     |                                                                                                                                                                                      |     |                                                                                                                |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | fU][fC][mC][mA][mU][mU][mG][mA][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                           |     | ][fA][mU][mG][fG][mA][mC][mA][fG][mG][mA][mC][mA][mG][mUs][mGs][mG]                                            |     |
| 125 | [mCs][mU][mA][mA][mG][mC][mU][fA][fC][fC][fU][mG][mA][mG][mA][mA][mC][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 641 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fU][mU][fC][mU][mC][fA][mG][mG][mU][fA][mG][mC][mU][mU][mA][mGs][mGs][mG] | 642 |
| 126 | [mGs][mA][mG][mG][mU][mC][mC][fA][fG][fC][fA][mG][mA][mG][mG][mU][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 643 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fA][mC][fC][mU][mC][fU][mG][mC][mU][fG][mG][mA][mC][mC][mU][mCs][mGs][mG] | 644 |
| 127 | [mGs][mC][mA][mG][mA][mG][mG][fU][fU][fG][fU][mC][mC][mA][mU][mG][mA][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 645 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fC][mA][fU][mG][mG][fA][mC][mA][mA][fC][mC][mU][mC][mU][mG][mCs][mGs][mG] | 646 |
| 128 | [mCs][mA][mG][mA][mG][mG][mU][fU][fG][fU][fC][mC][mA][mU][mG][mA][mC][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 647 | [MePhosphonate-4O-mUs][fCs][fUs][fG][fU][mC][fA][mU][mG][fG][mA][mC][mA][fA][mC][mC][mU][mC][mU][mGs][mGs][mG] | 648 |

|     |                                                                                                                                                                                  |     |                                                                                                                |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 129 | [mGs][mA][mG][mG][mA][mU][mG][fA][fG][fG][fA][mA][mC][mU][mU][mU][mG][mG][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 649 | [MePhosphonate-4O-mUs][fUs][fCs][fA][mA][fA][mG][mU][fU][mC][mC][mU][fC][mA][mU][mC][mC][mU][mCs][mGs][mG]     | 650 |
| 130 | [mGs][mA][mA][mC][mU][mU][mU][fG][fG][fA][fG][mG][mA][mA][mA][mU][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 651 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fA][mU][fU][mU][mC][fC][mU][mC][mC][fA][mA][mA][mG][mU][mU][mCs][mGs][mG] | 652 |
| 131 | [mGs][mA][mC][mG][mC][mU][mC][fU][fU][fC][fA][mG][mC][mU][mA][mU][mU][mA][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 653 | [MePhosphonate-4O-mUs][fGs][fUs][fA][fA][mU][fA][mG][mC][fU][mG][mA][mA][fG][mA][mG][mC][mG][mU][mCs][mGs][mG] | 654 |
| 132 | [mAs][mC][mG][mC][mU][mC][mU][fU][fC][fA][fG][mC][mU][mA][mU][mU][mA][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 655 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fA][mA][fU][mA][mG][fC][mU][mG][mA][fA][mG][mA][mG][mC][mG][mUs][mGs][mG] | 656 |
| 133 | [mCs][mG][mC][mU][mC][mU][mU][fC][fA][fG][fC][mU][mA][mU][mU][mA][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-                                | 657 | [MePhosphonate-4O-mUs][fUs][fUs][fG][fU][mA][fA][mU][mA][fG][mC][mU][mG][fA][mA][mG][mA][mG][mC][mGs][mGs][mG] | 658 |

|     |                                                                                                                                                                                     |     |                                                                                                                |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][mG][mG][mC][mU][mG][mC]                                                                                                                                                     |     |                                                                                                                |     |
| 134 | [mGs][mC][mU][mC][mU][mU][mC][fA][fG][fC][fU][mA][mU][mU][mA][mC][mA][mA][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 659 | [MePhosphonate-4O-mUs][fGs][fUs][fU][fG][mU][fA][mA][mU][fA][mG][mC][mU][fG][mA][mA][mG][mA][mG][mCs][mGs][mG] | 660 |
| 135 | [mCs][mU][mC][mU][mU][mC][mA][fG][fC][fU][fA][mU][mU][mA][mC][mA][mA][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 661 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fU][mG][fU][mA][mA][fU][mA][mG][mC][fU][mG][mA][mA][mG][mA][mGs][mGs][mG] | 662 |
| 136 | [mUs][mC][mU][mU][mC][mA][mG][fC][fU][fA][fU][mU][mA][mC][mA][mA][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 663 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fU][mU][fG][mU][mA][fA][mU][mA][mG][fC][mU][mG][mA][mA][mG][mAs][mGs][mG] | 664 |
| 137 | [mCs][mU][mU][mC][mA][mG][mC][fU][fA][fU][fU][mA][mC][mA][mA][mC][mA][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 665 | [MePhosphonate-4O-mUs][fGs][fAs][fU][fG][mU][fU][mG][mU][fA][mA][mU][mA][fG][mC][mU][mG][mA][mA][mGs][mGs][mG] | 666 |
| 138 | [mUs][mU][mC][mA][mG][mC][mU][fA][fU][fU][fA][mC][mA][mA][mC][mA][mU][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-                                              | 667 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fU][mG][fU][mU][mG][fU][mA][mA][mU][fA][mG][mC][mU][mG][mA][mAs][mGs][mG] | 668 |

|     |                                                                                                                                                                                 |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                                       |     |                                                                                                                |     |
| 139 | [mCs][mC][mA][mG][mC][mC][mU][fG][fA][fC][fC][mU][mC][mA][mC][mC][mU][mG][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 669 | [MePhosphonate-4O-mUs][fGs][fCs][fA][fG][mG][fU][mG][mA][fG][mG][mU][mC][fA][mG][mG][mC][mU][mG][mGs][mGs][mG] | 670 |
| 140 | [mCs][mA][mG][mC][mC][mU][mG][fA][fC][fC][fU][mC][mA][mC][mC][mU][mG][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 671 | [MePhosphonate-4O-mUs][fAs][fGs][fC][fA][mG][fG][mU][mG][fA][mG][mG][mU][fC][mA][mG][mG][mC][mU][mGs][mGs][mG] | 672 |
| 141 | [mAs][mG][mC][mC][mU][mG][mA][fC][fC][fU][fC][mA][mC][mC][mU][mG][mC][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 673 | [MePhosphonate-4O-mUs][fAs][fAs][fG][fC][mA][fG][mG][mU][fG][mA][mG][mG][fU][mC][mA][mG][mG][mC][mUs][mGs][mG] | 674 |
| 142 | [mGs][mC][mC][mU][mG][mA][mC][fC][fU][fC][fA][mC][mC][mU][mG][mC][mU][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 675 | [MePhosphonate-4O-mUs][fUs][fAs][fA][fG][mC][fA][mG][mG][fU][mG][mA][mG][fG][mU][mC][mA][mG][mG][mCs][mGs][mG] | 676 |
| 143 | [mCs][mC][mU][mG][mA][mC][mC][fU][fC][fA][fC][mC][mU][mG][mC][mU][mU][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 677 | [MePhosphonate-4O-mUs][fUs][fUs][fA][fA][mG][fC][mA][mG][fG][mU][mG][mA][fG][mG][mU][mC][mA][mG][mGs][mGs][mG] | 678 |

|     |                                                                                                                                                                                 |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                      |     |                                                                                                                |     |
| 144 | [mCs][mU][mG][mA][mC][mC][mU][fC][fA][fC][fC][mU][mG][mC][mU][mU][mA][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 679 | [MePhosphonate-4O-mUs][fAs][fUs][fU][fA][mA][fG][mC][mA][fG][mG][mU][mG][fA][mG][mG][mU][mC][mA][mGs][mGs][mG] | 680 |
| 145 | [mUs][mG][mA][mC][mC][mU][mC][fA][fC][fC][fU][mG][mC][mU][mU][mA][mA][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 681 | [MePhosphonate-4O-mUs][fAs][fAs][fU][fU][mA][fA][mG][mC][fA][mG][mG][mU][fG][mA][mG][mG][mU][mC][mAs][mGs][mG] | 682 |
| 146 | [mGs][mA][mC][mC][mU][mC][mA][fC][fC][fU][fG][mC][mU][mU][mA][mA][mU][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 683 | [MePhosphonate-4O-mUs][fCs][fAs][fA][fU][mU][fA][mA][mG][fC][mA][mG][mG][fU][mG][mA][mG][mG][mU][mCs][mGs][mG] | 684 |
| 147 | [mAs][mC][mC][mU][mC][mA][mC][fC][fU][fG][fC][mU][mU][mA][mA][mU][mU][mG][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 685 | [MePhosphonate-4O-mUs][fUs][fCs][fA][fA][mU][fU][mA][mA][fG][mC][mA][mG][fG][mU][mG][mA][mG][mG][mUs][mGs][mG] | 686 |
| 148 | [mCs][mC][mU][mC][mA][mC][mC][fU][fG][fC][fU][mU][mA][mA][mU][mU][mG][mA][mC][mA][mG][mC][mA][                                                                                  | 687 | [MePhosphonate-4O-mUs][fGs][fUs][fC][fA][mA][fU][mU][mA][fA][mG][mC][mA][fG][mG][mU][mG][mA][mG][mGs][mGs][mG] | 688 |

|     |                                                                                                                                                                                                                     |     |                                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------|-----|
|     | mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mC][mC<br>][mU][mG][mC]                                                                                                                   |     |                                                                                                                                |     |
| 149 | [mCs][mU][mC][mA][<br>mC][mC][mU][fG][fC][<br>fU][fU][mA][mA][mU][<br>mU][mG][mA][mC][m<br>A][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 689 | [MePhosphonate-4O-<br>mUs][fUs][fGs][fU][fC][mA<br>][fA][mU][mU][fA][mA][m<br>G][mC][fA][mG][mG][mU][<br>mG][mA][mGs][mGs][mG] | 690 |
| 150 | [mUs][mC][mA][mC][<br>mC][mU][mG][fC][fU][<br>fU][fA][mA][mU][mU][<br>mG][mA][mC][mA][m<br>C][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 691 | [MePhosphonate-4O-<br>mUs][fGs][fUs][fG][fU][mC<br>][fA][mA][mU][fU][mA][m<br>A][mG][fC][mA][mG][mG][<br>mU][mG][mAs][mGs][mG] | 692 |
| 151 | [mCs][mA][mC][mC][m<br>U][mG][mC][fU][fU][f<br>A][fA][mU][mU][mG][<br>mA][mC][mA][mC][mC<br>][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 693 | [MePhosphonate-4O-<br>mUs][fGs][fGs][fU][fG][mU<br>][fC][mA][mA][fU][mU][m<br>A][mA][fG][mC][mA][mG][<br>mG][mU][mGs][mGs][mG] | 694 |
| 152 | [mAs][mC][mC][mU][<br>mG][mC][mU][fU][fA][<br>fA][fU][mU][mG][mA][<br>mC][mA][mC][mC][mA<br>][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 695 | [MePhosphonate-4O-<br>mUs][fUs][fGs][fG][fU][mG<br>][fU][mC][mA][fA][mU][m<br>U][mA][fA][mG][mC][mA][<br>mG][mG][mUs][mGs][mG] | 696 |
| 153 | [mCs][mC][mU][mG][<br>mC][mU][mU][fA][fA][<br>fU][fU][mG][mA][mC][<br>mA][mC][mC][mA][m                                                                                                                             | 697 | [MePhosphonate-4O-<br>mUs][fUs][fUs][fG][fG][mU<br>][fG][mU][mC][fA][mA][m                                                     | 698 |

|     |                                                                                                                                                                                  |     |                                                                                                                |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | A][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                                            |     | U][mU][fA][mA][mG][mC][mA][mG][mGs][mGs][mG]                                                                   |     |
| 154 | [mCs][mU][mG][mC][mU][mU][mA][fA][fU][fU][fG][mA][mC][mA][mC][mC][mA][mA][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 699 | [MePhosphonate-4O-mUs][fGs][fUs][fU][fG][mG][fU][mG][mU][fC][mA][mA][mU][fU][mA][mA][mG][mC][mA][mGs][mGs][mG] | 700 |
| 155 | [mUs][mG][mC][mU][mU][mA][mA][fU][fU][fG][fA][mC][mA][mC][mC][mA][mA][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 701 | [MePhosphonate-4O-mUs][fAs][fGs][fU][fU][mG][fG][mU][mG][fU][mC][mA][mA][fU][mU][mA][mA][mG][mC][mAs][mGs][mG] | 702 |
| 156 | [mGs][mC][mU][mU][mA][mA][mU][fU][fG][fA][fC][mA][mC][mC][mA][mA][mC][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 703 | [MePhosphonate-4O-mUs][fAs][fAs][fG][fU][mU][fG][mG][mU][fG][mU][mC][mA][fA][mU][mU][mA][mA][mG][mCs][mGs][mG] | 704 |
| 157 | [mCs][mU][mU][mA][mA][mU][mU][fG][fA][fC][fA][mC][mC][mA][mA][mC][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]     | 705 | [MePhosphonate-4O-mUs][fAs][fAs][fA][fG][mU][fU][mG][mG][fU][mG][mU][mC][fA][mA][mU][mU][mA][mA][mGs][mGs][mG] | 706 |
| 158 | [mUs][mU][mA][mA][mU][mU][mG][fA][fC][fA][fC][mC][mA][mA][                                                                                                                       | 707 | [MePhosphonate-4O-mUs][fAs][fAs][fA][fA][mG][fU][mU][mG][fG][mU][m                                             | 708 |

|     |                                                                                                                                                                                  |     |                                                                                                                |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | mC][mU][mU][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                                           |     | G][mU][fC][mA][mA][mU][mU][mA][mAs][mGs][mG]                                                                   |     |
| 159 | [mUs][mA][mA][mU][mU][mG][mA][fC][fA][fC][fC][mA][mA][mC][mU][mU][mU][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 709 | [MePhosphonate-4O-mUs][fGs][fAs][fA][fA][mA][fG][mU][mU][fG][mG][mU][mG][fU][mC][mA][mA][mU][mU][mAs][mGs][mG] | 710 |
| 160 | [mAs][mU][mU][mG][mA][mA][mG][fG][fG][fG][fU][mG][mC][mU][mG][mU][mG][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 711 | [MePhosphonate-4O-mUs][fAs][fGs][fC][fA][mC][fA][mG][mC][fA][mC][mC][mC][fC][mU][mU][mC][mA][mA][mUs][mGs][mG] | 712 |
| 161 | [mCs][mU][mU][mG][mG][mA][mC][fA][fA][fA][fA][mG][mG][mA][mU][mU][mG][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 713 | [MePhosphonate-4O-mUs][fCs][fAs][fC][fA][mA][fU][mC][mC][fU][mU][mU][mU][fG][mU][mC][mC][mA][mA][mGs][mGs][mG] | 714 |
| 162 | [mUs][mU][mG][mG][mA][mC][mA][fA][fA][fA][fG][mG][mA][mU][mU][mG][mU][mG][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 715 | [MePhosphonate-4O-mUs][fCs][fCs][fA][fC][mA][fA][mU][mC][fC][mU][mU][mU][fU][mG][mU][mC][mC][mA][mAs][mGs][mG] | 716 |
| 163 | [mUs][mC][mA][mA][mC][mG][mG][fU][fU][                                                                                                                                           | 717 | [MePhosphonate-4O-mUs][fAs][fAs][fA][fU][mC]                                                                   | 718 |

|     |                                                                                                                                                                                  |     |                                                                                                                |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | fC][fC][mC][mU][mU][mG][mA][mU][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]                                       |     | ][fA][mA][mG][fG][mG][mA][mA][fC][mC][mG][mU][mU][mG][mAs][mGs][mG]                                            |     |
| 164 | [mCs][mA][mA][mC][mG][mG][mU][fU][fC][fC][fC][mU][mU][mG][mA][mU][mU][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 719 | [MePhosphonate-4O-mUs][fGs][fAs][fA][fA][mU][fC][mA][mA][fG][mG][mG][mA][fA][mC][mC][mG][mU][mU][mGs][mGs][mG] | 720 |
| 165 | [mAs][mA][mC][mG][mG][mU][mU][fC][fC][fC][fU][mU][mG][mA][mU][mU][mU][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 721 | [MePhosphonate-4O-mUs][fAs][fGs][fA][fA][mA][fU][mC][mA][fA][mG][mG][mG][fA][mA][mC][mC][mG][mU][mUs][mGs][mG] | 722 |
| 166 | [mAs][mC][mG][mG][mU][mU][mC][fC][fC][fU][fU][mG][mA][mU][mU][mU][mC][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 723 | [MePhosphonate-4O-mUs][fAs][fAs][fG][fA][mA][fA][mU][mC][fA][mA][mG][mG][fG][mA][mA][mC][mC][mG][mUs][mGs][mG] | 724 |
| 167 | [mGs][mU][mA][mC][mA][mU][mU][fG][fA][fC][fC][mA][mG][mA][mC][mC][mA][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 725 | [MePhosphonate-4O-mUs][fCs][fAs][fU][fG][mG][fU][mC][mU][fG][mG][mU][mC][fA][mA][mU][mG][mU][mA][mCs][mGs][mG] | 726 |

|     |                                                                                                                                                                                  |     |                                                                                                                |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 168 | [mAs][mC][mC][mU][mG][mU][mA][fC][fC][fA][fC][mC][mU][mC][mC][mU][mG][mU][mG][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC]             | 727 | [MePhosphonate-4O-mUs][fCs][fAs][fA][mG][fG][mA][mG][fG][mU][mG][mG][fU][mA][mC][mA][mG][mG][mUs][mGs][mG]     | 728 |
| 169 | [mCs][mC][mU][mG][mU][mA][mC][fC][fA][fC][fC][mU][mC][mC][mU][mG][mU][mG][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 729 | [MePhosphonate-4O-mUs][fAs][fCs][fA][fC][mA][fG][mG][mA][fG][mG][mU][mG][fG][mU][mA][mC][mA][mG][mGs][mGs][mG] | 730 |
| 170 | [mGs][mU][mA][mC][mC][mA][mC][fC][fU][fC][fC][mU][mG][mU][mG][mU][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 731 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fA][mC][fA][mC][mA][fG][mG][mA][mG][fG][mU][mG][mG][mU][mA][mCs][mGs][mG] | 732 |
| 171 | [mGs][mC][mA][mC][mA][mG][mG][fC][fA][fU][fC][mA][mA][mG][mU][mU][mC][mU][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 733 | [MePhosphonate-4O-mUs][fUs][fAs][fG][fA][mA][fC][mU][mU][fG][mA][mU][mG][fC][mC][mU][mG][mU][mG][mCs][mGs][mG] | 734 |
| 172 | [mAs][mC][mA][mG][mG][mC][mA][fU][fC][fA][fA][mG][mU][mU][mC][mU][mA][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-                                | 735 | [MePhosphonate-4O-mUs][fAs][fGs][fU][fA][mG][fA][mA][mC][fU][mU][mG][mA][fU][mG][mC][mC][mU][mG][mUs][mGs][mG] | 736 |

|     |                                                                                                                                                                                  |     |                                                                                                                |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][mG][mG][mC][mU][mG][mC]                                                                                                                                                  |     |                                                                                                                |     |
| 173 | [mCs][mA][mG][mG][mC][mA][mU][fC][fA][fA][fG][mU][mU][mC][mU][mA][mC][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 737 | [MePhosphonate-4O-mUs][fGs][fAs][fU][mA][fG][mA][mA][fC][mU][mU][mG][fA][mU][mG][mC][mC][mU][mGs][mGs][mG]     | 738 |
| 174 | [mAs][mG][mG][mC][mA][mU][mC][fA][fA][fG][fU][mU][mC][mU][mA][mC][mU][mC][mC][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 739 | [MePhosphonate-4O-mUs][fGs][fGs][fA][fG][mU][fA][mG][mA][fA][mC][mU][mU][fG][mA][mU][mG][mC][mC][mUs][mGs][mG] | 740 |
| 175 | [mGs][mG][mC][mA][mU][mC][mA][fA][fG][fU][fU][mC][mU][mA][mC][mU][mC][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 741 | [MePhosphonate-4O-mUs][fUs][fGs][fG][fA][mG][fU][mA][mG][fA][mA][mC][mU][fU][mG][mA][mU][mG][mC][mCs][mGs][mG] | 742 |
| 176 | [mGs][mC][mA][mU][mC][mA][mA][fG][fU][fU][fC][mU][mA][mC][mU][mC][mC][mA][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 743 | [MePhosphonate-4O-mUs][fAs][fUs][fG][fG][mA][fG][mU][mA][fG][mA][mA][mC][fU][mU][mG][mA][mU][mG][mCs][mGs][mG] | 744 |
| 177 | [mCs][mA][mU][mC][mA][mA][mG][fU][fU][fC][fU][mA][mC][mU][mC][mC][mA][mU][mU][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-                                              | 745 | [MePhosphonate-4O-mUs][fAs][fAs][fU][fG][mG][fA][mG][mU][fA][mG][mA][mA][fC][mU][mU][mG][mA][mU][mGs][mGs][mG] | 746 |

|     |                                                                                                                                                                                 |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                                       |     |                                                                                                                |     |
| 178 | [mAs][mU][mC][mA][mG][mU][fU][fC][fU][fA][mC][mU][mC][mC][mA][mU][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]         | 747 | [MePhosphonate-4O-mUs][fGs][fAs][fA][fU][mG][fG][mA][mG][fU][mA][mG][mA][fA][mC][mU][mU][mG][mA][mUs][mGs][mG] | 748 |
| 179 | [mUs][mC][mA][mA][mG][mU][mU][fC][fU][fA][fC][mU][mC][mC][mA][mU][mU][mC][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]     | 749 | [MePhosphonate-4O-mUs][fUs][fGs][fA][fA][mU][fG][mG][mA][fG][mU][mA][mG][fA][mA][mC][mU][mU][mG][mAs][mGs][mG] | 750 |
| 180 | [mCs][mA][mA][mG][mU][mU][mC][fU][fA][fC][fU][mC][mC][mA][mU][mU][mC][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]     | 751 | [MePhosphonate-4O-mUs][fCs][fUs][fG][fA][mA][fU][mG][mG][fA][mG][mU][mA][fG][mA][mA][mC][mU][mU][mGs][mGs][mG] | 752 |
| 181 | [mAs][mA][mG][mU][mU][mC][mU][fA][fC][fU][fC][mC][mA][mU][mU][mC][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                 | 753 | [MePhosphonate-4O-mUs][fGs][fCs][fU][fG][mA][fA][mU][mG][fG][mA][mG][mU][fA][mG][mA][mA][mC][mU][mUs][mGs][mG] | 754 |
| 182 | [mAs][mG][mU][mU][mC][mU][mA][fC][fU][fC][fC][mA][mU][mU][mC][mA][mG][mC][mA][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC] | 755 | [MePhosphonate-4O-mUs][fUs][fGs][fC][fU][mG][fA][mA][mU][fG][mG][mA][mG][fU][mA][mG][mA][mA][mC][mUs][mGs][mG] | 756 |

|     |                                                                                                                                                                                 |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mC][mU][mG][mC]                                                                                                                      |     |                                                                                                                |     |
| 183 | [mGs][mU][mU][mC][mU][mA][mC][fU][fC][fC][fA][mU][mU][mC][mA][mG][mC][mA][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 757 | [MePhosphonate-4O-mUs][fCs][fUs][fG][fC][mU][fG][mA][mA][fU][mG][mG][mA][fG][mU][mA][mG][mA][mA][mCs][mGs][mG] | 758 |
| 184 | [mGs][mU][mG][mU][mC][mA][mU][fC][fU][fC][fA][mG][mA][mC][mA][mA][mC][mC][mU][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 759 | [MePhosphonate-4O-mUs][fAs][fGs][fG][fU][mU][fG][mU][mC][fU][mG][mA][mG][fA][mU][mG][mA][mC][mA][mCs][mGs][mG] | 760 |
| 185 | [mCs][mA][mU][mC][mU][mC][mA][fG][fA][fC][fA][mA][mC][mC][mU][mG][mC][mU][mG][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 761 | [MePhosphonate-4O-mUs][fCs][fAs][fG][fC][mA][fG][mG][mU][fU][mG][mU][mC][fU][mG][mA][mG][mA][mU][mGs][mGs][mG] | 762 |
| 186 | [mUs][mC][mA][mG][mA][mC][mA][fA][fC][fC][fU][mG][mC][mU][mG][mG][mU][mG][mA][mA][mG][mC][mA][mG][mC][mC][mG][ademA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] | 763 | [MePhosphonate-4O-mUs][fUs][fCs][fA][fC][mC][fA][mG][mC][fA][mG][mG][mU][fU][mG][mU][mC][mU][mG][mAs][mGs][mG] | 764 |
| 187 | [mCs][mG][mG][mG][mG][mA][mC][fC][fU][fG][fU][mU][mA][mC][mA][mG][mA][mC][mA][mA][mA][mG][mC][mA][                                                                              | 765 | [MePhosphonate-4O-mUs][fUs][fGs][fU][fC][mU][fG][mU][mA][fA][mC][mA][mG][fG][mU][mC][mC][mC][mC][mCs][mGs][mG] | 766 |

|     |                                                                                                                                                                                                                     |     |                                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------|-----|
|     | mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC]                                                                                                                   |     |                                                                                                                                |     |
| 188 | [mGs][mA][mC][mA][<br>mA][mC][mG][fC][fU][<br>fG][fC][mC][mA][mU][<br>mU][mG][mU][mC][m<br>U][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 767 | [MePhosphonate-4O-<br>mUs][fAs][fGs][fA][fC][mA<br>][fA][mU][mG][fG][mC][m<br>A][mG][fC][mG][mU][mU][<br>mG][mU][mCs][mGs][mG] | 768 |
| 189 | [mGs][mC][mU][mG][<br>mC][mC][mU][fC][fC][<br>fU][fG][mA][mC][mU][<br>mG][mU][mA][mA][m<br>U][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 769 | [MePhosphonate-4O-<br>mUs][fAs][fUs][fU][fA][mC<br>][fA][mG][mU][fC][mA][m<br>G][mG][fA][mG][mG][mC][<br>mA][mG][mCs][mGs][mG] | 770 |
| 190 | [mCs][mU][mG][mC][<br>mC][mU][mC][fC][fU][<br>fG][fA][mC][mU][mG][<br>mU][mA][mA][mU][m<br>A][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 771 | [MePhosphonate-4O-<br>mUs][fUs][fAs][fU][fU][mA<br>][fC][mA][mG][fU][mC][m<br>A][mG][fG][mA][mG][mG][<br>mC][mA][mGs][mGs][mG] | 772 |
| 191 | [mUs][mA][mA][mU][<br>mA][mU][mU][fA][fA][<br>fA][fC][mU][mU][mU][<br>mU][mU][mU][mA][m<br>A][mA][mG][mC][mA][<br>mG][mC][mC][mG][ade<br>mA-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc][mG][mG][mC<br>][mU][mG][mC] | 773 | [MePhosphonate-4O-<br>mUs][fUs][fUs][fA][fA][mA<br>][fA][mA][mA][fG][mU][m<br>U][mU][fA][mA][mU][mA][<br>mU][mU][mAs][mGs][mG] | 774 |
| 192 | [mAs][mA][mU][mA][<br>mU][mU][mA][fA][fA][<br>fC][fU][mU][mU][mU][<br>mU][mU][mA][mA][m                                                                                                                             | 775 | [MePhosphonate-4O-<br>mUs][fUs][fUs][fU][fA][mA<br>][fA][mA][mA][fA][mG][m                                                     | 776 |

|  |                                                                                                       |  |                                              |  |
|--|-------------------------------------------------------------------------------------------------------|--|----------------------------------------------|--|
|  | A][mA][mG][mC][mA][mG][mC][mC][mG][ade mA-GalNAc][ademA-GalNAc][ademA-GalNAc][mG][mG][mC][mU][mG][mC] |  | U][mU][fU][mA][mA][mU][mA][mU][mUs][mGs][mG] |  |
|--|-------------------------------------------------------------------------------------------------------|--|----------------------------------------------|--|

**[00253]** The human hepatocyte 3D spheroid-based assay described in Example 2 is repeated with the GalXC™-SCAP oligonucleotides of Table 4, the results of which are shown in Table 5.

**[00254]** Table 5: GalXC™-SCAP Oligonucleotide SCAP mRNA Knockdown in 3D Human Spheroids; administered at 100 nM for 7 Days;-5' and -3' Assays % mRNA Remaining (normalized to Hs HPRT-517 (HEX) and Hs SFRS9-569 (HEX) vs mock control).

| GalXC™<br>-SCAP | HPRT-517 (HEX)   |       | SFRS9-569 (HEX)  |       | Average          |       |
|-----------------|------------------|-------|------------------|-------|------------------|-------|
|                 | % mRNA Remaining | % SEM | % mRNA Remaining | % SEM | % mRNA Remaining | % SEM |
| 1               | 67.3             | 11.5  | 66.3             | 12.0  | 66.8             | 0.7   |
| 2               | 26.3             | 12.1  | 17.7             | 7.8   | 22.0             | 6.1   |
| 3               | 43.5             | 4.7   | 48.0             | 5.6   | 45.7             | 3.2   |
| 4               | 64.2             | 12.4  | 55.8             | 13.6  | 60.0             | 6.0   |
| 5               | 73.5             | 10.2  | 86.3             | 11.0  | 79.9             | 9.0   |
| 6               | 59.8             | 10.1  | 94.1             | 11.3  | 77.0             | 24.3  |
| 7               | 43.9             | 7.8   | 60.8             | 11.1  | 52.3             | 11.9  |
| 8               | 94.4             | 26.7  | 110.7            | 19.3  | 102.6            | 11.5  |
| 9               | 32.7             | 5.0   | 53.7             | 10.3  | 43.2             | 14.8  |
| 10              | 44.1             | 3.3   | 61.7             | 5.1   | 52.9             | 12.4  |
| 11              | 77.1             | 21.9  | 97.5             | 18.5  | 87.3             | 14.4  |
| 12              | 64.3             | 54.4  | 72.5             | 53.6  | 68.4             | 5.8   |
| 13              | 6.4              | 1.9   | 36.3             | 6.9   | 21.4             | 21.1  |
| 14              | 80.4             | 16.1  | 104.2            | 17.8  | 92.3             | 16.8  |
| 15              | 87.1             | 10.4  | 111.2            | 12.5  | 99.2             | 17.0  |
| 16              | 91.3             | 19.6  | 106.5            | 23.2  | 98.9             | 10.8  |
| 17              | 64.3             | 6.3   | 101.3            | 14.1  | 82.8             | 26.2  |
| 18              | 99.0             | 18.7  | 101.6            | 28.4  | 100.3            | 1.8   |
| 19              | 75.7             | 11.1  | 90.1             | 16.0  | 82.9             | 10.2  |
| 20              | 35.2             | 7.4   | 45.6             | 12.1  | 40.4             | 7.3   |
| 21              | 32.7             | 7.0   | 35.0             | 11.0  | 33.9             | 1.6   |
| 22              | 49.3             | 4.8   | 61.6             | 5.2   | 55.4             | 8.7   |
| 23              | 76.2             | 16.4  | 86.0             | 20.5  | 81.1             | 6.9   |
| 24              | 22.7             | 4.6   | 38.0             | 7.1   | 30.4             | 10.8  |
| 25              | 110.6            | 19.0  | 103.6            | 19.7  | 107.1            | 4.9   |
| 26              | 57.2             | 16.0  | 67.9             | 16.1  | 62.6             | 7.6   |
| 27              | 66.4             | 11.2  | 78.6             | 11.9  | 72.5             | 8.6   |
| 28              | 100.0            | 22.1  | 134.8            | 21.6  | 117.4            | 24.6  |
| 29              | 53.2             | 13.3  | 58.1             | 13.8  | 55.6             | 3.5   |

|    |       |       |       |      |       |      |
|----|-------|-------|-------|------|-------|------|
| 30 | 42.7  | 10.6  | 66.5  | 15.3 | 54.6  | 16.8 |
| 31 | 46.2  | 5.8   | 89.9  | 12.6 | 68.0  | 31.0 |
| 32 | 59.9  | 12.1  | 73.3  | 11.8 | 66.6  | 9.5  |
| 33 | 29.4  | 5.5   | 38.5  | 7.4  | 33.9  | 6.4  |
| 34 | 92.3  | 19.3  | 127.0 | 18.3 | 109.7 | 24.6 |
| 35 | 95.5  | 25.6  | 120.3 | 27.5 | 107.9 | 17.5 |
| 36 | 69.9  | 20.9  | 102.1 | 33.2 | 86.0  | 22.8 |
| 37 | 57.1  | 20.6  | 82.3  | 22.0 | 69.7  | 17.8 |
| 38 | 53.7  | 12.9  | 70.4  | 14.8 | 62.1  | 11.8 |
| 39 | 87.5  | 19.1  | 107.1 | 26.1 | 97.3  | 13.8 |
| 40 | 67.7  | 16.2  | 93.7  | 26.9 | 80.7  | 18.4 |
| 41 | 78.5  | 16.1  | 94.7  | 14.0 | 86.6  | 11.5 |
| 42 | 43.0  | 5.8   | 39.2  | 5.7  | 41.1  | 2.7  |
| 43 | 25.8  | 4.7   | 29.7  | 5.4  | 27.7  | 2.8  |
| 44 | 55.4  | 7.6   | 72.2  | 8.6  | 63.8  | 11.9 |
| 45 | 78.0  | 7.7   | 101.9 | 7.2  | 89.9  | 16.9 |
| 46 | 53.4  | 38.0  | 118.6 | 56.2 | 86.0  | 46.1 |
| 47 | 69.1  | 10.8  | 87.4  | 13.8 | 78.2  | 12.9 |
| 48 | 155.7 | 107.9 | 73.6  | 57.4 | 114.7 | 58.0 |
| 49 | 57.1  | 9.2   | 62.7  | 11.9 | 59.9  | 3.9  |
| 50 | 61.2  | 6.3   | 76.6  | 7.7  | 68.9  | 10.9 |
| 51 | 37.8  | 6.3   | 38.1  | 7.6  | 38.0  | 0.2  |
| 52 | 32.6  | 5.7   | 35.9  | 8.4  | 34.2  | 2.3  |
| 53 | 50.4  | 3.8   | 60.5  | 6.5  | 55.4  | 7.1  |
| 54 | 41.8  | 9.4   | 51.4  | 12.0 | 46.6  | 6.8  |
| 55 | 58.5  | 8.0   | 57.5  | 11.4 | 58.0  | 0.7  |
| 56 | 82.7  | 14.0  | 86.3  | 17.9 | 84.5  | 2.5  |
| 57 | 59.9  | 5.9   | 64.3  | 5.5  | 62.1  | 3.1  |
| 58 | 90.3  | 11.2  | 87.7  | 10.9 | 89.0  | 1.9  |
| 59 | 78.7  | 8.1   | 83.8  | 7.3  | 81.3  | 3.6  |
| 60 | 40.2  | 8.8   | 35.7  | 8.0  | 37.9  | 3.2  |
| 61 | 46.5  | 8.6   | 49.6  | 8.7  | 48.1  | 2.2  |
| 62 | 33.4  | 6.5   | 38.3  | 7.2  | 35.9  | 3.5  |
| 63 | 30.7  | 5.0   | 41.2  | 6.5  | 36.0  | 7.4  |
| 64 | 60.0  | 11.9  | 48.1  | 9.6  | 54.1  | 8.4  |
| 65 | 39.0  | 5.5   | 39.0  | 6.1  | 39.0  | 0.1  |
| 66 | 30.3  | 3.4   | 25.6  | 3.6  | 28.0  | 3.3  |
| 67 | 14.2  | 3.6   | 17.0  | 3.7  | 15.6  | 1.9  |
| 68 | 33.4  | 5.2   | 28.6  | 5.2  | 31.0  | 3.4  |
| 69 | 27.9  | 1.9   | 32.7  | 4.3  | 30.3  | 3.4  |
| 70 | 11.0  | 1.2   | 12.4  | 1.7  | 11.7  | 1.0  |
| 71 | 74.5  | 6.9   | 87.7  | 7.5  | 81.1  | 9.3  |
| 72 | 88.7  | 7.1   | 83.0  | 7.8  | 85.8  | 4.1  |
| 73 | 41.3  | 12.4  | 46.3  | 5.4  | 43.8  | 3.5  |
| 74 | 77.9  | 28.7  | 99.8  | 29.7 | 88.9  | 15.4 |
| 75 | 45.8  | 20.7  | 86.2  | 21.2 | 66.0  | 28.6 |
| 76 | 81.9  | 13.4  | 86.9  | 15.8 | 84.4  | 3.5  |

|     |       |       |       |      |       |      |
|-----|-------|-------|-------|------|-------|------|
| 77  | 94.3  | 14.9  | 105.8 | 13.8 | 100.0 | 8.2  |
| 78  | 73.6  | 10.1  | 84.8  | 12.6 | 79.2  | 7.9  |
| 79  | 41.2  | 8.6   | 47.3  | 9.2  | 44.2  | 4.3  |
| 80  | 68.6  | 6.7   | 91.5  | 8.5  | 80.0  | 16.2 |
| 81  | 60.5  | 5.8   | 67.7  | 10.2 | 64.1  | 5.1  |
| 82  | 49.4  | 21.3  | 49.5  | 12.3 | 49.5  | 0.1  |
| 83  | 65.4  | 7.3   | 85.3  | 10.4 | 75.4  | 14.1 |
| 84  | 66.2  | 10.2  | 60.9  | 11.2 | 63.5  | 3.8  |
| 85  | 67.7  | 4.9   | 78.3  | 6.6  | 73.0  | 7.5  |
| 86  | 58.2  | 7.3   | 71.3  | 9.5  | 64.7  | 9.3  |
| 87  | 66.2  | 4.9   | 79.2  | 8.8  | 72.7  | 9.2  |
| 88  | 82.1  | 11.0  | 94.1  | 15.9 | 88.1  | 8.5  |
| 89  | 83.4  | 56.0  | 48.4  | 20.8 | 65.9  | 24.8 |
| 90  | 67.7  | 9.7   | 67.3  | 9.1  | 67.5  | 0.3  |
| 91  | 56.9  | 23.8  | 55.5  | 22.0 | 56.2  | 1.0  |
| 92  | 83.5  | 8.7   | 84.2  | 9.2  | 83.9  | 0.4  |
| 93  | 49.2  | 4.3   | 45.6  | 5.4  | 47.4  | 2.5  |
| 94  | 62.6  | 6.2   | 79.6  | 9.5  | 71.1  | 12.1 |
| 95  | 43.8  | 9.1   | 48.4  | 10.3 | 46.1  | 3.2  |
| 96  | 47.6  | 6.8   | 48.7  | 6.1  | 48.1  | 0.7  |
| 97  | 127.0 | 110.9 | 66.2  | 54.3 | 96.6  | 43.0 |
| 98  | 56.9  | 5.5   | 68.5  | 5.4  | 62.7  | 8.2  |
| 99  | 83.0  | 6.1   | 84.6  | 9.6  | 83.8  | 1.1  |
| 100 | 72.1  | 25.4  | 137.4 | 41.3 | 104.7 | 46.2 |
| 101 | 39.0  | 6.9   | 48.5  | 9.0  | 43.8  | 6.7  |
| 102 | 55.8  | 6.4   | 74.0  | 10.7 | 64.9  | 12.9 |
| 103 | 21.6  | 10.5  | 41.7  | 15.9 | 31.6  | 14.2 |
| 104 | 12.6  | 7.3   | 15.9  | 11.4 | 14.2  | 2.3  |
| 105 | 17.6  | 3.1   | 60.0  | 6.8  | 38.8  | 30.0 |
| 106 | 3.3   | 0.6   | 13.9  | 5.1  | 8.6   | 7.5  |
| 107 | 6.4   | 1.5   | 22.9  | 5.2  | 14.7  | 11.7 |
| 108 | 17.7  | 2.9   | 44.6  | 8.3  | 31.1  | 19.1 |
| 109 | 15.8  | 10.0  | 57.0  | 30.9 | 36.4  | 29.2 |
| 110 | 12.1  | 1.4   | 49.2  | 5.2  | 30.6  | 26.2 |
| 111 | 27.8  | 6.9   | 50.5  | 12.1 | 39.2  | 16.1 |
| 112 | 28.8  | 15.5  | 64.5  | 27.3 | 46.7  | 25.2 |
| 113 | 20.7  | 3.0   | 40.6  | 5.4  | 30.6  | 14.1 |
| 114 | 37.7  | 17.1  | 71.2  | 22.6 | 54.4  | 23.7 |
| 115 | 17.5  | 6.2   | 30.2  | 11.8 | 23.9  | 9.0  |
| 116 | 63.9  | 9.2   | 86.9  | 11.8 | 75.4  | 16.3 |
| 117 | 30.5  | 2.9   | 39.4  | 4.1  | 34.9  | 6.3  |
| 118 | 43.9  | 10.9  | 61.8  | 14.2 | 52.9  | 12.7 |
| 119 | 44.0  | 5.2   | 57.4  | 8.7  | 50.7  | 9.5  |
| 120 | 38.1  | 12.1  | 55.8  | 15.3 | 46.9  | 12.5 |
| 121 | 59.4  | 29.3  | 86.1  | 35.7 | 72.8  | 18.9 |
| 122 | 62.6  | 12.2  | 81.9  | 13.3 | 72.3  | 13.7 |
| 123 | 55.7  | 19.8  | 85.2  | 30.5 | 70.5  | 20.8 |

|     |       |      |       |      |       |      |
|-----|-------|------|-------|------|-------|------|
| 124 | 35.2  | 8.0  | 80.9  | 21.6 | 58.1  | 32.4 |
| 125 | 57.3  | 8.2  | 71.1  | 7.1  | 64.2  | 9.7  |
| 126 | 86.3  | 21.0 | 88.9  | 25.2 | 87.6  | 1.8  |
| 127 | 83.4  | 15.4 | 106.5 | 22.9 | 94.9  | 16.3 |
| 128 | 119.6 | 61.8 | 78.2  | 59.0 | 98.9  | 29.3 |
| 129 | 88.0  | 14.9 | 94.3  | 16.8 | 91.2  | 4.4  |
| 130 | 94.3  | 68.0 | 83.8  | 54.1 | 89.1  | 7.5  |
| 131 | 50.2  | 17.0 | 66.4  | 14.8 | 58.3  | 11.5 |
| 132 | 50.9  | 5.1  | 47.6  | 4.6  | 49.3  | 2.4  |
| 133 | 33.1  | 18.1 | 45.3  | 13.4 | 39.2  | 8.6  |
| 134 | 38.7  | 21.1 | 61.9  | 25.4 | 50.3  | 16.4 |
| 135 | --    | --   | 52.6  | 31.5 | 52.6  | 32.5 |
| 136 | 34.2  | 10.0 | 37.6  | 10.1 | 35.9  | 2.4  |
| 137 | 92.8  | 24.3 | 92.7  | 21.9 | 92.8  | 0.1  |
| 138 | 49.7  | 14.6 | 48.9  | 11.4 | 49.3  | 0.6  |
| 139 | 74.2  | 11.0 | 86.8  | 11.9 | 80.5  | 8.9  |
| 140 | 91.6  | 25.4 | 92.3  | 27.1 | 91.9  | 0.5  |
| 141 | 61.9  | 7.5  | 64.1  | 8.2  | 63.0  | 1.6  |
| 142 | 60.3  | 10.8 | 72.7  | 17.4 | 66.5  | 8.8  |
| 143 | 136.6 | 56.4 | 55.2  | 41.9 | 95.9  | 57.6 |
| 144 | 121.2 | 42.0 | 59.0  | 29.7 | 90.1  | 44.0 |
| 145 | 83.5  | 10.9 | 87.6  | 12.3 | 85.5  | 2.9  |
| 146 | 73.6  | 7.3  | 67.9  | 4.9  | 70.7  | 4.0  |
| 147 | 104.3 | 16.4 | 77.3  | 8.5  | 90.8  | 19.1 |
| 148 | 84.2  | 12.7 | 81.0  | 10.8 | 82.6  | 2.3  |
| 149 | 53.4  | 9.7  | 58.5  | 11.8 | 55.9  | 3.6  |
| 150 | 77.3  | 25.8 | 69.8  | 23.9 | 73.5  | 5.4  |
| 151 | 108.2 | 43.9 | 120.3 | 39.8 | 114.3 | 8.5  |
| 152 | 66.5  | 12.1 | 56.5  | 11.2 | 61.5  | 7.1  |
| 153 | 43.3  | 6.4  | 57.9  | 11.6 | 50.6  | 10.4 |
| 154 | 78.7  | 8.2  | 78.4  | 9.0  | 78.5  | 0.2  |
| 155 | 86.6  | 8.1  | 69.9  | 7.7  | 78.3  | 11.8 |
| 156 | 36.0  | 4.9  | 40.7  | 4.3  | 38.3  | 3.3  |
| 157 | 39.6  | 3.7  | 31.2  | 3.2  | 35.4  | 5.9  |
| 158 | 25.2  | 11.5 | 26.4  | 11.8 | 25.8  | 0.8  |
| 159 | 24.6  | 7.4  | 22.5  | 6.1  | 23.6  | 1.5  |
| 160 | 101.4 | 17.4 | 86.1  | 16.5 | 93.7  | 10.8 |
| 161 | 90.3  | 12.2 | 65.3  | 16.3 | 77.8  | 17.7 |
| 162 | 74.4  | 11.1 | 66.2  | 12.6 | 70.3  | 5.8  |
| 163 | 19.5  | 2.8  | 10.2  | 2.2  | 14.8  | 6.6  |
| 164 | 23.3  | 2.6  | 18.1  | 3.6  | 20.7  | 3.6  |
| 165 | 16.7  | 7.7  | 10.4  | 4.2  | 13.6  | 4.5  |
| 166 | 27.2  | 4.2  | 23.2  | 2.7  | 25.2  | 2.8  |
| 167 | 87.0  | 10.1 | 77.9  | 8.7  | 82.5  | 6.4  |
| 168 | 116.7 | 39.9 | 89.4  | 27.8 | 103.1 | 19.3 |
| 169 | 100.9 | 7.7  | 87.6  | 5.3  | 94.2  | 9.4  |
| 170 | 95.2  | 22.4 | 83.3  | 18.1 | 89.3  | 8.4  |

|     |      |      |       |      |       |      |
|-----|------|------|-------|------|-------|------|
| 171 | 47.4 | 10.3 | 42.2  | 9.8  | 44.8  | 3.7  |
| 172 | 63.3 | 14.3 | 43.2  | 10.7 | 53.2  | 14.2 |
| 173 | 55.6 | 10.5 | 48.9  | 8.3  | 52.2  | 4.7  |
| 174 | 45.5 | 6.5  | 38.9  | 7.5  | 42.2  | 4.6  |
| 175 | 45.5 | 15.1 | 33.2  | 13.4 | 39.4  | 8.7  |
| 176 | 30.7 | 7.3  | 30.2  | 6.2  | 30.4  | 0.3  |
| 177 | 46.4 | 7.4  | 45.0  | 5.9  | 45.7  | 1.0  |
| 178 | 38.9 | 4.9  | 41.3  | 5.2  | 40.1  | 1.7  |
| 179 | 63.6 | 12.7 | 49.6  | 14.6 | 56.6  | 9.9  |
| 180 | 80.4 | 9.9  | 72.2  | 8.1  | 76.3  | 5.8  |
| 181 | 68.2 | 7.5  | 50.7  | 7.1  | 59.4  | 12.4 |
| 182 | 37.9 | 22.9 | 53.0  | 24.5 | 45.5  | 10.7 |
| 183 | 93.8 | 20.0 | 89.0  | 17.9 | 91.4  | 3.4  |
| 184 | 95.3 | 21.4 | 132.1 | 24.0 | 113.7 | 26.0 |
| 185 | 77.4 | 5.5  | 79.3  | 9.4  | 78.3  | 1.4  |
| 186 | 55.1 | 3.5  | 39.1  | 4.1  | 47.1  | 11.4 |
| 187 | 69.3 | 37.6 | 78.8  | 30.9 | 74.0  | 6.7  |
| 188 | 81.2 | 15.0 | 66.2  | 14.1 | 73.7  | 10.6 |
| 189 | 57.2 | 15.8 | 58.6  | 12.4 | 57.9  | 1.0  |
| 190 | 69.4 | 29.6 | 70.6  | 28.9 | 70.0  | 0.9  |
| 191 | 77.3 | 8.0  | 62.2  | 7.6  | 69.7  | 10.7 |
| 192 | 79.9 | 42.5 | 67.8  | 28.7 | 73.9  | 8.5  |

**[00255]** *IN VIVO* FUNCTION

**[00256]** Example 4: RNAi Oligonucleotide Modulation of *SCAP* Activity *In Vivo* – GalXC™-Based Compounds

**[00257]** *Mouse studies:* The GalXC™-SCAP oligonucleotides, as listed in Tables 3 (unmodified) and 4 (modified), are evaluated in hydrodynamic injection (HDI) mouse model. In the HDI studies, mice are engineered to transiently express human SCAP mRNA in hepatocytes. A GalXC™-SCAP oligonucleotide control (GalXC™-SCAP oligonucleotide no. 42; *see*, SEQ ID NOs: 475 and 476) is used as a benchmark control. Briefly, 6-8-week-old female CD-1 mice are treated SQ with a GalXC™-SCAP oligonucleotide at a dose level of 2 mg/kg. Three days later (72 hr.), the mice are HDI with a DNA plasmid encoding the full human *SCAP* gene under control of a ubiquitous cytomegalovirus (CMV) promoter sequence. One day after introduction of the plasmid, liver samples are collected. Total RNA derived from these mice are subjected to qRT-PCR analysis for SCAP mRNA, relative to mice treated only with an identical volume of PBS. The values are normalized for transfection efficiency using the NeoR gene included on the plasmid.

**[00258]** As shown in Tables 6 to 8, a number of GalXC™-SCAP oligonucleotides tested inhibited *SCAP* activity, as determined by a reduced amount of SCAP mRNA in liver samples

from oligonucleotide-treated mice relative to mice treated with PBS. The mean % of remaining SCAP mRNA in liver samples of mice treated with the GalXC™-SCAP oligonucleotide control relative to mice treated with PBS. Tables 6 to 8 show that a number of the GalXC™-SCAP oligonucleotides tested inhibit *SCAP* activity to a greater extent than the GalXC™-SCAP oligonucleotide control.

[00259] Table 6: *In Vivo* Activity of GalXC™-SCAP Oligonucleotides in Mice (single-dose, SQ, 2 mg/kg; 96-hr harvest; HDI of hSCAP plasmid in mice).

| GalXC™-SCAP Oligo | Animal |       |       |       |       | Average | SEM  |
|-------------------|--------|-------|-------|-------|-------|---------|------|
|                   | 1      | 2     | 3     | 4     | 5     |         |      |
| PBS               | 70.0   | 125.3 | 145.2 | 59.4  | --    | 100.0   | 20.9 |
| 20                | 120.7  | 88.7  | 89.0  | 90.6  | 67.1  | 91.2    | 8.6  |
| 27                | 47.7   | 58.4  | 52.6  | 45.9  | 63.5  | 53.6    | 3.3  |
| 33                | --     | 95.8  | --    | 71.8  | 72.5  | 80.0    | 7.9  |
| 42                | 67.8   | 70.5  | 50.7  | 79.1  | 26.7  | 58.9    | 9.3  |
| 43                | 62.4   | 46.8  | 50.2  | 72.9  | 90.0  | 64.5    | 7.9  |
| 44                | 50.6   | 108.5 | 40.0  | 42.0  | 79.5  | 64.1    | 13.2 |
| 57                | 54.0   | --    | --    | 89.2  | 41.1  | 61.4    | 14.4 |
| 65                | 76.6   | 98.3  | 39.1  | 105.1 | 168.8 | 97.6    | 21.2 |
| 66                | 35.7   | 30.8  | 26.1  | 37.5  | 55.1  | 37.0    | 4.9  |
| 70                | --     | 12.6  | 30.8  | 11.2  | 5.83* | 18.2    | 6.3  |
| 104               | 53.7   | 45.8  | 73.7  | 54.0  | 48.3  | 55.1    | 4.9  |
| 105               | 23.7   | 101.6 | 50.3  | 62.9  | 100.6 | 67.8    | 15.0 |
| 106               | 59.6   | 29.8  | 28.4  | 53.5  | 30.5  | 40.4    | 6.7  |
| 107               | 30.3   | 12.4  | 43.0  | 13.1  | 22.1  | 24.2    | 5.7  |
| 108               | 35.5   | 71.6  | 46.4  | 54.2  | 48.1  | 51.1    | 5.9  |
| 113               | 50.5   | 55.2  | 85.0  | 38.8  | 42.9  | 54.5    | 8.1  |
| 117               | 58.7   | 82.1  | 63.0  | 46.9  | 51.6  | 60.4    | 6.1  |
| 120               | 54.1   | --    | 43.7  | 55.7  | 90.5  | 61.0    | 10.2 |

[00260] Table 7: *In Vivo* Activity of GalXC™-SCAP Oligonucleotides in Mice (single-dose, SQ, 2 mg/kg; 96-hr harvest; HDI of hSCAP plasmid in mice).

| GalXC™-SCAP Oligo | Animal |       |      |       |       | Average | SEM  |
|-------------------|--------|-------|------|-------|-------|---------|------|
|                   | 1      | 2     | 3    | 4     | 5     |         |      |
| PBS               | 105.9  | 122.9 | 90.2 | 105.6 | 75.4  | 100.0   | 8.0  |
| 2                 | 32.8   | 67.0  | 37.1 | 57.0  | 55.7  | 49.9    | 6.5  |
| 13                | 44.4   | 38.9  | 66.1 | 77.2  | 56.4  | 56.6    | 7.0  |
| 67                | 36.9   | --    | 32.1 | 41.5  | 43.5  | 38.5    | 2.5  |
| 69                | 56.5   | 51.9  | 50.1 | 60.5  | 51.3  | 54.0    | 1.9  |
| 108               | 45.7   | 88.3  | 80.2 | 56.6  | 134.9 | 81.1    | 15.5 |
| 110               | 65.7   | 50.3  | 24.3 | 30.4  | 48.3  | 43.8    | 7.4  |
| 115               | 15.0   | 45.4  | --   | 45.3  | 32.7  | 34.6    | 7.2  |
| 133               | 17.0   | 21.9  | 31.6 | 52.8  | 25.6  | 29.8    | 6.2  |

|     |      |      |      |      |      |      |      |
|-----|------|------|------|------|------|------|------|
| 144 | 66.5 | 93.9 | 28.0 | 88.0 | 32.1 | 61.7 | 13.7 |
| 157 | 21.4 | 22.9 | 72.8 | 14.1 | 43.3 | 34.9 | 10.6 |
| 159 | 24.6 | 45.3 | 58.0 | 30.4 | 34.9 | 38.6 | 5.9  |
| 163 | 9.0  | 40.3 | 48.8 | 20.8 | 24.0 | 28.6 | 7.1  |
| 164 | 34.7 | 68.5 | 81.0 | 61.8 | 55.0 | 60.2 | 7.7  |
| 165 | 48.5 | 32.3 | 49.2 | 44.6 | 39.2 | 42.8 | 3.2  |
| 166 | 31.8 | 29.4 | 55.4 | 66.0 | 70.0 | 50.5 | 8.5  |
| 176 | 31.3 | 32.1 | 31.6 | 60.5 | 30.9 | 37.3 | 5.8  |
| 177 | 26.7 | 22.8 | 19.7 | 17.9 | 15.3 | 20.5 | 2.0  |

**[00261]** Table 8: *In Vivo* Activity of GalXC™-SCAP Oligonucleotides in Mice (single-dose, SQ, 2 mg/kg; 96-hr harvest; HDI of hSCAP plasmid in mice).

| GalXC™-SCAP Oligo | Animal |       |       |       |       |       | Average | SEM |
|-------------------|--------|-------|-------|-------|-------|-------|---------|-----|
|                   | 1      | 2     | 3     | 4     | 5     |       |         |     |
| PBS               | 121.8  | 102.2 | 82.8  | 57.4  | 135.8 | 100.0 | 13.9    |     |
| 66                | 45.5   | 33.4  | 36.9  | 55.5  | 38.9  | 42.0  | 3.9     |     |
| 70                | 20.0   | 27.6  | 42.6  | 24.4  | 45.3  | 32.0  | 5.1     |     |
| 107               | 26.3   | 12.3  | 18.7  | 10.5  | 18.5  | 17.3  | 2.8     |     |
| 151               | 132.9  | 67.9  | 83.6  | 98.1  | 126.3 | 101.8 | 12.4    |     |
| 152               | 61.4   | 70.6  | 100.5 | 76.0  | 66.1  | 74.9  | 6.8     |     |
| 153               | 89.8   | 68.2  | 54.4  | 128.9 | 69.7  | 82.2  | 13.0    |     |
| 154               | 117.0  | 114.8 | 124.6 | 39.4  | 167.8 | 112.7 | 20.7    |     |
| 155               | 109.6  | 128.6 | 61.2  | 120.9 | 62.1  | 96.5  | 14.5    |     |
| 156               | 66.2   | 46.3  | 58.4  | 86.0  | 81.5  | 67.7  | 7.3     |     |
| 157               | 41.6   | 39.6  | 34.5  | 54.1  | 36.0  | 41.2  | 3.5     |     |

**[00262]** The tables above show that the *in vivo* HDI results are consistent with the *in vitro* data in the Huh7 cells and 3D human spheroids of Example 3.

**[00263]** Based on the results above, 7 GalXC™-SCAP oligonucleotides are selected for a dose-response study in the HDI mouse model, the results of which are shown in Table 9.

**[00264]** Table 9: Dose-Response of GalXC™-SCAP Oligonucleotides in Mice (GalXC™ multiple-dose, 0.3-3.0 mg/kg, 96-hr harvest; HDI of hSCAP plasmid in mice).

|                   |         | Dose<br>(mg/kg) | Animal |       |       |       |      | Avg   | SEM  |
|-------------------|---------|-----------------|--------|-------|-------|-------|------|-------|------|
|                   |         |                 | 1      | 2     | 3     | 4     | 5    |       |      |
| GalXC™-SCAP Oligo | Study 1 |                 |        |       |       |       |      |       |      |
|                   | PBS     | --              | 113.3  | 106.6 | 93.6  | 119.7 | 66.8 | 100.0 | 9.4  |
|                   |         | --              | 82.1   | 85.1  | 46.0  | 57.5  | 36.7 | 61.5  | 9.6  |
|                   |         | --              | 60.6   | 27.9  | 36.1  | 35.4  | --   | 53.3  | 14.4 |
|                   | 70      | 0.3             | 18.8   | 5.3   | 10.0  | 18.3  | 12.4 | 13.0  | 2.6  |
|                   |         | 1.0             | 62.5   | 67.9  | 43.5  | --    | --   | 58.0  | 7.4  |
|                   |         | 3.0             | 20.4   | 29.4  | 22.4  | 29.9  | 26.9 | 25.8  | 1.9  |
|                   | 107     | 0.3             | 8.6    | 9.8   | 16.4  | 9.3   | 6.1  | 10.0  | 1.7  |
|                   |         | 1.0             | 106.3  | 101.1 | 121.0 | 70.0  | 61.4 | 92.0  | 11.3 |

|  |         |     |       |       |       |       |       |       |      |
|--|---------|-----|-------|-------|-------|-------|-------|-------|------|
|  | 133     | 3.0 | 1.1   | 47.7  | 36.2  | 69.0  | 57.7  | 42.3  | 11.7 |
|  |         | 0.3 | 19.7  | 16.6  | 20.1  | 23.3  | 18.6  | 19.6  | 1.1  |
|  |         | 1.0 | 75.7  | 39.3  | 44.1  | 79.7  | 71.3  | 62.0  | 8.4  |
|  |         | 3.0 | 32.7  | 19.6  | 44.6  | 33.4  | 62.2  | 38.5  | 7.1  |
|  | 177     | 0.3 | 15.1  | 15.7  | 8.2   | 27.4  | 32.7  | 19.8  | 4.5  |
|  |         | 1.0 | 113.3 | 106.6 | 93.6  | 119.7 | 66.8  | 100.0 | 9.4  |
|  |         | 3.0 | 82.1  | 85.1  | 46.0  | 57.5  | 36.7  | 61.5  | 9.6  |
|  | Study 2 |     |       |       |       |       |       |       |      |
|  | PBS     | --  | 60.6  | 83.1  | 141.2 | 40.6  | 174.4 | 100.0 | 25.1 |
|  |         | --  | 65.1  | 36.4  | 70.9  | 100.7 | 81.7  | 71.0  | 10.6 |
|  |         | --  | 46.5  | 40.4  | 33.5  | 18.8  | 59.2  | 39.7  | 6.7  |
|  | 66      | 0.3 | 17.8  | 9.0   | 30.6  | 29.2  | 24.3  | 22.2  | 4.0  |
|  |         | 1.0 | 66.9  | 32.9  | 48.7  | 54.1  | 51.6  | 50.8  | 5.5  |
|  |         | 3.0 | 21.2  | 78.9  | 42.3  | 65.8  | 40.7  | 49.8  | 10.2 |
|  | 157     | 0.3 | 7.4   | 18.7  | 14.9  | 20.2  | 14.6  | 15.2  | 2.2  |
|  |         | 1.0 | 101.5 | 59.7  | 53.6  | 110.9 | 117.5 | 88.6  | 13.3 |
|  |         | 3.0 | 21.2  | 27.4  | 39.6  | 45.2  | 48.3  | 36.3  | 5.2  |
|  | 163     | 0.3 | 31.1  | 13.7  | 26.3  | 20.2  | 47.2  | 27.7  | 5.7  |
|  |         | 1.0 | 60.6  | 83.1  | 141.2 | 40.6  | 174.4 | 100.0 | 25.1 |
|  |         | 3.0 | 65.1  | 36.4  | 70.9  | 100.7 | 81.7  | 71.0  | 10.6 |

**[00265]** The GalXC™-SCAP oligonucleotides show a dose-dependent reduction of human SCAP mRNA expression. The GalXC™-SCAP oligonucleotides have an ED<sub>50</sub> between 0.4-0.8 mg/kg against exogenously expressed human SCAP mRNA.

**[00266]** *Primate (NHP) studies:* Based on the mouse results above, 6 GalXC™-SCAP oligonucleotides are selected for evaluation of their ability to inhibit SCAP activity in NHPs (*e.g.*, rhesus macaques; *Macaca mulatta*) for a single-dose (2 or 6 mg/kg), 84-day study. Here, the NHPs are grouped so that their mean body weights (about 5.4 kg) are comparable between the control and experimental groups. Each cohort contains 6 individuals (3 male and 3 female individuals). The GalXC™-SCAP oligonucleotides are administered SQ on Study Day 0. Blood samples are collected at 2 pre-dose time points (*i.e.*, Days -21 and 0) and then weekly after dosing for a liver enzyme panel and lipid profile. Ultrasound-guided core needle liver biopsies are collected on Study Days -21, 28, 56, and 83. At each time point, total RNA derived from the liver biopsy samples is individualized to qRT-PCR analysis to measure SCAP mRNA in oligonucleotide-treated monkeys relative to monkeys treated with a comparable volume of PBS. To normalize the data, the measurements are made relative to the geometric mean of two reference genes, PPIB and 18S rRNA. As shown in Table 10, treating NHPs with the GalXC™-

SCAP oligonucleotides inhibits *SCAP* activity in the liver, as determined by a reduced amount of *SCAP* mRNA in liver samples from oligonucleotide-treated NHPs relative to NHPs treated with PBS. For all time points evaluated, GalXC™-SCAP oligonucleotides inhibit *SCAP* activity to a greater extent than the benchmark PBS and time-matched controls.

**[00267]** Table 10: SCAP mRNA Knockdown by Select GalXC™-SCAP Oligonucleotides in NHP Liver (at Day 28 vs. Pre-Dose and Time-Matched PBS).

|                   |     | Dose<br>(mg/kg) | Animal |      |      |      |      |      | Avg   | SEM  |
|-------------------|-----|-----------------|--------|------|------|------|------|------|-------|------|
|                   |     |                 | 1      | 2    | 3    | 4    | 5    | 6    |       |      |
| GalXC™-SCAP Oligo | PBS | --              | 158.8  | 91.4 | 79.9 | 91.3 | 91.4 | 87.3 | 100.0 | 11.9 |
|                   | 66  | 6.0             | 41.4   | 63.2 | 38.5 | 67.1 | 39.1 | 55.0 | 50.7  | 5.2  |
|                   | 70  | 6.0             | 36.6   | 29.7 | 33.6 | 23.9 | 26.2 | 27.4 | 29.6  | 1.9  |
|                   | 107 | 2.0             | 44.0   | 62.1 | 50.0 | 52.4 | 42.0 | 72.5 | 53.8  | 4.7  |
|                   | 107 | 6.0             | 43.8   | 50.2 | 56.4 | 27.9 | 37.6 | 12.0 | 38.0  | 6.6  |
|                   | 157 | 6.0             | 55.7   | 55.0 | 39.5 | 41.9 | 19.3 | 42.0 | 42.2  | 5.4  |
|                   | 163 | 6.0             | 24.6   | 29.1 | 32.9 | 26.6 | 45.6 | 37.3 | 32.7  | 3.2  |
|                   | 177 | 6.0             | 42.7   | 49.2 | 33.7 | 38.3 | 23.6 | 50.4 | 39.7  | 4.1  |

**[00268]** Table 11: SCAP mRNA Knockdown by Select GalXC™-SCAP Oligonucleotides in NHP Liver (at Day 56 vs. Pre-Dose and Time-Matched PBS).

|                   |     | Dose<br>(mg/kg) | Animal |      |      |      |      |      | Avg   | SEM  |
|-------------------|-----|-----------------|--------|------|------|------|------|------|-------|------|
|                   |     |                 | 1      | 2    | 3    | 4    | 5    | 6    |       |      |
| GalXC™-SCAP Oligo | PBS | --              | 186.6  | 67.8 | 97.7 | 89.3 | 62.0 | 96.6 | 100.0 | 18.4 |
|                   | 66  | 6.0             | 58.6   | 76.4 | 57.2 | 42.2 | 40.8 | 71.0 | 57.7  | 5.9  |
|                   | 70  | 6.0             | 43.5   | 28.1 | 23.5 | 37.5 | 39.9 | 30.1 | 33.8  | 3.1  |
|                   | 107 | 2.0             | 40.6   | 69.1 | 48.9 | 74.2 | 39.7 | 77.2 | 58.3  | 7.0  |
|                   | 107 | 6.0             | 37.4   | 72.7 | 68.1 | 29.9 | 68.3 | 42.8 | 53.2  | 7.6  |
|                   | 157 | 6.0             | 54.8   | 88.6 | 50.3 | 30.0 | 47.8 | 57.7 | 54.9  | 7.8  |
|                   | 163 | 6.0             | 36.1   | 42.9 | 36.0 | 29.1 | 74.3 | 36.3 | 42.5  | 6.6  |
|                   | 177 | 6.0             | 56.7   | 55.5 | 37.4 | 42.5 | 38.9 | 52.1 | 47.2  | 3.5  |

**[00269]** Table 12: SCAP mRNA Knockdown by Select GalXC™-SCAP Oligonucleotides in NHP Liver (at Day 84 vs. Pre-Dose and Time-Matched PBS).

|                   |     | Dose<br>(mg/kg) | Animal |       |       |       |       |       | Avg   | SEM  |
|-------------------|-----|-----------------|--------|-------|-------|-------|-------|-------|-------|------|
|                   |     |                 | 1      | 2     | 3     | 4     | 5     | 6     |       |      |
| GalXC™-SCAP Oligo | PBS | --              | 126.5  | 101.8 | 106.6 | 136.9 | 32.2  | 96.1  | 100.0 | 15.0 |
|                   | 66  | 6.0             | 62.4   | 82.5  | 125.0 | 79.5  | 88.2  | 57.5  | 82.5  | 9.8  |
|                   | 70  | 6.0             | 48.1   | 44.4  | 71.9  | 75.0  | 109.1 | 58.6  | 67.9  | 9.7  |
|                   | 107 | 2.0             | 110.6  | 97.2  | 109.1 | 86.0  | 136.8 | 87.4  | 104.5 | 7.7  |
|                   | 107 | 6.0             | 75.2   | 90.7  | 165.7 | 49.7  | 125.3 | 60.5  | 94.5  | 17.9 |
|                   | 157 | 6.0             | 36.2   | 88.4  | 95.2  | 79.8  | 83.4  | 104.1 | 81.2  | 9.7  |
|                   | 163 | 6.0             | 39.7   | 72.3  | 40.3  | 14.8  | 81.1  | 89.2  | 56.2  | 11.8 |

|  |     |     |      |      |       |      |      |       |      |     |
|--|-----|-----|------|------|-------|------|------|-------|------|-----|
|  | 177 | 6.0 | 42.1 | 80.8 | 103.4 | 96.5 | 94.5 | 106.1 | 87.2 | 9.7 |
|--|-----|-----|------|------|-------|------|------|-------|------|-----|

[00270] An about 70% reduction of SCAP mRNA is achieved after a single 6 mg/kg dose of GalXC™-SCAP oligonucleotide nos. 70 and 163, an about 60% reduction of SCAP mRNA is achieved after a single 6 mg/kg dose of GalXC-SCAP oligonucleotide nos. 107, 157 and 177, and an about 50% reduction of SCAP mRNA is achieved after a single 6 mg/kg dose of GalXC™-SCAP oligonucleotide no. 66. Moreover, a dose response is observed following the 2 mg/kg and 6 mg/kg dose of GalXC™-SCAP oligonucleotide no. 107, where the ED<sub>50</sub> is about 2 mg/kg. Likewise, a sustained reduction of liver SCAP mRNA expression is observed 56 days post a single 6.0 mg/kg dose of the GalXC™-SCAP oligonucleotides. An about 50% reduction of SCAP mRNA is observed 84 days after a single dose of GalXC™-SCAP oligonucleotide nos. 70 and 163.

[00271] Taken together, these results show that GalXC™-SCAP oligonucleotides designed to target human and NHP SCAP mRNA inhibit *SCAP* activity *in vivo* (as determined by the reduction of the amount of SCAP mRNA in treated animals).

## SEQUENCES

[00272] The following nucleic and/or amino acid sequences are referred to in the disclosure and are provided below for reference.

[00273] SEQ ID NO:1 – wild-type human *SCAP* (4254 bp; NCBI Ref. Seq. No. NM\_012235.4)  
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[illegible]

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[00278] SEQ ID NO:6 – wild-type rat *SCAP* (1276 aa; NCBI Ref. Seq. No. NP\_001094436.1)  
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**[00279]** SEQ ID NO:7 – wild-type non-human primate *SCAP* (4135 bp; NCBI Ref. Seq. No. XM\_001100342)

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142

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[00280] SEQ ID NO:8 – wild-type non-human primate *SCAP* (1229 aa; NCBI Ref. Seq. No. XP\_001100342.2)

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**[00281]** SEQ ID NOS:9-392 – GalXC™-SCAP Oligonucleotides (unmodified)

| GalXC-<br>SCAP<br>Oligo | Sense Strand<br>(passenger; 36-mer)           | SEQ ID<br>NO: | Antisense Strand<br>(guide; 22-mer) | SEQ ID<br>NO: |
|-------------------------|-----------------------------------------------|---------------|-------------------------------------|---------------|
| 1                       | UGUUUGCCUACAUC<br>UACUUAGCAGCCGA<br>AAGGCUGC  | 9             | UAAGUAGAUGUAGGCA<br>AACAGG          | 10            |
| 2                       | GUUUUGCCUACAUCU<br>ACUUCAGCAGCCGA<br>AAGGCUGC | 11            | UGAAGUAGAUGUAGGC<br>AAACGG          | 12            |
| 3                       | UUUGCCUACAUCUA<br>CUUCUAGCAGCCGA<br>AAGGCUGC  | 13            | UAGAAGUAGAUGUAGG<br>CAAAGG          | 14            |
| 4                       | GCCUACAUCUACUU<br>CUCCAAGCAGCCGA<br>AAGGCUGC  | 15            | UUGGAGAAGUAGAUGU<br>AGGCGG          | 16            |
| 5                       | AAGAU CGACAUGGU<br>CAAGUAGCAGCCGA<br>AAGGCUGC | 17            | UACUUGACCAUGUCGA<br>UCUUGG          | 18            |
| 6                       | AGAUCGACAUGGUC<br>AAGUCAGCAGCCGA<br>AAGGCUGC  | 19            | UGACUUGACCAUGUCG<br>AUCUGG          | 20            |
| 7                       | AUCGACAUGGUCAA<br>GUCCAAGCAGCCGA<br>AAGGCUGC  | 21            | UUGGACUUGACCAUGU<br>CGAUGG          | 22            |
| 8                       | GUGUUGGUGCUCAC<br>CAAGUAGCAGCCGA<br>AAGGCUGC  | 23            | UACUUGGUGAGCACCA<br>ACACGG          | 24            |
| 9                       | UGUUGGUGCUCACC<br>AAGUCAGCAGCCGA<br>AAGGCUGC  | 25            | UGACUUGGUGAGCACC<br>AACAGG          | 26            |
| 10                      | GAGAGCUGGUCCA<br>CAUGAAGCAGCCGA<br>AAGGCUGC   | 27            | UUCAUGAUGGACCAGC<br>UCUCGG          | 28            |
| 11                      | AGAGCUGGUCCAUC<br>AUGAAAGCAGCCGA<br>AAGGCUGC  | 29            | UUUCAUGAUGGACCAG<br>CUCUGG          | 30            |
| 12                      | GAGCUGGUCCAUCA<br>UGAAGAGCAGCCGA<br>AAGGCUGC  | 31            | UCUUCAUGAUGGACCA<br>GCUCGG          | 32            |
| 13                      | AGCUGGUCCAUCAU<br>GAAGAAGCAGCCGA<br>AAGGCUGC  | 33            | UUCUUCAUGAUGGACC<br>AGCUGG          | 34            |
| 14                      | GCUGGUCCAUCAUG<br>AAGAAAGCAGCCGA<br>AAGGCUGC  | 35            | UUUCUUCAUGAUGGAC<br>CAGCGG          | 36            |

|    |                                              |    |                            |    |
|----|----------------------------------------------|----|----------------------------|----|
| 15 | CUGGUCCAUCAUGA<br>AGAACAGCAGCCGA<br>AAGGCUGC | 37 | UGUUCUUCAUGAUGGA<br>CCAGGG | 38 |
| 16 | CCGUUGUCUGGAUU<br>GGCAUAGCAGCCGA<br>AAGGCUGC | 39 | UAUGCCAAUCCAGACA<br>ACGGGG | 40 |
| 17 | UUGUCUGGAUUGGC<br>AUCCUAGCAGCCGA<br>AAGGCUGC | 41 | UAGGAUGCCAAUCCAG<br>ACAAGG | 42 |
| 18 | UGUCUGGAUUGGCA<br>UCCUGAGCAGCCGA<br>AAGGCUGC | 43 | UCAGGAUGCCAAUCCA<br>GACAGG | 44 |
| 19 | GUCUGGAUUGGCAU<br>CCUGGAGCAGCCGA<br>AAGGCUGC | 45 | UCCAGGAUGCCAAUCC<br>AGACGG | 46 |
| 20 | CUGGAUUGGCAUCC<br>UGGUAAGCAGCCGA<br>AAGGCUGC | 47 | UUACCAGGAUGCCAAU<br>CCAGGG | 48 |
| 21 | UGGAUUGGCAUCCU<br>GGUAUAGCAGCCGA<br>AAGGCUGC | 49 | UAUACCAGGAUGCCAA<br>UCCAGG | 50 |
| 22 | GGAUUGGCAUCCUG<br>GUAAUAGCAGCCGA<br>AAGGCUGC | 51 | UUAUACCAGGAUGCCA<br>AUCCGG | 52 |
| 23 | GAUUGGCAUCCUGG<br>UAUACAGCAGCCGA<br>AAGGCUGC | 53 | UGUAUACCAGGAUGCC<br>AAUCGG | 54 |
| 24 | AUUGGCAUCCUGGU<br>AUACAAGCAGCCGA<br>AAGGCUGC | 55 | UUGUAUACCAGGAUGC<br>CAAUGG | 56 |
| 25 | CUCCAUCUUCCAC<br>CUGAUAGCAGCCGA<br>AAGGCUGC  | 57 | UAUCAGGUGGGAAGAU<br>GGAGGG | 58 |
| 26 | CAUCUGCCUGUGGG<br>AUGUAAGCAGCCGA<br>AAGGCUGC | 59 | UUACAUCCACAGGCA<br>GAUGGG  | 60 |
| 27 | UCUGCCUGUGGGAU<br>GUACUAGCAGCCGA<br>AAGGCUGC | 61 | UAGUACAUCCACAGG<br>CAGAGG  | 62 |
| 28 | GUGGUGCAAGCUUG<br>GGUGUAGCAGCCGA<br>AAGGCUGC | 63 | UACACCCAAGCUUGCA<br>CCACGG | 64 |
| 29 | UGGUGCAAGCUUGG<br>GUGUCAGCAGCCGA<br>AAGGCUGC | 65 | UGACACCCAAGCUUGC<br>ACCAGG | 66 |
| 30 | GGUGCAAGCUUGGG<br>UGUCAAGCAGCCGA<br>AAGGCUGC | 67 | UUGACACCCAAGCUUG<br>CACCGG | 68 |

|    |                                              |    |                             |     |
|----|----------------------------------------------|----|-----------------------------|-----|
| 31 | GUGCAAGCUUGGGU<br>GUCAUAGCAGCCGA<br>AAGGCUGC | 69 | UAUGACACCCAAGCUU<br>GCACGG  | 70  |
| 32 | GCAAGCUUGGGUGU<br>CAUCUAGCAGCCGA<br>AAGGCUGC | 71 | UAGAUGACACCCAAGC<br>UUGCGG  | 72  |
| 33 | CAAGCUUGGGUGUC<br>AUCUCAGCAGCCGA<br>AAGGCUGC | 73 | UGAGAUGACACCCAAG<br>CUUGGG  | 74  |
| 34 | AAGCUUGGGUGUCA<br>UCUCAAGCAGCCGA<br>AAGGCUGC | 75 | UUGAGAUGACACCCAA<br>GCUUGG  | 76  |
| 35 | AGCUUGGGUGUCAU<br>CUCAGAGCAGCCGA<br>AAGGCUGC | 77 | UCUGAGAUGACACCCA<br>AGCUGG  | 78  |
| 36 | GCUUGGGUGUCAUC<br>UCAGAAGCAGCCGA<br>AAGGCUGC | 79 | UUCUGAGAUGACACCC<br>AAGCGG  | 80  |
| 37 | GUGUCUCCUUUUGG<br>GACCUAGCAGCCGA<br>AAGGCUGC | 81 | UAGGUCCCAAAAGGAG<br>ACACGG  | 82  |
| 38 | UGUCUCCUUUUGGG<br>ACCUAAGCAGCCGA<br>AAGGCUGC | 83 | UUAGGUCCCAAAAGGA<br>GACAGG  | 84  |
| 39 | GGGGACCUGUUACA<br>GACAGAGCAGCCGA<br>AAGGCUGC | 85 | UCUGUCUGUAAACAGGU<br>CCCCGG | 86  |
| 40 | GGGACCUGUUACAG<br>ACAGUAGCAGCCGA<br>AAGGCUGC | 87 | UACUGUCUGUAAACAGG<br>UCCCCG | 88  |
| 41 | GGACCUGUUACAGA<br>CAGUCAGCAGCCGA<br>AAGGCUGC | 89 | UGACUGUCUGUAAACAG<br>GUCCGG | 90  |
| 42 | GACCUGUUACAGAC<br>AGUCUAGCAGCCGA<br>AAGGCUGC | 91 | UAGACUGUCUGUAACA<br>GGUCGG  | 92  |
| 43 | ACCUGUUACAGACA<br>GUCUAAGCAGCCGA<br>AAGGCUGC | 93 | UUAGACUGUCUGUAAAC<br>AGGUGG | 94  |
| 44 | UGCCAUUGUCUGCA<br>ACUUUAGCAGCCGA<br>AAGGCUGC | 95 | UAAAGUUGCAGACAAU<br>GGCAGG  | 96  |
| 45 | GCCAUUGUCUGCAA<br>CUUUGAGCAGCCGA<br>AAGGCUGC | 97 | UCAAAGUUGCAGACAA<br>UGGCGG  | 98  |
| 46 | CCAUUGUCUGCAAC<br>UUUGGAGCAGCCGA<br>AAGGCUGC | 99 | UCCAAAGUUGCAGACA<br>AUGGGG  | 100 |

|    |                                              |     |                            |     |
|----|----------------------------------------------|-----|----------------------------|-----|
| 47 | AUUGUCUGCAACUU<br>UGGCAAGCAGCCGA<br>AAGGCUGC | 101 | UUGCCAAAGUUGCAGA<br>CAAUGG | 102 |
| 48 | UCUGCAACUUUGGC<br>AGUGAAGCAGCCGA<br>AAGGCUGC | 103 | UUCACUGCCAAAGUUG<br>CAGAGG | 104 |
| 49 | CUACCCACUGCUGA<br>AACUCAGCAGCCGA<br>AAGGCUGC | 105 | UGAGUUUCAGCAGUGG<br>GUAGGG | 106 |
| 50 | GCCAGGAACAGGAC<br>CUGUGAGCAGCCGA<br>AAGGCUGC | 107 | UCACAGGUCCUGUCC<br>UGGCGG  | 108 |
| 51 | GAACAGGACCUGUG<br>GAAUUAGCAGCCGA<br>AAGGCUGC | 109 | UAAUUCCACAGGUCCU<br>GUUCGG | 110 |
| 52 | ACAGGACCUGUGGA<br>AUUCAAGCAGCCGA<br>AAGGCUGC | 111 | UUGAAUUCCACAGGUC<br>CUGUGG | 112 |
| 53 | UGGAAUUCACCACC<br>CCUGUAGCAGCCGA<br>AAGGCUGC | 113 | UACAGGGGUGGUGAAU<br>UCCAGG | 114 |
| 54 | CUUGUGACCACCUA<br>CAUCAAGCAGCCGA<br>AAGGCUGC | 115 | UUGAUGUAGGUGGUCA<br>CAAGGG | 116 |
| 55 | UUGUGACCACCUAC<br>AUCAUAGCAGCCGA<br>AAGGCUGC | 117 | UAUGAUGUAGGUGGUC<br>ACAAGG | 118 |
| 56 | UGUGACCACCUACA<br>UCAUCAGCAGCCGA<br>AAGGCUGC | 119 | UGAUGAUGUAGGUGGU<br>CACAGG | 120 |
| 57 | GUGACCACCUACAU<br>CAUCUAGCAGCCGA<br>AAGGCUGC | 121 | UAGAUGAUGUAGGUGG<br>UCACGG | 122 |
| 58 | UGACCACCUACAUC<br>AUCUUAGCAGCCGA<br>AAGGCUGC | 123 | UAAGAUGAUGUAGGUG<br>GUCAGG | 124 |
| 59 | GACCACCUACAUCA<br>UCUUGAGCAGCCGA<br>AAGGCUGC | 125 | UCAAGAUGAUGUAGGU<br>GGUCGG | 126 |
| 60 | ACCACCUACAUCAU<br>CUUGUAGCAGCCGA<br>AAGGCUGC | 127 | UACAAGAUGAUGUAGG<br>UGGUGG | 128 |
| 61 | CCACCUACAUCAUC<br>UUGUUAGCAGCCGA<br>AAGGCUGC | 129 | UAACAAGAUGAUGUAG<br>GUGGGG | 130 |
| 62 | CACCUACAUCAUCU<br>UGUUUAGCAGCCGA<br>AAGGCUGC | 131 | UAAACAAGAUGAUGUA<br>GGUGGG | 132 |

|    |                                              |     |                            |     |
|----|----------------------------------------------|-----|----------------------------|-----|
| 63 | ACCUACAUCUUCU<br>GUUUGAGCAGCCGA<br>AAGGCUGC  | 133 | UCAAACAAGAUGAUGU<br>AGGUGG | 134 |
| 64 | CCUACAUCUUCUUG<br>UUUGCAGCAGCCGA<br>AAGGCUGC | 135 | UGCAAACAAGAUGAUG<br>UAGGGG | 136 |
| 65 | CUACAUCUUCUUGU<br>UUGCCAGCAGCCGA<br>AAGGCUGC | 137 | UGGCAAACAAGAUGAU<br>GUAGGG | 138 |
| 66 | ACAUCUUCUUGUUU<br>GCCUAAGCAGCCGA<br>AAGGCUGC | 139 | UUAGGCAAACAAGAUG<br>AUGUGG | 140 |
| 67 | AUCAUCUUGUUUGC<br>CUACAAGCAGCCGA<br>AAGGCUGC | 141 | UUGUAGGCAAACAAGA<br>UGAUGG | 142 |
| 68 | UCAUCUUGUUUGCC<br>UACAUAGCAGCCGA<br>AAGGCUGC | 143 | UAUGUAGGCAAACAAG<br>AUGAGG | 144 |
| 69 | AUCUUGUUUGCCUA<br>CAUCUAGCAGCCGA<br>AAGGCUGC | 145 | UAGAUGUAGGCAAACA<br>AGAUGG | 146 |
| 70 | UCUUGUUUGCCUAC<br>AUCUAAGCAGCCGA<br>AAGGCUGC | 147 | UUAGAUGUAGGCAAAC<br>AAGAGG | 148 |
| 71 | UUUCCCCUACCUUG<br>UGGUGAGCAGCCGA<br>AAGGCUGC | 149 | UCACCACAAGGUAGGG<br>GAAAGG | 150 |
| 72 | UUCCCCUACCUUGU<br>GGUGGAGCAGCCGA<br>AAGGCUGC | 151 | UCCACCACAAGGUAGG<br>GGAAGG | 152 |
| 73 | CCCUACCUUGUGGU<br>GGUUAAGCAGCCGA<br>AAGGCUGC | 153 | UUAACCACCACAAGGU<br>AGGGGG | 154 |
| 74 | CUACCUUGUGGUGG<br>UUAUUAGCAGCCGA<br>AAGGCUGC | 155 | UAAUAACCACCACAAG<br>GUAGGG | 156 |
| 75 | UACCUUGUGGUGGU<br>UAUUGAGCAGCCGA<br>AAGGCUGC | 157 | UCAAUAACCACCACAA<br>GGUAGG | 158 |
| 76 | ACCUUGUGGUGGUU<br>AUUGGAGCAGCCGA<br>AAGGCUGC | 159 | UCCAAUAACCACCACA<br>AGGUGG | 160 |
| 77 | CCUUGUGGUGGUUA<br>UUGGGAGCAGCCGA<br>AAGGCUGC | 161 | UCCCAUAACCACCACA<br>AGGGG  | 162 |
| 78 | CUUGUGGUGGUUA<br>UUGGGUAGCAGCCG<br>AAAGGCUGC | 163 | UACCCAUAACCACCAC<br>AAGGG  | 164 |

|    |                                               |     |                             |     |
|----|-----------------------------------------------|-----|-----------------------------|-----|
| 79 | UUGUGGUGGUUUAU<br>UGGGUUAGCAGCCG<br>AAAGGCUGC | 165 | UAACCCAAUAACCACC<br>ACAAGG  | 166 |
| 80 | UGUGGUGGUUUAU<br>GGGUUAAGCAGCCG<br>AAAGGCUGC  | 167 | UUAACCCAAUAACCAC<br>CACAGG  | 168 |
| 81 | GUGGUGGUUUAUUG<br>GGUUAGAGCAGCCG<br>AAAGGCUGC | 169 | UCUAACCCAAUAACCA<br>CCACGG  | 170 |
| 82 | UGGUGGUUUAUUGG<br>GUUAGAAGCAGCCG<br>AAAGGCUGC | 171 | UUCUAACCCAAUAACC<br>ACCAGG  | 172 |
| 83 | GGUGGUUUAUUGGG<br>UUAGAGAGCAGCCG<br>AAAGGCUGC | 173 | UCUCUAACCCAAUAAC<br>CACCGG  | 174 |
| 84 | GUGGUUAUUGGGU<br>UAGAGAAGCAGCCG<br>AAAGGCUGC  | 175 | UUCUCUAACCCAAUAA<br>CCACGG  | 176 |
| 85 | UGGUUAUUGGGUU<br>AGAGAAAGCAGCCG<br>AAAGGCUGC  | 177 | UUUCUCUAACCCAAUA<br>ACCAGG  | 178 |
| 86 | GGUUAUUGGGUUA<br>GAGAAUAGCAGCCG<br>AAAGGCUGC  | 179 | UAUUCUCUAACCCAAU<br>AACC GG | 180 |
| 87 | GUUAUUGGGUUAG<br>AGAAUGAGCAGCCG<br>AAAGGCUGC  | 181 | UCAUUCUCUAACCCAA<br>UAACGG  | 182 |
| 88 | UUAUUGGGUUAGA<br>GAAUGUAGCAGCCG<br>AAAGGCUGC  | 183 | UACAUUCUCUAACCCA<br>AUAAGG  | 184 |
| 89 | AUUGGGUUAGAGA<br>AUGUGUAGCAGCCG<br>AAAGGCUGC  | 185 | UACACAUUCUCUAACC<br>CAAUGG  | 186 |
| 90 | UUGGGUUAGAGAA<br>UGUGUUAGCAGCCG<br>AAAGGCUGC  | 187 | UACACAUUCUCUAAC<br>CCAAGG   | 188 |
| 91 | GGUUAGAGAAUGU<br>GUUGGUAGCAGCCG<br>AAAGGCUGC  | 189 | UACCAACACAUUCUCU<br>AACC GG | 190 |
| 92 | GUUAGAGAAUGUG<br>UUGGUGAGCAGCCG<br>AAAGGCUGC  | 191 | UCACCAACACAUUCUC<br>UAACGG  | 192 |
| 93 | UUAGAGAAUGUGU<br>UGGUGCAGCAGCCG<br>AAAGGCUGC  | 193 | UGCACCAACACAUUCU<br>CUAAGG  | 194 |
| 94 | UAGAGAAUGUGUU<br>GGUGCUAGCAGCCG<br>AAAGGCUGC  | 195 | UAGCACCAACACAUUC<br>UCUAGG  | 196 |

|     |                                               |     |                            |     |
|-----|-----------------------------------------------|-----|----------------------------|-----|
| 95  | AGAGAAUGUGUUG<br>GUGCUCAGCAGCCG<br>AAAGGCUGC  | 197 | UGAGCACCAACACAUU<br>CUCUGG | 198 |
| 96  | GAGAAUGUGUUGG<br>UGCUC AAGCAGCCG<br>AAAGGCUGC | 199 | UUGAGCACCAACACAU<br>UCUCGG | 200 |
| 97  | AGAAUGUGUUGGU<br>GCUCACAGCAGCCG<br>AAAGGCUGC  | 201 | UGUGAGCACCAACACA<br>UUCUGG | 202 |
| 98  | AAUGUGUUGGUGC<br>UCACCAAGCAGCCG<br>AAAGGCUGC  | 203 | UUGGUGAGCACCAACA<br>CAUUGG | 204 |
| 99  | AUGUGUUGGUGCUC<br>ACCAAAGCAGCCGA<br>AAGGCUGC  | 205 | UUUGGUGAGCACCAAC<br>ACAUGG | 206 |
| 100 | UGUGUUGGUGCUC A<br>CCAAGAGCAGCCGA<br>AAGGCUGC | 207 | UCUUGGUGAGCACCAA<br>CACAGG | 208 |
| 101 | UGGUCCAUGAUGAA<br>GAACAAGCAGCCGA<br>AAGGCUGC  | 209 | UUGUUCUUCAUGAUGG<br>ACCAGG | 210 |
| 102 | GGUCCAUGAUGAAG<br>AACAUAGCAGCCGA<br>AAGGCUGC  | 211 | UAUGUUCUUCAUGAUG<br>GACCGG | 212 |
| 103 | CUGACUUCUUCUUC<br>CAGAUAGCAGCCGA<br>AAGGCUGC  | 213 | UAUCUGAAGGAAGAAG<br>UCAGGG | 214 |
| 104 | ACUUCUUCUUCAG<br>AUGCUAGCAGCCGA<br>AAGGCUGC   | 215 | UAGCAUCUGAAGGAAG<br>AAGUGG | 216 |
| 105 | UCCUUCAGAUUGCUG<br>UUUUUAGCAGCCGA<br>AAGGCUGC | 217 | UAAAAACAGCAUCUGA<br>AGGAGG | 218 |
| 106 | CCUUCAGAUUGCUGU<br>UUUUCAGCAGCCGA<br>AAGGCUGC | 219 | UGAAAAACAGCAUCUG<br>AAGGGG | 220 |
| 107 | CUUCAGAUUGCUGUU<br>UUUCAAGCAGCCGA<br>AAGGCUGC | 221 | UUGAAAAACAGCAUCU<br>GAAGGG | 222 |
| 108 | UUCAGAUUGCUGUUU<br>UUCACAGCAGCCGA<br>AAGGCUGC | 223 | UGUGAAAAACAGCAUC<br>UGAAGG | 224 |
| 109 | CAGAUUGCUGUUUUU<br>CACCAAGCAGCCGA<br>AAGGCUGC | 225 | UUGGUGAAAAACAGCA<br>UCUGGG | 226 |
| 110 | AGAUGCUGUUUUUC<br>ACCACAGCAGCCGA<br>AAGGCUGC  | 227 | UGUGGUGAAAAACAGC<br>AUCUGG | 228 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 111 | GAUGCUGUUUUUCA<br>CCACUAGCAGCCGA<br>AAGGCUGC | 229 | UAGUGGUGAAAAACAG<br>CAUCGG | 230 |
| 112 | AUGCUGUUUUUCAC<br>CACUGAGCAGCCGA<br>AAGGCUGC | 231 | UCAGUGGUGAAAAACA<br>GCAUGG | 232 |
| 113 | UGCUGUUUUUCACC<br>ACUGUAGCAGCCGA<br>AAGGCUGC | 233 | UACAGUGGUGAAAAAC<br>AGCAGG | 234 |
| 114 | GCUGUUUUUCACCA<br>CUGUCAGCAGCCGA<br>AAGGCUGC | 235 | UGACAGUGGUGAAAAA<br>CAGCGG | 236 |
| 115 | UGUUUUUCACCACU<br>GUCCUAGCAGCCGA<br>AAGGCUGC | 237 | UAGGACAGUGGUGAAA<br>AACAGG | 238 |
| 116 | GUUUUUCACCACUG<br>UCCUGAGCAGCCGA<br>AAGGCUGC | 239 | UCAGGACAGUGGUGAA<br>AAACGG | 240 |
| 117 | UUUUUCACCACUGU<br>CCUGUAGCAGCCGA<br>AAGGCUGC | 241 | UACAGGACAGUGGUGA<br>AAAAGG | 242 |
| 118 | UUUUCACCACUGUC<br>CUGUCAGCAGCCGA<br>AAGGCUGC | 243 | UGACAGGACAGUGGUG<br>AAAAGG | 244 |
| 119 | UUCACCACUGUCCU<br>GUCCAAGCAGCCGA<br>AAGGCUGC | 245 | UUGGACAGGACAGUGG<br>UGAAGG | 246 |
| 120 | CACCACUGUCCUGU<br>CCAUAAGCAGCCGA<br>AAGGCUGC | 247 | UAAUGGACAGGACAGU<br>GGUGGG | 248 |
| 121 | ACCACUGUCCUGUC<br>CAUUGAGCAGCCGA<br>AAGGCUGC | 249 | UCAAUGGACAGGACAG<br>UGGUGG | 250 |
| 122 | CCACUGUCCUGUCC<br>AUUGAAGCAGCCGA<br>AAGGCUGC | 251 | UUCAUGGACAGGACA<br>GUGGGG  | 252 |
| 123 | CACUGUCCUGUCCA<br>UUGACAGCAGCCGA<br>AAGGCUGC | 253 | UGUCAUUGGACAGGAC<br>AGUGGG | 254 |
| 124 | ACUGUCCUGUCCAU<br>UGACAAGCAGCCGA<br>AAGGCUGC | 255 | UUGUCAUUGGACAGGA<br>CAGUGG | 256 |
| 125 | CUAAGCUACCUGAG<br>AACCAAGCAGCCGA<br>AAGGCUGC | 257 | UUGGUUCUCAGGUAGC<br>UUAGGG | 258 |
| 126 | GAGGUCCAGCAGAG<br>GUUGUAGCAGCCGA<br>AAGGCUGC | 259 | UACAACCUCUGCUGGA<br>CCUCGG | 260 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 127 | GCAGAGGUUGUCCA<br>UGACAAGCAGCCGA<br>AAGGCUGC | 261 | UUGUCAUGGACAACCU<br>CUGCGG | 262 |
| 128 | CAGAGGUUGUCCA<br>GACAGAGCAGCCGA<br>AAGGCUGC  | 263 | UCUGUCAUGGACAACC<br>UCUGGG | 264 |
| 129 | GAGGAUGAGGAAC<br>UUUGGAAGCAGCCG<br>AAAGGCUGC | 265 | UUCCAAAGUUCCUCAU<br>CCUCGG | 266 |
| 130 | GAACUUUGGAGGA<br>AAUUGUAGCAGCCG<br>AAAGGCUGC | 267 | UACAAUUUCCUCCAAA<br>GUUCGG | 268 |
| 131 | GACGCUCUUCAGCU<br>AUUACAGCAGCCGA<br>AAGGCUGC | 269 | UGUAAUAGCUGAAGAG<br>CGUCGG | 270 |
| 132 | ACGCUCUUCAGCUA<br>UUACAAGCAGCCGA<br>AAGGCUGC | 271 | UUGUAAUAGCUGAAGA<br>GCGUGG | 272 |
| 133 | CGCUCUUCAGCUAU<br>UACAAAGCAGCCGA<br>AAGGCUGC | 273 | UUUGUAAUAGCUGAAG<br>AGCGGG | 274 |
| 134 | GCUCUUCAGCUAUU<br>ACAACAGCAGCCGA<br>AAGGCUGC | 275 | UGUUGUAAUAGCUGAA<br>GAGCGG | 276 |
| 135 | CUCUUCAGCUAUUA<br>CAACAAGCAGCCGA<br>AAGGCUGC | 277 | UUGUUGUAAUAGCUGA<br>AGAGGG | 278 |
| 136 | UCUUCAGCUAUUAC<br>AACAUAGCAGCCGA<br>AAGGCUGC | 279 | UAUGUUGUAAUAGCUG<br>AAGAGG | 280 |
| 137 | CUUCAGCUAUUACA<br>ACAUCAGCAGCCGA<br>AAGGCUGC | 281 | UGAUGUUGUAAUAGCU<br>GAAGGG | 282 |
| 138 | UUCAGCUAUUACAA<br>CAUCAAGCAGCCGA<br>AAGGCUGC | 283 | UUGAUGUUGUAAUAGC<br>UGAAGG | 284 |
| 139 | CCAGCCUGACCUCA<br>CCUGCAGCAGCCGA<br>AAGGCUGC | 285 | UGCAGGUGAGGUCAGG<br>CUGGGG | 286 |
| 140 | CAGCCUGACCUCAC<br>CUGCUAGCAGCCGA<br>AAGGCUGC | 287 | UAGCAGGUGAGGUCAG<br>GCUGGG | 288 |
| 141 | AGCCUGACCUCACC<br>UGCUUAGCAGCCGA<br>AAGGCUGC | 289 | UAAGCAGGUGAGGUCA<br>GGCUGG | 290 |
| 142 | GCCUGACCUCACCU<br>GCUUAAGCAGCCGA<br>AAGGCUGC | 291 | UUAAGCAGGUGAGGUC<br>AGGCGG | 292 |

|     |                                              |     |                             |     |
|-----|----------------------------------------------|-----|-----------------------------|-----|
| 143 | CCUGACCUCACCUG<br>CUUAAAGCAGCCGA<br>AAGGCUGC | 293 | UUUAAGCAGGUGAGGU<br>CAGGGG  | 294 |
| 144 | CUGACCUCACCUGC<br>UUAUUAGCAGCCGA<br>AAGGCUGC | 295 | UAUUAAGCAGGUGAGG<br>UCAGGG  | 296 |
| 145 | UGACCUCACCUGCU<br>UAAUUAGCAGCCGA<br>AAGGCUGC | 297 | UAAUUAAGCAGGUGAG<br>GUCAGG  | 298 |
| 146 | GACCUCACCUGCUU<br>AAUUGAGCAGCCGA<br>AAGGCUGC | 299 | UCAAUUAAGCAGGUGA<br>GGUCGG  | 300 |
| 147 | ACCUCACCUGCUUA<br>AUUGAAGCAGCCGA<br>AAGGCUGC | 301 | UUCAUUAAGCAGGUG<br>AGGUGG   | 302 |
| 148 | CCUCACCUGCUUAA<br>UUGACAGCAGCCGA<br>AAGGCUGC | 303 | UGUCAAUUAAGCAGGU<br>GAGGGG  | 304 |
| 149 | CUCACCUGCUUAAU<br>UGACAAGCAGCCGA<br>AAGGCUGC | 305 | UUGUCAAUUAAGCAGG<br>UGAGGG  | 306 |
| 150 | UCACCUGCUUAAUU<br>GACACAGCAGCCGA<br>AAGGCUGC | 307 | UGUGUCAAUUAAGCAG<br>GUGAGG  | 308 |
| 151 | CACCUGCUUAAUUG<br>ACACCAGCAGCCGA<br>AAGGCUGC | 309 | UGGUGUCAAUUAAGCA<br>GGUGGG  | 310 |
| 152 | ACCUGCUUAAUUGA<br>CACCAAGCAGCCGA<br>AAGGCUGC | 311 | UUGGUGUCAAUUAAGC<br>AGGUGG  | 312 |
| 153 | CCUGCUUAAUUGAC<br>ACCAAAGCAGCCGA<br>AAGGCUGC | 313 | UUUGGUGUCAAUUAAG<br>CAGGGG  | 314 |
| 154 | CUGCUUAAUUGACA<br>CCAACAGCAGCCGA<br>AAGGCUGC | 315 | UGUUGGUGUCAAUUAA<br>GCAGGG  | 316 |
| 155 | UGCUUAAUUGACAC<br>CAACUAGCAGCCGA<br>AAGGCUGC | 317 | UAGUUGGUGUCAAUUA<br>AGCAGG  | 318 |
| 156 | GCUUAAUUGACACC<br>AACUUAGCAGCCGA<br>AAGGCUGC | 319 | UAAGUUGGUGUCAAUU<br>AAGCGG  | 320 |
| 157 | CUUAAUUGACACCA<br>ACUUUAGCAGCCGA<br>AAGGCUGC | 321 | UAAAGUUGGUGUCAAU<br>UAAGGG  | 322 |
| 158 | UUAUUUGACACCAA<br>CUUUUAGCAGCCGA<br>AAGGCUGC | 323 | UAAAAGUUGGUGUCAAA<br>UUAAGG | 324 |

|     |                                              |     |                            |     |
|-----|----------------------------------------------|-----|----------------------------|-----|
| 159 | UAAUUGACACCAAC<br>UUUUCAGCAGCCGA<br>AAGGCUGC | 325 | UGAAAAGUUGGUGUCA<br>AUUAGG | 326 |
| 160 | AUUGAAGGGGUGC<br>UGUGCUAGCAGCCG<br>AAAGGCUGC | 327 | UAGCACAGCACCCCUUC<br>AAUGG | 328 |
| 161 | CUUGGACAAAAGGA<br>UUGUGAGCAGCCGA<br>AAGGCUGC | 329 | UCACAAUCCUUUUGUC<br>CAAGGG | 330 |
| 162 | UUGGACAAAAGGA<br>UUGUGGAGCAGCCG<br>AAAGGCUGC | 331 | UCCACAAUCCUUUUGU<br>CCAAGG | 332 |
| 163 | UCAACGGUUCUUU<br>GAUUUAGCAGCCGA<br>AAGGCUGC  | 333 | UAAAUCAAGGGAACCG<br>UUGAGG | 334 |
| 164 | CAACGGUUCUUUG<br>AUUUCAGCAGCCGA<br>AAGGCUGC  | 335 | UGAAAUCAAGGGAACC<br>GUUGGG | 336 |
| 165 | AACGGUUCUUUGA<br>UUUCUAGCAGCCGA<br>AAGGCUGC  | 337 | UAGAAAUCAAGGGAAC<br>CGUUGG | 338 |
| 166 | ACGGUUCUUUGAU<br>UUCUUAGCAGCCGA<br>AAGGCUGC  | 339 | UAAGAAAUCAAGGGAA<br>CCGUGG | 340 |
| 167 | GUACAUUGACCAGA<br>CCAUGAGCAGCCGA<br>AAGGCUGC | 341 | UCAUGGUCUGGUCAAU<br>GUACGG | 342 |
| 168 | ACCUGUACCACCUC<br>CUGUGAGCAGCCGA<br>AAGGCUGC | 343 | UCACAGGAGGUGGUAC<br>AGGUGG | 344 |
| 169 | CCUGUACCACCUC<br>UGUGUAGCAGCCGA<br>AAGGCUGC  | 345 | UACACAGGAGGUGGUA<br>CAGGGG | 346 |
| 170 | GUACCACCUCUGU<br>GUCAUAGCAGCCGA<br>AAGGCUGC  | 347 | UAUGACACAGGAGGUG<br>GUACGG | 348 |
| 171 | GCACAGGCAUCAAG<br>UUCUAAGCAGCCGA<br>AAGGCUGC | 349 | UUAGAACUUGAUGCCU<br>GUGCGG | 350 |
| 172 | ACAGGCAUCAAGUU<br>CUACUAGCAGCCGA<br>AAGGCUGC | 351 | UAGUAGAACUUGAUGC<br>CUGUGG | 352 |
| 173 | CAGGCAUCAAGUUC<br>UACUCAGCAGCCGA<br>AAGGCUGC | 353 | UGAGUAGAACUUGAUG<br>CCUGGG | 354 |
| 174 | AGGCAUCAAGUUCU<br>ACUCCAGCAGCCGA<br>AAGGCUGC | 355 | UGGAGUAGAACUUGAU<br>GCCUGG | 356 |

|     |                                               |     |                             |     |
|-----|-----------------------------------------------|-----|-----------------------------|-----|
| 175 | GGCAUCAAGUUCUA<br>CUCCAAGCAGCCGA<br>AAGGCUGC  | 357 | UUGGAGUAGAACUUGA<br>UGCCGG  | 358 |
| 176 | GCAUCAAGUUCUAC<br>UCCAUAGCAGCCGA<br>AAGGCUGC  | 359 | UAUGGAGUAGAACUUG<br>AUGCGG  | 360 |
| 177 | CAUCAAGUUCUACU<br>CCAUAAGCAGCCGA<br>AAGGCUGC  | 361 | UAAUGGAGUAGAACUU<br>GAUGGG  | 362 |
| 178 | AUCAAGUUCUACUC<br>CAUUCAGCAGCCGA<br>AAGGCUGC  | 363 | UGAAUGGAGUAGAACU<br>UGAUGG  | 364 |
| 179 | UCAAGUUCUACUCC<br>AUUCAAGCAGCCGA<br>AAGGCUGC  | 365 | UUGAAUGGAGUAGAAC<br>UUGAGG  | 366 |
| 180 | CAAGUUCUACUCCA<br>UUCAGAGCAGCCGA<br>AAGGCUGC  | 367 | UCUGAAUGGAGUAGAA<br>CUUGGG  | 368 |
| 181 | AAGUUCUACUCCA<br>UCAGCAGCAGCCGA<br>AAGGCUGC   | 369 | UGCUGAAUGGAGUAGA<br>ACUUGG  | 370 |
| 182 | AGUUCUACUCCA<br>CAGCAAGCAGCCGA<br>AAGGCUGC    | 371 | UUGCUGAAUGGAGUAG<br>AACUGG  | 372 |
| 183 | GUUCUACUCCA<br>AGCAGAGCAGCCGA<br>AAGGCUGC     | 373 | UCUGCUGAAUGGAGUA<br>GAACGG  | 374 |
| 184 | GUGUCAUCUCAGAC<br>AACCUAGCAGCCGA<br>AAGGCUGC  | 375 | UAGGUUGUCUGAGAUG<br>ACACGG  | 376 |
| 185 | CAUCUCAGACAACC<br>UGCUGAGCAGCCGA<br>AAGGCUGC  | 377 | UCAGCAGGUUGUCUGA<br>GAUGGG  | 378 |
| 186 | UCAGACAACCUUGCU<br>GGUGAAGCAGCCGA<br>AAGGCUGC | 379 | UUCACCAGCAGGUUGU<br>CUGAGG  | 380 |
| 187 | CGGGGACCUGUUAC<br>AGACAAGCAGCCGA<br>AAGGCUGC  | 381 | UUGUCUGUAAACAGGUC<br>CCCGGG | 382 |
| 188 | GACAACGCUGCCAU<br>UGUCUAGCAGCCGA<br>AAGGCUGC  | 383 | UAGACAAUGGCAGCGU<br>UGUCGG  | 384 |
| 189 | GCUGCCUCCUGACU<br>GUAAUAGCAGCCGA<br>AAGGCUGC  | 385 | UAUUACAGUCAGGAGG<br>CAGCGG  | 386 |
| 190 | CUGCCUCCUGACUG<br>UAAUAAGCAGCCGA<br>AAGGCUGC  | 387 | UUAUUACAGUCAGGAG<br>GCAGGG  | 388 |

|     |                                             |     |                           |     |
|-----|---------------------------------------------|-----|---------------------------|-----|
| 191 | UAAUAUUAACUU<br>UUUAAAAGCAGCCG<br>AAAGGCUGC | 389 | UUUAAAAAAGUUAAU<br>AUUAGG | 390 |
| 192 | AAUAUUAACUUU<br>UUUAAAAGCAGCCG<br>AAAGGCUGC | 391 | UUUAAAAAAGUUAA<br>UAUUGG  | 392 |

**[00282]** SEQ ID NOs:393-776 – GalXC™-SCAP Oligonucleotides (modified)

| GalXC-<br>SCAP<br>Oligo | Sense Strand<br>(passenger; 36-mer)                                                                                                                            | SEQ ID<br>NO: | Antisense Strand<br>(guide; 22-mer)                                                                            | SEQ ID<br>NO: |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------|---------------|
| 1                       | mU*mGmUmUmG<br>mC/i2FC//i2FU//i2FA//i<br>2FC/mAmUmCmUmA<br>mCmUmUmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC   | 393           | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FA*/i2FG//i<br>2FU/mA/i2FG/mAmU/i2FG/<br>mUmAmG/i2FG/mCmAmA<br>mAmCmA*mG*mG | 394           |
| 2                       | mG*mUmUmUmGmC<br>mC/i2FU//i2FA//i2FC//i<br>2FA/mUmCmUmAmC<br>mUmUmCmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 395           | [MePhosphonate-4O-<br>mUs]/i2FG*/i2FA*/i2FA//i<br>2FG/mU/i2FA/mGmA/i2FU/<br>mGmUmA/i2FG/mGmCmA<br>mAmAmC*mG*mG | 396           |
| 3                       | mU*mUmUmGmCmC<br>mU/i2FA//i2FC//i2FA//i<br>2FU/mCmUmAmCmU<br>mUmCmUmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 397           | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FG*/i2FA//i<br>2FA/mG/i2FU/mAmG/i2FA/<br>mUmGmU/i2FA/mGmGmC<br>mAmAmA*mG*mG | 398           |
| 4                       | mG*mCmCmUmAmC<br>mA/i2FU//i2FC//i2FU//i<br>2FA/mCmUmUmCmU<br>mCmCmAmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 399           | [MePhosphonate-4O-<br>mUs]/i2FU*/i2FG*/i2FG//i<br>2FA/mG/i2FA/mAmG/i2FU/<br>mAmGmA/i2FU/mGmUmA<br>mGmGmC*mG*mG | 400           |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 5  | mA*mAmGmAmUmC<br>mG/i2FA//i2FC//i2FA//i<br>2FU/mGmGmUmCmA<br>mAmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 401 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FU//i<br>2FU/mG/i2FA/mCmC/i2FA/<br>mUmGmU/i2FC/mGmAmU<br>mCmUmU*mG*mG | 402 |
| 6  | mA*mGmAmUmCmG<br>mA/i2FC//i2FA//i2FU//i<br>2FG/mGmUmCmA<br>mGmUmCmA<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC        | 403 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FC//i<br>2FU/mU/i2FG/mAmC/i2FC/<br>mAmUmG/i2FU/mCmGmA<br>mUmCmU*mG*mG | 404 |
| 7  | mA*mUmCmGmAmC<br>mA/i2FU//i2FG//i2FG//i<br>2FU/mCmA<br>mCmCmA<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC              | 405 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FG//i<br>2FA/mC/i2FU/mUmG/i2FA/<br>mCmCmA/i2FU/mGmUmC<br>mGmAmU*mG*mG | 406 |
| 8  | mG*mUmGmUmUmG<br>mG/i2FU//i2FG//i2FC//i<br>2FU/mCmA<br>mAmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC       | 407 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FU//i<br>2FU/mG/i2FG/mUmG/i2FA/<br>mGmCmA/i2FC/mCmA<br>mCmA*mG*mG     | 408 |
| 9  | mU*mGmUmUmGmG<br>mU/i2FG//i2FC//i2FU//i<br>2FC/mAmCmCmA<br>mGmUmCmA<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC        | 409 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FC//i<br>2FU/mU/i2FG/mGmU/i2FG/<br>mAmGmC/i2FA/mCmCmA<br>mAmCmA*mG*mG | 410 |
| 10 | mG*mAmGmAmGmC<br>mU/i2FG//i2FG//i2FU//i<br>2FC/mCmA<br>mUmGmAmAmGmCm                                                                                          | 411 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FC/*i2FA//i<br>2FU/mG/i2FA/mUmG/i2FG/                                       | 412 |

|    |                                                                                                                  |     |                                                                                                   |     |
|----|------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------|-----|
|    | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                |     | mAmCmC/i2FA/mGmCmUmCmUmC*mG*mG                                                                    |     |
| 11 | mA*mGmAmGmCmUmG/i2FG//i2FU//i2FC//i2FC/mAmUmCmAmUmGmAmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 413 | [MePhosphonate-4O-mUs]/i2FU/*/i2FU/*/i2FC//i2FA/mU/i2FG/mAmU/i2FG/mGmAmC/i2FC/mAmGmCmUmCmU*mG*mG  | 414 |
| 12 | mG*mAmGmCmUmGmG/i2FU//i2FC//i2FC//i2FA/mUmCmAmUmGmAmAmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 415 | [MePhosphonate-4O-mUs]/i2FC/*/i2FU/*/i2FU//i2FC/mA/i2FU/mGmA/i2FU/mGmGmA/i2FC/mCmAmGmCmUmC*mG*mG  | 416 |
| 13 | mA*mGmCmUmGmGmU/i2FC//i2FC//i2FA//i2FU/mCmAmUmGmA mAmGmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 417 | [MePhosphonate-4O-mUs]/i2FU/*/i2FC/*/i2FU//i2FU/mC/i2FA/mUmG/i2FA/mUmGmG/i2FA/mCmCmA mGmCmU*mG*mG | 418 |
| 14 | mG*mCmUmGmGmUmC/i2FC//i2FA//i2FU//i2FC/mAmUmGmA mAmGmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC   | 419 | [MePhosphonate-4O-mUs]/i2FU/*/i2FU/*/i2FC//i2FU/mU/i2FC/mAmU/i2FG/mAmUmG/i2FG/mAmCmCmAmGmC*mG*mG  | 420 |
| 15 | mC*mUmGmGmUmCmC/i2FA//i2FU//i2FC//i2FA/mUmGmA mAmGmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 421 | [MePhosphonate-4O-mUs]/i2FG/*/i2FU/*/i2FU//i2FC/mU/i2FU/mCmA/i2FU/mGmAmU/i2FG/mGmAmCmCmAmG*mG*mG  | 422 |

|    |                                                                                                                               |     |                                                                                                 |     |
|----|-------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
|    | GalNAc]mGmGmCmUmGmC                                                                                                           |     |                                                                                                 |     |
| 16 | mC*mCmGmUmUmGmU/i2FC//i2FU//i2FG//i2FG/mAmUmUmGmGmCmAmUmAmGmCmAmGmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC   | 423 | [MePhosphonate-4O-mUs]/i2FA/*i2FU/*i2FG//i2FC/mC/i2FA/mAmU/i2FC/mCmAmG/i2FA/mCmAmAmCmGmG*mG*mG  | 424 |
| 17 | mU*mUmGmUmCmUmG/i2FG//i2FA//i2FU//i2FU/mGmGmCmAmUmCmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 425 | [MePhosphonate-4O-mUs]/i2FA/*i2FG/*i2FG//i2FA/mU/i2FG/mCmC/i2FA/mAmUmC/i2FC/mAmGmAmCmAmA*mG*mG  | 426 |
| 18 | mU*mGmUmCmUmGmG/i2FA//i2FU//i2FU//i2FG/mGmCmAmUmCmCmUmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 427 | [MePhosphonate-4O-mUs]/i2FC/*i2FA/*i2FG//i2FG/mA/i2FU/mGmC/i2FC/mAmAmU/i2FC/mCmAmGmAmCmA*mG*mG  | 428 |
| 19 | mG*mUmCmUmGmGmA/i2FU//i2FU//i2FG//i2FG/mCmAmUmCmCmUmGmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 429 | [MePhosphonate-4O-mUs]/i2FC/*i2FC/*i2FA//i2FG/mG/i2FA/mUmG/i2FC/mCmAmA/i2FU/mCmCmA mGmAmC*mG*mG | 430 |
| 20 | mC*mUmGmGmAmUmU/i2FG//i2FG//i2FC//i2FA/mUmCmCmUmGmGmUmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 431 | [MePhosphonate-4O-mUs]/i2FU/*i2FA/*i2FC//i2FC/mA/i2FG/mGmA/i2FU/mGmCmC/i2FA/mAmUmCmCmAmG*mG*mG  | 432 |
| 21 | mU*mGmGmAmUmUmG/i2FG//i2FC//i2FA//i                                                                                           | 433 | [MePhosphonate-4O-mUs]/i2FA/*i2FU/*i2FA//i                                                      | 434 |

|    |                                                                                                                                                                |     |                                                                                                                |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | 2FU/mCmCmUmGmG<br>mUmAmUmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                            |     | 2FC/mC/i2FA/mGmG/i2FA/<br>mUmGmC/i2FC/mAmAmU<br>mCmCmA*mG*mG                                                   |     |
| 22 | mG*mGmAmUmUmG<br>mG/i2FC//i2FA//i2FU//i<br>2FC/mCmUmGmGmU<br>mAmUmAmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 435 | [MePhosphonate-4O-<br>mUs]/i2FU*/i2FA*/i2FU//i<br>2FA/mC/i2FC/mAmG/i2FG/<br>mAmUmG/i2FC/mCmAmA<br>mUmCmC*mG*mG | 436 |
| 23 | mG*mAmUmUmGmG<br>mC/i2FA//i2FU//i2FC//i<br>2FC/mUmGmGmUmA<br>mUmAmCmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 437 | [MePhosphonate-4O-<br>mUs]/i2FG*/i2FU*/i2FA//i<br>2FU/mA/i2FC/mCmA/i2FG/<br>mGmAmU/i2FG/mCmCmA<br>mAmUmC*mG*mG | 438 |
| 24 | mA*mUmUmGmGmC<br>mA/i2FU//i2FC//i2FC//i<br>2FU/mGmGmUmAmU<br>mAmCmAmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 439 | [MePhosphonate-4O-<br>mUs]/i2FU*/i2FG*/i2FU//i<br>2FA/mU/i2FA/mCmC/i2FA/<br>mGmGmA/i2FU/mGmCmC<br>mAmAmU*mG*mG | 440 |
| 25 | mC*mUmCmCmAmU<br>mC/i2FU//i2FU//i2FC//i<br>2FC/mCmAmCmCmU<br>mGmAmUmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 441 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FU*/i2FC//i<br>2FA/mG/i2FG/mUmG/i2FG/<br>mGmAmA/i2FG/mAmUmG<br>mGmAmG*mG*mG | 442 |
| 26 | mC*mAmUmCmUmG<br>mC/i2FC//i2FU//i2FG//i<br>2FU/mGmGmGmAmU<br>mGmUmAmAmGmCm<br>AmGmCmCmG[ademA-<br>-GalNAc][ademA-                                              | 443 | [MePhosphonate-4O-<br>mUs]/i2FU*/i2FA*/i2FC//i<br>2FA/mU/i2FC/mCmC/i2FA/<br>mCmAmG/i2FG/mCmAmG<br>mAmUmG*mG*mG | 444 |

|    |                                                                                                                                |     |                                                                                                 |     |
|----|--------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                              |     |                                                                                                 |     |
| 27 | mU*mCmUmGmCmCmU/i2FG//i2FU//i2FG//i2FG/mGmAmUmGmUmAmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 445 | [MePhosphonate-4O-mUs]/i2FA/*i2FG/*i2FU//i2FA/mC/i2FA/mUmC/i2FC/mCmAmC/i2FA/mGmGmCmAmGmA*mG*mG  | 446 |
| 28 | mG*mUmGmGmUmGmC/i2FA//i2FA//i2FG//i2FC/mUmUmGmGmGmUmGmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 447 | [MePhosphonate-4O-mUs]/i2FA/*i2FC/*i2FA//i2FC/mC/i2FC/mAmA/i2FG/mCmUmU/i2FG/mCmAmCmCmAmC*mG*mG  | 448 |
| 29 | mU*mGmGmUmGmCmA/i2FA//i2FG//i2FC//i2FU/mUmGmGmGmUmGmUmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 449 | [MePhosphonate-4O-mUs]/i2FG/*i2FA/*i2FC//i2FA/mC/i2FC/mCmA/i2FA/mGmCmU/i2FU/mGmCmA mCmCmA*mG*mG | 450 |
| 30 | mG*mGmUmGmCmA mA/i2FG//i2FC//i2FU//i2FU/mGmGmGmUmGmUmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 451 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FA//i2FC/mA/i2FC/mCmC/i2FA/mAmGmC/i2FU/mUmGmCmAmCmC*mG*mG  | 452 |
| 31 | mG*mUmGmCmA mA/i2FC//i2FU//i2FU//i2FG/mGmGmUmGmUmCmAmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC   | 453 | [MePhosphonate-4O-mUs]/i2FA/*i2FU/*i2FG//i2FA/mC/i2FA/mCmC/i2FC/mAmAmG/i2FC/mUmUmGmCmAmC*mG*mG  | 454 |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 32 | mG*mCmAmAmGmC<br>mU/i2FU//i2FG//i2FG//i<br>2FG/mUmGmUmCmA<br>mUmCmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 455 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FG/*i2FA//i<br>2FU/mG/i2FA/mCmA/i2FC/<br>mCmCmA/i2FA/mGmCmU<br>mUmGmC*mG*mG | 456 |
| 33 | mC*mAmAmGmCmU<br>mU/i2FG//i2FG//i2FG//i<br>2FU/mGmUmCmA<br>mCmUmCmA<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC        | 457 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FG//i<br>2FA/mU/i2FG/mAmC/i2FA/<br>mCmCmC/i2FA/mAmGmC<br>mUmUmG*mG*mG | 458 |
| 34 | mA*mAmGmCmUmU<br>mG/i2FG//i2FG//i2FU//i<br>2FG/mUmCmA<br>mUmCmA<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC            | 459 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FA//i<br>2FG/mA/i2FU/mGmA/i2FC/<br>mAmCmC/i2FC/mAmAmG<br>mCmUmU*mG*mG | 460 |
| 35 | mA*mGmCmUmUmG<br>mG/i2FG//i2FU//i2FG//i<br>2FU/mCmA<br>mCmA<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                | 461 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FU/*i2FG//i<br>2FA/mG/i2FA/mUmG/i2FA/<br>mCmA/i2FC/mCmA<br>mGmCmU*mG*mG     | 462 |
| 36 | mG*mCmUmUmGmG<br>mG/i2FU//i2FG//i2FU//i<br>2FC/mAmUmCmUmC<br>mAmGmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 463 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FC/*i2FU//i<br>2FG/mA/i2FG/mAmU/i2FG/<br>mAmCmA/i2FC/mCmA<br>mAmGmC*mG*mG   | 464 |
| 37 | mG*mUmGmUmCmU<br>mC/i2FC//i2FU//i2FU//i<br>2FU/mUmGmGmA<br>mCmCmUmAmGmCm                                                                                      | 465 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FG/*i2FG//i<br>2FU/mC/i2FC/mCmA/i2FA/                                       | 466 |

|    |                                                                                                                                             |     |                                                                                                                  |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------|-----|
|    | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                           |     | mAmAmG/i2FG/mAmGmA<br>mCmAmC*mG*mG                                                                               |     |
| 38 | mU*mGmUmCmUmC<br>mC/i2FU//i2FU//i2FU//i<br>2FU/mGmGmGmAmC<br>mCmUmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 467 | [MePhosphonate-4O-<br>mUs]/i2FU/*/i2FA/*/i2FG//i<br>2FG/mU/i2FC/mCmC/i2FA/<br>mAmAmA/i2FG/mGmAmG<br>mAmCmA*mG*mG | 468 |
| 39 | mG*mGmGmGmAmC<br>mC/i2FU//i2FG//i2FU//i<br>2FU/mAmCmAmGmA<br>mCmAmGmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 469 | [MePhosphonate-4O-<br>mUs]/i2FC/*/i2FU/*/i2FG//i<br>2FU/mC/i2FU/mGmU/i2FA/<br>mAmCmA/i2FG/mGmUmC<br>mCmCmC*mG*mG | 470 |
| 40 | mG*mGmGmAmCmC<br>mU/i2FG//i2FU//i2FU//i<br>2FA/mCmAmGmAmC<br>mAmGmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 471 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FC/*/i2FU//i<br>2FG/mU/i2FC/mUmG/i2FU/<br>mAmAmC/i2FA/mGmGmU<br>mCmCmC*mG*mG | 472 |
| 41 | mG*mGmAmCmCmU<br>mG/i2FU//i2FU//i2FA//i<br>2FC/mAmGmAmCmA<br>mGmUmCmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 473 | [MePhosphonate-4O-<br>mUs]/i2FG/*/i2FA/*/i2FC//i<br>2FU/mG/i2FU/mCmU/i2FG/<br>mUmAmA/i2FC/mAmGmG<br>mUmCmC*mG*mG | 474 |
| 42 | mG*mAmCmCmUmG<br>mU/i2FU//i2FA//i2FC//i<br>2FA/mGmAmCmAmG<br>mUmCmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 475 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FG/*/i2FA//i<br>2FC/mU/i2FG/mUmC/i2FU/<br>mGmUmA/i2FA/mCmAmG<br>mGmUmC*mG*mG | 476 |

|    |                                                                                                                               |     |                                                                                                 |     |
|----|-------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
|    | GalNAc]mGmGmCmUmGmC                                                                                                           |     |                                                                                                 |     |
| 43 | mA*mCmCmUmGmUmU/i2FA//i2FC//i2FA//i2FG/mAmCmAmGmUmCmUmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 477 | [MePhosphonate-4O-mUs]/i2FU*/i2FA*/i2FG//i2FA/mC/i2FU/mGmU/i2FC/mUmGmU/i2FA/mAmCmA mGmGmU*mG*mG | 478 |
| 44 | mU*mGmCmCmAmUmU/i2FG//i2FU//i2FC//i2FU/mGmCmAmAmCmUmUmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 479 | [MePhosphonate-4O-mUs]/i2FA*/i2FA*/i2FA//i2FG/mU/i2FU/mGmC/i2FA/mGmAmC/i2FA/mAmUmGmGmCmA*mG*mG  | 480 |
| 45 | mG*mCmCmAmUmUmG/i2FU//i2FC//i2FU//i2FG/mCmAmAmCmUmUmUmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 481 | [MePhosphonate-4O-mUs]/i2FC*/i2FA*/i2FA//i2FA/mG/i2FU/mUmG/i2FC/mAmGmA/i2FC/mAmAmUmGmGmC*mG*mG  | 482 |
| 46 | mC*mCmAmUmUmGmU/i2FC//i2FU//i2FG//i2FC/mAmAmCmUmUmUmGmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 483 | [MePhosphonate-4O-mUs]/i2FC*/i2FC*/i2FA//i2FA/mA/i2FG/mUmU/i2FG/mCmAmG/i2FA/mCmAmAmUmGmG*mG*mG  | 484 |
| 47 | mA*mUmUmGmUmCmU/i2FG//i2FC//i2FA//i2FA/mCmUmUmUmGmGmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 485 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FC//i2FC/mA/i2FA/mAmG/i2FU/mUmGmC/i2FA/mGmAmCmAmAmU*mG*mG  | 486 |
| 48 | mU*mCmUmGmCmA mA/i2FC//i2FU//i2FU//i                                                                                          | 487 | [MePhosphonate-4O-mUs]/i2FU*/i2FC*/i2FA//i                                                      | 488 |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | 2FU/mGmGmCmAmG<br>mUmGmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                                              |     | 2FC/mU/i2FG/mCmC/i2FA/<br>mAmAmG/i2FU/mUmGmC<br>mAmGmA*mG*mG                                                   |     |
| 49 | mC*mUmAmCmCmC<br>mA/i2FC//i2FU//i2FG//i<br>2FC/mUmGmAmAmA<br>mCmUmCmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 489 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FG//i<br>2FU/mU/i2FU/mCmA/i2FG/<br>mCmAmG/i2FU/mGmGmG<br>mUmAmG*mG*mG | 490 |
| 50 | mG*mCmCmAmGmG<br>mA/i2FA//i2FC//i2FA//i<br>2FG/mGmAmCmCmU<br>mGmUmGmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 491 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FA/*i2FC//i<br>2FA/mG/i2FG/mUmC/i2FC/<br>mUmGmU/i2FU/mCmCmU<br>mGmGmC*mG*mG | 492 |
| 51 | mG*mAmAmCmAmG<br>mG/i2FA//i2FC//i2FC//i<br>2FU/mGmUmGmGmA<br>mAmUmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 493 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FA/*i2FU//i<br>2FU/mC/i2FC/mAmC/i2FA/<br>mGmGmU/i2FC/mCmUmG<br>mUmUmC*mG*mG | 494 |
| 52 | mA*mCmAmGmGmA<br>mC/i2FC//i2FU//i2FG//i<br>2FU/mGmGmAmAmU<br>mUmCmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 495 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FA//i<br>2FA/mU/i2FU/mCmC/i2FA/<br>mCmAmG/i2FG/mUmCmC<br>mUmGmU*mG*mG | 496 |
| 53 | mU*mGmGmAmAmU<br>mU/i2FC//i2FA//i2FC//i<br>2FC/mAmCmCmCmC<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-                                              | 497 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FA//i<br>2FG/mG/i2FG/mGmU/i2FG/<br>mGmUmG/i2FA/mAmUmU<br>mCmCmA*mG*mG | 498 |

|    |                                                                                                                                 |     |                                                                                                 |     |
|----|---------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                               |     |                                                                                                 |     |
| 54 | mC*mUmUmGmUmGmA/i2FC//i2FC//i2FA//i2FC/mCmUmAmCmA mUmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 499 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FA//i2FU/mG/i2FU/mAmG/i2FG/mUmGmG/i2FU/mCmAmCmAmAmG*mG*mG  | 500 |
| 55 | mU*mUmGmUmGmA mC/i2FC//i2FA//i2FC//i2FC/mUmAmCmAmUmCmAmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 501 | [MePhosphonate-4O-mUs]/i2FA*/i2FU*/i2FG//i2FA/mU/i2FG/mUmA/i2FG/mGmUmG/i2FG/mUmCmA mCmAmA*mG*mG | 502 |
| 56 | mU*mGmUmGmAmC mC/i2FA//i2FC//i2FC//i2FU/mAmCmAmUmCmAmUmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 503 | [MePhosphonate-4O-mUs]/i2FG*/i2FA*/i2FU//i2FG/mA/i2FU/mGmU/i2FA/mGmGmU/i2FG/mGmUmCmAmCmA*mG*mG  | 504 |
| 57 | mG*mUmGmAmCmC mA/i2FC//i2FC//i2FU//i2FA/mCmAmUmCmA mUmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 505 | [MePhosphonate-4O-mUs]/i2FA*/i2FG*/i2FA//i2FU/mG/i2FA/mUmG/i2FU/mAmGmG/i2FU/mGmGmUmCmAmC*mG*mG  | 506 |
| 58 | mU*mGmAmCmCmA mC/i2FC//i2FU//i2FA//i2FC/mAmUmCmAmUmCmUmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 507 | [MePhosphonate-4O-mUs]/i2FA*/i2FA*/i2FG//i2FA/mU/i2FG/mAmU/i2FG/mUmAmG/i2FG/mUmGmGmUmCmA*mG*mG  | 508 |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 59 | mG*mAmCmCmAmC<br>mC/i2FU//i2FA//i2FC//i<br>2FA/mUmCmAmUmC<br>mUmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 509 | [MePhosphonate-4O-<br>mUs]/i2FC*/i2FA*/i2FA//i<br>2FG/mA/i2FU/mGmA/i2FU/<br>mGmUmA/i2FG/mGmUmG<br>mGmUmC*mG*mG | 510 |
| 60 | mA*mCmCmAmCmC<br>mU/i2FA//i2FC//i2FA//i<br>2FU/mCmAmUmCmU<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 511 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FC*/i2FA//i<br>2FA/mG/i2FA/mUmG/i2FA/<br>mUmGmU/i2FA/mGmGmU<br>mGmGmU*mG*mG | 512 |
| 61 | mC*mCmAmCmCmU<br>mA/i2FC//i2FA//i2FU//i<br>2FC/mAmUmCmUmU<br>mGmUmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 513 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FA*/i2FC//i<br>2FA/mA/i2FG/mAmU/i2FG/<br>mAmUmG/i2FU/mAmGmG<br>mUmGmG*mG*mG | 514 |
| 62 | mC*mAmCmCmUmA<br>mC/i2FA//i2FU//i2FC//i<br>2FA/mUmCmUmUmG<br>mUmUmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 515 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FA*/i2FA//i<br>2FC/mA/i2FA/mGmA/i2FU/<br>mGmAmU/i2FG/mUmAmG<br>mGmUmG*mG*mG | 516 |
| 63 | mA*mCmCmUmAmC<br>mA/i2FU//i2FC//i2FA//i<br>2FU/mCmUmUmGmU<br>mUmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 517 | [MePhosphonate-4O-<br>mUs]/i2FC*/i2FA*/i2FA//i<br>2FA/mC/i2FA/mAmG/i2FA/<br>mUmGmA/i2FU/mGmUmA<br>mGmGmU*mG*mG | 518 |
| 64 | mC*mCmUmAmCmA<br>mU/i2FC//i2FA//i2FU//i<br>2FC/mUmUmGmUmU<br>mUmGmCmAmGmCm                                                                                    | 519 | [MePhosphonate-4O-<br>mUs]/i2FG*/i2FC*/i2FA//i<br>2FA/mA/i2FC/mAmA/i2FG/                                       | 520 |

|    |                                                                                                                                |     |                                                                                                   |     |
|----|--------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------|-----|
|    | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                |     | mAmUmG/i2FA/mUmGmUmAmGmG*mG*mG                                                                    |     |
| 65 | mC*mUmAmCmAmUmC/i2FA//i2FU//i2FC//i2FU/mUmGmUmUmUmGmCmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 521 | [MePhosphonate-4O-mUs]/i2FG/*/i2FG/*/i2FC//i2FA/mA/i2FA/mCmA/i2FA/mGmAmU/i2FG/mAmUmGmUmAmG*mG*mG  | 522 |
| 66 | mA*mCmAmUmCmA mU/i2FC//i2FU//i2FU//i2FG/mUmUmUmGmCmCmUmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 523 | [MePhosphonate-4O-mUs]/i2FU/*/i2FA/*/i2FG//i2FG/mC/i2FA/mAmA/i2FC/mAmAmG/i2FA/mUmGmA mUmGmU*mG*mG | 524 |
| 67 | mA*mUmCmAmUmCmU/i2FU//i2FG//i2FU//i2FU/mUmGmCmCmUmAmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 525 | [MePhosphonate-4O-mUs]/i2FU/*/i2FG/*/i2FU//i2FA/mG/i2FG/mCmA/i2FA/mAmCmA/i2FA/mGmAmUmGmAmU*mG*mG  | 526 |
| 68 | mU*mCmAmUmCmUmU/i2FG//i2FU//i2FU//i2FU/mGmCmCmUmAmCmAmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 527 | [MePhosphonate-4O-mUs]/i2FA/*/i2FU/*/i2FG//i2FU/mA/i2FG/mGmC/i2FA/mAmAmC/i2FA/mAmGmA mUmGmA*mG*mG | 528 |
| 69 | mA*mUmCmUmUmGmU/i2FU//i2FU//i2FG//i2FC/mCmUmAmCmA mUmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]             | 529 | [MePhosphonate-4O-mUs]/i2FA/*/i2FG/*/i2FA//i2FU/mG/i2FU/mAmG/i2FG/mCmAmA/i2FA/mCmAmAmGmAmU*mG*mG  | 530 |

|    |                                                                                                                               |     |                                                                                                 |     |
|----|-------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
|    | GalNAc]mGmGmCmUmGmC                                                                                                           |     |                                                                                                 |     |
| 70 | mU*mCmUmUmGmUmU/i2FU//i2FG//i2FC//i2FC/mUmAmCmAmUmCmUmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 531 | [MePhosphonate-4O-mUs]/i2FU*/i2FA*/i2FG//i2FA/mU/i2FG/mUmA/i2FG/mGmCmA/i2FA/mAmCmA mAmGmA*mG*mG | 532 |
| 71 | mU*mUmUmCmCmCmC/i2FU//i2FA//i2FC//i2FC/mUmUmGmUmGmGmUmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 533 | [MePhosphonate-4O-mUs]/i2FC*/i2FA*/i2FC//i2FC/mA/i2FC/mAmA/i2FG/mGmUmA/i2FG/mGmGmGmAmAmA*mG*mG  | 534 |
| 72 | mU*mUmCmCmCmCmU/i2FA//i2FC//i2FC//i2FU/mUmGmUmGmGmUmGmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 535 | [MePhosphonate-4O-mUs]/i2FC*/i2FC*/i2FA//i2FC/mC/i2FA/mCmA/i2FA/mGmGmU/i2FA/mGmGmGmGmAmA*mG*mG  | 536 |
| 73 | mC*mCmCmUmAmCmC/i2FU//i2FU//i2FG//i2FU/mGmGmUmGmGmUmUmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 537 | [MePhosphonate-4O-mUs]/i2FU*/i2FA*/i2FA//i2FC/mC/i2FA/mCmC/i2FA/mCmA/i2FG/mGmUmAmGmGmG*mG*mG    | 538 |
| 74 | mC*mUmAmCmCmUmU/i2FG//i2FU//i2FG//i2FG/mUmGmGmUmUmAmUmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 539 | [MePhosphonate-4O-mUs]/i2FA*/i2FA*/i2FU//i2FA/mA/i2FC/mCmA/i2FC/mCmA/i2FA/mAmGmGmUmAmG*mG*mG    | 540 |
| 75 | mU*mAmCmCmUmUmG/i2FU//i2FG//i2FG//i                                                                                           | 541 | [MePhosphonate-4O-mUs]/i2FC*/i2FA*/i2FA//i                                                      | 542 |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | 2FU/mGmGmUmUmA<br>mUmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                            |     | 2FU/mA/i2FA/mCmC/i2FA/<br>mCmCmA/i2FC/mAmAmG<br>mGmUmA*mG*mG                                                   |     |
| 76 | mA*mCmCmUmUmG<br>mU/i2FG//i2FG//i2FU//i<br>2FG/mGmUmUmAmU<br>mUmGmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 543 | [MePhosphonate-4O-<br>mUs]/i2FC*/i2FC*/i2FA//i<br>2FA/mU/i2FA/mAmC/i2FC/<br>mAmCmC/i2FA/mCmA<br>mGmGmU*mG*mG   | 544 |
| 77 | mC*mCmUmUmGmU<br>mG/i2FG//i2FU//i2FG//i<br>2FG/mUmUmAmUmU<br>mGmGmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 545 | [MePhosphonate-4O-<br>mUs]/i2FC*/i2FC*/i2FC//i<br>2FA/mA/i2FU/mAmA/i2FC/<br>mCmA/i2FC/mAmCmA<br>mAmGmG*mG*mG   | 546 |
| 78 | mC*mUmUmGmUmG<br>mG/i2FU//i2FG//i2FG//i<br>2FU/mUmAmUmUmG<br>mGmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 547 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FC*/i2FC//i<br>2FC/mA/i2FA/mUmA/i2FA/<br>mCmCmA/i2FC/mCmA<br>mAmAmG*mG*mG   | 548 |
| 79 | mU*mUmGmUmGmG<br>mU/i2FG//i2FG//i2FU//i<br>2FU/mAmUmUmGmG<br>mGmUmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 549 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FA*/i2FC//i<br>2FC/mC/i2FA/mAmU/i2FA/<br>mAmCmC/i2FA/mCmA<br>mCmA*mG*mG     | 550 |
| 80 | mU*mGmUmGmGmU<br>mG/i2FG//i2FU//i2FU//i<br>2FA/mUmUmGmGmG<br>mUmUmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-                                              | 551 | [MePhosphonate-4O-<br>mUs]/i2FU*/i2FA*/i2FA//i<br>2FC/mC/i2FC/mAmA/i2FU/<br>mAmAmC/i2FC/mAmCmC<br>mAmCmA*mG*mG | 552 |

|    |                                                                                                                              |     |                                                                                                |     |
|----|------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------|-----|
|    | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                            |     |                                                                                                |     |
| 81 | mG*mUmGmGmUmGmG/i2FU//i2FU//i2FA//i2FU/mUmGmGmGmUmUmAmGmAmGmCmAmGmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 553 | [MePhosphonate-4O-mUs]/i2FC/*i2FU/*i2FA/i2FA/mC/i2FC/mCmA/i2FA/mUmAmA/i2FC/mCmA/mCmA*mG*mG     | 554 |
| 82 | mU*mGmGmUmGmGmU/i2FU//i2FA//i2FU//i2FU/mGmGmGmUmUmAmGmAmAmGmCmAmGmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 555 | [MePhosphonate-4O-mUs]/i2FU/*i2FC/*i2FU//i2FA/mA/i2FC/mCmC/i2FA/mAmUmA/i2FA/mCmA/mCmA*mG*mG    | 556 |
| 83 | mG*mGmUmGmGmUmU/i2FA//i2FU//i2FU//i2FG/mGmGmUmUmAmGmAmGmAmGmCmAmGmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 557 | [MePhosphonate-4O-mUs]/i2FC/*i2FU/*i2FC//i2FU/mA/i2FA/mCmC/i2FC/mAmAmU/i2FA/mAmCmCmAmCmC*mG*mG | 558 |
| 84 | mG*mUmGmGmUmUmA/i2FU//i2FU//i2FG//i2FG/mGmUmUmAmGmAmGmAmAmGmCmAmGmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 559 | [MePhosphonate-4O-mUs]/i2FU/*i2FC/*i2FU//i2FC/mU/i2FA/mAmC/i2FC/mCmA/i2FU/mAmAmCmCmA*mG*mG     | 560 |
| 85 | mU*mGmGmUmUmAmU/i2FU//i2FG//i2FG//i2FG/mUmUmAmGmA mGmAmAmAmGmCmAmGmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 561 | [MePhosphonate-4O-mUs]/i2FU/*i2FU/*i2FC//i2FU/mC/i2FU/mAmA/i2FC/mCmA/i2FA/mUmAmAmCmA*mG*mG     | 562 |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 86 | mG*mGmUmUmAmU<br>mU/i2FG//i2FG//i2FG//i<br>2FU/mUmAmGmAmG<br>mAmAmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 563 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FU/*i2FU//i<br>2FC/mU/i2FC/mUmA/i2FA/<br>mCmCmC/i2FA/mAmUmA<br>mAmCmC*mG*mG | 564 |
| 87 | mG*mUmUmAmUmU<br>mG/i2FG//i2FG//i2FU//i<br>2FU/mAmGmAmGmA<br>mAmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 565 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FA/*i2FU//i<br>2FU/mC/i2FU/mCmU/i2FA/<br>mAmCmC/i2FC/mAmAmU<br>mAmAmC*mG*mG | 566 |
| 88 | mU*mUmAmUmUmG<br>mG/i2FG//i2FU//i2FU//i<br>2FA/mGmAmGmAmA<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 567 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FA//i<br>2FU/mU/i2FC/mUmC/i2FU/<br>mAmAmC/i2FC/mCmAmA<br>mUmAmA*mG*mG | 568 |
| 89 | mA*mUmUmGmGmG<br>mU/i2FU//i2FA//i2FG//i<br>2FA/mGmAmAmUmG<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 569 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FA//i<br>2FC/mA/i2FU/mUmC/i2FU/<br>mCmUmA/i2FA/mCmCmC<br>mAmAmU*mG*mG | 570 |
| 90 | mU*mUmGmGmGmU<br>mU/i2FA//i2FG//i2FA//i<br>2FG/mAmAmUmGmU<br>mGmUmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 571 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FA/*i2FC//i<br>2FA/mC/i2FA/mUmU/i2FC/<br>mUmCmU/i2FA/mAmCmC<br>mCmAmA*mG*mG | 572 |
| 91 | mG*mGmUmUmAmG<br>mA/i2FG//i2FA//i2FA//i<br>2FU/mGmUmGmUmU<br>mGmGmUmAmGmCm                                                                                    | 573 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FC//i<br>2FA/mA/i2FC/mAmC/i2FA/                                       | 574 |

|    |                                                                                                                                                               |     |                                                                                                                |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|    | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                                             |     | mUmUmC/i2FU/mCmUmAmAmCmC*mG*mG                                                                                 |     |
| 92 | mG*mUmUmAmGmA<br>mG/i2FA//i2FA//i2FU//i<br>2FG/mUmGmUmUmG<br>mGmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 575 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FA/*i2FC//i<br>2FC/mA/i2FA/mCmA/i2FC/<br>mAmUmU/i2FC/mUmCmU<br>mAmAmC*mG*mG | 576 |
| 93 | mU*mUmAmGmAmG<br>mA/i2FA//i2FU//i2FG//i<br>2FU/mGmUmUmGmG<br>mUmGmCmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 577 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FC/*i2FA//i<br>2FC/mC/i2FA/mAmC/i2FA/<br>mCmAmU/i2FU/mCmUmC<br>mUmAmA*mG*mG | 578 |
| 94 | mU*mAmGmAmGmA<br>mA/i2FU//i2FG//i2FU//i<br>2FG/mUmUmGmGmU<br>mGmCmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 579 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FG/*i2FC//i<br>2FA/mC/i2FC/mAmA/i2FC/<br>mAmCmA/i2FU/mUmCmU<br>mCmUmA*mG*mG | 580 |
| 95 | mA*mGmAmGmAmA<br>mU/i2FG//i2FU//i2FG//i<br>2FU/mUmGmGmUmG<br>mCmUmCmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 581 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FG//i<br>2FC/mA/i2FC/mCmA/i2FA/<br>mCmAmC/i2FA/mUmUmC<br>mUmCmU*mG*mG | 582 |
| 96 | mG*mAmGmAmAmU<br>mG/i2FU//i2FG//i2FU//i<br>2FU/mGmGmUmGmC<br>mUmCmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]                 | 583 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FA//i<br>2FG/mC/i2FA/mCmC/i2FA/<br>mAmCmA/i2FC/mAmUmU<br>mCmUmC*mG*mG | 584 |

|     |                                                                                                                                                               |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc]mGmGmCmU<br>mGmC                                                                                                                                       |     |                                                                                                                |     |
| 97  | mA*mGmAmAmUmG<br>mU/i2FG//i2FU//i2FU//i<br>2FG/mGmUmGmCmU<br>mCmAmCmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 585 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FU/*i2FG//i<br>2FA/mG/i2FC/mAmC/i2FC/<br>mAmAmC/i2FA/mCmAmU<br>mUmCmU*mG*mG | 586 |
| 98  | mA*mAmUmGmUmG<br>mU/i2FU//i2FG//i2FG//i<br>2FU/mGmCmUmCmA<br>mCmCmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 587 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FG//i<br>2FU/mG/i2FA/mGmC/i2FA/<br>mCmCmA/i2FA/mCmAmC<br>mAmUmU*mG*mG | 588 |
| 99  | mA*mUmGmUmGmU<br>mU/i2FG//i2FG//i2FU//i<br>2FG/mCmUmCmAmC<br>mCmAmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 589 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FU/*i2FG//i<br>2FG/mU/i2FG/mAmG/i2FC/<br>mAmCmC/i2FA/mAmCmA<br>mCmAmU*mG*mG | 590 |
| 100 | mU*mGmUmGmUmU<br>mG/i2FG//i2FU//i2FG//i<br>2FC/mUmCmAmCmC<br>mAmAmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 591 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FU/*i2FU//i<br>2FG/mG/i2FU/mGmA/i2FG/<br>mCmAmC/i2FC/mAmAmC<br>mAmCmA*mG*mG | 592 |
| 101 | mU*mGmGmUmCmC<br>mA/i2FU//i2FC//i2FA//i<br>2FU/mGmAmAmGmA<br>mAmCmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 593 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FU//i<br>2FU/mC/i2FU/mUmC/i2FA/<br>mUmGmA/i2FU/mGmGmA<br>mCmCmA*mG*mG | 594 |
| 102 | mG*mGmUmCmCmA<br>mU/i2FC//i2FA//i2FU//i                                                                                                                       | 595 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FU/*i2FG//i                                                                 | 596 |

|     |                                                                                                                                                               |     |                                                                                                                  |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------|-----|
|     | 2FG/mAmAmGmAmA<br>mCmAmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                                              |     | 2FU/mU/i2FC/mUmU/i2FC/<br>mAmUmG/i2FA/mUmGmG<br>mAmCmC*mG*mG                                                     |     |
| 103 | mC*mUmGmAmCmU<br>mU/i2FC//i2FU//i2FU//i<br>2FC/mCmUmUmCmA<br>mGmAmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 597 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FU/*/i2FC//i<br>2FU/mG/i2FA/mAmG/i2FG/<br>mAmAmG/i2FA/mAmGmU<br>mCmAmG*mG*mG | 598 |
| 104 | mA*mCmUmUmCmU<br>mU/i2FC//i2FC//i2FU//i<br>2FU/mCmAmGmAmU<br>mGmCmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 599 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FG/*/i2FC//i<br>2FA/mU/i2FC/mUmG/i2FA/<br>mAmGmG/i2FA/mAmGmA<br>mAmGmU*mG*mG | 600 |
| 105 | mU*mCmCmUmUmC<br>mA/i2FG//i2FA//i2FU//i<br>2FG/mCmUmGmUmU<br>mUmUmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 601 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FA/*/i2FA//i<br>2FA/mA/i2FC/mAmG/i2FC/<br>mAmUmC/i2FU/mGmA<br>mGmGmA*mG*mG   | 602 |
| 106 | mC*mCmUmUmCmA<br>mG/i2FA//i2FU//i2FG//i<br>2FC/mUmGmUmUmU<br>mUmUmCmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 603 | [MePhosphonate-4O-<br>mUs]/i2FG/*/i2FA/*/i2FA//i<br>2FA/mA/i2FA/mCmA/i2FG/<br>mCmA/i2FC/mUmGmA<br>mAmGmG*mG*mG   | 604 |
| 107 | mC*mUmUmCmA<br>mA/i2FU//i2FG//i2FC//i<br>2FU/mGmUmUmUmU<br>mUmCmA/mAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-                                               | 605 | [MePhosphonate-4O-<br>mUs]/i2FU/*/i2FG/*/i2FA//i<br>2FA/mA/i2FA/mAmC/i2FA/<br>mGmCmA/i2FU/mCmUmG<br>mAmAmG*mG*mG | 606 |

|     |                                                                                                                                                               |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                                                             |     |                                                                                                                |     |
| 108 | mU*mUmCmAmGmA<br>mU/i2FG//i2FC//i2FU//i<br>2FG/mUmUmUmUmU<br>mCmAmCmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 607 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FU/*i2FG/i<br>2FA/mA/i2FA/mAmA/i2FC/<br>mAmGmC/i2FA/mUmCmU<br>mGmAmA*mG*mG  | 608 |
| 109 | mC*mAmGmAmUmG<br>mC/i2FU//i2FG//i2FU//i<br>2FU/mUmUmUmCmA<br>mCmCmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 609 | [MePhosphonate-4O-<br>mUs]/i2FU/*i2FG/*i2FG/i<br>2FU/mG/i2FA/mAmA/i2FA/<br>mAmCmA/i2FG/mCmAmU<br>mCmUmG*mG*mG  | 610 |
| 110 | mA*mGmAmUmGmC<br>mU/i2FG//i2FU//i2FU//i<br>2FU/mUmUmCmAmC<br>mCmAmCmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 611 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FU/*i2FG/i<br>2FG/mU/i2FG/mAmA/i2FA/<br>mAmAmC/i2FA/mGmCmA<br>mUmCmU*mG*mG  | 612 |
| 111 | mG*mAmUmGmCmU<br>mG/i2FU//i2FU//i2FU//i<br>2FU/mUmCmAmCmC<br>mAmCmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 613 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FG/*i2FU//i<br>2FG/mG/i2FU/mGmA/i2FA/<br>mAmAmA/i2FC/mAmGmC<br>mAmUmC*mG*mG | 614 |
| 112 | mA*mUmGmCmUmG<br>mU/i2FU//i2FU//i2FU//i<br>2FU/mCmAmCmCmA<br>mCmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 615 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FA/*i2FG//i<br>2FU/mG/i2FG/mUmG/i2FA/<br>mAmAmA/i2FA/mCmAmG<br>mCmAmU*mG*mG | 616 |

|     |                                                                                                                                                               |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 113 | mU*mGmCmUmGmU<br>mU/i2FU//i2FU//i2FU//i<br>2FC/mAmCmCmAmC<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 617 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FA/i<br>2FG/mU/i2FG/mGmU/i2FG/<br>mAmAmA/i2FA/mAmCmA<br>mGmCmA*mG*mG  | 618 |
| 114 | mG*mCmUmGmUmU<br>mU/i2FU//i2FU//i2FC//i<br>2FA/mCmCmAmCmU<br>mGmUmCmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 619 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FC//i<br>2FA/mG/i2FU/mGmG/i2FU/<br>mGmAmA/i2FA/mAmAmC<br>mAmGmC*mG*mG | 620 |
| 115 | mU*mGmUmUmUmU<br>mU/i2FC//i2FA//i2FC//i<br>2FC/mAmCmUmGmU<br>mCmCmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 621 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FG/*i2FG//i<br>2FA/mC/i2FA/mGmU/i2FG/<br>mGmUmG/i2FA/mAmAmA<br>mAmCmA*mG*mG | 622 |
| 116 | mG*mUmUmUmUmU<br>mC/i2FA//i2FC//i2FC//i<br>2FA/mCmUmGmUmC<br>mCmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 623 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FA/*i2FG//i<br>2FG/mA/i2FC/mAmG/i2FU/<br>mGmGmU/i2FG/mAmAmA<br>mAmAmC*mG*mG | 624 |
| 117 | mU*mUmUmUmUmC<br>mA/i2FC//i2FC//i2FA//i<br>2FC/mUmGmUmCmC<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 625 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FC/*i2FA//i<br>2FG/mG/i2FA/mCmA/i2FG/<br>mUmGmG/i2FU/mGmAmA<br>mAmAmA*mG*mG | 626 |
| 118 | mU*mUmUmUmCmA<br>mC/i2FC//i2FA//i2FC//i<br>2FU/mGmUmCmCmU<br>mGmUmCmAmGmCm                                                                                    | 627 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FC//i<br>2FA/mG/i2FG/mAmC/i2FA/                                       | 628 |

|     |                                                                                                                     |     |                                                                                                    |     |
|-----|---------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------|-----|
|     | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                   |     | mGmUmG/i2FG/mUmGmA<br>mAmAmA*mG*mG                                                                 |     |
| 119 | mU*mUmCmAmCmCmA/i2FC//i2FU//i2FG//i2FU/mCmCmUmGmUmCmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 629 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FG//i2FA/mC/i2FA/mGmG/i2FA/mCmAmG/i2FU/mGmGmUmGmAmA*mG*mG     | 630 |
| 120 | mC*mAmCmCmAmCmU/i2FG//i2FU//i2FC//i2FC/mUmGmUmCmCmAmUmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 631 | [MePhosphonate-4O-mUs]/i2FA/*i2FA/*i2FU//i2FG/mG/i2FA/mCmA/i2FG/mGmAmC/i2FA/mGmUmGmGmUmG*mG*mG     | 632 |
| 121 | mA*mCmCmAmCmUmG/i2FU//i2FC//i2FC//i2FU/mGmUmCmCmA<br>mUmUmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 633 | [MePhosphonate-4O-mUs]/i2FC/*i2FA/*i2FA//i2FU/mG/i2FG/mAmC/i2FA/mGmGmA/i2FC/mAmGmUmGmGmUmG*mG*mG   | 634 |
| 122 | mC*mCmAmCmUmGmU/i2FC//i2FC//i2FU//i2FG/mUmCmCmAmUmUmGmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 635 | [MePhosphonate-4O-mUs]/i2FU/*i2FC/*i2FA//i2FA/mU/i2FG/mGmA/i2FC/mAmGmG/i2FA/mCmAmGmUmGmG*mG*mG     | 636 |
| 123 | mC*mAmCmUmGmUmC/i2FC//i2FU//i2FG//i2FU/mCmCmAmUmUmGmAmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 637 | [MePhosphonate-4O-mUs]/i2FG/*i2FU/*i2FC//i2FA/mA/i2FU/mGmG/i2FA/mCmAmG/i2FG/mAmCmA<br>mGmUmG*mG*mG | 638 |

|     |                                                                                                                                |     |                                                                                                |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------|-----|
|     | GalNAc]mGmGmCmUmGmC                                                                                                            |     |                                                                                                |     |
| 124 | mA*mCmUmGmUmCmC/i2FU//i2FG//i2FU//i2FC/mCmAmUmUmGmAmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 639 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FU//i2FC/mA/i2FA/mUmG/i2FG/mAmCmA/i2FG/mGmAmCmAmGmU*mG*mG | 640 |
| 125 | mC*mUmAmAmGmCmU/i2FA//i2FC//i2FC//i2FU/mGmAmGmAmAmCmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 641 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FG//i2FU/mU/i2FC/mUmC/i2FA/mGmGmU/i2FA/mGmCmUmUmAmG*mG*mG | 642 |
| 126 | mG*mAmGmGmUmCmC/i2FA//i2FG//i2FC//i2FA/mGmAmGmGmUmUmGmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 643 | [MePhosphonate-4O-mUs]/i2FA/*i2FC/*i2FA//i2FA/mC/i2FC/mUmC/i2FU/mGmCmU/i2FG/mGmAmCmCmUmC*mG*mG | 644 |
| 127 | mG*mCmAmGmAmGmG/i2FU//i2FU//i2FG//i2FU/mCmCmAmUmGmAmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 645 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FU//i2FC/mA/i2FU/mGmG/i2FA/mCmA/i2FC/mCmUmCmUmGmC*mG*mG   | 646 |
| 128 | mC*mAmGmAmGmGmU/i2FU//i2FG//i2FU//i2FC/mCmAmUmGmA mCmAmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 647 | [MePhosphonate-4O-mUs]/i2FC/*i2FU/*i2FG//i2FU/mC/i2FA/mUmG/i2FG/mAmCmA/i2FA/mCmCmUmCmUmG*mG*mG | 648 |
| 129 | mG*mAmGmGmAmUmG/i2FA//i2FG//i2FG//i                                                                                            | 649 | [MePhosphonate-4O-mUs]/i2FU/*i2FC/*i2FC//i                                                     | 650 |

|     |                                                                                                                                                               |     |                                                                                                                  |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------|-----|
|     | 2FA/mAmCmUmUmU<br>mGmGmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                                              |     | 2FA/mA/i2FA/mGmU/i2FU/<br>mCmCmU/i2FC/mAmUmC<br>mCmUmC*mG*mG                                                     |     |
| 130 | mG*mAmAmCmUmU<br>mU/i2FG//i2FG//i2FA//i<br>2FG/mGmAmAmAmU<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 651 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FC/*/i2FA//i<br>2FA/mU/i2FU/mUmC/i2FC/<br>mUmCmC/i2FA/mAmAmG<br>mUmUmC*mG*mG | 652 |
| 131 | mG*mAmCmGmCmU<br>mC/i2FU//i2FU//i2FC//i<br>2FA/mGmCmUmAmU<br>mUmAmCmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 653 | [MePhosphonate-4O-<br>mUs]/i2FG/*/i2FU/*/i2FA//i<br>2FA/mU/i2FA/mGmC/i2FU/<br>mGmAmA/i2FG/mAmGmC<br>mGmUmC*mG*mG | 654 |
| 132 | mA*mCmGmCmUmC<br>mU/i2FU//i2FC//i2FA//i<br>2FG/mCmUmAmUmU<br>mAmCmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 655 | [MePhosphonate-4O-<br>mUs]/i2FU/*/i2FG/*/i2FU//i<br>2FA/mA/i2FU/mAmG/i2FC/<br>mUmGmA/i2FA/mGmAmG<br>mCmGmU*mG*mG | 656 |
| 133 | mC*mGmCmUmCmU<br>mU/i2FC//i2FA//i2FG//i<br>2FC/mUmAmUmUmA<br>mCmAmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 657 | [MePhosphonate-4O-<br>mUs]/i2FU/*/i2FU/*/i2FG//i<br>2FU/mA/i2FA/mUmA/i2FG/<br>mCmUmG/i2FA/mAmGmA<br>mGmCmG*mG*mG | 658 |
| 134 | mG*mCmUmCmUmU<br>mC/i2FA//i2FG//i2FC//i<br>2FU/mAmUmUmAmC<br>mAmAmCmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-                                              | 659 | [MePhosphonate-4O-<br>mUs]/i2FG/*/i2FU/*/i2FU//i<br>2FG/mU/i2FA/mAmU/i2FA/<br>mGmCmU/i2FG/mAmAmG<br>mAmGmC*mG*mG | 660 |

|     |                                                                                                                                       |     |                                                                                                    |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                                     |     |                                                                                                    |     |
| 135 | mC*mUmCmUmUmCmA/i2FG//i2FC//i2FU//i2FA/mUmUmAmCmA<br>mAmCmAmAmGmCm<br>AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 661 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FU//i2FU/mG/i2FU/mAmA/i2FU/mAmGmC/i2FU/mGmAmAmGmAmG*mG*mG     | 662 |
| 136 | mU*mCmUmUmCmA<br>mG/i2FC//i2FU//i2FA//i2FU/mUmAmCmAmAmCmAmUmAmGmCm<br>AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 663 | [MePhosphonate-4O-mUs]/i2FA/*i2FU/*i2FG//i2FU/mU/i2FG/mUmA/i2FA/mUmAmG/i2FC/mUmGmA<br>mAmGmA*mG*mG | 664 |
| 137 | mC*mUmUmCmAmGmC/i2FU//i2FA//i2FU//i2FU/mAmCmAmAmCmAmUmCmAmGmCm<br>AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 665 | [MePhosphonate-4O-mUs]/i2FG/*i2FA/*i2FU//i2FG/mU/i2FU/mGmU/i2FA/mAmUmA/i2FG/mCmUmG<br>mAmAmG*mG*mG | 666 |
| 138 | mU*mUmCmAmGmCmU/i2FA//i2FU//i2FU//i2FA/mCmAmAmCmA<br>mUmCmAmAmGmCm<br>AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 667 | [MePhosphonate-4O-mUs]/i2FU/*i2FG/*i2FA//i2FU/mG/i2FU/mUmG/i2FU/mAmAmU/i2FA/mGmCmUmGmAmA*mG*mG     | 668 |
| 139 | mC*mCmAmGmCmCmU/i2FG//i2FA//i2FC//i2FC/mUmCmAmCmCmUmGmCmAmGmCm<br>AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 669 | [MePhosphonate-4O-mUs]/i2FG/*i2FC/*i2FA//i2FG/mG/i2FU/mGmA/i2FG/mGmUmC/i2FA/mGmGmCmUmGmG*mG*mG     | 670 |

|     |                                                                                                                                   |     |                                                                                                 |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
| 140 | mC*mAmGmCmCmUmG/i2FA//i2FC//i2FC//i2FU/mCmAmCmCmUmGmCmUmAmGmCmAmGmCmCmG[ademaA-GalNAc][ademaA-GalNAc][ademaA-GalNAc]mGmGmCmUmGmC  | 671 | [MePhosphonate-4O-mUs]/i2FA/*i2FG/*i2FC//i2FA/mG/i2FG/mUmG/i2FA/mGmGmU/i2FC/mAmGmGmCmUmG*mG*mG  | 672 |
| 141 | mA*mGmCmCmUmGmA/i2FC//i2FC//i2FU//i2FC/mAmCmCmUmGmCmUmUmAmGmCmAmGmCmCmG[ademaA-GalNAc][ademaA-GalNAc][ademaA-GalNAc]mGmGmCmUmGmC  | 673 | [MePhosphonate-4O-mUs]/i2FA/*i2FA/*i2FG//i2FC/mA/i2FG/mGmU/i2FG/mAmGmG/i2FU/mCmAmGmGmCmU*mG*mG  | 674 |
| 142 | mG*mCmCmUmGmA mC/i2FC//i2FU//i2FC//i2FA/mCmCmUmGmCmUmUmAmAmGmCmAmGmCmCmG[ademaA-GalNAc][ademaA-GalNAc][ademaA-GalNAc]mGmGmCmUmGmC | 675 | [MePhosphonate-4O-mUs]/i2FU/*i2FA/*i2FA//i2FG/mC/i2FA/mGmG/i2FU/mGmAmG/i2FG/mUmCmA mGmGmC*mG*mG | 676 |
| 143 | mC*mCmUmGmA mC/i2FU//i2FC//i2FA//i2FC/mCmUmGmCmUmUmAmAmAmGmCmAmGmCmCmG[ademaA-GalNAc][ademaA-GalNAc][ademaA-GalNAc]mGmGmCmUmGmC   | 677 | [MePhosphonate-4O-mUs]/i2FU/*i2FU/*i2FA//i2FA/mG/i2FC/mAmG/i2FG/mUmGmA/i2FG/mGmUmC mAmGmG*mG*mG | 678 |
| 144 | mC*mUmGmA mCmCmU/i2FC//i2FA//i2FC//i2FC/mUmGmCmUmUmAmAmUmAmGmCmAmGmCmCmG[ademaA-GalNAc][ademaA-GalNAc][ademaA-GalNAc]mGmGmCmUmGmC | 679 | [MePhosphonate-4O-mUs]/i2FA/*i2FU/*i2FU//i2FA/mA/i2FG/mCmA/i2FG/mGmUmG/i2FA/mGmGmUmCmA mG*mG*mG | 680 |
| 145 | mU*mGmA mCmCmUmC/i2FA//i2FC//i2FC//i2FU/mGmCmUmUmAmAmUmUmAmGmCmAmGmCmCmG[ademaA-GalNAc][ademaA-GalNAc][ademaA-GalNAc]mGmGmCmUmGmC | 681 | [MePhosphonate-4O-mUs]/i2FA/*i2FA/*i2FU//i2FU/mA/i2FA/mGmC/i2FA/                                | 682 |

|     |                                                                                                                       |     |                                                                                                |     |
|-----|-----------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------|-----|
|     | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                     |     | mGmGmU/i2FG/mAmGmGmUmCmA*mG*mG                                                                 |     |
| 146 | mG*mAmCmCmUmCmA/i2FC//i2FC//i2FU//i2FG/mCmUmUmAmAmUmUmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC       | 683 | [MePhosphonate-4O-mUs]/i2FC*/i2FA*/i2FA/i2FU/mU/i2FA/mAmG/i2FC/mAmGmG/i2FU/mGmAmGmGmUmC*mG*mG  | 684 |
| 147 | mA*mCmCmUmCmA mC/i2FC//i2FU//i2FG//i2FC/mUmUmAmAmUmUmGmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC      | 685 | [MePhosphonate-4O-mUs]/i2FU*/i2FC*/i2FA/i2FA/mU/i2FU/mAmA/i2FG/mCmAmG/i2FG/mUmGmA mGmGmU*mG*mG | 686 |
| 148 | mC*mCmUmCmA mC/i2FU//i2FG//i2FC//i2FU/mUmAmAmUmUmGmAmCmA mGmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 687 | [MePhosphonate-4O-mUs]/i2FG*/i2FU*/i2FC//i2FA/mA/i2FU/mUmA/i2FA/mGmCmA/i2FG/mGmUmGmAmGmG*mG*mG | 688 |
| 149 | mC*mUmCmA mU/i2FG//i2FC//i2FU//i2FU/mAmAmUmUmGmAmCmA mGmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 689 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FU//i2FC/mA/i2FA/mUmU/i2FA/mAmGmC/i2FA/mGmGmUmGmAmG*mG*mG | 690 |
| 150 | mU*mCmA mG/i2FC//i2FU//i2FU//i2FA/mAmUmUmGmA mCmA mGmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc]                    | 691 | [MePhosphonate-4O-mUs]/i2FG*/i2FU*/i2FG//i2FU/mC/i2FA/mAmU/i2FU/mAmAmG/i2FC/mAmGmGmUmGmA*mG*mG | 692 |

|     |                                                                                                                                |     |                                                                                                 |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------|-----|
|     | GalNAc]mGmGmCmUmGmC                                                                                                            |     |                                                                                                 |     |
| 151 | mC*mAmCmCmUmGmC/i2FU//i2FU//i2FA//i2FA/mUmUmGmAmCmAmCmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 693 | [MePhosphonate-4O-mUs]/i2FG*/i2FG*/i2FU//i2FG/mU/i2FC/mAmA/i2FU/mUmAmA/i2FG/mCmAmGmGmUmG*mG*mG  | 694 |
| 152 | mA*mCmCmUmGmCmU/i2FU//i2FA//i2FA//i2FU/mUmGmAmCmA mCmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 695 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FG//i2FU/mG/i2FU/mCmA/i2FA/mUmUmA/i2FA/mGmCmA mGmGmU*mG*mG | 696 |
| 153 | mC*mCmUmGmCmUmU/i2FA//i2FA//i2FU//i2FU/mGmAmCmAmCmCmAmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 697 | [MePhosphonate-4O-mUs]/i2FU*/i2FU*/i2FG//i2FG/mU/i2FG/mUmC/i2FA/mAmUmU/i2FA/mAmGmCmAmGmG*mG*mG  | 698 |
| 154 | mC*mUmGmCmUmUmA/i2FA//i2FU//i2FU//i2FG/mAmCmAmCmCmAmAmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC  | 699 | [MePhosphonate-4O-mUs]/i2FG*/i2FU*/i2FU//i2FG/mG/i2FU/mGmU/i2FC/mAmAmU/i2FU/mAmAmGmCmAmG*mG*mG  | 700 |
| 155 | mU*mGmCmUmUmAmA/i2FU//i2FU//i2FG//i2FA/mCmAmCmCmA mAmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 701 | [MePhosphonate-4O-mUs]/i2FA*/i2FG*/i2FU//i2FU/mG/i2FG/mUmG/i2FU/mCmAmA/i2FU/mUmAmA mGmCmA*mG*mG | 702 |
| 156 | mG*mCmUmUmAmAmU/i2FU//i2FG//i2FA//i                                                                                            | 703 | [MePhosphonate-4O-mUs]/i2FA*/i2FA*/i2FG//i                                                      | 704 |

|     |                                                                                                                                                               |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
|     | 2FC/mAmCmCmAmA<br>mCmUmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                                              |     | 2FU/mU/i2FG/mGmU/i2FG/<br>mUmCmA/i2FA/mUmUmA<br>mAmGmC*mG*mG                                                   |     |
| 157 | mC*mUmUmAmAmU<br>mU/i2FG//i2FA//i2FC//i<br>2FA/mCmCmAmAmC<br>mUmUmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 705 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FA/*i2FA//i<br>2FG/mU/i2FU/mGmG/i2FU/<br>mGmUmC/i2FA/mAmUmU<br>mAmAmG*mG*mG | 706 |
| 158 | mU*mUmAmAmUmU<br>mG/i2FA//i2FC//i2FA//i<br>2FC/mCmAmAmCmU<br>mUmUmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 707 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FA/*i2FA//i<br>2FA/mG/i2FU/mUmG/i2FG/<br>mUmGmU/i2FC/mAmAmU<br>mUmAmA*mG*mG | 708 |
| 159 | mU*mAmAmUmUmG<br>mA/i2FC//i2FA//i2FC//i<br>2FC/mAmAmCmUmU<br>mUmUmCmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 709 | [MePhosphonate-4O-<br>mUs]/i2FG/*i2FA/*i2FA//i<br>2FA/mA/i2FG/mUmU/i2FG/<br>mGmUmG/i2FU/mCmAmA<br>mUmUmA*mG*mG | 710 |
| 160 | mA*mUmUmGmA<br>mG/i2FG//i2FG//i2FG//i<br>2FU/mGmCmUmGmU<br>mGmCmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC   | 711 | [MePhosphonate-4O-<br>mUs]/i2FA/*i2FG/*i2FC//i<br>2FA/mC/i2FA/mGmC/i2FA/<br>mCmCmC/i2FC/mUmUmC<br>mAmAmU*mG*mG | 712 |
| 161 | mC*mUmUmGmGmA<br>mC/i2FA//i2FA//i2FA//i<br>2FA/mGmGmAmUmU<br>mGmUmGmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-                                              | 713 | [MePhosphonate-4O-<br>mUs]/i2FC/*i2FA/*i2FC//i<br>2FA/mA/i2FU/mCmC/i2FU/<br>mUmUmU/i2FG/mUmCmC<br>mAmAmG*mG*mG | 714 |

|     |                                                                                                                                          |     |                                                                                                        |     |
|-----|------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                                        |     |                                                                                                        |     |
| 162 | mU*mUmGmGmAmCmA/i2FA//i2FA//i2FA//i2FG/mGmAmUmUmGmUmGmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC            | 715 | [MePhosphonate-4O-mUs]/i2FC/*i2FC/*i2FA//i2FC/mA/i2FA/mUmC/i2FC/mUmUmU/i2FU/mGmUmCmCmA* <i>mG*mG</i>   | 716 |
| 163 | mU*mCmA*AmCmGmG/i2FU//i2FU//i2FC//i2FC/mCmUmUmGmA mUmUmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC           | 717 | [MePhosphonate-4O-mUs]/i2FA/*i2FA/*i2FA//i2FU/mC/i2FA/mAmG/i2FG/mGmA/i2FC/mCmGmUmUmGmA* <i>mG*mG</i>   | 718 |
| 164 | mC*mAmAmCmGmGmU/i2FU//i2FC//i2FC//i2FC/mUmUmGmA mUmUmCmA*AmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC           | 719 | [MePhosphonate-4O-mUs]/i2FG/*i2FA/*i2FA//i2FA/mU/i2FC/mAmA/i2FG/mGmA/i2FA/mCmCmGmUmUmG* <i>mG*mG</i>   | 720 |
| 165 | mA*mAmCmGmGmUmU/i2FC//i2FC//i2FC//i2FU/mUmGmA mUmUmUmUmUmUmUmUmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 721 | [MePhosphonate-4O-mUs]/i2FA/*i2FG/*i2FA//i2FA/mA/i2FU/mCmA/i2FA/mGmGmG/i2FA/mAmCmCmGmUmU* <i>mG*mG</i> | 722 |
| 166 | mA*mCmGmGmUmUmC/i2FC//i2FC//i2FU//i2FU/mGmA mUmUmUmUmUmUmUmUmCmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC   | 723 | [MePhosphonate-4O-mUs]/i2FA/*i2FA/*i2FG//i2FA/mA/i2FA/mUmC/i2FA/mAmGmG/i2FG/mAmAmCmCmGmU* <i>mG*mG</i> | 724 |

|     |                                                                                                                                                               |     |                                                                                                                |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|-----|
| 167 | mG*mUmAmCmAmU<br>mU/i2FG//i2FA//i2FC//i<br>2FC/mAmGmAmCmC<br>mAmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 725 | [MePhosphonate-4O-<br>mUs]/i2FC*/i2FA*/i2FU//i<br>2FG/mG/i2FU/mCmU/i2FG/<br>mGmUmC/i2FA/mAmUmG<br>mUmAmC*mG*mG | 726 |
| 168 | mA*mCmCmUmGmU<br>mA/i2FC//i2FC//i2FA//i<br>2FC/mCmUmCmCmU<br>mGmUmGmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 727 | [MePhosphonate-4O-<br>mUs]/i2FC*/i2FA*/i2FC//i<br>2FA/mG/i2FG/mAmG/i2FG/<br>mUmGmG/i2FU/mAmCmA<br>mGmGmU*mG*mG | 728 |
| 169 | mC*mCmUmGmUmA<br>mC/i2FC//i2FA//i2FC//i<br>2FC/mUmCmCmUmG<br>mUmGmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 729 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FC*/i2FA//i<br>2FC/mA/i2FG/mGmA/i2FG/<br>mGmUmG/i2FG/mUmAmC<br>mAmGmG*mG*mG | 730 |
| 170 | mG*mUmAmCmCmA<br>mC/i2FC//i2FU//i2FC//i<br>2FC/mUmGmUmGmU<br>mCmAmUmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 731 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FU*/i2FG//i<br>2FA/mC/i2FA/mCmA/i2FG/<br>mGmAmG/i2FG/mUmGmG<br>mUmAmC*mG*mG | 732 |
| 171 | mG*mCmAmCmAmG<br>mG/i2FC//i2FA//i2FU//i<br>2FC/mAmAmGmUmU<br>mCmUmAmAmGmCm<br>AmGmCmCmG[ademA<br>-GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 733 | [MePhosphonate-4O-<br>mUs]/i2FU*/i2FA*/i2FG//i<br>2FA/mA/i2FC/mUmU/i2FG/<br>mAmUmG/i2FC/mCmUmG<br>mUmGmC*mG*mG | 734 |
| 172 | mA*mCmAmGmGmC<br>mA/i2FU//i2FC//i2FA//i<br>2FA/mGmUmUmCmU<br>mAmCmUmAmGmCm                                                                                    | 735 | [MePhosphonate-4O-<br>mUs]/i2FA*/i2FG*/i2FU//i<br>2FA/mG/i2FA/mAmC/i2FU/                                       | 736 |

|     |                                                                                                                                           |     |                                                                                                    |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------|-----|
|     | AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                           |     | mUmGmA/i2FU/mGmCmCmUmGmU*mG*mG                                                                     |     |
| 173 | mC*mAmGmGmCmA<br>mU/i2FC//i2FA//i2FA//i2FG/mUmUmCmUmA<br>mCmUmCmAmGmCm<br>AmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 737 | [MePhosphonate-4O-mUs]/i2FG*/i2FA*/i2FG//i2FU/mA/i2FG/mAmA/i2FC/mUmUmG/i2FA/mUmGmCmCmUmG*mG*mG     | 738 |
| 174 | mA*mGmGmCmAmUmC/i2FA//i2FA//i2FG//i2FU/mUmCmUmAmCmUmCmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC             | 739 | [MePhosphonate-4O-mUs]/i2FG*/i2FG*/i2FA//i2FG/mU/i2FA/mGmA/i2FA/mCmUmU/i2FG/mAmUmGmCmCmU*mG*mG     | 740 |
| 175 | mG*mGmCmAmUmCmA/i2FA//i2FG//i2FU//i2FU/mCmUmAmCmUmCmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC             | 741 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FG//i2FA/mG/i2FU/mAmG/i2FA/mAmCmU/i2FU/mGmAmUmGmCmC*mG*mG     | 742 |
| 176 | mG*mCmAmUmCmA<br>mA/i2FG//i2FU//i2FU//i2FC/mUmAmCmUmCmCmAmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC         | 743 | [MePhosphonate-4O-mUs]/i2FA*/i2FU*/i2FG//i2FG/mA/i2FG/mUmA/i2FG/mAmAmC/i2FU/mUmGmA<br>mUmGmC*mG*mG | 744 |
| 177 | mC*mAmUmCmAmA<br>mG/i2FU//i2FU//i2FC//i2FU/mAmCmUmCmCmAmUmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]                     | 745 | [MePhosphonate-4O-mUs]/i2FA*/i2FA*/i2FU//i2FG/mG/i2FA/mGmU/i2FA/mGmAmA/i2FC/mUmUmGmAmUmG*mG*mG     | 746 |

|     |                                                                                                                                   |     |                                                                                                   |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------|-----|
|     | GalNAc]mGmGmCmUmGmC                                                                                                               |     |                                                                                                   |     |
| 178 | mA*mUmCmAmAmGmU/i2FU//i2FC//i2FU//i2FA/mCmUmCmCmA<br>mUmUmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 747 | [MePhosphonate-4O-mUs]/i2FG*/i2FA*/i2FA/i2FU/mG/i2FG/mAmG/i2FU/mAmGmA/i2FA/mCmUmUmGmAmU*mG*mG     | 748 |
| 179 | mU*mCmAmAmGmUmU/i2FC//i2FU//i2FA//i2FC/mUmCmCmAmUmUmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 749 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FA/i2FA/mU/i2FG/mGmA/i2FG/mUmAmG/i2FA/mAmCmUmUmGmA*mG*mG     | 750 |
| 180 | mC*mAmAmGmUmUmC/i2FU//i2FA//i2FC//i2FU/mCmCmAmUmUmCmAmGmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 751 | [MePhosphonate-4O-mUs]/i2FC*/i2FU*/i2FG/i2FA/mA/i2FU/mGmG/i2FA/mGmUmA/i2FG/mAmAmCmUmUmG*mG*mG     | 752 |
| 181 | mA*mAmGmUmUmCmU/i2FA//i2FC//i2FU//i2FC/mCmAmUmUmCmAmGmCmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC     | 753 | [MePhosphonate-4O-mUs]/i2FG*/i2FC*/i2FU//i2FG/mA/i2FA/mUmG/i2FG/mAmGmU/i2FA/mGmAmAmCmUmUmU*mG*mG  | 754 |
| 182 | mA*mGmUmUmCmUmA/i2FC//i2FU//i2FC//i2FC/mAmUmUmCmA<br>mGmCmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 755 | [MePhosphonate-4O-mUs]/i2FU*/i2FG*/i2FC/i2FU/mG/i2FA/mAmU/i2FG/mGmAmG/i2FU/mAmGmA<br>mAmCmU*mG*mG | 756 |
| 183 | mG*mUmUmCmUmAmC/i2FU//i2FC//i2FC//i                                                                                               | 757 | [MePhosphonate-4O-mUs]/i2FC*/i2FU*/i2FG//i                                                        | 758 |

|     |                                                                                                                                                               |     |                                                                                                                  |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------|-----|
|     | 2FA/mUmUmCmAmG<br>mCmAmGmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC                                                              |     | 2FC/mU/i2FG/mAmA/i2FU/<br>mGmGmA/i2FG/mUmAmG<br>mAmAmC*mG*mG                                                     |     |
| 184 | mG*mUmGmUmCmA<br>mU/i2FC//i2FU//i2FC//i<br>2FA/mGmAmCmAmA<br>mCmCmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 759 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FG/*/i2FG//i<br>2FU/mU/i2FG/mUmC/i2FU/<br>mGmAmG/i2FA/mUmGmA<br>mCmAmC*mG*mG | 760 |
| 185 | mC*mAmUmCmUmC<br>mA/i2FG//i2FA//i2FC//i<br>2FA/mAmCmCmUmG<br>mCmUmGmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 761 | [MePhosphonate-4O-<br>mUs]/i2FC/*/i2FA/*/i2FG//i<br>2FC/mA/i2FG/mGmU/i2FU/<br>mGmUmC/i2FU/mGmAmG<br>mAmUmG*mG*mG | 762 |
| 186 | mU*mCmAmGmAmC<br>mA/i2FA//i2FC//i2FC//i<br>2FU/mGmCmUmGmG<br>mUmGmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 763 | [MePhosphonate-4O-<br>mUs]/i2FU/*/i2FC/*/i2FA//i<br>2FC/mC/i2FA/mGmC/i2FA/<br>mGmGmU/i2FU/mGmUmC<br>mUmGmA*mG*mG | 764 |
| 187 | mC*mGmGmGmGmA<br>mC/i2FC//i2FU//i2FG//i<br>2FU/mUmAmCmAmG<br>mAmCmAmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-<br>GalNAc][ademA-<br>GalNAc]mGmGmCmU<br>mGmC | 765 | [MePhosphonate-4O-<br>mUs]/i2FU/*/i2FG/*/i2FU//i<br>2FC/mU/i2FG/mUmA/i2FA/<br>mCmAmG/i2FG/mUmCmC<br>mCmCmG*mG*mG | 766 |
| 188 | mG*mAmCmAmAmC<br>mG/i2FC//i2FU//i2FG//i<br>2FC/mCmAmUmUmG<br>mUmCmUmAmGmCm<br>AmGmCmCmG[ademA-<br>GalNAc][ademA-                                              | 767 | [MePhosphonate-4O-<br>mUs]/i2FA/*/i2FG/*/i2FA//i<br>2FC/mA/i2FA/mUmG/i2FG/<br>mCmAmG/i2FC/mGmUmU<br>mGmUmC*mG*mG | 768 |

|     |                                                                                                                               |     |                                                                                                |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------|-----|
|     | GalNAc][ademA-GalNAc]mGmGmCmUmGmC                                                                                             |     |                                                                                                |     |
| 189 | mG*mCmUmGmCmCmU/i2FC//i2FC//i2FU//i2FG/mAmCmUmGmUmAmAmUmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 769 | [MePhosphonate-4O-mUs]/i2FA*/i2FU*/i2FU//i2FA/mC/i2FA/mGmU/i2FC/mAmGmG/i2FA/mGmGmCmAmGmC*mG*mG | 770 |
| 190 | mC*mUmGmCmCmUmC/i2FC//i2FU//i2FG//i2FA/mCmUmGmUmAmAmUmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 771 | [MePhosphonate-4O-mUs]/i2FU*/i2FA*/i2FU//i2FU/mA/i2FC/mAmG/i2FU/mCmAmG/i2FG/mAmGmGmCmAmG*mG*mG | 772 |
| 191 | mU*mAmAmUmAmUmU/i2FA//i2FA//i2FA//i2FC/mUmUmUmUmUmAmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC   | 773 | [MePhosphonate-4O-mUs]/i2FU*/i2FU*/i2FA//i2FA/mA/i2FA/mAmA/i2FG/mUmUmU/i2FA/mAmUmAmUmUmA*mG*mG | 774 |
| 192 | mA*mAmUmAmUmUmA/i2FA//i2FA//i2FC//i2FU/mUmUmUmUmUmAmAmAmAmGmCmAmGmCmCmG[ademA-GalNAc][ademA-GalNAc][ademA-GalNAc]mGmGmCmUmGmC | 775 | [MePhosphonate-4O-mUs]/i2FU*/i2FU*/i2FU//i2FA/mA/i2FA/mAmA/i2FA/mGmUmU/i2FU/mAmAmUmAmUmU*mG*mG | 776 |

[00283] SEQ ID NO: 777 – Target Sequence 1

ACATCATCTTGTTCCTA

[00284] SEQ ID NO: 778 – Target Sequence 2

TCTTGTTCCTACATCTA

[00285] SEQ ID NO:779 – Target Sequence 3

CTTCAGATGCTGTTTTTCA

[00286] SEQ ID NO:780 – Target Sequence 4

CGCTCTTCAGCTATTACAA

[00287] SEQ ID NO:781 – Target Sequence 5

CTTAATTGACACCAACTTT

[00288] SEQ ID NO:782 – Target Sequence 6

TCAACGGTTCCCTTGATTT

[00289] SEQ ID NO:783 – Target Sequence 7

CATCAAGTTCTACTCCATT

[00290] SEQ ID NO:784 – Artificial Sequence

GCAGCCGAAAGGCUGC

[00291] SEQ ID NOs:785-1168 –SCAP Oligonucleotides

| SCAP Oligo | Sense Strand (passenger; 19-mer) | SEQ ID NO: | Antisense Strand (guide; 19-mer) | SEQ ID NO: |
|------------|----------------------------------|------------|----------------------------------|------------|
| 1          | UGUUUGCCUACAUCUACUU              | 785        | AAGUAGAUGUAGGCAAACA              | 786        |
| 2          | GUUUGCCUACAUCUACUUC              | 787        | GAAGUAGAUGUAGGCAAC               | 788        |
| 3          | UUUGCCUACAUCUACUUCU              | 789        | AGAAGUAGAUGUAGGCAAA              | 790        |
| 4          | GCCUACAUCUACUUCUCCA              | 791        | UGGAGAAGUAGAUGUAGGC              | 792        |
| 5          | AAGAU CGACAUGGUCAAGU             | 793        | ACUUGACCAUGUCGAUCUU              | 794        |
| 6          | AGAUCGACAUGGUC AAGUC             | 795        | GACUUGACCAUGUCGAUCU              | 796        |
| 7          | AUCGACAUGGUCAA GUCCA             | 797        | UGGACUUGACCAUGUCGAU              | 798        |
| 8          | GUGUUGGUGCUCAC CAAGU             | 799        | ACUUGGUGAGCACCAACAC              | 800        |
| 9          | UGUUGGUGCUCACC AAGUC             | 801        | GACUUGGUGAGCACCAACA              | 802        |

|    |                          |     |                         |     |
|----|--------------------------|-----|-------------------------|-----|
| 10 | GAGAGCUGGUCCAUC<br>CAUGA | 803 | UCAUGAUGGACCAGCU<br>CUC | 804 |
| 11 | AGAGCUGGUCCAUC<br>AUGAA  | 805 | UUCAUGAUGGACCAGC<br>UCU | 806 |
| 12 | GAGCUGGUCCAUCA<br>UGAAG  | 807 | CUUCAUGAUGGACCAG<br>CUC | 808 |
| 13 | AGCUGGUCCAUCAU<br>GAAGA  | 809 | UCUUCAUGAUGGACCA<br>GCU | 810 |
| 14 | GCUGGUCCAUCAUG<br>AAGAA  | 811 | UUCUUCAUGAUGGACC<br>AGC | 812 |
| 15 | CUGGUCCAUCAUGA<br>AGAAC  | 813 | GUUCUUCAUGAUGGAC<br>CAG | 814 |
| 16 | CCGUUGUCUGGAUU<br>GGCAU  | 815 | AUGCCAAUCCAGACAA<br>CGG | 816 |
| 17 | UUGUCUGGAUUGGC<br>AUCCU  | 817 | AGGAUGCCAAUCCAGA<br>CAA | 818 |
| 18 | UGUCUGGAUUGGCA<br>UCCUG  | 819 | CAGGAUGCCAAUCCAG<br>ACA | 820 |
| 19 | GUCUGGAUUGGCAU<br>CCUGG  | 821 | CCAGGAUGCCAAUCCA<br>GAC | 822 |
| 20 | CUGGAUUGGCAUCC<br>UGGUA  | 823 | UACCAGGAUGCCAAUC<br>CAG | 824 |
| 21 | UGGAUUGGCAUCCU<br>GGUAU  | 825 | AUACCAGGAUGCCAAU<br>CCA | 826 |
| 22 | GGAUUGGCAUCCUG<br>GUAUA  | 827 | UAUACCAGGAUGCCAA<br>UCC | 828 |
| 23 | GAUUGGCAUCCUGG<br>UAUAC  | 829 | GUAUACCAGGAUGCCA<br>AUC | 830 |
| 24 | AUUGGCAUCCUGGU<br>AUACA  | 831 | UGUAUACCAGGAUGCC<br>AAU | 832 |
| 25 | CUCCAUCUUCCAC<br>CUGAU   | 833 | AUCAGGUGGGAAGAUG<br>GAG | 834 |
| 26 | CAUCUGCCUGUGGG<br>AUGUA  | 835 | UACAUCCACAGGCAG<br>AUG  | 836 |
| 27 | UCUGCCUGUGGGAU<br>GUACU  | 837 | AGUACAUCCACAGGC<br>AGA  | 838 |
| 28 | GUGGUGCAAGCUUG<br>GGUGU  | 839 | ACACCCAAGCUUGCACC<br>AC | 840 |
| 29 | UGGUGCAAGCUUGG<br>GUGUC  | 841 | GACACCCAAGCUUGCA<br>CCA | 842 |
| 30 | GGUGCAAGCUUGGG<br>UGUCA  | 843 | UGACACCCAAGCUUGC<br>ACC | 844 |
| 31 | GUGCAAGCUUGGGU<br>GUCAU  | 845 | AUGACACCCAAGCUUG<br>CAC | 846 |
| 32 | GCAAGCUUGGGUGU<br>CAUCU  | 847 | AGAUGACACCCAAGCU<br>UGC | 848 |
| 33 | CAAGCUUGGGUGUC<br>AUCUC  | 849 | GAGAUGACACCCAAGC<br>UUG | 850 |

|    |                         |     |                          |     |
|----|-------------------------|-----|--------------------------|-----|
| 34 | AAGCUUGGGUGUCA<br>UCUCA | 851 | UGAGAUGACACCCAAG<br>CUU  | 852 |
| 35 | AGCUUGGGUGUCAU<br>CUCAG | 853 | CUGAGAUGACACCCAA<br>GCU  | 854 |
| 36 | GCUUGGGUGUCAUC<br>UCAGA | 855 | UCUGAGAUGACACCCA<br>AGC  | 856 |
| 37 | GUGUCUCCUUUUGG<br>GACCU | 857 | AGGUCCCCAAAAGGAGA<br>CAC | 858 |
| 38 | UGUCUCCUUUUGGG<br>ACCUA | 859 | UAGGUCCCCAAAAGGAG<br>ACA | 860 |
| 39 | GGGGACCUGUUACA<br>GACAG | 861 | CUGUCUGUAACAGGUC<br>CCC  | 862 |
| 40 | GGGACCUGUUACAG<br>ACAGU | 863 | ACUGUCUGUAACAGGU<br>CCC  | 864 |
| 41 | GGACCUGUUACAGA<br>CAGUC | 865 | GACUGUCUGUAACAGG<br>UCC  | 866 |
| 42 | GACCUGUUACAGAC<br>AGUCU | 867 | AGACUGUCUGUAACAG<br>GUC  | 868 |
| 43 | ACCUGUUACAGACA<br>GUCUA | 869 | UAGACUGUCUGUAACA<br>GGU  | 870 |
| 44 | UGCCAUUGUCUGCA<br>ACUUU | 871 | AAAGUUGCAGACAAUG<br>GCA  | 872 |
| 45 | GCCAUUGUCUGCAA<br>CUUUG | 873 | CAAAGUUGCAGACAAU<br>GGC  | 874 |
| 46 | CCAUUGUCUGCAAC<br>UUUGG | 875 | CCAAAGUUGCAGACAA<br>UGG  | 876 |
| 47 | AUUGUCUGCAACUU<br>UGGCA | 877 | UGCCAAAGUUGCAGAC<br>AAU  | 878 |
| 48 | UCUGCAACUUUGGC<br>AGUGA | 879 | UCACUGCCAAAGUUGC<br>AGA  | 880 |
| 49 | CUACCCACUGCUGA<br>AACUC | 881 | GAGUUUCAGCAGUGGG<br>UAG  | 882 |
| 50 | GCCAGGAACAGGAC<br>CUGUG | 883 | CACAGGUCCUGUCCU<br>GGC   | 884 |
| 51 | GAACAGGACCUGUG<br>GAAUU | 885 | AAUUCCACAGGUCCUG<br>UUC  | 886 |
| 52 | ACAGGACCUGUGGA<br>AUUCA | 887 | UGAAUUCCACAGGUCC<br>UGU  | 888 |
| 53 | UGGAAUUCACCACC<br>CCUGU | 889 | ACAGGGGUGGUGAAUU<br>CCA  | 890 |
| 54 | CUUGUGACCACCUA<br>CAUCA | 891 | UGAUGUAGGUGGUCAC<br>AAG  | 892 |
| 55 | UUGUGACCACCUAC<br>AUCAU | 893 | AUGAUGUAGGUGGUCA<br>CAA  | 894 |
| 56 | UGUGACCACCUACA<br>UCAUC | 895 | GAUGAUGUAGGUGGUC<br>ACA  | 896 |
| 57 | GUGACCACCUACAU<br>CAUCU | 897 | AGAUGAUGUAGGUGGU<br>CAC  | 898 |

|    |                         |     |                         |     |
|----|-------------------------|-----|-------------------------|-----|
| 58 | UGACCACCUACAUC<br>AUCUU | 899 | AAGAUGAUGUAGGUGG<br>UCA | 900 |
| 59 | GACCACCUACAUCA<br>UCUUG | 901 | CAAGAUGAUGUAGGUG<br>GUC | 902 |
| 60 | ACCACCUACAUCAU<br>CUUGU | 903 | ACAAGAUGAUGUAGGU<br>GGU | 904 |
| 61 | CCACCUACAUCAUC<br>UUGUU | 905 | AACAAGAUGAUGUAGG<br>UGG | 906 |
| 62 | CACCUACAUCAUCU<br>UGUUU | 907 | AAACAAGAUGAUGUAG<br>GUG | 908 |
| 63 | ACCUACAUCAUCUU<br>GUUUG | 909 | CAAACAAGAUGAUGUA<br>GGU | 910 |
| 64 | CCUACAUCAUCUUG<br>UUUGC | 911 | GCAAACAAGAUGAUGU<br>AGG | 912 |
| 65 | CUACAUCAUCUUGU<br>UUGCC | 913 | GGCAAACAAGAUGAUG<br>UAG | 914 |
| 66 | ACAUCAUCUUGUUU<br>GCCUA | 915 | UAGGCAAACAAGAUGA<br>UGU | 916 |
| 67 | AUCAUCUUGUUUGC<br>CUACA | 917 | UGUAGGCAAACAAGAU<br>GAU | 918 |
| 68 | UCAUCUUGUUUGCC<br>UACAU | 919 | AUGUAGGCAAACAAGA<br>UGA | 920 |
| 69 | AUCUUGUUUGCCUA<br>CAUCU | 921 | AGAUGUAGGCAAACAA<br>GAU | 922 |
| 70 | UCUUGUUUGCCUAC<br>AUCUA | 923 | UAGAUGUAGGCAAACA<br>AGA | 924 |
| 71 | UUUCCCCUACCUUG<br>UGGUG | 925 | CACCACAAGGUAGGGG<br>AAA | 926 |
| 72 | UUCCCCUACCUUGU<br>GGUGG | 927 | CCACCACAAGGUAGGG<br>GAA | 928 |
| 73 | CCCUACCUUGUGGU<br>GGUUA | 929 | UAACCACCACAAGGUA<br>GGG | 930 |
| 74 | CUACCUUGUGGUGG<br>UUAUU | 931 | AAUAACCACCACAAGG<br>UAG | 932 |
| 75 | UACCUUGUGGUGGU<br>UAUUG | 933 | CAAUAACCACCACAAG<br>GUA | 934 |
| 76 | ACCUUGUGGUGGUU<br>AUUGG | 935 | CCAAUAACCACCACAA<br>GGU | 936 |
| 77 | CCUUGUGGUGGUUA<br>UUGGG | 937 | CCCAUAACCACCACAA<br>GG  | 938 |
| 78 | CUUGUGGUGGUUA<br>UUGGGU | 939 | ACCCAUAACCACCACA<br>AG  | 940 |
| 79 | UUGUGGUGGUUAU<br>UGGGUU | 941 | AACCCAUAACCACCAC<br>AA  | 942 |
| 80 | UGUGGUGGUUAUU<br>GGGUUA | 943 | UAACCCAUAACCACC<br>ACA  | 944 |
| 81 | GUGGUGGUUAUUG<br>GGUUAG | 945 | CUAACCCAUAACCACC<br>AC  | 946 |

|     |                         |     |                         |     |
|-----|-------------------------|-----|-------------------------|-----|
| 82  | UGGUGGUUAUUGG<br>GUUAGA | 947 | UCUAACCCAAUAACCA<br>CCA | 948 |
| 83  | GGUGGUUAUUGGG<br>UUAGAG | 949 | CUCUAACCCAAUAACC<br>ACC | 950 |
| 84  | GUGGUUAUUGGGU<br>UAGAGA | 951 | UCUCUAACCCAAUAAC<br>CAC | 952 |
| 85  | UGGUUAUUGGGUU<br>AGAGAA | 953 | UUCUCUAACCCAAUAA<br>CCA | 954 |
| 86  | GGUUAUUGGGUUA<br>GAGAAU | 955 | AUUCUCUAACCCAAUA<br>ACC | 956 |
| 87  | GUUAUUGGGUUAG<br>AGAAUG | 957 | CAUUCUCUAACCCAAU<br>AAC | 958 |
| 88  | UUAUUGGGUUAGA<br>GAAUGU | 959 | ACAUUCUCUAACCCAA<br>UAA | 960 |
| 89  | AUUGGGUUAGAGA<br>AUGUGU | 961 | ACACAUUCUCUAACCC<br>AAU | 962 |
| 90  | UUGGGUUAGAGAA<br>UGUGUU | 963 | AACACAUUCUCUAACC<br>CAA | 964 |
| 91  | GGUUAGAGAAUGU<br>GUUGGU | 965 | ACCAACACAUUCUCUA<br>ACC | 966 |
| 92  | GUUAGAGAAUGUG<br>UUGGUG | 967 | CACCAACACAUUCUCU<br>AAC | 968 |
| 93  | UUAGAGAAUGUGU<br>UGGUGC | 969 | GCACCAACACAUUCUC<br>UAA | 970 |
| 94  | UAGAGAAUGUGUU<br>GGUGCU | 971 | AGCACCAACACAUUCU<br>CUA | 972 |
| 95  | AGAGAAUGUGUUG<br>GUGCUC | 973 | GAGCACCAACACAUUC<br>UCU | 974 |
| 96  | GAGAAUGUGUUGG<br>UGCUCU | 975 | UGAGCACCAACACAUU<br>CUC | 976 |
| 97  | AGAAUGUGUUGGU<br>GCUCAC | 977 | GUGAGCACCAACACAU<br>UCU | 978 |
| 98  | AAUGUGUUGGUGC<br>UCACCA | 979 | UGGUGAGCACCAACAC<br>AUU | 980 |
| 99  | AUGUGUUGGUGCUC<br>ACCAA | 981 | UUGGUGAGCACCAACA<br>CAU | 982 |
| 100 | UGUGUUGGUGCUCU<br>CCAAG | 983 | CUUGGUGAGCACCAAC<br>ACA | 984 |
| 101 | UGGUCCAUCAUGAA<br>GAACA | 985 | UGUUCUUCAUGAUGGA<br>CCA | 986 |
| 102 | GGUCCAUCAUGAAG<br>AACAU | 987 | AUGUUCUUCAUGAUGG<br>ACC | 988 |
| 103 | CUGACUUCUCCUU<br>CAGAU  | 989 | AUCUGAAGGAAGAAGU<br>CAG | 990 |
| 104 | ACUUCUCCUUCAG<br>AUGCU  | 991 | AGCAUCUGAAGGAAGA<br>AGU | 992 |
| 105 | UCCUUCAGAUGCUG<br>UUUUU | 993 | AAAAACAGCAUCUGAA<br>GGA | 994 |

|     |                          |      |                         |      |
|-----|--------------------------|------|-------------------------|------|
| 106 | CCUUCAGAUGCUGU<br>UUUUC  | 995  | GAAAAACAGCAUCUGA<br>AGG | 996  |
| 107 | CUUCAGAUGCUGUU<br>UUUCA  | 997  | UGAAAAACAGCAUCUG<br>AAG | 998  |
| 108 | UUCAGAUGCUGUUU<br>UUCAC  | 999  | GUGAAAAACAGCAUCU<br>GAA | 1000 |
| 109 | CAGAUGCUGUUUUU<br>CACCA  | 1001 | UGGUGAAAAACAGCAU<br>CUG | 1002 |
| 110 | AGAUGCUGUUUUUC<br>ACCAC  | 1003 | GUGGUGAAAAACAGCA<br>UCU | 1004 |
| 111 | GAUGCUGUUUUUCA<br>CCACU  | 1005 | AGUGGUGAAAAACAGC<br>AUC | 1006 |
| 112 | AUGCUGUUUUUCAC<br>CACUG  | 1007 | CAGUGGUGAAAAACAG<br>CAU | 1008 |
| 113 | UGCUGUUUUUCACC<br>ACUGU  | 1009 | ACAGUGGUGAAAAACA<br>GCA | 1010 |
| 114 | GCUGUUUUUCACCA<br>CUGUC  | 1011 | GACAGUGGUGAAAAAC<br>AGC | 1012 |
| 115 | UGUUUUUCACCACU<br>GUCCU  | 1013 | AGGACAGUGGUGAAAA<br>ACA | 1014 |
| 116 | GUUUUUUCACCACUG<br>UCCUG | 1015 | CAGGACAGUGGUGAAA<br>AAC | 1016 |
| 117 | UUUUUCACCACUGU<br>CCUGU  | 1017 | ACAGGACAGUGGUGAA<br>AAA | 1018 |
| 118 | UUUUUCACCACUGUC<br>CUGUC | 1019 | GACAGGACAGUGGUGA<br>AAA | 1020 |
| 119 | UUCACCACUGUCCU<br>GUCCA  | 1021 | UGGACAGGACAGUGGU<br>GAA | 1022 |
| 120 | CACCACUGUCCUGU<br>CCAUU  | 1023 | AAUGGACAGGACAGUG<br>GUG | 1024 |
| 121 | ACCACUGUCCUGUC<br>CAUUG  | 1025 | CAAUGGACAGGACAGU<br>GGU | 1026 |
| 122 | CCACUGUCCUGUCC<br>AUUGA  | 1027 | UCAAUGGACAGGACAG<br>UGG | 1028 |
| 123 | CACUGUCCUGUCCA<br>UUGAC  | 1029 | GUCAAUGGACAGGACA<br>GUG | 1030 |
| 124 | ACUGUCCUGUCCAU<br>UGACA  | 1031 | UGUCAUGGACAGGAC<br>AGU  | 1032 |
| 125 | CUAAGCUACCUGAG<br>AACCA  | 1033 | UGGUUCUCAGGUAGCU<br>UAG | 1034 |
| 126 | GAGGUCCAGCAGAG<br>GUUGU  | 1035 | ACAACCUCUGCUGGAC<br>CUC | 1036 |
| 127 | GCAGAGGUUGUCCA<br>UGACA  | 1037 | UGUCAUGGACAACCUC<br>UGC | 1038 |
| 128 | CAGAGGUUGUCCAU<br>GACAG  | 1039 | CUGUCAUGGACAACCU<br>CUG | 1040 |
| 129 | GAGGAUGAGGAAC<br>UUUGGA  | 1041 | UCCAAAGUCCUCAUC<br>CUC  | 1042 |

|     |                         |      |                         |      |
|-----|-------------------------|------|-------------------------|------|
| 130 | GAACUUUGGAGGA<br>AAUUGU | 1043 | ACAAUUUCCUCCAAAG<br>UUC | 1044 |
| 131 | GACGCUCUUCAGCU<br>AUUAC | 1045 | GUAAUAGCUGAAGAGC<br>GUC | 1046 |
| 132 | ACGCUCUUCAGCUA<br>UUACA | 1047 | UGUAAUAGCUGAAGAG<br>CGU | 1048 |
| 133 | CGCUCUUCAGCUAU<br>UACAA | 1049 | UUGUAAUAGCUGAAGA<br>GCG | 1050 |
| 134 | GCUCUUCAGCUAUU<br>ACAAC | 1051 | GUUGUAAUAGCUGAAG<br>AGC | 1052 |
| 135 | CUCUUCAGCUAUUA<br>CAACA | 1053 | UGUUGUAAUAGCUGAA<br>GAG | 1054 |
| 136 | UCUUCAGCUAUUAC<br>AACAU | 1055 | AUGUUGUAAUAGCUGA<br>AGA | 1056 |
| 137 | CUUCAGCUAUUACA<br>ACAUC | 1057 | GAUGUUGUAAUAGCUG<br>AAG | 1058 |
| 138 | UUCAGCUAUUACAA<br>CAUCA | 1059 | UGAUGUUGUAAUAGCU<br>GAA | 1060 |
| 139 | CCAGCCUGACCUCA<br>CCUGC | 1061 | GCAGGUGAGGUCAGGC<br>UGG | 1062 |
| 140 | CAGCCUGACCUCAC<br>CUGCU | 1063 | AGCAGGUGAGGUCAGG<br>CUG | 1064 |
| 141 | AGCCUGACCUCACC<br>UGCUU | 1065 | AAGCAGGUGAGGUCAG<br>GCU | 1066 |
| 142 | GCCUGACCUCACCU<br>GCUUA | 1067 | UAAGCAGGUGAGGUCA<br>GGC | 1068 |
| 143 | CCUGACCUCACCUG<br>CUUAA | 1069 | UUAAGCAGGUGAGGUC<br>AGG | 1070 |
| 144 | CUGACCUCACCUGC<br>UUAAU | 1071 | AUUAAGCAGGUGAGGU<br>CAG | 1072 |
| 145 | UGACCUCACCUGCU<br>UAAUU | 1073 | AAUUAAGCAGGUGAGG<br>UCA | 1074 |
| 146 | GACCUCACCUGCUU<br>AAUUG | 1075 | CAAUUAAGCAGGUGAG<br>GUC | 1076 |
| 147 | ACCUCACCUGCUUA<br>AUUGA | 1077 | UCAAUUAAGCAGGUGA<br>GGU | 1078 |
| 148 | CCUCACCUGCUUAA<br>UUGAC | 1079 | GUCAAUUAAGCAGGUG<br>AGG | 1080 |
| 149 | CUCACCUGCUUAAU<br>UGACA | 1081 | UGCAAUUAAGCAGGU<br>GAG  | 1082 |
| 150 | UCACCUGCUUAAUU<br>GACAC | 1083 | GUGUCAAUUAAGCAGG<br>UGA | 1084 |
| 151 | CACCUGCUUAAUUG<br>ACACC | 1085 | GGUGUCAAUUAAGCAG<br>GUG | 1086 |
| 152 | ACCUGCUUAAUUGA<br>CACCA | 1087 | UGGUGUCAAUUAAGCA<br>GGU | 1088 |
| 153 | CCUGCUUAAUUGAC<br>ACCAA | 1089 | UUGGUGUCAAUUAAGC<br>AGG | 1090 |

|     |                         |      |                          |      |
|-----|-------------------------|------|--------------------------|------|
| 154 | CUGCUUAAUUGACA<br>CCAAC | 1091 | GUUGGUGUCAAUUAAAG<br>CAG | 1092 |
| 155 | UGCUUAAUUGACAC<br>CAACU | 1093 | AGUUGGUGUCAAUUAA<br>GCA  | 1094 |
| 156 | GCUUAAUUGACACC<br>AACUU | 1095 | AAGUUGGUGUCAAUUA<br>AGC  | 1096 |
| 157 | CUUAAUUGACACCA<br>ACUUU | 1097 | AAAGUUGGUGUCAAUU<br>AAG  | 1098 |
| 158 | UUAUUGACACCAA<br>CUUUU  | 1099 | AAAAGUUGGUGUCAAU<br>UAA  | 1100 |
| 159 | UAAUUGACACCAAC<br>UUUUC | 1101 | GAAAAGUUGGUGUCA<br>UUA   | 1102 |
| 160 | AUUGAAGGGGUGC<br>UGUGCU | 1103 | AGCACAGCACCCCUUCA<br>AU  | 1104 |
| 161 | CUUGGACAAAAGGA<br>UUGUG | 1105 | CACAAUCCUUUUGUCC<br>AAG  | 1106 |
| 162 | UUGGACAAAAGGA<br>UUGUGG | 1107 | CCACAAUCCUUUUGUC<br>CAA  | 1108 |
| 163 | UCAACGGUUCCCUU<br>GAUUU | 1109 | AAAUCAAGGGAACCGU<br>UGA  | 1110 |
| 164 | CAACGGUUCCCUUG<br>AUUUC | 1111 | GAAAUCAAGGGAACCG<br>UUG  | 1112 |
| 165 | AACGGUUCCCUUGA<br>UUUCU | 1113 | AGAAAUCAAGGGAACC<br>GUU  | 1114 |
| 166 | ACGGUUCCCUUGAU<br>UUCUU | 1115 | AAGAAAUCAAGGGAAC<br>CGU  | 1116 |
| 167 | GUACAUUGACCAGA<br>CCAUG | 1117 | CAUGGUCUGGUCAAUG<br>UAC  | 1118 |
| 168 | ACCUGUACCACCUC<br>CUGUG | 1119 | CACAGGAGGUGGUACA<br>GGU  | 1120 |
| 169 | CCUGUACCACCUC<br>UGUGU  | 1121 | ACACAGGAGGUGGUAC<br>AGG  | 1122 |
| 170 | GUACCACCUCUGU<br>GUCAU  | 1123 | AUGACACAGGAGGUGG<br>UAC  | 1124 |
| 171 | GCACAGGCAUCAAG<br>UUCUA | 1125 | UAGAACUUGAUGCCUG<br>UGC  | 1126 |
| 172 | ACAGGCAUCAAGUU<br>CUACU | 1127 | AGUAGAACUUGAUGCC<br>UGU  | 1128 |
| 173 | CAGGCAUCAAGUUC<br>UACUC | 1129 | GAGUAGAACUUGAUGC<br>CUG  | 1130 |
| 174 | AGGCAUCAAGUUCU<br>ACUCC | 1131 | GGAGUAGAACUUGAUG<br>CCU  | 1132 |
| 175 | GGCAUCAAGUUCUA<br>CUCCA | 1133 | UGGAGUAGAACUUGAU<br>GCC  | 1134 |
| 176 | GCAUCAAGUUCUAC<br>UCCAU | 1135 | AUGGAGUAGAACUUGA<br>UGC  | 1136 |
| 177 | CAUCAAGUUCUACU<br>CCAUA | 1137 | AAUGGAGUAGAACUUG<br>AUG  | 1138 |

|     |                         |      |                          |      |
|-----|-------------------------|------|--------------------------|------|
| 178 | AUCAAGUUCUACUC<br>CAUUC | 1139 | GAAUGGAGUAGAACUU<br>GAU  | 1140 |
| 179 | UCAAGUUCUACUCC<br>AUUCA | 1141 | UGAAUGGAGUAGAACU<br>UGA  | 1142 |
| 180 | CAAGUUCUACUCCA<br>UUCAG | 1143 | CUGAAUGGAGUAGAAC<br>UUG  | 1144 |
| 181 | AAGUUCUACUCCAU<br>UCAGC | 1145 | GCUGAAUGGAGUAGAA<br>CUU  | 1146 |
| 182 | AGUUCUACUCCAUU<br>CAGCA | 1147 | UGCUGAAUGGAGUAGA<br>ACU  | 1148 |
| 183 | GUUCUACUCCAUUC<br>AGCAG | 1149 | CUGCUGAAUGGAGUAG<br>AAC  | 1150 |
| 184 | GUGUCAUCUCAGAC<br>AACCU | 1151 | AGGUUGUCUGAGAUGA<br>CAC  | 1152 |
| 185 | CAUCUCAGACAACC<br>UGCUG | 1153 | CAGCAGGUUGUCUGAG<br>AUG  | 1154 |
| 186 | UCAGACAACCUGCU<br>GGUGA | 1155 | UCACCAGCAGGUUGUC<br>UGA  | 1156 |
| 187 | CGGGGACCUGUUAC<br>AGACA | 1157 | UGUCUGUAAACAGGUCC<br>CCG | 1158 |
| 188 | GACAACGCUGCCAU<br>UGUCU | 1159 | AGACAAUGGCAGCGUU<br>GUC  | 1160 |
| 189 | GCUGCCUCCUGACU<br>GUAAU | 1161 | AUUACAGUCAGGAGGC<br>AGC  | 1162 |
| 190 | CUGCCUCCUGACUG<br>UAAUA | 1163 | UAUUACAGUCAGGAGG<br>CAG  | 1164 |
| 191 | UAAUAUUAACUU<br>UUUUA   | 1165 | UUAAAAAAGUUUAAUA<br>UUA  | 1166 |
| 192 | AAUAUUAACUUU<br>UUUAAA  | 1167 | UUUAAAAAAGUUUAAU<br>AUU  | 1168 |

## CLAIMS

The invention claimed is:

1. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein the antisense strand comprises a region of complementarity to a *SCAP* mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.
2. The RNAi oligonucleotide of Claim 1, wherein the sense strand is 15 to 50 nucleotides in length.
3. The RNAi oligonucleotide of Claims 1 or 2, wherein the sense strand is 18 to 36 nucleotides in length.
4. The RNAi oligonucleotide of any one of Claims 1 to 3, wherein the antisense strand is 15 to 30 nucleotides in length.
5. The RNAi oligonucleotide of any one of Claims 1 to 4, wherein the antisense strand is 22 nucleotides in length, and where in the antisense strand and the sense strand form a duplex region of at least 19 nucleotides in length, optionally at least 20 nucleotides in length.
6. The RNAi oligonucleotide of any one of Claims 1 to 5, wherein the region of complementarity is at least 19 contiguous nucleotides in length, optionally at least 20 nucleotides in length.
7. The RNAi oligonucleotide of any one of Claims 1 to 6, wherein the 3' end of the sense strand comprises a stem-loop set forth as S1-L-S2, wherein S1 is complementary to S2, and wherein L forms a loop between S1 and S2 of 3 to 5 nucleotides in length.
8. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense

strand of 15 to 50 nucleotides in length and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.

9. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 15 to 50 nucleotides in length and an antisense strand of 15 to 30 nucleotides in length, wherein the sense strand and the antisense strand form a duplex region, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.

10. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 15 to 50 nucleotides in length and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein the antisense strand comprises a region of complementarity to an SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is 19 contiguous nucleotides in length, optionally 20 nucleotides in length.

11. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 18 to 36 nucleotides in length and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is 19 contiguous nucleotides in length, optionally 20 nucleotides in length.

12. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 18 to 36 nucleotides in length and an antisense strand of 22 nucleotides in length, wherein the sense strand and the antisense strand form a duplex region, wherein the antisense

strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is 19 contiguous nucleotides in length, optionally 20 nucleotides in length.

13. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 18 to 36 nucleotides in length and an antisense strand of 22 nucleotides in length, wherein the sense strand and the antisense strand form a duplex region, wherein the 3' end of the sense strand comprises a stem-loop set forth as S1-L-S2, wherein S1 is complementary to S2, wherein L forms a loop between S1 and S2 of 3 to 5 nucleotides in length, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is 19 contiguous nucleotides in length, optionally 20 nucleotides in length.

14. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 36 nucleotides in length and an antisense strand of 22 nucleotides in length, wherein the sense strand and the antisense strand form a duplex region, wherein the 3' end of the sense strand comprises a stem-loop set forth as S1-L-S2, wherein S1 is complementary to S2, wherein L forms a loop between S1 and S2 of 3 to 5 nucleotides in length, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is 19 contiguous nucleotides in length, optionally 20 nucleotides in length.

15. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand of 36 nucleotides in length and an antisense strand of 22 nucleotides in length, wherein the sense strand and the antisense strand form a duplex region of at least 19 nucleotides in length, optionally 20 nucleotides in length, wherein the 3' end of the sense strand comprises a stem-loop set forth as S1-L-S2, wherein S1 is complementary to S2, wherein L forms a loop between S1 and S2 of 3 to 5 nucleotides in length, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777

to 783, and wherein the region of complementarity is 19 contiguous nucleotides in length, optionally 20 nucleotides in length.

16. The RNAi oligonucleotide of any one of Claims 7 and 13 to 15, wherein L is a triloop or a tetraloop.

17. The RNAi oligonucleotide of Claim 16, wherein L is a tetraloop.

18. The RNAi oligonucleotide of Claim 17, wherein the tetraloop comprises a sequence of 5'-GAAA-3'.

19. The RNAi oligonucleotide of any one of Claims 13 to 18, wherein S1 and S2 are 1-10 nucleotides in length and have the same length.

20. The RNAi oligonucleotide of Claim 19, wherein S1 and S2 are 1 nucleotide, 2 nucleotides, 3 nucleotides, 4 nucleotides, 5 nucleotides, 6 nucleotides, 7 nucleotides, 8 nucleotides, 9 nucleotides, or 10 nucleotides in length.

21. The RNAi oligonucleotide of Claim 20, wherein S1 and S2 are 6 nucleotides in length.

22. The RNAi oligonucleotide of any one of Claims 13 to 21, wherein the stem-loop comprises the sequence 5'-GCAGCCGAAAGGCUGC-3' (SEQ ID NO: 784).

23. The RNAi oligonucleotide of any one of Claims 1 to 22, wherein the antisense strand comprises a 3' overhang sequence of 1 or more nucleotides in length.

24. The RNAi oligonucleotide of Claim 23, wherein the 3' overhang sequence is 2 nucleotides in length, and optionally wherein the 3' overhang sequence is GG.

25. The RNAi oligonucleotide of any one of the preceding claims comprising at least 1 modified nucleotide.

26. The RNAi oligonucleotide of any one of Claims 13 to 25, wherein all nucleotides of the oligonucleotide are modified except the nucleotides in the loop of the stem-loop.
27. The RNAi oligonucleotide of Claim 25 or 26, wherein the modified nucleotide comprises a 2'-modification.
28. The RNAi oligonucleotide of Claim 27, wherein the 2'-modification is a modification selected from the group consisting of 2'-aminoethyl, 2'-fluoro, 2'-O-methyl, 2'-O-methoxyethyl, and 2'-deoxy-2'-fluoro- $\beta$ -D-arabinonucleic acid.
29. The RNAi oligonucleotide of any one of Claims 25 to 28, wherein all nucleotides comprising the RNAi oligonucleotide are modified, and optionally wherein the modification is a 2'-modification selected from the group consisting of 2'-fluoro and 2'-O-methyl.
30. The RNAi oligonucleotide of Claim 29, wherein one or more nucleotides at positions 8, 9, 10, or 11 of the sense strand are modified with 2'-fluoro.
31. The RNAi oligonucleotide of Claim 29 or 30, wherein one or more nucleotides at positions 2, 3, 4, 5, 7, 10, or 14 of the antisense strand are modified with 2'-fluoro.
32. The RNAi oligonucleotide of any one of Claims 29 to 31, wherein one or more nucleotides at positions 1, 2, 3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 35, or 36 of the sense strand are modified with 2'-O-methyl.
33. The RNAi oligonucleotide of any one of Claims 29 to 32, wherein one or more nucleotides at positions 1, 6, 8, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, or 22 of the antisense strand are modified with 2'-O-methyl.
34. The RNAi oligonucleotide of any one of the preceding claims comprising at least one modified internucleotide linkage.
35. The RNAi oligonucleotide of Claim 34, wherein the at least one modified internucleotide linkage is a phosphorothioate linkage.

36. The RNAi oligonucleotide of Claim 35, wherein the internucleotide linkage of nucleotides at positions 1 and 2 of the sense strand are modified with the phosphorothioate linkage.
37. The RNAi oligonucleotide of Claim 35 or 36, wherein the internucleotide linkage of one or more nucleotides at positions 1 and 2, 2 and 3, 3 and 4, 20 and 21, or 21 and 22 of the antisense strand are modified with the phosphorothioate linkage.
38. The RNAi oligonucleotide of any one of Claims 1 to 24, wherein the RNAi oligonucleotide has a modification pattern as shown in FIG. 1.
39. The RNAi oligonucleotide of any one of the preceding claims, wherein the 4'-carbon of the sugar of the 5'-nucleotide of the antisense strand comprises a phosphate analog.
40. The RNAi oligonucleotide of Claim 39, wherein the phosphate analog is oxymethylphosphonate, vinyl phosphonate or malonylphosphonate, and optionally wherein the phosphate analog is a 4'-phosphate analog comprising 5'-methoxyphosphonate-4'-oxy.
41. The RNAi oligonucleotide of any one of the preceding claims, wherein at least one nucleotide of the oligonucleotide is conjugated to one or more targeting ligands.
42. The RNAi oligonucleotide of Claim 41, wherein each targeting ligand comprises a carbohydrate, amino sugar, cholesterol, polypeptide, or lipid.
43. The RNAi oligonucleotide of Claim 42, wherein each targeting ligand comprises a N-acetylgalactosamine (GalNAc) moiety.
44. The RNAi oligonucleotide of Claim 43, wherein the GalNAc moiety is a monovalent GalNAc moiety, a bivalent GalNAc moiety, a trivalent GalNAc moiety, or a tetravalent GalNAc moiety.

45. The RNAi oligonucleotide of any one of Claims 16 to 40, wherein up to 4 nucleotides of L of the stem-loop are each conjugated to a monovalent GalNAc moiety.
46. The RNAi oligonucleotide of any one of the preceding claims, wherein the sense strand comprises a nucleotide sequence of any one of the odd numbers of SEQ ID NOs: 9 to 392.
47. The RNAi oligonucleotide of any one of the preceding claims, wherein the antisense strand comprises a nucleotide sequence of any one of the even numbers of SEQ ID NOs: 9 to 392.
48. The RNAi oligonucleotide of any one of the preceding claims, wherein the sense strand and the antisense strands comprise nucleotide sequences selected from the group consisting of:
- (a) SEQ ID NOs: 139 and 140, respectively;
  - (b) SEQ ID NOs: 147 and 148, respectively;
  - (c) SEQ ID NOs: 221 and 222, respectively;
  - (d) SEQ ID NOs: 273 and 274, respectively;
  - (e) SEQ ID NOs: 321 and 322, respectively;
  - (f) SEQ ID NOs: 333 and 334, respectively; and
  - (g) SEQ ID NOs: 361 and 362 respectively.
49. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 139 and wherein the antisense strand comprises SEQ ID NO: 140.
50. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 147 and wherein the antisense strand comprises SEQ ID NO: 148.
51. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 221 and wherein the antisense strand comprises SEQ ID NO: 222.
52. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 273 and wherein the antisense strand comprises SEQ ID NO: 274.

53. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 321 and wherein the antisense strand comprises SEQ ID NO: 322.
54. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 333 and wherein the antisense strand comprises SEQ ID NO: 334.
55. The RNAi oligonucleotide of Claim 48, wherein the sense strand comprises SEQ ID NO: 361 and wherein the antisense strand comprises SEQ ID NO: 362.
56. The RNAi oligonucleotide of Claim 48, wherein the sense strand and the antisense strands comprise nucleotide sequences selected from the group consisting of:
- (a') SEQ ID NOs: 523 and 524, respectively;
  - (b') SEQ ID NOs: 531 and 532, respectively;
  - (c') SEQ ID NOs: 605 and 606, respectively;
  - (d') SEQ ID NOs: 657 and 658, respectively;
  - (e') SEQ ID NOs: 705 and 706, respectively;
  - (f') SEQ ID NOs: 717 and 718, respectively; and
  - (g') SEQ ID NOs: 745 and 746 respectively.
57. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 523 and the antisense strand is SEQ ID NO: 524.
58. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 531 and the antisense strand is SEQ ID NO: 532.
59. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 605 and the antisense strand is SEQ ID NO: 606.
60. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 657 and the antisense strand is SEQ ID NO: 658.
61. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 705 and the antisense strand is SEQ ID NO: 706.

62. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 717 and the antisense strand is SEQ ID NO: 718.

63. The RNAi oligonucleotide of Claim 56, wherein the sense strand is SEQ ID NO: 745 and the antisense strand is SEQ ID NO: 746.

64. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein all nucleotides comprising the sense strand and antisense strand are modified, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.

65. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein all nucleotides comprising the sense strand and antisense strand are modified, wherein the 4'-carbon of the sugar of the 5'-nucleotide of the antisense strand comprises a phosphate analog, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.

66. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein all nucleotides comprising the sense strand and antisense strand are modified, wherein the 4'-carbon of the sugar of the 5'-nucleotide of the antisense strand comprises a phosphate analog, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 19 contiguous nucleotides in length.

67. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand form a duplex region, wherein all nucleotides comprising the sense strand and the antisense strand are modified, wherein the antisense strand and the sense strand comprise 1 or more 2'-fluoro and 2'-O-methyl modified nucleotides and at least one phosphorothioate linkage, wherein the 4'-carbon of the sugar of the 5'-nucleotide of the antisense strand comprises a phosphate analog, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.

68. The RNAi oligonucleotide of any one of Claims 64 to 67, wherein the sense strand comprises of any one of SEQ ID NOs: 139, 147, 221, 273, 321, 333 and 361; or wherein the sense strand comprises of any one of SEQ ID NOs: 523, 531, 605, 657, 705, 717 and 745.

69. The RNAi oligonucleotide of any one of Claims 64 to 68, wherein the antisense strand comprises of any one of SEQ ID NOs: 140, 148, 222, 274, 322, 334 and 362; or wherein the antisense strand comprises of any one of SEQ ID NOs: 524, 532, 606, 658, 706, 718 and 746.

70. The RNAi oligonucleotide of any one of Claims 64 to 67, wherein the sense strand and antisense strands are selected from the group consisting of:

- (a) SEQ ID NOs:139 and 140, respectively;
- (b) SEQ ID NOs:147 and 148, respectively;
- (c) SEQ ID NOs:221 and 222, respectively;
- (d) SEQ ID NOs:273 and 274, respectively;
- (e) SEQ ID NOs:321 and 322, respectively;
- (f) SEQ ID NOs:333 and 334, respectively; and
- (g) SEQ ID NOs:361 and 362 respectively; or
- (a') SEQ ID NOs:523 and 524, respectively;
- (b') SEQ ID NOs:531 and 532, respectively;
- (c') SEQ ID NOs:605 and 606, respectively;
- (d') SEQ ID NOs:657 and 658, respectively;
- (e') SEQ ID NOs:705 and 706, respectively;

- (f) SEQ ID NOs:717 and 718, respectively; and
- (g') SEQ ID NOs:745 and 746 respectively.

71. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO: 139 and the antisense strand comprises SEQ ID NO: 140.

72. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO: 147 and the antisense strand comprises SEQ ID NO: 148.

73. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO: 221 and the antisense strand comprises SEQ ID NO: 222.

74. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO: 273 and the antisense strand comprises SEQ ID NO: 274.

75. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO: 321 and the antisense strand comprises SEQ ID NO: 322.

76. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO: 333 and the antisense strand comprises SEQ ID NO: 334.

77. The RNAi oligonucleotide of Claim 70, wherein the sense strand comprises SEQ ID NO:361 and the antisense strand comprises SEQ ID NO:362.

78. The RNAi oligonucleotide of any one of Claims 71 to 77, wherein at least one nucleotide of the oligonucleotide is conjugated to one or more targeting ligands.

79. The RNAi oligonucleotide of Claim 78, wherein each targeting ligand is a carbohydrate, amino sugar, cholesterol, polypeptide, or lipid.

80. The RNAi oligonucleotide of Claim 79, wherein each targeting ligand comprises a N-acetylgalactosamine (GalNAc) moiety.

81. The RNAi oligonucleotide of Claim 80, wherein the GalNAc moiety is a monovalent GalNAc moiety, a bivalent GalNAc moiety, a trivalent GalNAc moiety, or a tetravalent GalNAc moiety.

82. The RNAi oligonucleotide of Claim 81, wherein a sequence of 5'-GCAGCCGAAAGGCUGC-3' (SEQ ID NO: 784) in the sense strand forms a stem-loop structure, and wherein the AAA nucleotides in a sequence of 5'-GAAA-3' in the loop are each conjugated to a monovalent GalNAc moiety.

83. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 523 and the antisense strand is SEQ ID NO: 524.

84. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 531 and the antisense strand is SEQ ID NO: 532.

85. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 605 and the antisense strand is SEQ ID NO: 606.

86. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 657 and the antisense strand is SEQ ID NO: 658.

87. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 705 and the antisense strand is SEQ ID NO: 706.

88. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 717 and the antisense strand is SEQ ID NO: 718.

89. The RNAi oligonucleotide of Claim 70, wherein the sense strand is SEQ ID NO: 745 and the antisense strand is SEQ ID NO: 746.

90. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand form a duplex

region, and wherein the sense strand and the antisense strand consist of sequences selected from the group consisting of:

- (a') SEQ ID NOs:523 and 524, respectively;
- (b') SEQ ID NOs:531 and 532, respectively;
- (c') SEQ ID NOs: 605 and 606, respectively;
- (d') SEQ ID NOs: 657 and 658, respectively;
- (e') SEQ ID NOs: 705 and 706, respectively;
- (f') SEQ ID NOs:717 and 718, respectively; and
- (g') SEQ ID NOs: 745 and 746 respectively.

91. The RNAi oligonucleotide of Claim 90, wherein a sequence of 5'-GCAGCCGAAAGGCUGC-3' (SEQ ID NO: 784) in the sense strand forms a stem-loop structure, and wherein the AAA nucleotides in a sequence of 5'-GAAA-3' in the loop are each conjugated to a monovalent GalNAc moiety.

92. A pharmaceutical composition comprising:  
the RNAi oligonucleotide of any one of Claims 1 to 91, or a pharmaceutically acceptable salt thereof; and  
a pharmaceutically acceptable carrier, delivery agent or excipient.

93. A method of delivering an oligonucleotide to an individual, the method comprising the step of:  
administering the pharmaceutical composition of Claim 92 to the individual.

94. A method of treating an individual having a disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the method comprising the step of:  
administering to the individual a therapeutically effective amount of the RNAi oligonucleotide of any one of Claims 1 to 91, or the pharmaceutical composition of Claim 92, thereby treating the individual.

95. A method of reducing sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity in a cell, a population of cells or an individual, the method comprising the step of:

contacting the cell or the population of cells with the RNAi oligonucleotide of any one of Claims 1 to 91 or the pharmaceutical composition of Claim 92; or

administering to the individual the RNAi oligonucleotide of any one of Claims 1 to 91 or the pharmaceutical composition of Claim 92.

96. The method of Claim 95, wherein reducing *SCAP* activity comprises reducing an amount or level of *SCAP* mRNA, an amount or level of *SCAP* protein, *SCAP* activity or a combination thereof.

97. The method of Claim 94 or 95, wherein the individual has a disease, disorder, or condition associated with *SCAP* activity.

98. The method of Claim 97, wherein the disease, disorder or condition associated with *SCAP* activity is acute coronary diseases (ACD), atherosclerotic cardiovascular disease (ASCVD), alcoholic hepatitis (AH), alcoholic liver disease (ALD), cardiometabolic disease, cholangiocarcinoma (CCA), cirrhosis, coronary heart diseases (CHD), diabetes, hepatic fibrosis, hepatic inflammation, hepatocellular carcinoma (HCC), hyperlipidemia, hypertriglyceridemia, high non-HDL cholesterol, insulin resistance, liver steatosis, metabolic syndromes (MetS), non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), obesity, or primary sclerosing cholangitis (PSC).

99. The method of any one of Claims 94 to 98, wherein the RNAi oligonucleotide or the pharmaceutical composition is administered in combination with a second composition or therapeutic agent.

100. A method of treating an individual having a disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the method comprising the step of:

administering to the individual a therapeutically effective amount of a RNAi oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand

and the antisense strand form a duplex region, wherein the antisense strand comprises a region of complementarity to a SCAP mRNA target sequence of any one of SEQ ID NOs: 777 to 783, and wherein the region of complementarity is at least 15 contiguous nucleotides in length.

101. A method of treating an individual having a disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the method comprising the step of:

administering to the individual a therapeutically effective amount of a RNAi oligonucleotide comprising a sense strand and an antisense strand selected from a row set forth in Table 3 or Table 4, or a pharmaceutical composition thereof.

102. A method of treating an individual having a disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the method comprising the step of:

administering to the individual a therapeutically effective amount of a RNAi oligonucleotide comprising a sense strand and an antisense strand, wherein the sense strand and the antisense strand comprise nucleotide sequences selected from the group consisting of:

- (a) SEQ ID NOs: 139 and 140, respectively;
- (b) SEQ ID NOs: 147 and 148, respectively;
- (c) SEQ ID NOs: 221 and 222, respectively;
- (d) SEQ ID NOs: 273 and 274, respectively;
- (e) SEQ ID NOs: 321 and 322, respectively;
- (f) SEQ ID NOs: 333 and 334, respectively; and
- (g) SEQ ID NOs: 361 and 362 respectively; or
- (a') SEQ ID NOs: 523 and 524, respectively;
- (b') SEQ ID NOs: 531 and 532, respectively;
- (c') SEQ ID NOs: 605 and 606, respectively;
- (d') SEQ ID NOs: 657 and 658, respectively;
- (e') SEQ ID NOs: 705 and 706, respectively;
- (f) SEQ ID NOs: 717 and 718, respectively; and
- (g') SEQ ID NOs: 745 and 746 respectively.

103. The method of Claim 102, wherein the sense strand is SEQ ID NO: 523 and the antisense strand is SEQ ID NO: 524.

104. The method of Claim 102, wherein the sense strand is SEQ ID NO: 531 and the antisense strand is SEQ ID NO: 532.

105. The method of Claim 102, wherein the sense strand is SEQ ID NO: 605 and the antisense strand is SEQ ID NO: 606.

106. The method of Claim 102, wherein the sense strand is SEQ ID NO: 657 and the antisense strand is SEQ ID NO: 658.

107. The method of Claim 102, wherein the sense strand is SEQ ID NO: 705 and the antisense strand is SEQ ID NO: 706.

108. The method of Claim 105, wherein the sense strand is SEQ ID NO: 717 and the antisense strand is SEQ ID NO: 718.

109. The method of Claim 75, wherein the sense strand is SEQ ID NO: 745 and the antisense strand is SEQ ID NO: 746.

110. The method of any one of Claims 100 to 109, wherein the disease, disorder or condition associated with *SCAP* activity is selected from the group consisting of acute coronary diseases (ACD), atherosclerotic cardiovascular disease (ASCVD), alcoholic hepatitis (AH), alcoholic liver disease (ALD), cardiometabolic disease, cholangiocarcinoma (CCA), cirrhosis, coronary heart diseases (CHD), diabetes, hepatic fibrosis, hepatic inflammation, hepatocellular carcinoma (HCC), hyperlipidemia, hypertriglyceridemia, high non-HDL cholesterol, insulin resistance, liver steatosis, metabolic syndromes (MetS), non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), obesity, or primary sclerosing cholangitis (PSC).

111. Use of the RNAi oligonucleotide of any one of Claims 1 to 91, or the pharmaceutical composition of Claim 92, in the manufacture of a medicament for the treatment of a disease,

disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, optionally for the treatment of acute coronary diseases (ACD), atherosclerotic cardiovascular disease (ASCVD), alcoholic hepatitis (AH), alcoholic liver disease (ALD), cardiometabolic disease, cholangiocarcinoma (CCA), cirrhosis, coronary heart diseases (CHD), diabetes, hepatic fibrosis, hepatic inflammation, hepatocellular carcinoma (HCC), hyperlipidemia, hypertriglyceridemia, high non-HDL cholesterol, insulin resistance, liver steatosis, metabolic syndromes (MetS), non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), obesity, or primary sclerosing cholangitis (PSC).

112. The RNAi oligonucleotide of any one of Claims 1 to 91, or the pharmaceutical composition of Claim 92, for use, or adaptable for use, in the treatment of a disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, optionally for the treatment of acute coronary diseases (ACD), atherosclerotic cardiovascular disease (ASCVD), alcoholic hepatitis (AH), alcoholic liver disease (ALD), cardiometabolic disease, cholangiocarcinoma (CCA), cirrhosis, coronary heart diseases (CHD), diabetes, hepatic fibrosis, hepatic inflammation, hepatocellular carcinoma (HCC), hyperlipidemia, hypertriglyceridemia, high non-HDL cholesterol, insulin resistance, liver steatosis, metabolic syndromes (MetS), non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), obesity, or primary sclerosing cholangitis (PSC).

113. A kit comprising the RNAi oligonucleotide of any one of Claims 1 to 91, an optional pharmaceutically acceptable carrier, and a package insert comprising instructions for administration to an individual having a disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity.

114. The use of Claim 111, the RNAi oligonucleotide or pharmaceutical composition for use, or adaptable for use, of Claim 112, or the kit of Claim 113, wherein the disease, disorder, or condition associated with sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity is acute coronary diseases (ACD), atherosclerotic cardiovascular disease (ASCVD), alcoholic hepatitis (AH), alcoholic liver disease (ALD), cardiometabolic disease, cholangiocarcinoma (CCA), cirrhosis, coronary heart diseases

(CHD), diabetes, hepatic fibrosis, hepatic inflammation, hepatocellular carcinoma (HCC), hyperlipidemia, hypertriglyceridemia, high non-HDL cholesterol, insulin resistance, liver steatosis, metabolic syndromes (MetS), non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), obesity, or primary sclerosing cholangitis (PSC).

115. A RNAi oligonucleotide for modulating sterol regulatory element-binding protein (SREBP) cleavage-activating protein (*SCAP*) activity, the oligonucleotide having a sense strand and an antisense strand that are optionally modified, wherein the sense strand and the antisense strand form a duplex region, wherein the sense strand and the antisense strand are a pair selected from the group consisting of:

- (a) SEQ ID NOs: 139 and 140, respectively;
- (b) SEQ ID NOs: 147 and 148, respectively;
- (c) SEQ ID NOs: 221 and 222, respectively;
- (d) SEQ ID NOs: 273 and 274, respectively;
- (e) SEQ ID NOs: 321 and 322, respectively;
- (f) SEQ ID NOs: 333 and 334, respectively; and
- (g) SEQ ID NOs: 361 and 362, respectively,

wherein a sequence of 5'-GCAGCCGAAAGGCUGC-3' (SEQ ID NO: 784) in the sense strand forms a stem-loop structure, and wherein the AAA nucleotides in a sequence of 5'-GAAA-3' in the loop are each conjugated to a monovalent GalNAc moiety.

116. The RNAi oligonucleotide of Claim 115, wherein the sense strand and the antisense strand are optionally modified and are a pair selected from the group consisting of:

- (a') SEQ ID NOs: 523 and 524, respectively;
- (b') SEQ ID NOs: 531 and 532, respectively;
- (c') SEQ ID NOs: 605 and 606, respectively;
- (d') SEQ ID NOs: 657 and 658, respectively;
- (e') SEQ ID NOs: 705 and 706, respectively;
- (f) SEQ ID NOs: 717 and 718, respectively; and
- (g') SEQ ID NOs: 745 and 746, respectively.