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- (73) Patenthaver: **Janssen BioPharma, Inc., 260 E. Grand Ave., 2nd Floor, South San Francisco, CA 94080, USA**
- (72) Opfinder: **BEIGELMAN, Leonid, 260 E. Grand Avenue, 2nd Floor, South San Francisco, CA 94080, USA**  
**HENDRICKS, Robert Than, 260 E. Grand Avenue, 2nd Floor, South San Francisco, CA 94080, USA**  
**STOYCHEVA, Antitsa Dimitrova, 260 E. Grand Avenue, 2nd Floor, South San Francisco, CA 94080, USA**  
**DEVAL, Jerome, 260 E. Grand Avenue, 2nd Floor, South San Francisco, CA 94080, USA**  
**STEVENS, Sarah Katherine, 260 E. Grand Avenue, 2nd Floor, South San Francisco, CA 94080, USA**
- (74) Fuldmægtig i Danmark: **RWS Group, Europa House, Chiltern Park, Chiltern Hill, Chalfont St Peter, Bucks SL9  
9FG, Storbritannien**
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# DESCRIPTION

## SEQUENCE LISTING

**[0001]** The present application is being filed along with a Sequence Listing in electronic format. The Sequence Listing is provided as a file entitled ALIOS081, created September 9, 2014, which is 4 kb bytes in size.

## BACKGROUND

### Field

**[0002]** The present application relates to the fields of chemistry, biochemistry and medicine. More particularly, disclosed herein are pyridazinone compounds, pharmaceutical compositions that include one or more pyridazinone compounds, and methods of synthesizing the same. Also disclosed herein are methods of ameliorating and/or treating an orthomyxovirus viral infection with one or more pyridazinone compounds.

### Description

**[0003]** The viruses of the *Orthomyxoviridae* family are negative-sense, single-stranded RNA viruses. The *Orthomyxoviridae* family contains several genera including Influenzavirus A, Influenzavirus B, Influenzavirus C, Isavirus and Thogotovirus. Influenzaviruses can cause respiratory viral infections, including upper and lower respiratory tract viral infections. Respiratory viral infections are a leading cause of death of millions of people each year. Upper respiratory tract viral infections involve the nose, sinuses, pharynx and/or larynx. Lower respiratory tract viral infections involve the respiratory system below the vocal cords, including the trachea, primary bronchi and lungs.

## SUMMARY

**[0004]** The present invention relates to a compound of Formula (I), or a pharmaceutically acceptable salt thereof. The present invention also relates to a compound of Formula (II), or a pharmaceutically acceptable salt thereof. The present invention also relates to a pharmaceutical composition comprising an effective amount of a compound of Formula (I) or a compound of Formula (II), or a pharmaceutically acceptable salt of a compound of Formula (I) or a compound of Formula (II); and a pharmaceutically acceptable carrier, diluent, excipient, or

combination thereof. The present invention also relates to a compound of Formula (I) or a compound of Formula (II), or a pharmaceutically acceptable salt of a compound of Formula (I) or a compound of Formula (II), for use in ameliorating or treating an orthomyxovirus.

**[0005]** Also described herein are methods of ameliorating and/or treating an orthomyxovirus viral infection that can include administering to a subject suffering from the orthomyxovirus viral infection an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, or a pharmaceutical composition that includes one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing. Also described herein is using one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, in the manufacture of a medicament for ameliorating and/or treating an orthomyxovirus viral infection. Also described herein are compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, that can be used for ameliorating and/or treating an orthomyxovirus viral infection. Also described herein are methods of ameliorating and/or treating an orthomyxovirus viral infection that can include contacting a cell infected with the orthomyxovirus with an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, or a pharmaceutical composition that includes one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing. Also described herein are methods of preventing an orthomyxovirus infection that can include administering to a subject an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, or a pharmaceutical composition that includes one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing. For example, the orthomyxovirus viral infection can be an influenza viral infection (such as influenza A, B and/or C).

**[0006]** Also described herein are methods of inhibiting the replication of an orthomyxovirus that can include contacting a cell infected with the orthomyxovirus with an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, or a pharmaceutical composition that includes one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing. For example, the orthomyxovirus viral infection can be an influenza viral infection (such as influenza A, B and/or C). Also described herein is a method for inhibiting endonuclease activity of an influenza endonuclease that can include contacting the active site of the endonuclease with an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, or a pharmaceutical composition that includes one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0007]** Figure 1 shows example anti-influenza agents.

## **DETAILED DESCRIPTION**

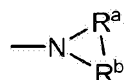
**[0008]** Influenza is a negative sense, single stranded RNA virus and a member of the *Orthomyxoviridae* family. There are currently three species of influenza; influenza A, influenza B and influenza C. Influenza A has a lipid membrane derived from the host cell, which contains the hemagglutinin, neuramidase and M2 proteins that project from the surface of the virus. Influenza A has been further classified based the hemagglutinin (H or HA) and the neuramidase (N). There are approximately 16 H antigens (H1 to H16) and 9 N antigens (N1 to N9). Influenza A includes several subtypes, including H1N1, H1N2, H2N2, H3N1, H3N2, H3N8, H5N1, H5N2, H5N3, H5N8, H5N9, H7N1, H7N2, H7N3, H7N4, H7N7, H7N9, H9N2 and H10N7. The influenza virus polymerase is a heterotrimer composed of three subunits, polymerase acid (PA), polymerase basic 1 (PB1) and polymerase basic 2 (PB2). This polymerase is responsible for replication and transcription of the viral RNA in the nuclei of infected cells. The PA subunit contains the endonuclease active site. The endonuclease activity of the PA cleaves the cellular mRNA, which is then used by the PB1 subunit as a primer for the viral mRNA synthesis.

**[0009]** Influenza viruses can be transmitted from person to person via direct contact with infected secretions and/or contaminated surfaces or objections. Complications from an influenza viral infection include pneumonia, bronchitis, dehydration, and sinus and ear infections. Medications currently approved by the FDA against an influenza infection include a limited number of neuraminidase inhibitors and M2 protein inhibitors. Examples of approved neuraminidase inhibitors and M2 protein inhibitors include amantadine, rimantadine, Relenza® (zanamivir, GlaxoSmithKline) and Tamiflu® (oseltamivir, Genentech).

### **Definitions**

**[0010]** Unless defined otherwise, all technical and scientific terms used herein have the same meaning as is commonly understood by one of ordinary skill in the art. In the event that there are a plurality of definitions for a term herein, those in this section prevail unless stated otherwise.

**[0011]** As used herein, any "R" group(s) such as, without limitation, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> represent substituents that can be attached to the indicated atom. An R group may be substituted or unsubstituted. If two "R" groups are described as being "taken together" the R groups and the atoms they are attached to can form a cycloalkyl, cycloalkenyl, aryl, heteroaryl or heterocycle. For example, without limitation, if R<sup>a</sup> and R<sup>b</sup> of an NR<sup>a</sup>R<sup>b</sup> group are indicated to be "taken together," it means that they are covalently bonded to one another to form a ring:



In addition, if two "R" groups are described as being "taken together" with the atom(s) to which they are attached to form a ring as an alternative, the R groups may not be limited to the

variables or substituents defined previously.

**[0012]** Whenever a group is described as being "optionally substituted" that group may be unsubstituted or substituted with one or more of the indicated substituents. Likewise, when a group is described as being "unsubstituted or substituted" if substituted, the substituent(s) may be selected from one or more of the indicated substituents. If no substituents are indicated, it is meant that the indicated "optionally substituted" or "substituted" group may be substituted with one or more group(s) individually and independently selected from alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aryl(alkyl), heteroaryl(alkyl), (heterocyclyl)alkyl, hydroxy, alkoxy, acyl, cyano, halogen, thiocarbonyl, O-carbamyl, N-carbamyl, O-thiocarbamyl, N-thiocarbamyl, C-amido, N-amido, S-sulfonamido, N-sulfonamido, C-carboxy, O-carboxy, isocyanato, thiocyanato, isothiocyanato, nitro, azido, silyl, sulfinyl, sulfonyl, haloalkyl, haloalkoxy, trihalomethanesulfonyl, trihalomethanesulfonamido, an amino, a mono-substituted amino group and a di-substituted amino group.

**[0013]** As used herein, "C<sub>a</sub> to C<sub>b</sub>" in which "a" and "b" are integers refer to the number of carbon atoms in an alkyl, alkenyl or alkynyl group, or the number of carbon atoms in the ring of a cycloalkyl, cycloalkenyl, aryl, heteroaryl or heterocyclyl group. That is, the alkyl, alkenyl, alkynyl, ring(s) of the cycloalkyl, ring(s) of the cycloalkenyl, ring(s) of the aryl, ring(s) of the heteroaryl or ring(s) of the heterocyclyl can contain from "a" to "b", inclusive, carbon atoms. Thus, for example, a "C<sub>1</sub> to C<sub>4</sub> alkyl" group refers to all alkyl groups having from 1 to 4 carbons, that is, CH<sub>3</sub>-, CH<sub>3</sub>CH<sub>2</sub>-, CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>-, (CH<sub>3</sub>)<sub>2</sub>CH-, CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>-, CH<sub>3</sub>CH<sub>2</sub>CH(CH<sub>3</sub>)- and (CH<sub>3</sub>)<sub>3</sub>C-. If no "a" and "b" are designated with regard to an alkyl, alkenyl, alkynyl, cycloalkyl cycloalkenyl, aryl, heteroaryl or heterocyclyl group, the broadest range described in these definitions is to be assumed.

**[0014]** As used herein, "alkyl" refers to a straight or branched hydrocarbon chain that comprises a fully saturated (no double or triple bonds) hydrocarbon group. The alkyl group may have 1 to 20 carbon atoms (whenever it appears herein, a numerical range such as "1 to 20" refers to each integer in the given range; e.g., "1 to 20 carbon atoms" means that the alkyl group may consist of 1 carbon atom, 2 carbon atoms, 3 carbon atoms, etc., up to and including 20 carbon atoms, although the present definition also covers the occurrence of the term "alkyl" where no numerical range is designated). The alkyl group may also be a medium size alkyl having 1 to 10 carbon atoms. The alkyl group could also be a lower alkyl having 1 to 6 carbon atoms. The alkyl group of the compounds may be designated as "C<sub>1</sub>-C<sub>4</sub> alkyl" or similar designations. By way of example only, "C<sub>1</sub>-C<sub>4</sub> alkyl" indicates that there are one to four carbon atoms in the alkyl chain, i.e., the alkyl chain is selected from methyl, ethyl, propyl, iso-propyl, n-butyl, iso-butyl, sec-butyl, and t-butyl. Typical alkyl groups include, but are in no way limited to, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tertiary butyl, pentyl (straight and branched) and hexyl (straight and branched). The alkyl group may be substituted or unsubstituted.

**[0015]** As used herein, "alkenyl" refers to an alkyl group that contains in the straight or branched hydrocarbon chain one or more double bonds. Examples of alkenyl groups include

allenyl, vinylmethyl and ethenyl. An alkenyl group may be unsubstituted or substituted.

**[0016]** As used herein, "alkynyl" refers to an alkyl group that contains in the straight or branched hydrocarbon chain one or more triple bonds. Examples of alkynyls include ethynyl and propynyl. An alkynyl group may be unsubstituted or substituted.

**[0017]** As used herein, "cycloalkyl" refers to a completely saturated (no double or triple bonds) mono- or multi-cyclic hydrocarbon ring system. When composed of two or more rings, the rings may be joined together in a fused fashion. Cycloalkyl groups can contain 3 to 10 atoms in the ring(s) or 3 to 8 atoms in the ring(s). A cycloalkyl group may be unsubstituted or substituted. Typical cycloalkyl groups include, but are in no way limited to, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl and cyclooctyl.

**[0018]** As used herein, "cycloalkenyl" refers to a mono- or multi-cyclic hydrocarbon ring system that contains one or more double bonds in at least one ring; although, if there is more than one, the double bonds cannot form a fully delocalized pi-electron system throughout all the rings (otherwise the group would be "aryl," as defined herein). When composed of two or more rings, the rings may be connected together in a fused fashion. A cycloalkenyl group may be unsubstituted or substituted.

**[0019]** As used herein, "aryl" refers to a carbocyclic (all carbon) mono-cyclic or multi-cyclic aromatic ring system (including fused ring systems where two carbocyclic rings share a chemical bond) that has a fully delocalized pi-electron system throughout all the rings. The number of carbon atoms in an aryl group can vary. For example, the aryl group can be a C<sub>6</sub>-C<sub>14</sub> aryl group, a C<sub>6</sub>-C<sub>10</sub> aryl group, or a C<sub>6</sub> aryl group. Examples of aryl groups include, but are not limited to, benzene, naphthalene and azulene. An aryl group may be substituted or unsubstituted.

**[0020]** As used herein, "heteroaryl" refers to a mono-cyclic or multi-cyclic aromatic ring system (a ring system with fully delocalized pi-electron system) that contain(s) one or more heteroatoms, that is, an element other than carbon, including but not limited to, nitrogen, oxygen and sulfur. The number of atoms in the ring(s) of a heteroaryl group can vary. For example, the heteroaryl group can contain 4 to 14 atoms in the ring(s), 5 to 10 atoms in the ring(s) or 5 to 6 atoms in the ring(s). Furthermore, the term "heteroaryl" includes fused ring systems where two rings, such as at least one aryl ring and at least one heteroaryl ring, or at least two heteroaryl rings, share at least one chemical bond. Examples of heteroaryl rings include, but are not limited to, furan, furazan, thiophene, benzothiophene, phthalazine, pyrrole, oxazole, benzoxazole, 1,2,3-oxadiazole, 1,2,4-oxadiazole, thiazole, 1,2,3-thiadiazole, 1,2,4-thiadiazole, benzothiazole, imidazole, benzimidazole, indole, indazole, pyrazole, benzopyrazole, isoxazole, benzoisoxazole, isothiazole, triazole, benzotriazole, thiadiazole, tetrazole, pyridine, pyridazine, pyrimidine, pyrazine, purine, pteridine, quinoline, isoquinoline, quinazoline, quinoxaline, cinnoline and triazine. A heteroaryl group may be substituted or unsubstituted.

**[0021]** As used herein, "heterocyclyl" or "heteroalicyclyl" refers to three-, four-, five-, six-, seven-, eight-, nine-, ten-, up to 18-membered mono-cyclic, bicyclic, and tricyclic ring system wherein carbon atoms together with from 1 to 5 heteroatoms constitute said ring system. A heterocycle may optionally contain one or more unsaturated bonds situated in such a way, however, that a fully delocalized pi-electron system does not occur throughout all the rings. The heteroatom(s) is an element other than carbon including, but not limited to, oxygen, sulfur, and nitrogen. A heterocycle may further contain one or more carbonyl or thiocarbonyl functionalities, so as to make the definition include oxo-systems and thio-systems such as lactams, lactones, cyclic imides, cyclic thioimides and cyclic carbamates. When composed of two or more rings, the rings may be joined together in a fused fashion. Additionally, any nitrogens in a heterocyclyl or a heteroalicyclyl may be quaternized. Heterocyclyl or heteroalicyclic groups may be unsubstituted or substituted. Examples of such "heterocyclyl" or "heteroalicyclyl" groups include but are not limited to, 1,3-dioxin, 1,3-dioxane, 1,4-dioxane, 1,2-dioxolane, 1,3-dioxolane, 1,4-dioxolane, 1,3-oxathiane, 1,4-oxathiin, 1,3-oxathiolane, 1,3-dithiole, 1,3-dithiolane, 1,4-oxathiane, tetrahydro-1,4-thiazine, 2H-1,2-oxazine, maleimide, succinimide, barbituric acid, thiobarbituric acid, dioxopiperazine, hydantoin, dihydrouracil, trioxane, hexahydro-1,3,5-triazine, imidazoline, imidazolidine, isoxazoline, isoxazolidine, oxazoline, oxazolidine, oxazolidinone, thiazoline, thiazolidine, morpholine, oxirane, piperidine *N*-Oxide, piperidine, piperazine, pyrrolidine, pyrrolidone, pyrrolidione, 4-piperidone, pyrazoline, pyrazolidine, 2-oxopyrrolidine, tetrahydropyran, 4H-pyran, tetrahydrothiopyran, thiamorpholine, thiamorpholine sulfoxide, thiamorpholine sulfone, and their benzo-fused analogs (e.g., benzimidazolidinone, tetrahydroquinoline and 3,4-methylenedioxyphenyl).

**[0022]** As used herein, the term "alkylene" refers to a straight or a branched tethering fully saturated (no double or triple bonds) hydrocarbon group that connect molecular fragments via its terminal carbon atoms. Examples include but are not limited to methylene ( $-\text{CH}_2-$ ), ethylene ( $-\text{CH}_2\text{CH}_2-$ ), propylene ( $-\text{CH}_2\text{CH}_2\text{CH}_2-$ ), and butylene ( $-(\text{CH}_2)_4-$ ) groups. A "lower alkylene group" refers to an alkylene group containing 1 to 6 carbons. A lower alkylene and alkylene group can be substituted by replacing one or more hydrogen of the lower alkylene group or alkylene group with a substituent(s) listed under the definition of "substituted."

**[0023]** As used herein, the term "alkenylene" refers to a straight or a branched tethering hydrocarbon group containing one or more double bonds that connect molecular fragments via its terminal carbon atoms. Examples include but are not limited to ethenylene ( $-\text{CH}=\text{CH}-$ ), propenylene ( $-\text{CH}=\text{CHCH}_2-$  or  $-\text{CH}_2\text{CH}=\text{CH}-$ ), and butenylene ( $-\text{CH}=\text{CHCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}=\text{CHCH}_2-$  or  $-\text{CH}_2\text{CH}_2\text{CH}=\text{CH}-$ ) groups. An alkenylene group may be substituted or unsubstituted.

**[0024]** As used herein, the term "heteroalkylene" refers to an alkylene containing one or more heteroatom groups or heteroatom containing groups in the carbon back bone (i.e., an alkylene group in which one or more carbon atoms is replaced with a heteroatom group or heteroatom containing group). In some embodiments, heteroalkyls may be substituted or unsubstituted. Heteroalkyls include, but are not limited to ether, thioether, amino-alkylene, and alkylene-



amino-alkylene moieties. Examples of heteroalkyls include, but are not limited to,  $-\text{CH}_2\text{O}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{O}-$ ,  $-\text{CH}_2\text{OCH}_2-$ ,  $-\text{CH}_2\text{OCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{OCH}_2\text{CH}_2-$ ,  $-(\text{CH}_2)_2\text{O}(\text{CH}_2)_2-$ ,  $-\text{CH}_2\text{S}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{S}-$ ,  $-\text{CH}_2\text{SCH}_2-$ ,  $-\text{CH}_2\text{SCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{SCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{SCH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{SCH}_2\text{CH}_2-$ ,  $-(\text{CH}_2)_2\text{S}(\text{CH}_2)_2-$ ,  $-\text{CH}_2\text{NH}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}-$ ,  $-\text{CH}_2\text{NHCH}_2-$ ,  $-\text{CH}_2\text{NHCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{NHCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{NHCH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{NHCH}_2\text{CH}_2-$ ,  $-(\text{CH}_2)_2\text{NH}(\text{CH}_2)_2-$ , and the like.

**[0025]** As used herein, the term "heteroalkenylene" refers to an alkenylene containing one or more heteroatoms in the carbon back bone (i.e., an alkenylene group in which one or more fully saturated carbon atoms (i.e.  $\text{CH}_2$ ) is replaced with a heteroatom group or a heteroatom containing group). In some embodiments, heteroalkenyls may be substituted or unsubstituted. Examples of heteroalkenyls include, but are not limited to,  $-\text{CH}=\text{CHCH}_2\text{OCH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{OCH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{OCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}=\text{CHCH}_2\text{O}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}=\text{CHCH}_2\text{O}-$ ,  $-(\text{CH}_2)_2\text{CH}=\text{CH}(\text{CH}_2)_2\text{O}-$ ,  $-\text{CH}=\text{CHCH}_2\text{S}-$ ,  $-\text{CH}=\text{CHCH}_2\text{SCH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{SCH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{CH}_2\text{SCH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{SCH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{SCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}=\text{CHCH}_2\text{S}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}=\text{CHCH}_2\text{S}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}=\text{CHCH}_2\text{S}-$ ,  $-(\text{CH}_2)_2\text{CH}=\text{CH}(\text{CH}_2)_2\text{S}-$ ,  $-\text{CH}=\text{CHCH}_2\text{NH}-$ ,  $-\text{CH}=\text{CHCH}_2\text{NHCH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{NHCH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{NHCH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CHCH}_2\text{NHCH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}=\text{CHCH}_2\text{NH}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}=\text{CHCH}_2\text{NH}-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}=\text{CHCH}_2\text{NH}-$ ,  $-(\text{CH}_2)_2\text{CH}=\text{CH}(\text{CH}_2)_2\text{NH}-$ , and the like.

**[0026]** As used herein, "aralkyl" and "aryl(alkyl)" refer to an aryl group connected, as a substituent, via a lower alkylene group. The lower alkylene and/or aryl group of an aralkyl may be substituted or unsubstituted. Examples include but are not limited to benzyl, 2-phenylalkyl, 3-phenylalkyl, and naphthylalkyl.

**[0027]** As used herein, "heteroaralkyl" and "heteroaryl(alkyl)" refer to a heteroaryl group connected, as a substituent, via a lower alkylene group. The lower alkylene and/or heteroaryl group of heteroaralkyl may be substituted or unsubstituted. Examples include but are not limited to 2-thienylalkyl, 3-thienylalkyl, furylalkyl, thienylalkyl, pyrrolylalkyl, pyridylalkyl, isoxazolylalkyl, imidazolylalkyl, and their benzo-fused analogs.

**[0028]** A "(heteroalicycyl)alkyl" and "(heterocyclyl)alkyl" refer to a heterocyclic or a heteroalicyclic group connected, as a substituent, via a lower alkylene group. The lower alkylene and/or heterocyclyl of a (heteroalicycyl)alkyl may be substituted or unsubstituted. Examples include but are not limited tetrahydro-2H-pyran-4-yl)methyl, (piperidin-4-yl)ethyl, (piperidin-4-yl)propyl, (tetrahydro-2H-thiopyran-4-yl)methyl, and (1,3-thiazinan-4-yl)methyl.

**[0029]** As used herein, "alkoxy" refers to the formula  $-\text{OR}$  wherein R is alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl is defined herein. A non-limiting list of alkoxys are methoxy, ethoxy, n-propoxy, 1-methylethoxy (isopropoxy), n-butoxy, iso-butoxy, sec-butoxy, tert-butoxy, phenoxy

and benzyloxy. An alkoxy may be substituted or unsubstituted.

**[0030]** As used herein, "acyl" refers to a hydrogen, alkyl, alkenyl, alkynyl, or aryl connected, as substituents, via a carbonyl group. Examples include formyl, acetyl, propanoyl, benzoyl and acryl. An acyl may be substituted or unsubstituted.

**[0031]** As used herein, "hydroxyalkyl" refers to an alkyl group in which one or more of the hydrogen atoms are replaced by a hydroxy group. Exemplary hydroxyalkyl groups include but are not limited to, 2-hydroxyethyl, 3-hydroxypropyl, 2-hydroxypropyl, and 2,2-dihydroxyethyl. A hydroxyalkyl may be substituted or unsubstituted.

**[0032]** As used herein, "haloalkyl" refers to an alkyl group in which one or more of the hydrogen atoms are replaced by a halogen (e.g., mono-haloalkyl, di-haloalkyl and tri-haloalkyl). Such groups include but are not limited to, chloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, 1-chloro-2-fluoromethyl and 2-fluoroisobutyl. A haloalkyl may be substituted or unsubstituted.

**[0033]** As used herein, "haloalkoxy" refers to an alkoxy group of the formula -O-alkyl in which one or more of the hydrogen atoms are replaced by a halogen (e.g., mono-haloalkoxy, di-haloalkoxy and tri-haloalkoxy). Such groups include but are not limited to, chloromethoxy, fluoromethoxy, difluoromethoxy, trifluoromethoxy, 1-chloro-2-fluoromethoxy and 2-fluoroisobutoxy. A haloalkoxy may be substituted or unsubstituted.

**[0034]** A "sulfenyl" group refers to an "-SR" group in which R can be hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. A sulfenyl may be substituted or unsubstituted.

**[0035]** A "sulfinyl" group refers to an "-S(=O)-R" group in which R can be the same as defined with respect to sulfenyl. A sulfinyl may be substituted or unsubstituted.

**[0036]** A "sulfonyl" group refers to an " $\text{SO}_2\text{R}$ " group in which R can be the same as defined with respect to sulfenyl. A sulfonyl may be substituted or unsubstituted.

**[0037]** An "O-carboxy" group refers to a " $\text{RC}(=\text{O})\text{O}-$ " group in which R can be hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl, as defined herein. An O-carboxy may be substituted or unsubstituted.

**[0038]** The terms "ester" and "C-carboxy" refer to a " $\text{-C}(=\text{O})\text{OR}$ " group in which R can be the same as defined with respect to O-carboxy. An ester and C-carboxy may be substituted or unsubstituted.

**[0039]** A "thiocarbonyl" group refers to a " $\text{-C}(=\text{S})\text{R}$ " group in which R can be the same as defined with respect to O-carboxy. A thiocarbonyl may be substituted or unsubstituted.

**[0040]** A "trihalomethanesulfonyl" group refers to an " $X_3CSO_2$ -" group wherein each X is a halogen.

**[0041]** A "trihalomethanesulfonamido" group refers to an " $X_3CS(O)_2N(R_A)$ -" group wherein each X is a halogen, and  $R_A$  hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl.

**[0042]** The term "amino" as used herein refers to a  $-NH_2$  group.

**[0043]** As used herein, the term "hydroxy" refers to a  $-OH$  group.

**[0044]** A "cyano" group refers to a  $-CN$  group.

**[0045]** The term "azido" as used herein refers to a  $-N_3$  group.

**[0046]** An "isocyanato" group refers to a  $-NCO$  group.

**[0047]** A "thiocyanato" group refers to a  $-CNS$  group.

**[0048]** An "isothiocyanato" group refers to an  $-NCS$  group.

**[0049]** A "carbonyl" group refers to a  $C=O$  group.

**[0050]** An "S-sulfonamido" group refers to a  $-SO_2N(R_AR_B)$  group in which  $R_A$  and  $R_B$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An S-sulfonamido may be substituted or unsubstituted.

**[0051]** An "N-sulfonamido" group refers to a  $RSO_2N(R_A)$  group in which R and  $R_A$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An N-sulfonamido may be substituted or unsubstituted.

**[0052]** An "O-carbamyl" group refers to a  $-OC(=O)N(R_AR_B)$  group in which  $R_A$  and  $R_B$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An O-carbamyl may be substituted or unsubstituted.

**[0053]** An "N-carbamyl" group refers to an  $ROC(=O)N(R_A)$  group in which R and  $R_A$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An N-carbamyl may be substituted or unsubstituted.

**[0054]** An "O-thiocarbamyl" group refers to a " $\text{-OC(=S)-N(R}_A\text{R}_B\text{)}$ " group in which  $R_A$  and  $R_B$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An O-thiocarbamyl may be substituted or unsubstituted.

**[0055]** An "N-thiocarbamyl" group refers to an " $\text{ROC(=S)N(R}_A\text{)-}$ " group in which R and  $R_A$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An N-thiocarbamyl may be substituted or unsubstituted.

**[0056]** A "C-amido" group refers to a " $\text{-C(=O)N(R}_A\text{R}_B\text{)}$ " group in which  $R_A$  and  $R_B$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. A C-amido may be substituted or unsubstituted.

**[0057]** An "N-amido" group refers to a " $\text{RC(=O)N(R}_A\text{)-}$ " group in which R and  $R_A$  can be independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, heteroaryl, heterocyclyl, aralkyl, (heteroaryl)alkyl or (heterocyclyl)alkyl. An N-amido may be substituted or unsubstituted.

**[0058]** The term "halogen atom" or "halogen" as used herein, means any one of the radio-stable atoms of column 7 of the Periodic Table of the Elements, such as, fluorine, chlorine, bromine and iodine.

**[0059]** Where the numbers of substituents is not specified (e.g. haloalkyl), there may be one or more substituents present. For example "haloalkyl" may include one or more of the same or different halogens. As another example, " $\text{C}_1\text{-C}_3$  alkoxyphenyl" may include one or more of the same or different alkoxy groups containing one, two or three atoms.

**[0060]** As used herein, the abbreviations for any protective groups, amino acids and other compounds, are, unless indicated otherwise, in accord with their common usage, recognized abbreviations, or the IUPAC-IUB Commission on Biochemical Nomenclature (See, Biochem. 11:942-944 (1972)).

**[0061]** The terms "protecting group" and "protecting groups" as used herein refer to any atom or group of atoms that is added to a molecule in order to prevent existing groups in the molecule from undergoing unwanted chemical reactions. Examples of protecting group moieties are described in T. W. Greene and P. G. M. Wuts, Protective Groups in Organic Synthesis, 3. Ed. John Wiley & Sons, 1999, and in J.F.W. McOmie, Protective Groups in Organic Chemistry Plenum Press, 1973. The protecting group moiety may be chosen in such a way, that they are stable to certain reaction conditions and readily removed at a convenient stage using methodology known from the art. A non-limiting list of protecting groups include benzyl; substituted benzyl; alkylcarbonyls and alkoxy carbonyls (e.g., t-butoxycarbonyl (BOC),

acetyl and isobutyryl); arylalkylcarbonyls and arylalkoxycarbonyls (e.g., benzyloxycarbonyl); substituted methyl ether (e.g. methoxymethyl ether and tetrahydropyranyl ether); substituted ethyl ether; a substituted benzyl ether; silyls (e.g., trimethylsilyl, triethylsilyl, triisopropylsilyl, t-butyltrimethylsilyl, tri-*iso*-propylsilyloxymethyl, [2-(trimethylsilyl)ethoxy]methyl and t-butyltriphenylsilyl); esters (e.g. benzoate ester); carbonates (e.g. methoxymethylcarbonate); sulfonates (e.g. tosylate and mesylate); acyclic ketal (e.g. dimethyl acetal and diisopropyl acetal); cyclic ketals (e.g., 1,3-dioxane and 1,3-dioxolane); acyclic acetal; cyclic acetal; acyclic hemiacetal; cyclic hemiacetal; dithioacetals (both cyclic and acyclic); dithioketals (both cyclic and acyclic) (e.g., S,S'-dimethyl, S,S'-diethyl, S,S'-diisopropyl, 1,3-dithiane and 1,3-dithiolane); orthoesters (including cyclic orthoesters, such as cyclic orthoformates); carbamates (e.g., N-phenylcarbamate) and triarylmethyl groups (e.g., trityl, monomethoxytrityl (MMTr), 4,4'-dimethoxytrityl (DMTr), and 4,4',4''-trimethoxytrityl (TMTr); and those described herein).

**[0062]** "Leaving group" as used herein refers to any atom or moiety that is capable of being displaced by another atom or moiety in a chemical reaction. More specifically, in some embodiments, "leaving group" refers to the atom or moiety that is displaced in a nucleophilic substitution reaction. In some embodiments, "leaving groups" are any atoms or moieties that are conjugate bases of strong acids. Examples of suitable leaving groups include, but are not limited to, tosylates, mesylates and halogens (e.g., I, Br, and Cl). Non-limiting characteristics and examples of leaving groups can be found, for example in Organic Chemistry, 2d ed., Francis Carey (1992), pages 328-331; Introduction to Organic Chemistry, 2d ed., Andrew Streitwieser and Clayton Heathcock (1981), pages 169-171; and Organic Chemistry, 5th ed., John McMurry (2000), pages 398 and 408.

**[0063]** The term "pharmaceutically acceptable salt" refers to a salt of a compound that does not cause significant irritation to an organism to which it is administered and does not abrogate the biological activity and properties of the compound. In some embodiments, the salt is an acid addition salt of the compound. Pharmaceutical salts can be obtained by reacting a compound with inorganic acids such as hydrohalic acid (e.g., hydrochloric acid or hydrobromic acid), sulfuric acid, nitric acid and phosphoric acid. Pharmaceutical salts can also be obtained by reacting a compound with an organic acid such as aliphatic or aromatic carboxylic or sulfonic acids, for example formic, acetic, succinic, lactic, malic, tartaric, citric, ascorbic, nicotinic, methanesulfonic, ethanesulfonic, p-toluenesulfonic, salicylic or naphthalenesulfonic acid. Pharmaceutical salts can also be obtained by reacting a compound with a base to form a salt such as an ammonium salt, an alkali metal salt, such as a sodium or a potassium salt, an alkaline earth metal salt, such as a calcium or a magnesium salt, a salt of organic bases such as dicyclohexylamine, N-methyl-D-glucamine, tris(hydroxymethyl)methylamine, C<sub>1</sub>-C<sub>7</sub> alkylamine, cyclohexylamine, triethanolamine, ethylenediamine, and salts with amino acids such as arginine and lysine.

**[0064]** Terms and phrases used in this application, and variations thereof, especially in the appended claims, unless otherwise expressly stated, should be construed as open ended as opposed to limiting. As examples of the foregoing, the term 'including' should be read to mean 'including, without limitation,' 'including but not limited to,' or the like; the term 'comprising' as

used herein is synonymous with 'including,' 'containing,' or 'characterized by,' and is inclusive or open-ended and does not exclude additional, unrecited elements or method steps; the term 'having' should be interpreted as 'having at least;' the term 'includes' should be interpreted as 'includes but is not limited to;' the term 'example' is used to provide exemplary instances of the item in discussion, not an exhaustive or limiting list thereof; and use of terms like 'preferably,' 'preferred,' 'desired,' or 'desirable,' and words of similar meaning should not be understood as implying that certain features are critical, essential, or even important to the structure or function, but instead as merely intended to highlight alternative or additional features that may or may not be utilized in a particular embodiment. In addition, the term "comprising" is to be interpreted synonymously with the phrases "having at least" or "including at least". When used in the context of a process, the term "comprising" means that the process includes at least the recited steps, but may include additional steps. When used in the context of a compound, composition or device, the term "comprising" means that the compound, composition or device includes at least the recited features or components, but may also include additional features or components. Likewise, a group of items linked with the conjunction 'and' should not be read as requiring that each and every one of those items be present in the grouping, but rather should be read as 'and/or' unless expressly stated otherwise. Similarly, a group of items linked with the conjunction 'or' should not be read as requiring mutual exclusivity among that group, but rather should be read as 'and/or' unless expressly stated otherwise.

**[0065]** With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity. The indefinite article "a" or "an" does not exclude a plurality. A single processor or other unit may fulfill the functions of several items recited in the claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

**[0066]** It is understood that, in any compound described herein having one or more chiral centers, if an absolute stereochemistry is not expressly indicated, then each center may independently be of R-configuration or S-configuration or a mixture thereof. Thus, the compounds provided herein may be enantiomerically pure, enantiomerically enriched, racemic mixture, diastereomerically pure, diastereomerically enriched, or a stereoisomeric mixture. In addition it is understood that, in any compound described herein having one or more double bond(s) generating geometrical isomers that can be defined as E or Z, each double bond may independently be E or Z a mixture thereof.

**[0067]** It is to be understood that where compounds disclosed herein have unfilled valencies, then the valencies are to be filled with hydrogens or isotopes thereof, e.g., hydrogen-1 (protium) and hydrogen-2 (deuterium).

**[0068]** It is understood that the compounds described herein can be labeled isotopically.

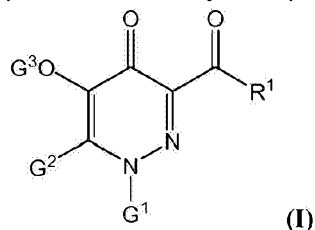
Substitution with isotopes such as deuterium may afford certain therapeutic advantages resulting from greater metabolic stability, such as, for example, increased *in vivo* half-life or reduced dosage requirements. Each chemical element as represented in a compound structure may include any isotope of said element. For example, in a compound structure a hydrogen atom may be explicitly disclosed or understood to be present in the compound. At any position of the compound that a hydrogen atom may be present, the hydrogen atom can be any isotope of hydrogen, including but not limited to hydrogen-1 (protium) and hydrogen-2 (deuterium). Thus, reference herein to a compound encompasses all potential isotopic forms unless the context clearly dictates otherwise.

**[0069]** It is understood that the methods and combinations described herein include crystalline forms (also known as polymorphs, which include the different crystal packing arrangements of the same elemental composition of a compound), amorphous phases, salts, solvates, and hydrates. In some embodiments, the compounds described herein exist in solvated forms with pharmaceutically acceptable solvents such as water, ethanol, or the like. In other embodiments, the compounds described herein exist in unsolvated form. Solvates contain either stoichiometric or non-stoichiometric amounts of a solvent, and may be formed during the process of crystallization with pharmaceutically acceptable solvents such as water, ethanol, or the like. Hydrates are formed when the solvent is water, or alcoholates are formed when the solvent is alcohol. In addition, the compounds provided herein can exist in unsolvated as well as solvated forms. In general, the solvated forms are considered equivalent to the unsolvated forms for the purposes of the compounds and methods provided herein.

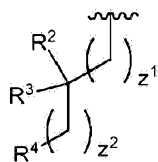
**[0070]** Where a range of values is provided, it is understood that the upper and lower limit, and each intervening value between the upper and lower limit of the range is encompassed within the embodiments.

### **Compounds**

**[0071]** Some embodiments disclosed herein relate to a compound of Formula (I), or a pharmaceutically acceptable salt thereof,



wherein: G<sup>1</sup> can be selected from



and R<sup>5</sup>; G<sup>2</sup> can be hydrogen, halogen, -CN, an optionally substituted C<sub>1-6</sub> alkyl, an optionally

substituted aryl, an optionally substituted heteroaryl,  $-\text{CH}_2\text{OH}$ ,  $-\text{CH}(\text{Y}^1)(\text{OH})$  or  $-\text{C}(\text{O})\text{Y}^1$ ;  $\text{G}^3$  can be selected from hydrogen,  $-\text{C}(\text{O})\text{Y}^2$ ,  $-\text{C}(\text{O})\text{O}-\text{Y}^2$ ,  $-(\text{CH}_2)-\text{OC}(\text{O})\text{Y}^2$ ,  $-(\text{CH}_2)-\text{OC}(\text{O})\text{OY}^2$ ,  $-(\text{CHCH}_3)-\text{OC}(\text{O})\text{Y}^2$  and  $-(\text{CHCH}_3)-\text{OC}(\text{O})\text{OY}^2$ ;  $\text{Y}^1$  and  $\text{Y}^2$  can be independently an optionally substituted  $\text{C}_{1-6}$  alkyl or an optionally substituted aryl;  $\text{R}^1$  can be selected from  $\text{OR}^6$ ,  $\text{NH}_2$ , an optionally substituted mono-substituted amine, an optionally substituted di-substituted amine, an optionally substituted heterocyclyl, an optionally substituted N-sulfonamido and an optionally substituted alkoxyamine; or  $\text{R}^1$  is  $\text{R}^{10}$ ;  $\text{R}^2$  can be hydrogen,  $\text{C}_{1-6}$  alkyl, an optionally substituted  $\text{C}_{3-6}$  cycloalkyl, an optionally substituted aryl, an optionally substituted aryl( $\text{C}_{1-6}$  alkyl) or an optionally substituted C-amido;  $\text{R}^3$  can be hydrogen or  $\text{C}_{1-6}$  alkyl; or  $\text{R}^2$  and  $\text{R}^3$  can be taken together with the carbon to which they are attached to form an optionally substituted  $\text{C}_{3-6}$  cycloalkyl, an optionally substituted 5 to 6 membered heterocyclyl or or  $\text{R}^2$  and  $\text{R}^3$  are taken together to form  $=\text{O}$ ;  $\text{R}^4$  can be selected from an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted cycloalkenyl, an optionally substituted heteroaryl and an optionally substituted heterocyclyl; or  $\text{R}^4$  can be  $\text{A}^1\text{R}^{\text{A}4}\text{R}^{\text{B}4}$ , wherein  $\text{A}^1$  can be CH or N; and  $\text{R}^{\text{A}4}$  and  $\text{R}^{\text{B}4}$  can be each independently an optionally substituted phenyl;  $\text{R}^5$  can be selected from an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted cycloalkenyl, an optionally substituted heteroaryl and an optionally substituted heterocyclyl;  $\text{R}^6$  can be selected from hydrogen,  $\text{C}_{1-6}$  alkyl,  $-\text{C}(\text{O})\text{R}^7$  and  $-\text{C}(\text{O})\text{NR}^8\text{R}^9$ ;  $\text{R}^7$  can be selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $\text{C}_{1-6}$  alkyl), heteroaryl( $\text{C}_{1-6}$  alkyl) and heterocyclyl( $\text{C}_{1-6}$  alkyl); and  $\text{R}^8$  and  $\text{R}^9$  can be independently selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $\text{C}_{1-6}$  alkyl), heteroaryl( $\text{C}_{1-6}$  alkyl) and heterocyclyl( $\text{C}_{1-6}$  alkyl); or  $\text{R}^8$  and  $\text{R}^9$  can be taken together with the nitrogen to which they are attached to form an optionally substituted heterocyclyl; wherein when  $\text{R}^1$  is  $\text{R}^{10}$ , then  $\text{R}^{10}$  and  $\text{R}^4$  can be taken together and include  $\text{L}^1$ , wherein  $\text{L}^1$  connects  $\text{R}^{10}$  and  $\text{R}^4$  to form an 11- to 20-membered ring, or wherein when  $\text{R}^1$  is  $\text{R}^{10}$ , then  $\text{R}^{10}$  and  $\text{R}^5$  can be taken together and include  $\text{L}^1$ , wherein  $\text{L}^1$  connects  $\text{R}^{10}$  and  $\text{R}^5$  to form an 11- to 20-membered ring;  $\text{R}^{10}$  is an optionally substituted- $\text{CH}_2$ -, an optionally substituted  $-\text{CH}=\text{CH}-$ , O (oxygen), S (sulfur) or  $\text{NR}^{11}$ ;  $\text{R}^{11}$  can be hydrogen or  $\text{C}_{1-6}$  alkyl;  $\text{L}^1$  is  $\text{L}^2$  or  $-\text{L}^3\text{L}^4\text{L}^5$ ,  $\text{L}^2$  is selected from the group consisting of an optionally substituted alkylene, an optionally substituted alkenylene, an optionally substituted heteroalkylene and an optionally substituted heteroalkenylene;  $\text{L}^3$  is an optionally substituted  $\text{C}_{1-6}$  alkylene;  $\text{L}^4$  is an optionally substituted cycloalkyl, an optionally substituted aryl, an optionally substituted heteroaryl, an optionally substituted heterocyclyl, O (oxygen), S (sulfur) or  $\text{NR}^{11}$ ; and  $\text{L}^5$  is an optionally substituted  $\text{C}_{1-6}$  alkylene or an optionally substituted heteroalkylene; and  $\text{Z}^1$  and  $\text{Z}^2$  can be independently 0, 1, 2, 3 or 4.



**[0072]** In some embodiments,  $G^3$  can be hydrogen. In other embodiments, the compound of Formula (I), or a pharmaceutically acceptable salt thereof, is a prodrug in which  $G^3$  can be selected from  $-C(O)Y^2$ ,  $-C(O)O-Y^2$ ,  $-(CH_2)-OC(O)Y^2$ ,  $-(CH_2)-OC(O)OY^2$ ,  $-(CHCH_3)-OC(O)Y^2$  and  $-(CHCH_3)-OC(O)OY^2$ .

**[0073]** A variety of substituents can be present on the 6-membered ring of Formula (I). For example, in some embodiments,  $G^2$  can be hydrogen. In other embodiments,  $G^2$  can be halogen. In still other embodiments,  $G^2$  can be  $-CN$ . In yet still other embodiments,  $G^2$  can be an optionally substituted aryl. In some embodiments,  $G^2$  can be an optionally substituted heteroaryl. In other embodiments,  $G^2$  can be  $-CH_2OH$ . In still other embodiments,  $G^2$  can be  $-CH(Y^1)(OH)$ . In yet still other embodiments,  $G^2$  can be  $-C(O)Y^1$ . In some embodiments,  $G^2$  can be an optionally substituted  $C_{1-6}$  alkyl. In some embodiments,  $G^2$  can be an unsubstituted  $C_{1-6}$  alkyl, such as methyl. When  $Y^1$  and  $Y^2$  are present in  $G^2$  and/or  $G^3$ , respectively,  $Y^1$  and  $Y^2$  can be independently an optionally substituted  $C_{1-6}$  alkyl or an optionally substituted aryl (such as an optionally substituted phenyl).

**[0074]** Various groups can be present at  $R^1$ . In some embodiments,  $R^1$  can be  $OR^6$ . For example, in some embodiments,  $R^1$  can be hydroxy. In other embodiments, when  $R^1$  is  $OR^6$ ,  $R^6$  can be  $C_{1-6}$  alkyl. In still other embodiments, when  $R^1$  is  $OR^6$ ,  $R^6$  can be  $-C(O)R^7$ . Examples of suitable  $R^7$  groups include, but are not limited to, hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In yet still other embodiments, when  $R^1$  is  $OR^6$ ,  $R^6$  can be  $-C(O)NR^8R^9$ .  $R^8$  and  $R^9$  can be independently various substituents, such as hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) or heterocyclyl( $C_{1-6}$  alkyl). In some embodiments,  $R^8$  and  $R^9$  can be taken together to form an optionally substituted heterocyclyl. Examples of suitable optionally substituted heterocyclyls that can be formed from  $R^8$  and  $R^9$  include 5 to 6 membered heterocyclyls. In some embodiments,  $R^6$  can be hydrogen,  $C_{1-6}$  alkyl, an acyl or C-amido. In some embodiments,  $R^6$  can be hydrogen,  $-C(O)R^7$  and  $-C(O)NR^8R^9$ . In other embodiments,  $R^6$  can be  $-C(O)R^7$  and  $-C(O)NR^8R^9$ .

**[0075]** In some embodiments,  $R^1$  can be  $NH_2$ . In other embodiments,  $R^1$  can be an optionally substituted mono-substituted amine. An example of a suitable mono-substituted amine is a group having the formula of  $-NHR^{1AA}$ , wherein  $R^{1AA}$  can be selected from alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In some embodiments,  $R^{1AA}$  can be selected

from alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In other embodiments, R<sup>1AA</sup> can be selected from alkyl, aryl, and aryl(C<sub>1-6</sub> alkyl). When R<sup>1</sup> is a mono-substituted amine having the formula -NHR<sup>1AA</sup>, R<sup>1AA</sup> can be a substituted or unsubstituted group.

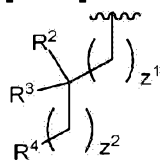
**[0076]** In other embodiments, R<sup>1</sup> can be an optionally substituted di-substituted amine. For example, R<sup>1</sup> can be a group having the formula of -NR<sup>1BB</sup>R<sup>1CC</sup>, wherein R<sup>1BB</sup> and R<sup>1CC</sup> can be independently selected from alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In some embodiments, R<sup>1BB</sup> and R<sup>1CC</sup> can be independently selected from alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In other embodiments, R<sup>1BB</sup> and R<sup>1CC</sup> can be independently selected from alkyl, aryl, and aryl(C<sub>1-6</sub> alkyl). In some embodiments, R<sup>1BB</sup> and R<sup>1CC</sup> can be the same. In other embodiments, R<sup>1BB</sup> and R<sup>1CC</sup> can be different. When R<sup>1</sup> is a di-substituted amine having the formula -NR<sup>1BB</sup>R<sup>1CC</sup>, R<sup>1BB</sup> and R<sup>1CC</sup> can be substituted or unsubstituted groups.

**[0077]** In still other embodiments, R<sup>1</sup> can be an optionally substituted heterocyclyl. Various heterocyclyls can be used and can be connected either through a ring carbon or a ring heteroatom. In some embodiments, the heterocyclyl can be a 5 to 6 membered heterocyclyl. In some embodiments, the heterocyclyl can include 1 heteroatom. In other embodiments, the heterocyclyl can include 2 heteroatoms, wherein the heteroatoms can be the same or different. In some embodiments, R<sup>1</sup> can be an optionally substituted heterocyclyl that contains at least one nitrogen in the ring and is an N-linked heterocyclyl. In some embodiments, R<sup>1</sup> can be an unsubstituted heterocyclyl. In some embodiments, R<sup>1</sup> can be a substituted heterocyclyl.

**[0078]** In still other embodiments, R<sup>1</sup> can be an optionally substituted N-sulfonamido. In some embodiments, when R<sup>1</sup> is an optionally substituted N-sulfonamido, the groups attached to the sulfur can be independently selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). An example of suitable structure for the optionally substituted N-sulfonamido is -NHS(O)<sub>2</sub>R<sup>1DD</sup>, wherein R<sup>1DD</sup> can be selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In some embodiments, R<sup>1DD</sup> can be selected from alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In other embodiments, R<sup>1DD</sup> can be selected from alkyl, aryl, and aryl(C<sub>1-6</sub> alkyl). When R<sup>1</sup> is a N-sulfonamido having the formula -NHS(O)<sub>2</sub>R<sup>1DD</sup>, R<sup>1DD</sup> can be a substituted or unsubstituted group.

**[0079]** In yet still other embodiments,  $R^1$  can be an optionally substituted alkoxyamine. Examples of an optionally substituted alkoxyamine include, but are not limited to, the following:  $-NH(C_{1-6} \text{ alkoxy})$  and  $-N(C_{1-6} \text{ alkyl})(C_{1-6} \text{ alkoxy})$ ,  $-NH(OCH_3)$  and  $-NCH_3(OCH_3)$ .

**[0080]** In some embodiments,  $G^1$  can be



In some embodiments,  $R^2$  can be hydrogen. In other embodiments,  $R^2$  can be a  $C_{1-6}$  alkyl. Examples of suitable  $C_{1-6}$  alkyl include methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, tert-butyl, straight or branched pentyl and straight or branched hexyl. In still other embodiments,  $R^2$  can be an optionally substituted  $C_{3-6}$  cycloalkyl. In some embodiments,  $R^2$  can be an optionally substituted  $C_{5-6}$  cycloalkyl, such as an optionally substituted monocyclic  $C_{5-6}$  cycloalkyl or an optionally substituted fused, bicyclic  $C_{5-6}$  cycloalkyl. In yet still other embodiments,  $R^2$  can be an optionally substituted aryl, such as an optionally substituted phenyl. In some embodiments,  $R^2$  can be an optionally substituted aryl( $C_{1-6}$  alkyl), for example, an optionally substituted benzyl. In other embodiments,  $R^2$  can be an optionally substituted C-amido. For example,  $R^2$  can be  $C(=O)NH-(C_{1-6} \text{ alkyl})$ . In some embodiments,  $R^3$  can be hydrogen. In other embodiments,  $R^3$  can be a  $C_{1-6}$  alkyl.

**[0081]** In some embodiments,  $R^2$  and  $R^3$  can be the same. In other embodiments,  $R^2$  and  $R^3$  can be different. In some embodiments,  $R^2$  and  $R^3$  can both be hydrogen. In other embodiments,  $R^2$  and  $R^3$  can both be a  $C_{1-6}$  alkyl. For example,  $R^2$  and  $R^3$  can both be methyl. In some embodiments,  $R^2$  can be  $C_{1-6}$  alkyl, an optionally substituted  $C_{3-6}$  cycloalkyl, an optionally substituted aryl, an optionally substituted aryl( $C_{1-6}$  alkyl) or an optionally substituted C-amido, and  $R^3$  can be hydrogen.

**[0082]** Alternatively, in some embodiments,  $R^2$  and  $R^3$  can be taken together to form an optionally substituted  $C_{3-6}$  cycloalkyl. Suitable cycloalkyls include cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. When  $R^2$  and  $R^3$  are taken together, the cycloalkyl group can be unsubstituted. In the alternative, the cycloalkyl group can be substituted with one or more substituents. In some embodiments,  $R^2$  and  $R^3$  can be taken together to form an optionally substituted  $C_5$  cycloalkyl. In some embodiments,  $R^2$  and  $R^3$  can be taken together to form an unsubstituted  $C_5$  cycloalkyl. In other embodiments,  $R^2$  and  $R^3$  can be taken together to form a mono-substituted or di-substituted  $C_5$  cycloalkyl. In some embodiments,  $R^2$  and  $R^3$  can be taken together to form an optionally substituted 5 to 6 membered heterocyclyl. Examples of

heterocyclyls that can be formed include, but are not limited to, optionally substituted nitrogen containing 5 to 6 membered heterocyclyls. In some embodiments,  $R^2$  and  $R^3$  can be taken together to form an optionally substituted 5 to 6 membered N-linked heterocyclyl, for example, an optionally substituted piperidino or an optionally substituted pyrrolidino. In some embodiments,  $R^2$  and  $R^3$  can be taken together to form  $=O$ , such that the carbon to which  $R^2$  and  $R^3$  are attached together with  $R^2$  and  $R^3$  form a carbonyl group.

**[0083]** Various groups can be  $R^4$ . In some embodiments,  $R^4$  can be an optionally substituted aryl. In some embodiments,  $R^4$  can be an optionally substituted naphthyl. In other embodiments,  $R^4$  can be an optionally substituted phenyl. In some embodiments,  $R^4$  can be an unsubstituted phenyl. In other embodiments,  $R^4$  can be a substituted phenyl. One or more groups can be present on a substituted phenyl. For example, the substituted phenyl can be a mono-substituted phenyl, such as an ortho-substituted phenyl, a meta-substituted phenyl or a para-substituted phenyl. As another example, the substituted phenyl can be a di-substituted phenyl, such as a 2,5-di-substituted phenyl, 2,4-di-substituted phenyl and 2,3-di-substituted phenyl. In some embodiments, the substituted phenyl can be substituted with 3 or more substituent.

**[0084]** In other embodiments,  $R^4$  can be an optionally substituted cycloalkyl or an optionally substituted cycloalkenyl. For example,  $R^4$  can be an optionally substituted  $C_{4-6}$  cycloalkyl. In some embodiments,  $R^4$  can be an unsubstituted cycloalkyl. In other embodiments,  $R^4$  can be a substituted cycloalkyl.

**[0085]** In still other embodiments,  $R^4$  can be an optionally substituted heteroaryl. In some embodiments,  $R^4$  can be an unsubstituted heteroaryl. In other embodiments,  $R^4$  can be a substituted heteroaryl. Examples of suitable heteroaryls are described herein. In some embodiments,  $R^4$  can be an optionally substituted monocyclic heteroaryl. In other embodiments,  $R^4$  can be an optionally substituted bicyclic heteroaryl, for example, an optionally substituted 1H-pyrrolo[2,3-b]pyridine.

**[0086]** In yet still other embodiments,  $R^4$  can be an optionally substituted heterocyclyl. In some embodiments,  $R^4$  can be an unsubstituted heterocyclyl. In other embodiments,  $R^4$  can be a substituted heterocyclyl. In some embodiments,  $R^4$  can be an optionally substituted monocyclic heterocyclyl. In other embodiments,  $R^4$  can be an optionally substituted bicyclic heterocyclyl.

**[0087]** When  $R^4$  is substituted, one or more groups can be present. When two or more of the substituents are present, two or more of the substituents can be the same. In some embodiments, when multiple substituents are present on  $R^4$ , at least one of the substituents is different from the remaining substituents. In some embodiments, all of the substituents present

on  $R^4$  are different. In some embodiments,  $R^4$  can be substituted with one or more substituents selected from halogen,  $C_{1-6}$  alkyl, alkoxy, aryloxy, haloalkyl, haloalkoxy, hydroxyalkyl, N-sulfonamido, S-sulfonamido, sulfonyl, an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted heterocyclyl, carbonyl, C-carboxy,  $-CH_2$ -(mono-substituted amine) and  $CH_2$ -(di-substituted amine). In some embodiments, when  $R^4$  is a substituted aryl, the aryl can be substituted with one or more groups selected from  $C_{1-6}$  alkyl, alkoxy, aryl (for example, phenyl), cyano, halogen, haloalkyl and haloalkoxy. In some embodiments, when  $R^4$  is a substituted cycloalkyl, the cycloalkyl can be substituted with  $C_{1-6}$  alkyl, alkoxy, halogen and haloalkyl. In some embodiments, when  $R^4$  is a substituted heterocyclyl, the heterocyclyl can be substituted with  $C_{1-6}$  alkyl, alkoxy, halogen, haloalkyl, aryl( $C_{1-6}$  alkyl) and C-carboxy. In some embodiments, the substituted heterocyclyl of  $R^4$  can be substituted with a substituted or an unsubstituted benzyl.

**[0088]** The pyridazinone ring can be connected to  $R^4$  via a substituted or unsubstituted alkylene. In some embodiments,  $Z^1$  can be 0. In other embodiments,  $Z^1$  can be 1. In still other embodiments,  $Z^1$  can be 2. In yet still other embodiments,  $Z^1$  can be 3. In some embodiments,  $Z^1$  can be 4. In some embodiments,  $Z^2$  can be 0. In other embodiments,  $Z^2$  can be 1. In still other embodiments,  $Z^2$  can be 2. In yet still other embodiments,  $Z^2$  can be 3. In some embodiments,  $Z^2$  can be 4. In some embodiments,  $Z^1$  can be 1, and  $Z^2$  can be 0. In other embodiments,  $Z^1$  and  $Z^2$  can be both 1. In still other embodiments,  $Z^1$  and  $Z^2$  can be both  $>1$ . In yet still other embodiments, at least one of  $Z^1$  and  $Z^2$  can be 1. In some embodiments, at least one of  $Z^1$  and  $Z^2$  can be 1, and the other of  $Z^1$  and  $Z^2$  can be  $>1$ .

**[0089]** In some embodiments,  $R^4$  can be  $A^1R^{A4}R^{B4}$ , wherein  $A^1$  can be CH or N; and  $R^{A4}$  and  $R^{B4}$  can be each independently an optionally substituted phenyl. For example,  $R^4$  can be  $CHR^{A4}R^{B4}$  or  $NR^{A4}R^{B4}$ . As described herein, the phenyl groups can be the same or different, and can be substituted or unsubstituted.

**[0090]** In other embodiments,  $G^1$  can be  $R^5$ . As with  $R^4$ ,  $R^5$  can be a variety of groups. In some embodiments,  $R^5$  can be an optionally substituted aryl. In some embodiments,  $R^5$  can be an optionally substituted naphthyl. In other embodiments,  $R^5$  can be an optionally substituted phenyl. In some embodiments,  $R^5$  can be an unsubstituted phenyl. In other embodiments,  $R^5$  can be a substituted phenyl. One or more groups can be present on a substituted phenyl. For example, the substituted phenyl can be a mono-substituted phenyl, such as an ortho-substituted phenyl, a meta-substituted phenyl or a para-substituted phenyl. As another example, the substituted phenyl can be a di-substituted phenyl, such as a 2,5-di-substituted phenyl, 2,4-di-substituted phenyl and 2,3-di-substituted phenyl. In some embodiments, the substituted phenyl can be substituted with 3 or more substituents.

**[0091]** In other embodiments,  $R^5$  can be an optionally substituted cycloalkyl or an optionally substituted cycloalkenyl. For example,  $R^5$  can be a substituted or an unsubstituted  $C_{4-6}$  cycloalkyl. In some embodiments,  $R^5$  can be an unsubstituted cycloalkyl. In other embodiments,  $R^5$  can be a substituted cycloalkyl.

**[0092]** In still other embodiments,  $R^5$  can be an optionally substituted heteroaryl. In some embodiments,  $R^5$  can be an unsubstituted heteroaryl. In other embodiments,  $R^5$  can be a substituted heteroaryl. In some embodiments,  $R^5$  can be an optionally substituted monocyclic heteroaryl. In other embodiments,  $R^5$  can be an optionally substituted bicyclic heteroaryl.

**[0093]** In yet still other embodiments,  $R^5$  can be an optionally substituted heterocyclyl. In some embodiments,  $R^5$  can be an unsubstituted heterocyclyl. In other embodiments,  $R^5$  can be a substituted heterocyclyl. In some embodiments,  $R^5$  can be an optionally substituted monocyclic heterocyclyl. In other embodiments,  $R^5$  can be an optionally substituted bicyclic heterocyclyl.

**[0094]** When  $R^5$  is substituted, one or more groups can be present. When two or more of the substituents are present, two or more of the substituents can be the same. In some embodiments, when multiple substituents are present on  $R^5$ , at least one of the substituents is different from the remaining substituents. In some embodiments, all of the substituents present on  $R^5$  are different. In some embodiments,  $R^5$  can be substituted with one or more substituents selected from halogen,  $C_{1-6}$  alkyl, alkoxy, aryloxy, haloalkyl, haloalkoxy, hydroxyalkyl, N-sulfonamido, S-sulfonamido, sulfonyl, an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted heterocyclyl, carbonyl, C-carboxy,  $-CH_2-$ (mono-substituted amine) and  $CH_2-$ (di-substituted amine). In some embodiments, when  $R^5$  is a substituted aryl, the aryl can be substituted with one or more groups selected from  $C_{1-6}$  alkyl, alkoxy, halogen and haloalkyl. In other embodiments, when  $R^5$  is a substituted aryl, the aryl can be substituted with one or more groups selected from  $C_{1-6}$  alkyl, alkoxy, aryl (for example, phenyl), cyano, halogen, haloalkyl and haloalkoxy. In some embodiments, when  $R^5$  is a substituted cycloalkyl, the cycloalkyl can be substituted with  $C_{1-6}$  alkyl, alkoxy, halogen and haloalkyl. In some embodiments, when  $R^5$  is a substituted heterocyclyl, the heterocyclyl can be substituted with  $C_{1-6}$  alkyl, alkoxy, halogen, haloalkyl, aryl( $C_{1-6}$  alkyl) and C-carboxy. In some embodiments, the substituted heterocyclyl of  $R^5$  can be substituted with a substituted or an unsubstituted benzyl.

**[0095]** In some embodiments,  $R^1$  is not mono-substituted amine, such as  $-NH-$ alkyl. In other embodiments,  $R^1$  is not di-substituted amine. For example, in some embodiments,  $R^1$  is not  $-N(alkyl)_2$ , including  $-N(CH_3)_2$ . In some embodiments,  $R^6$  is not  $C_{1-6}$  alkyl. In still other embodiments,  $R^1$  is not an optionally substituted heterocyclyl. In other embodiments,  $R^1$  is not

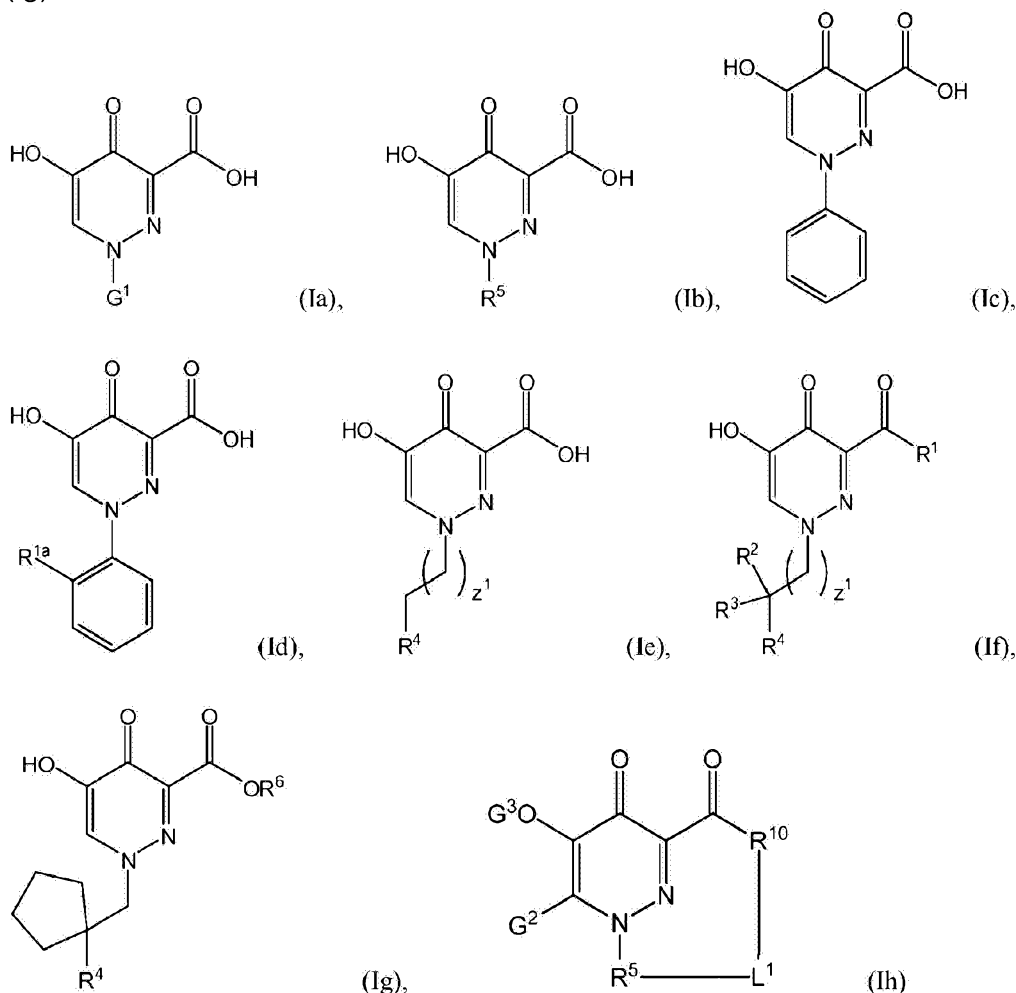
an optionally substituted N-linked heterocyclyl.

**[0096]** In some embodiments, the pyridazinone ring can be connected to  $R^4$  to form a cyclic compound, for example, a compound of Formula (Ih). In other embodiments, the pyridazinone ring can be connected to  $R^5$  to form a cyclic compound, such as a compound of Formula (Ij). In some embodiments, when  $R^1$  is  $R^{10}$ , then  $R^{10}$  and  $R^4$  can be taken together and include  $L^1$ , wherein  $L^1$  connects  $R^{10}$  and  $R^4$  to form an 11- to 20-membered ring, or wherein when  $R^1$  is  $R^{10}$ , then  $R^{10}$  and  $R^5$  can be taken together and include  $L^1$ , wherein  $L^1$  connects  $R^{10}$  and  $R^5$  to form an 11- to 20-membered ring; wherein  $R^{10}$  can be an optionally substituted  $-CH_2-$ , an optionally substituted  $-CH=CH-$ , O (oxygen), S (sulfur), or  $NR^{11}$ ; and wherein  $R^{11}$  can be hydrogen or  $C_{1-6}$  alkyl. In some embodiments,  $R^{10}$  can be  $NR^{11}$ . For example,  $R^{10}$  can be NH. In other embodiments,  $R^{10}$  can be an optionally substituted  $-CH_2-$ . In still other embodiments,  $R^{10}$  can be O (oxygen). In yet still other embodiments,  $R^{10}$  can be S (sulfur).

**[0097]** With respect to  $L^1$ , in some embodiments,  $L^1$  can be  $-L^2-$ . In some embodiments, when  $L^1$  is  $-L^2-$ ,  $L^2$  can be selected from an optionally substituted alkylene, an optionally substituted alkenylene, an optionally substituted heteroalkylene and an optionally substituted heteroalkenylene. In some embodiments,  $L^2$  can be an optionally substituted alkylene, for example, an optionally substituted  $C_{4-7}$  alkylene. In other embodiments,  $L^2$  can be an optionally substituted alkenylene, such as an optionally substituted  $C_{4-7}$  alkenylene. In still other embodiments,  $L^2$  can be an optionally substituted heteroalkylene. Examples of suitable optionally substituted heteroalkylenes include the following: an optionally substituted  $-(CH_2)_3-O-$ , an optionally substituted  $-(CH_2)_4-O-$ , an optionally substituted  $-(CH_2)_5-O-$ , an optionally substituted  $-(CH_2)_3-S-$ , an optionally substituted  $-(CH_2)_4-S-$ , an optionally substituted  $-(CH_2)_5-S-$ , an optionally substituted  $-(CH_2)_3-NH-$ , an optionally substituted  $-(CH_2)_4-NH-$ , and an optionally substituted  $-(CH_2)_5-NH-$ . In yet still other embodiments,  $L^2$  can be an optionally substituted heteroalkenylene, such as an optionally substituted  $-(CH_2)(CH=CH)(CH_2)-O-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)-O-$ , an optionally substituted  $-(CH_2)(CH=CH)(CH_2)_2-O-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)_2-O-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)-S-$ , an optionally substituted  $-(CH_2)(CH=CH)(CH_2)_2-S-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)_2-S$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)-NH-$ , an optionally substituted  $-(CH_2)(CH=CH)(CH_2)_2-NH-$  and an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)_2-NH-$ . In some embodiments,  $L^2$  can be an optionally substituted  $-(CH_2)_3-O-$ , an optionally substituted  $-(CH_2)_4-O-$ , or an optionally substituted  $-(CH_2)_5-O-$ . In other embodiments,  $L^2$  can be an optionally substituted  $C_3$  oxygen-containing heteroalkenylene, an optionally substituted  $C_4$  oxygen-containing heteroalkenylene, or an optionally substituted  $C_5$  oxygen-containing heteroalkenylene.

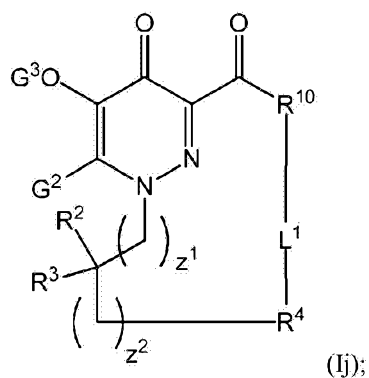
**[0098]** In other embodiments,  $L^1$  can be  $-L^3-L^4-L^5-$ , wherein  $L^3$  can be an optionally substituted  $C_{1-6}$  alkylene;  $L^4$  can be an optionally substituted cycloalkyl, an optionally substituted aryl, an optionally substituted heteroaryl, an optionally substituted heterocyclyl, O (oxygen), S (sulfur), or  $NR^{11}$ ; and  $L^5$  can be an optionally substituted  $C_{1-6}$  alkylene or an optionally substituted heteroalkylene. In some embodiments,  $L^3$  can be an optionally substituted  $C_{1-4}$  alkylene;  $L^4$  can be optionally substituted cycloalkyl, optionally substituted aryl, or optionally substituted heteroaryl; and  $L^5$  can be an optionally substituted  $C_{1-4}$  alkylene. In other embodiments,  $L^3$  can be an optionally substituted  $C_{1-4}$  alkylene;  $L^4$  can be O (oxygen), S (sulfur), or  $NR^{11}$ ; and  $L^5$  can be an optionally substituted  $C_{1-4}$  alkylene. In still other embodiments,  $L^3$  can be optionally substituted  $C_{2-4}$  alkylene;  $L^4$  can be optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted heterocyclyl, O (oxygen), S (sulfur), or  $NR^{11}$ ; and  $L^5$  can be optionally substituted  $C_{2-4}$  alkylene.

**[0099]** In some embodiments, a compound of Formula (I) can be a compound selected from Formula (Ia), Formula (Ib), Formula (Ic), Formula (Id), Formula (Ie), Formula (If) and Formula (Ig).



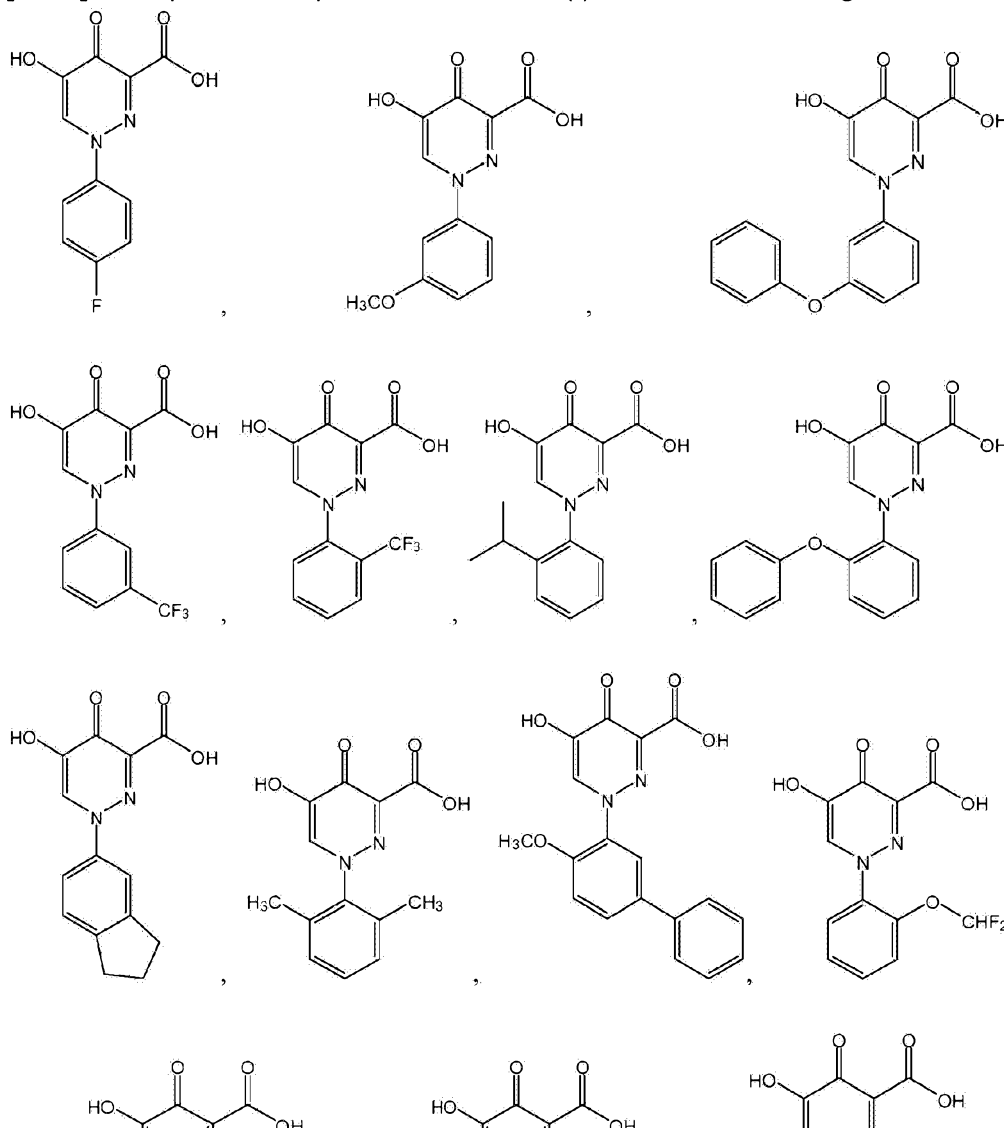


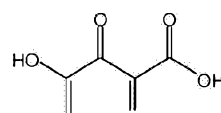
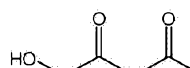
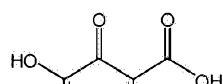
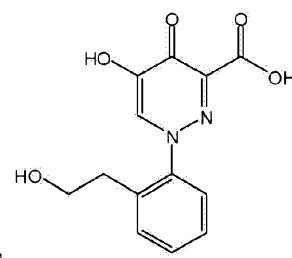
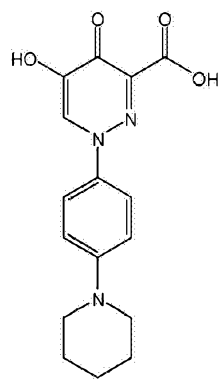
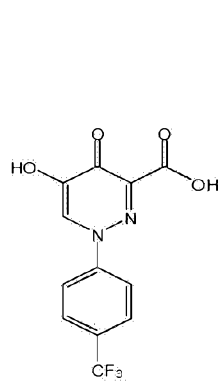
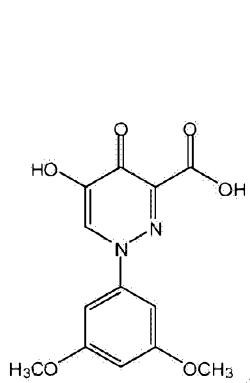
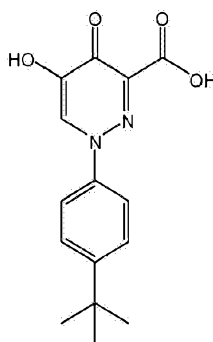
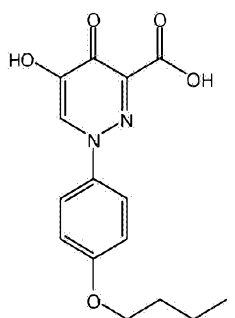
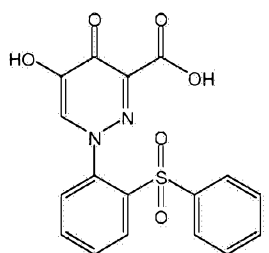
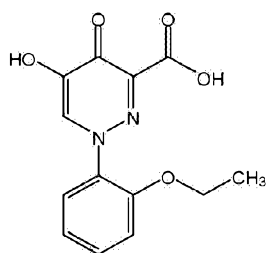
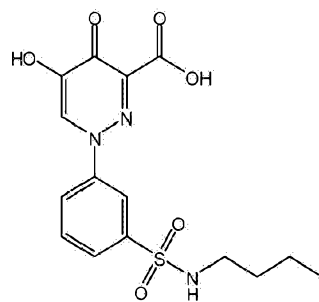
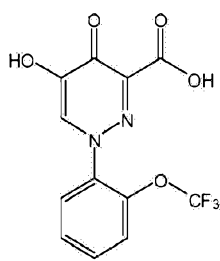
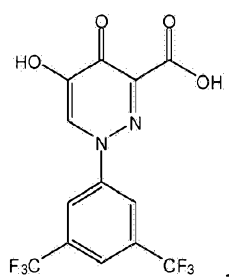
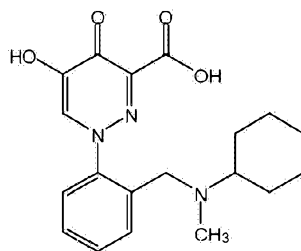
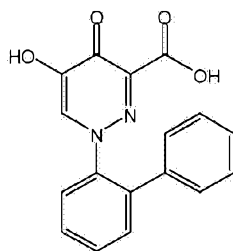
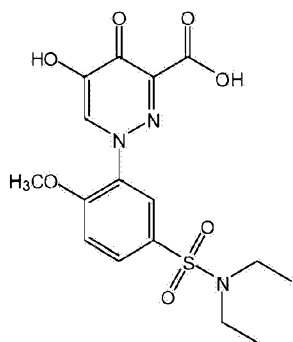
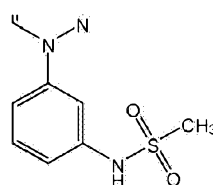
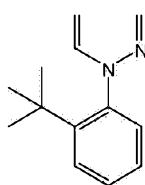
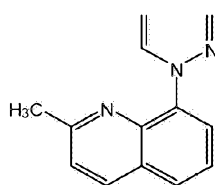
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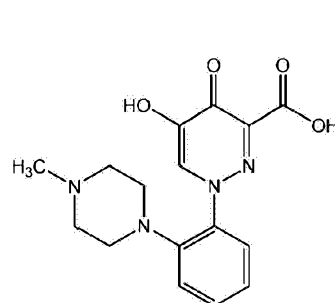
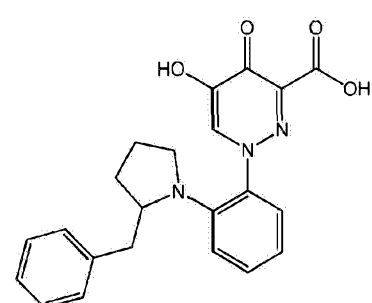
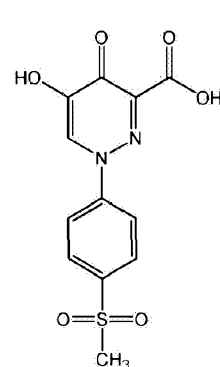
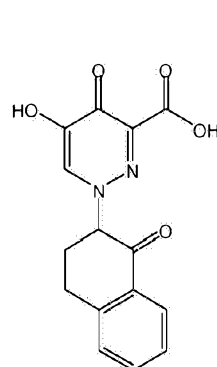
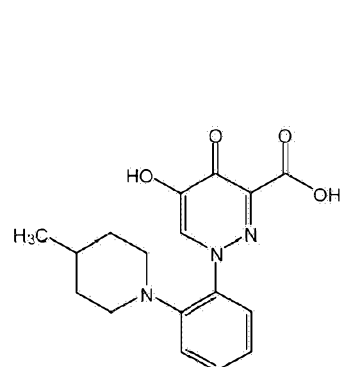
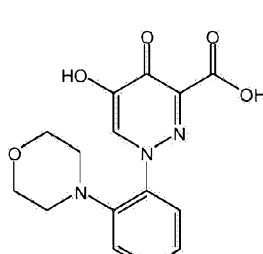
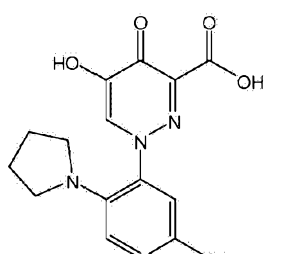
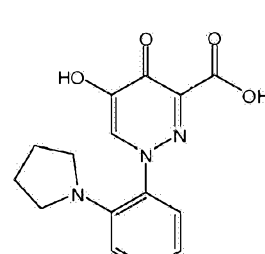
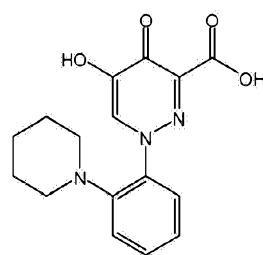
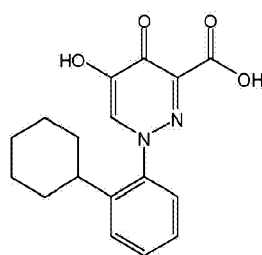
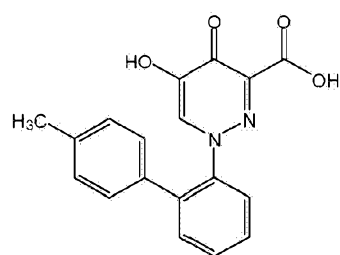
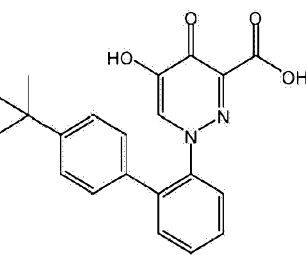
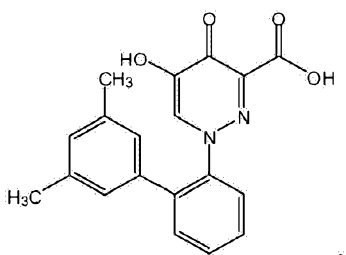
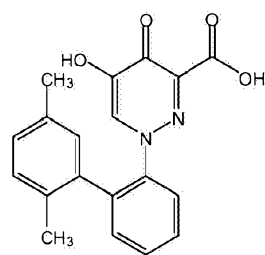
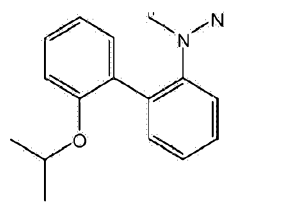
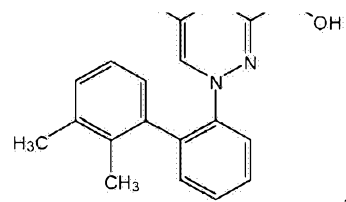
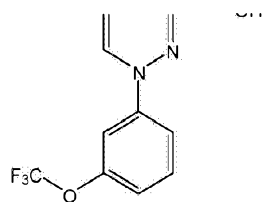


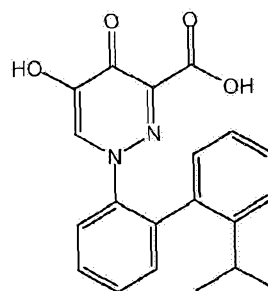
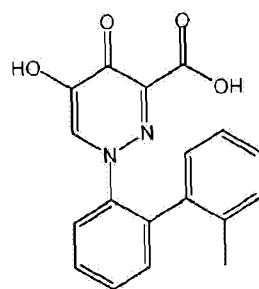
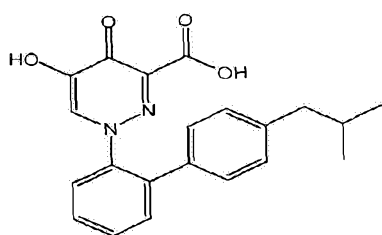
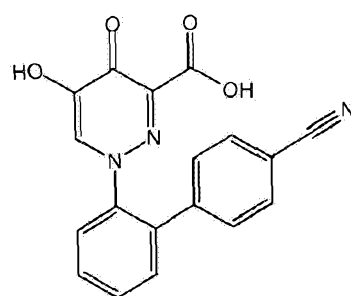
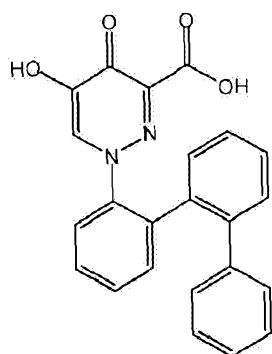
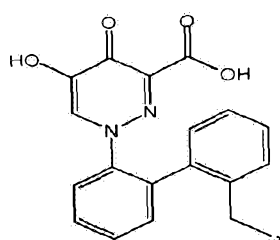
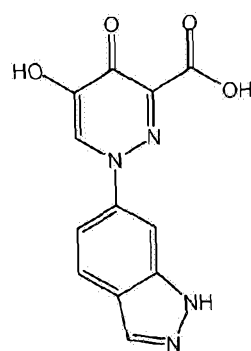
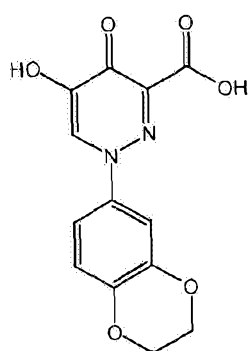
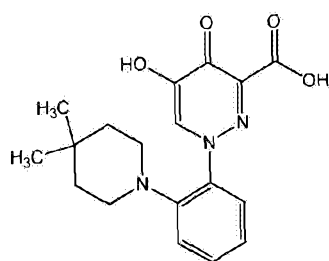
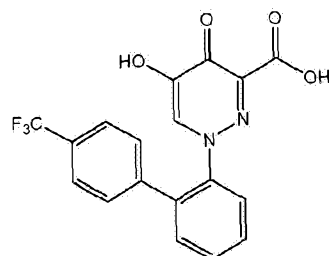
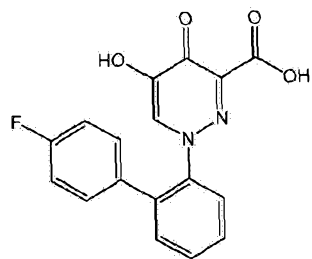
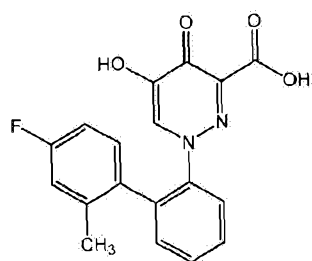
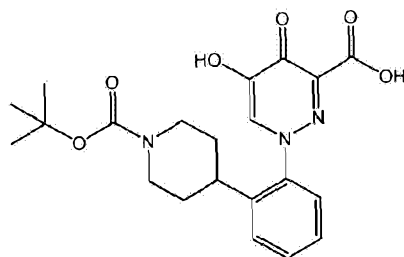
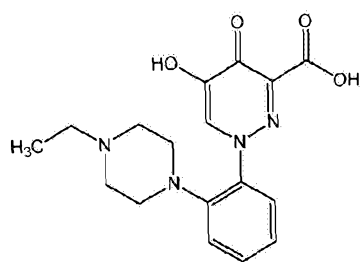
wherein  $G^1$ ,  $R^1$ ,  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$  and  $z^1$  are as defined above with respect to Formula (I). In various embodiments, for Formula (Ic), the phenyl ring can be substituted or unsubstituted; for Formula (Id),  $R^{1a}$  can be an optionally substituted N-linked heterocyclyl; for Formula (If),  $R^6$  is not hydrogen; and for Formula (If),  $R^1$  is not  $OR^6$ . In some embodiments,  $R^6$  is not hydrogen and/or not a  $C_{1-6}$  alkyl for Formulae (If) and/or (Ig).

**[0100]** Examples of compounds of Formula (I) include the following:

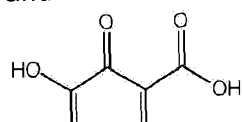


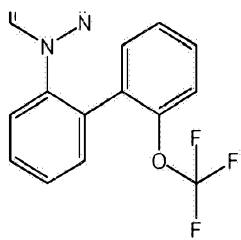






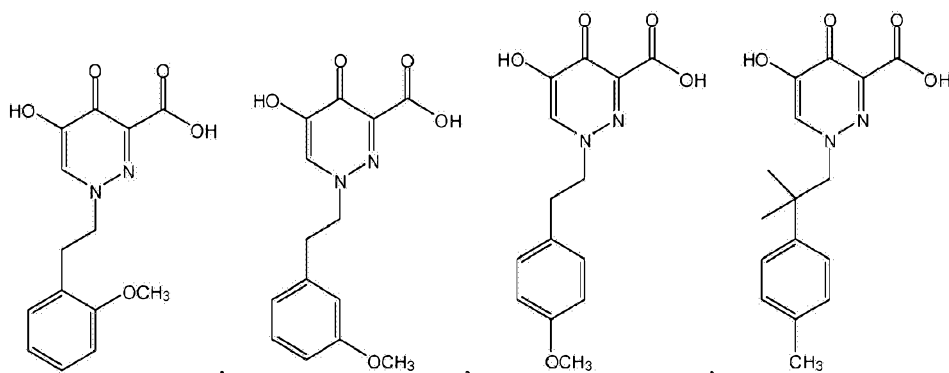
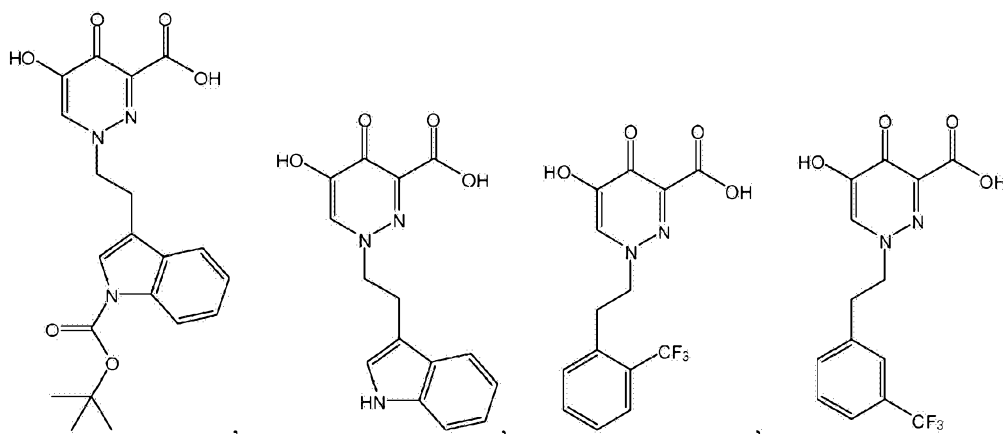
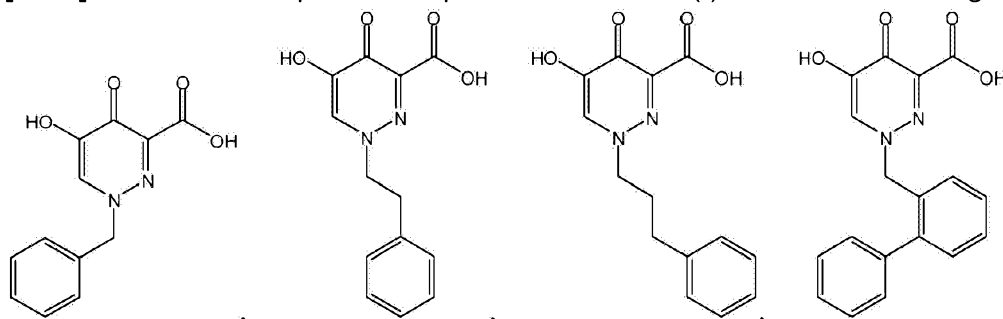
and



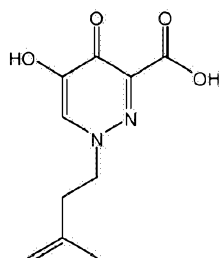


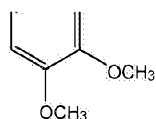
or a pharmaceutically acceptable salt of any of the foregoing.

**[0101]** Additional examples of compounds of Formula (I) include the following:



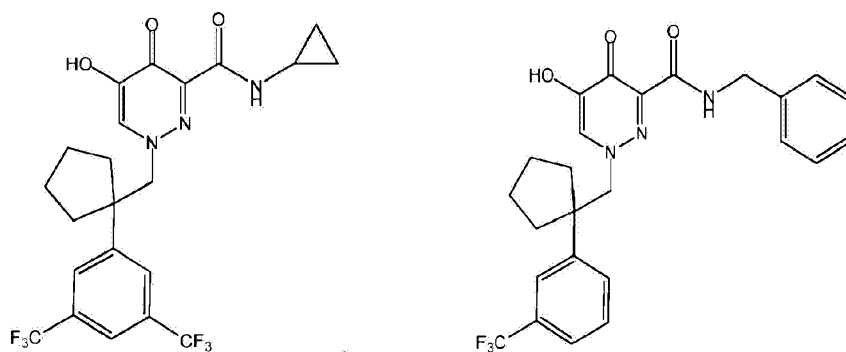
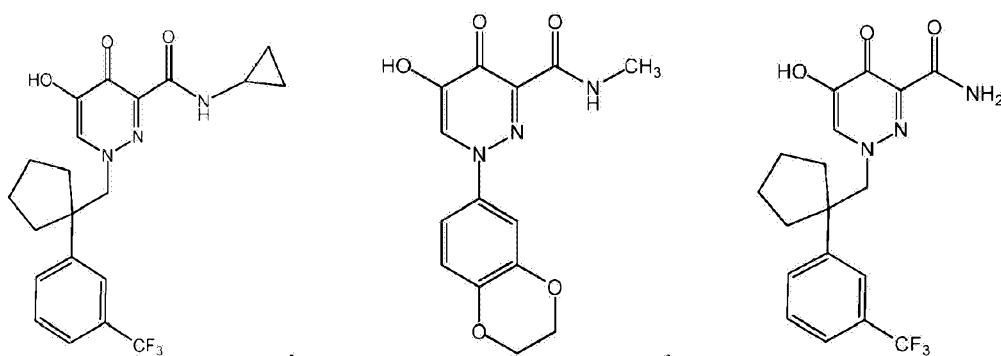
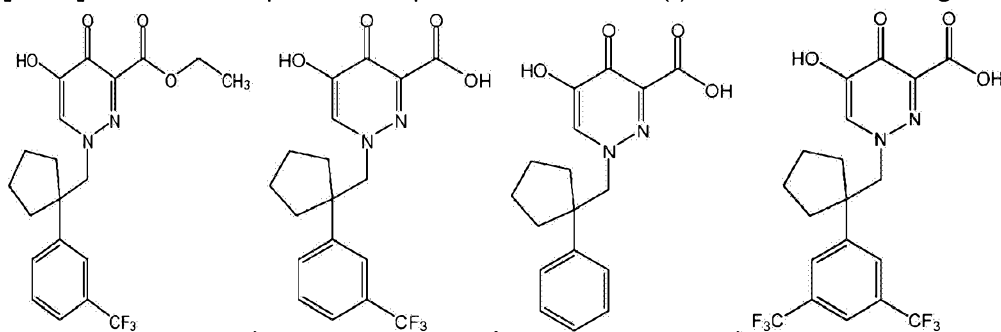
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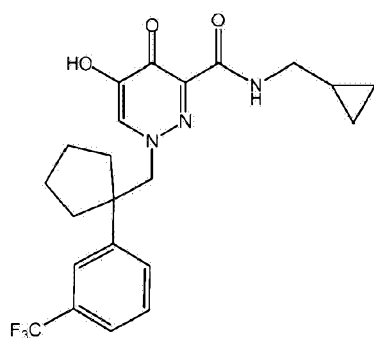


or a pharmaceutically acceptable salt of any of the foregoing.

**[0102]** Further examples of compounds of Formula (I) include the following:

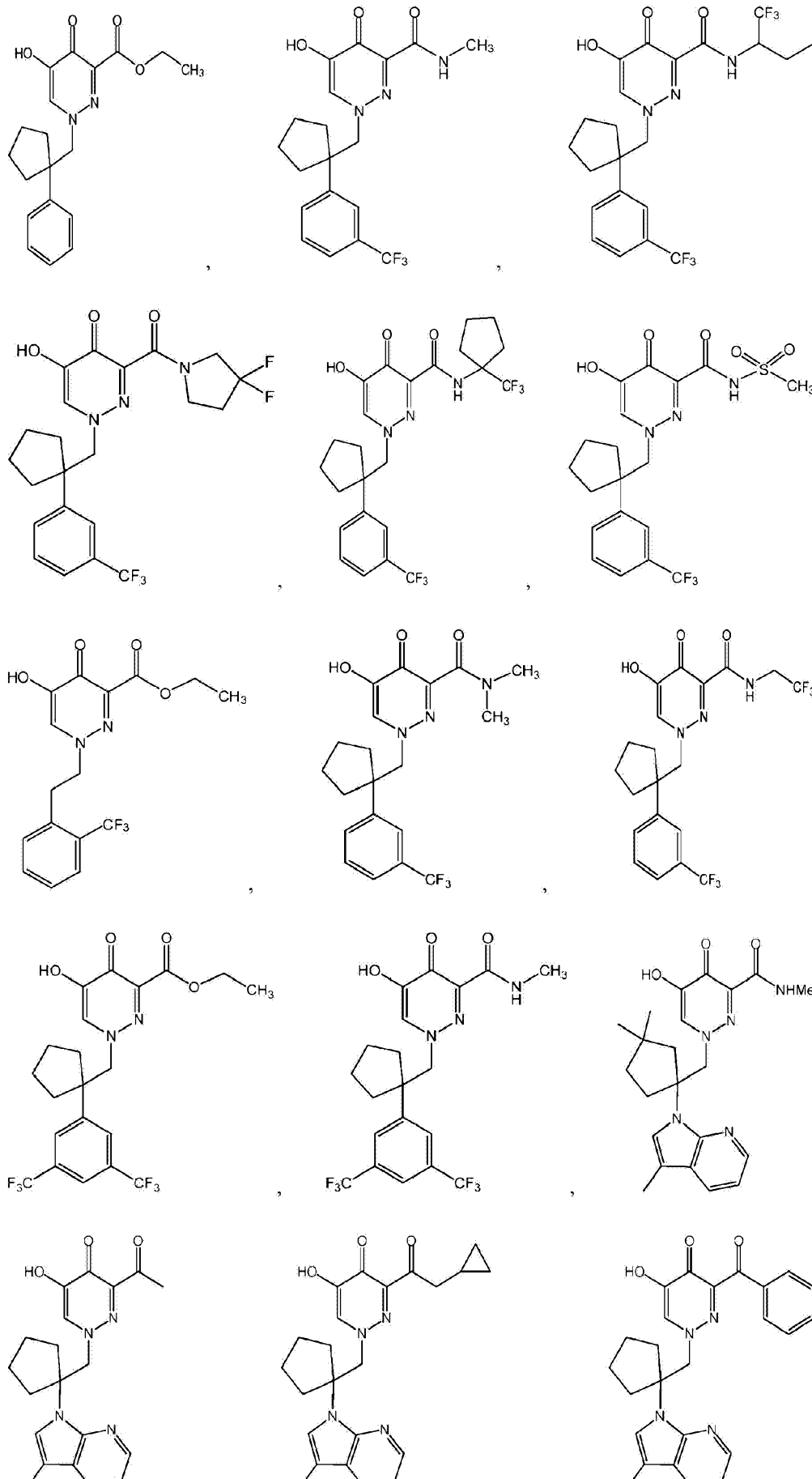


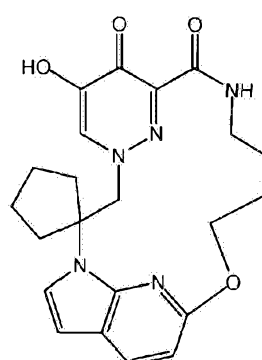
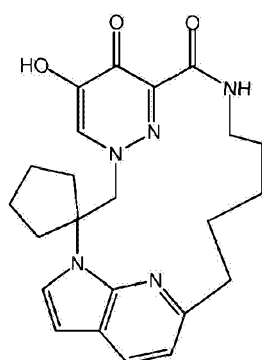
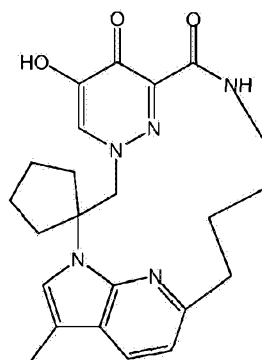
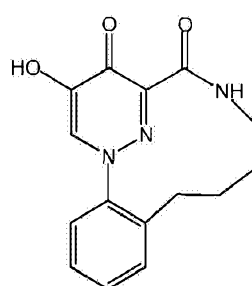
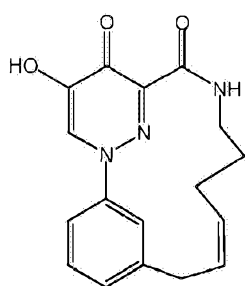
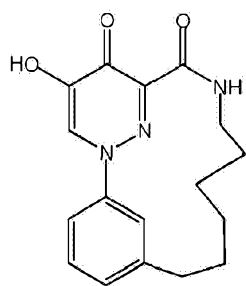
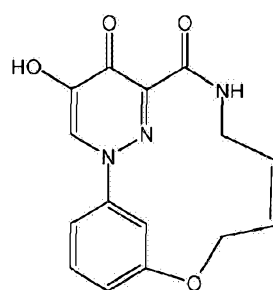
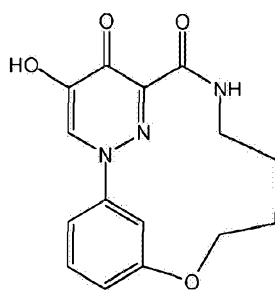
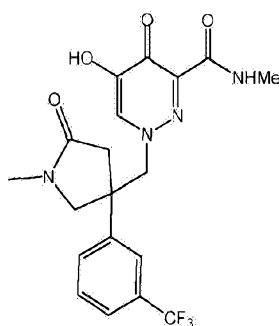
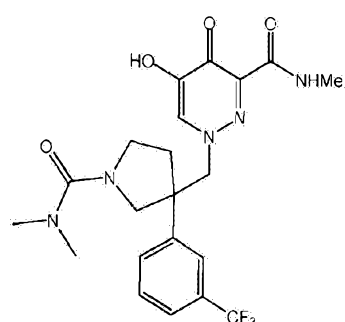
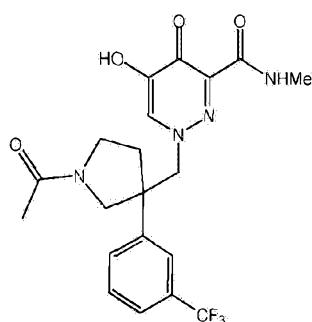
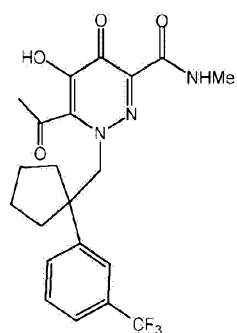
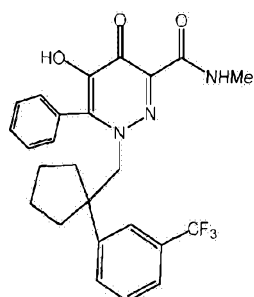
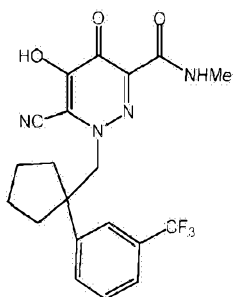
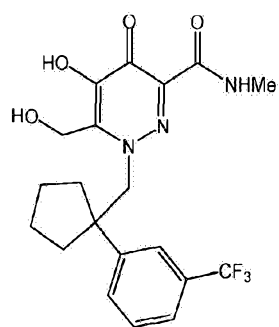
and



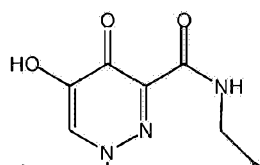
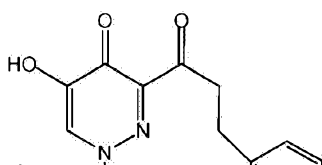
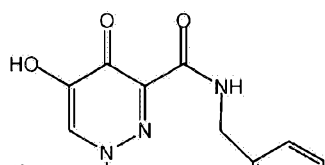
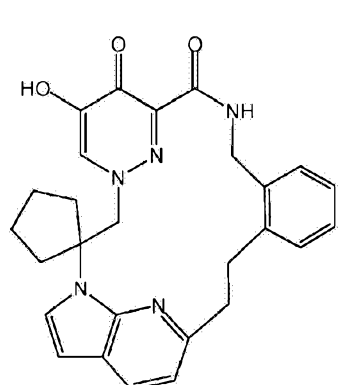
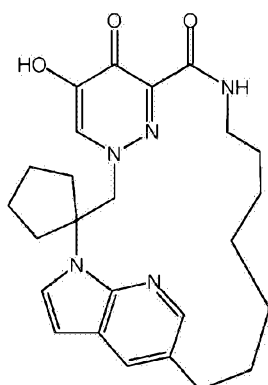
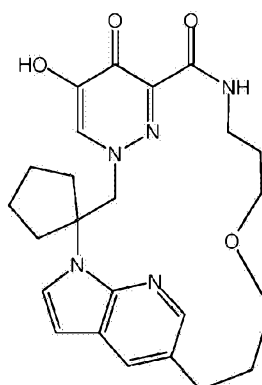
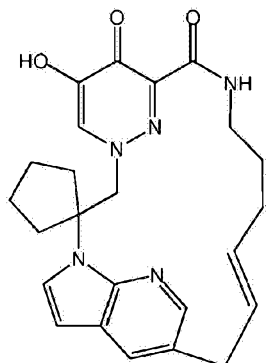
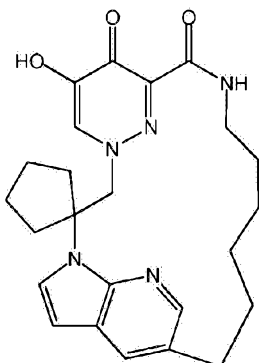
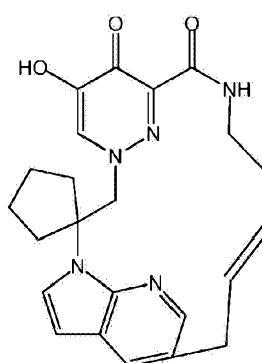
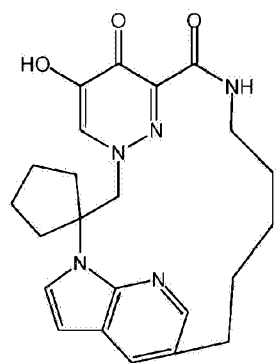
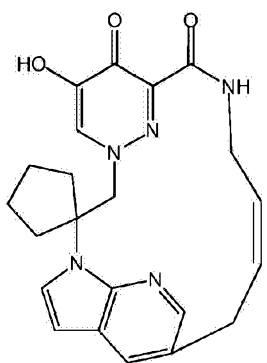
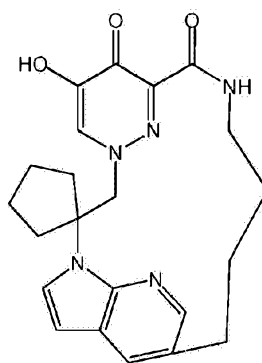
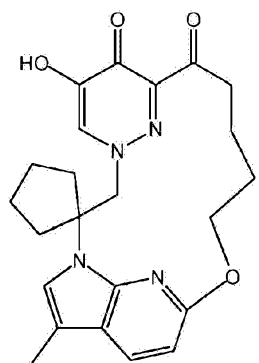
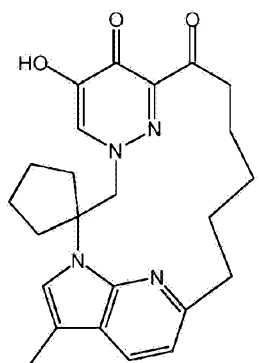
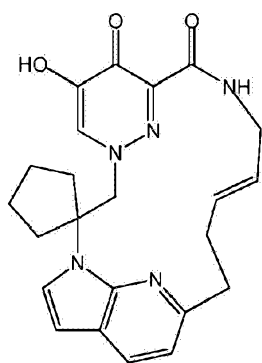
or a pharmaceutically acceptable salt of any of the foregoing.

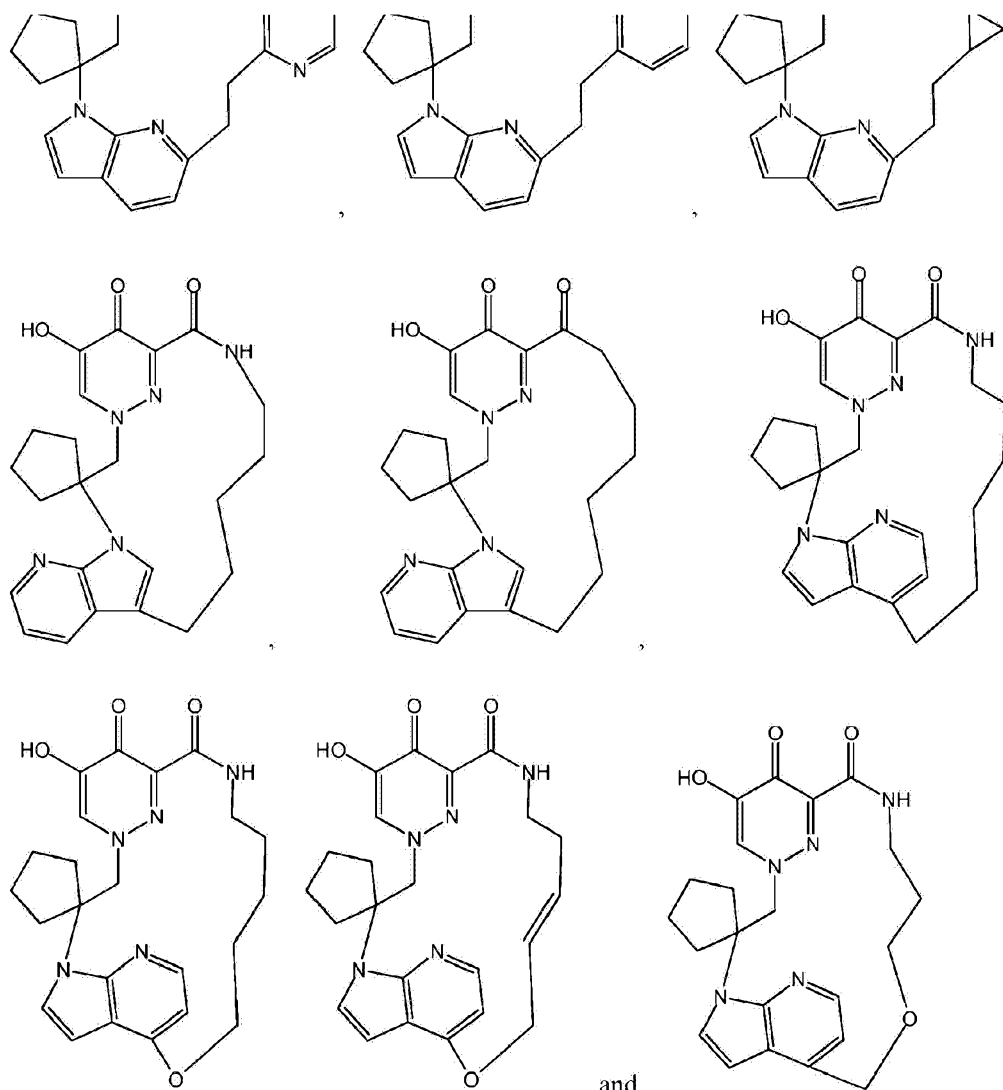
[0103] Examples of compounds of Formula (I) include the following:





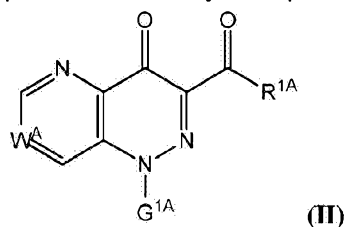




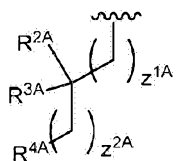


or a pharmaceutically acceptable salt of any of the foregoing.

**[0104]** Some embodiments disclosed herein relate to a compound of Formula (II), or a pharmaceutically acceptable salt thereof,



wherein:  $G^{1A}$  can be selected from



and  $R^{5A}$ ;  $R^{1A}$  can be selected from  $OR^{6A}$ ,  $NH_2$ , an optionally substituted alkyl, an optionally substituted aryl, an optionally substituted mono-substituted amine, an optionally substituted di-substituted amine, an optionally substituted heterocyclyl and an optionally substituted N-

sulfonamido or  $R^{10A}$ ;  $W^A$  can be  $-CH-$  or  $-N-$ ;  $R^{2A}$  can be hydrogen or  $C_{1-6}$  alkyl;  $R^{3A}$  can be hydrogen or  $C_{1-6}$  alkyl; or  $R^{2A}$  and  $R^{3A}$  can be taken together to form an optionally substituted  $C_{3-6}$  cycloalkyl or an optionally substituted 5 to 6 membered heterocyclyl;  $R^{4A}$  can be selected from an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted cycloalkenyl, an optionally substituted heteroaryl and an optionally substituted heterocyclyl;  $R^{5A}$  can be selected from an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted cycloalkenyl, an optionally substituted heteroaryl and an optionally substituted heterocyclyl;  $R^{6A}$  can be selected from hydrogen,  $C_{1-6}$  alkyl,  $-C(O)R^{7A}$  and  $-C(O)NR^{8A}R^{9A}$ ;  $R^{7A}$  can be selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl);  $R^{8A}$  and  $R^{9A}$  can be independently selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl); or  $R^{8A}$  and  $R^{9A}$  can be taken together to form an optionally substituted heterocyclyl; wherein when  $R^{1A}$  is  $R^{10A}$ , then  $R^{10A}$  and  $R^{4A}$  can be taken together and include  $L^{1A}$ , wherein  $L^{1A}$  connects  $R^{10A}$  and  $R^{4A}$  to form an 11- to 20-membered ring, or wherein when  $R^{1A}$  is  $R^{10A}$ , then  $R^{10A}$  and  $R^{5A}$  can be taken together and include  $L^{1A}$ , wherein  $L^{1A}$  connects  $R^{10A}$  and  $R^{5A}$  to form an 11- to 20-membered ring; wherein  $R^{10A}$  is optionally substituted  $-CH_2-$ , optionally substituted  $-CH=CH-$ , O (oxygen), S (sulfur), or  $NR^{11A}$ ; wherein  $R^{11A}$  can be hydrogen or  $C_{1-6}$  alkyl; wherein  $L^{1A}$  is  $L^{2A}$  or  $-L^{3A}L^{4A}L^{5A}$ ;  $L^{2A}$  is selected from the group consisting of an optionally substituted alkylene, an optionally substituted alkenylene, an optionally substituted heteroalkylene and an optionally substituted heteroalkenylene;  $L^{3A}$  is an optionally substituted  $C_{1-6}$  alkylene;  $L^{4A}$  is an optionally substituted cycloalkyl, an optionally substituted aryl, an optionally substituted heteroaryl, an optionally substituted heterocyclyl, O (oxygen), S (sulfur) or  $NR^{11A}$ ; and  $L^{5A}$  is an optionally substituted  $C_{1-6}$  alkylene or an optionally substituted heteroalkylene; and  $Z^{1A}$  and  $Z^{2A}$  can be independently 0, 1, 2, 3 or 4.

**[0105]** Various groups can be present at  $R^{1A}$ . In some embodiments,  $R^{1A}$  can be  $OR^{6A}$ . For example, in some embodiments,  $R^{1A}$  can be hydroxy. In other embodiments, when  $R^{1A}$  is  $OR^{6A}$ ,  $R^{6A}$  can be  $C_{1-6}$  alkyl. In still other embodiments, when  $R^{1A}$  is  $OR^{6A}$ ,  $R^{6A}$  can be  $-C(O)R^{7A}$ . Example of suitable  $R^{7A}$  groups include, but are not limited to, hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In yet still other embodiments, when  $R^{1A}$  is  $OR^{6A}$ ,  $R^{6A}$  can be  $-C(O)NR^{8A}R^{9A}$ .  $R^{8A}$  and  $R^{9A}$  can be independently various substituents, such as hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) or heterocyclyl( $C_{1-6}$  alkyl). In

some embodiments,  $R^{8A}$  and  $R^{9A}$  can be taken together to form an optionally substituted heterocyclyl. Examples of suitable optionally substituted heterocyclyls that can be formed from  $R^{8A}$  and  $R^{9A}$  include 5 to 6 membered heterocyclyls. In some embodiments,  $R^{6A}$  can be hydrogen,  $C_{1-6}$  alkyl, an acyl or C-amido. In some embodiments,  $R^{6A}$  can be hydrogen,  $-C(O)R^{7A}$  and  $-C(O)NR^{8A}R^{9A}$ . In other embodiments,  $R^{6A}$  can be  $-C(O)R^{7A}$  and  $-C(O)NR^{8A}R^{9A}$ .

**[0106]** In some embodiments,  $R^{1A}$  can be  $NH_2$ . In other embodiments,  $R^{1A}$  can be an optionally substituted mono-substituted amine. An example of a suitable mono-substituted amine is a group having the formula of  $-NHR^{1Aa}$ , wherein  $R^{1Aa}$  can be selected from alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In some embodiments,  $R^{1Aa}$  can be selected from alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In other embodiments,  $R^{1Aa}$  can be selected from alkyl, aryl, and aryl( $C_{1-6}$  alkyl). When  $R^{1A}$  is a mono-substituted amine having the formula  $-NHR^{1Aa}$ ,  $R^{1Aa}$  can be a substituted or unsubstituted group.

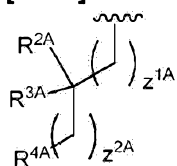
**[0107]** In other embodiments,  $R^{1A}$  can be an optionally substituted di-substituted amine. For example,  $R^{1A}$  can be a group having the formula of  $-NR^{1Bb}R^{1Cc}$ , wherein  $R^{1Bb}$  and  $R^{1Cc}$  can be independently selected from alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In some embodiments,  $R^{1Bb}$  and  $R^{1Cc}$  can be independently selected from alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$  alkyl), heteroaryl( $C_{1-6}$  alkyl) and heterocyclyl( $C_{1-6}$  alkyl). In other embodiments,  $R^{1Bb}$  and  $R^{1Cc}$  can be independently selected from alkyl, aryl, and aryl( $C_{1-6}$  alkyl). In some embodiments,  $R^{1Bb}$  and  $R^{1Cc}$  can be the same. In other embodiments,  $R^{1Bb}$  and  $R^{1Cc}$  can be different. When  $R^{1A}$  is a di-substituted amine having the formula  $-NR^{1Bb}R^{1Cc}$ ,  $R^{1Bb}$  and  $R^{1Cc}$  can be substituted or unsubstituted groups.

**[0108]** In still other embodiments,  $R^{1A}$  can be an optionally substituted heterocyclyl. Various heterocyclyls can be used and can be connected either through a ring carbon or a ring heteroatom. In some embodiments, the heterocyclyl can be a 5 to 6 membered heterocyclyl. In some embodiments, the heterocyclyl can include 1 heteroatom. In other embodiments, the heterocyclyl can include 2 heteroatoms, wherein the heteroatoms can be the same or different. In some embodiments,  $R^{1A}$  can be an optionally substituted heterocyclyl that contains at least one nitrogen in the ring and is an N-linked heterocyclyl. In some embodiments,  $R^{1A}$  can be an unsubstituted heterocyclyl. In some embodiments,  $R^{1A}$  can be a substituted heterocyclyl.

**[0109]** In still other embodiments,  $R^{1A}$  can be an optionally substituted N-sulfonamido. In some

embodiments, when  $R^{1A}$  is an optionally substituted N-sulfonamido, the groups attached to the sulfur can be independently selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). An example of suitable structure for the optionally substituted N-sulfonamido is  $-NHS(O)_2R^{1Dd}$ , wherein  $R^{1Dd}$  can be selected from hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In some embodiments,  $R^{1Dd}$  can be selected from alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub> alkyl), heteroaryl(C<sub>1-6</sub> alkyl) and heterocyclyl(C<sub>1-6</sub> alkyl). In other embodiments,  $R^{1Dd}$  can be selected from alkyl, aryl, and aryl(C<sub>1-6</sub> alkyl). When  $R^{1A}$  is a N-sulfonamido having the formula  $-NHS(O)_2R^{1Dd}$ ,  $R^{1Dd}$  can be a substituted or unsubstituted group.

**[0110]** In some embodiments,  $G^{1A}$  can be



In some embodiments,  $R^{2A}$  can be hydrogen. In other embodiments,  $R^{2A}$  can be a C<sub>1-6</sub> alkyl. Examples of suitable C<sub>1-6</sub> alkyl include methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, tert-butyl, straight or branched pentyl and straight or branched hexyl. In some embodiments,  $R^{3A}$  can be hydrogen. In other embodiments,  $R^{3A}$  can be a C<sub>1-6</sub> alkyl. In some embodiments,  $R^{2A}$  and  $R^{3A}$  can be the same. In other embodiments,  $R^{2A}$  and  $R^{3A}$  can be different. In some embodiments,  $R^{2A}$  and  $R^{3A}$  can both be hydrogen. In other embodiments,  $R^{2A}$  and  $R^{3A}$  can both be a C<sub>1-6</sub> alkyl. For example,  $R^{2A}$  and  $R^{3A}$  can both be methyl. Alternatively, in some embodiments,  $R^{2A}$  and  $R^{3A}$  can be taken together to form an optionally substituted C<sub>3-6</sub> cycloalkyl. Suitable cycloalkyls include cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. When  $R^{2A}$  and  $R^{3A}$  are taken together, the cycloalkyl group can be unsubstituted. In the alternative, the cycloalkyl group can be substituted with one or more substituents. In some embodiments,  $R^{2A}$  and  $R^{3A}$  can be taken together to form an optionally substituted C<sub>5</sub> cycloalkyl. In some embodiments,  $R^{2A}$  and  $R^{3A}$  can be taken together to form an unsubstituted C<sub>5</sub> cycloalkyl. In other embodiments,  $R^{2A}$  and  $R^{3A}$  can be taken together to form a mono-substituted or di-substituted C<sub>5</sub> cycloalkyl. In some embodiments,  $R^{2A}$  and  $R^{3A}$  can be taken together to form an optionally substituted 5 to 6 membered heterocyclyl. Examples of heterocyclyls that can be formed include, but are not limited to, optionally substituted nitrogen containing 5 to 6 membered heterocyclyls. In some embodiments,  $R^{2A}$  and  $R^{3A}$  can be taken together to form an optionally substituted 5 to 6 membered N-linked heterocyclyl, for example, an optionally substituted piperidino or an optionally substituted pyrrolidino.

**[0111]** Various groups can be  $R^{4A}$ . In some embodiments,  $R^{4A}$  can be an optionally substituted aryl. In some embodiments,  $R^{4A}$  can be an optionally substituted naphthyl. In other embodiments,  $R^{4A}$  can be an optionally substituted phenyl. In some embodiments,  $R^{4A}$  can be an unsubstituted phenyl. In other embodiments,  $R^{4A}$  can be a substituted phenyl. One or more groups can be present on a substituted phenyl. For example, the substituted phenyl can be a mono-substituted phenyl, such as an ortho-substituted phenyl, a meta-substituted phenyl or a para-substituted phenyl. As another example, the substituted phenyl can be a di-substituted phenyl, such as a 2,5-di-substituted phenyl, 2,4-di-substituted phenyl and 2,3-di-substituted phenyl. In some embodiments, the substituted phenyl can be substituted with 3 or more substituent.

**[0112]** In other embodiments,  $R^{4A}$  can be an optionally substituted cycloalkyl or an optionally substituted cycloalkenyl. For example,  $R^{4A}$  can be an optionally substituted  $C_{4-6}$  cycloalkyl. In some embodiments,  $R^{4A}$  can be an unsubstituted cycloalkyl. In other embodiments,  $R^{4A}$  can be a substituted cycloalkyl.

**[0113]** In still other embodiments,  $R^{4A}$  can be an optionally substituted heteroaryl. In some embodiments,  $R^{4A}$  can be an unsubstituted heteroaryl. In other embodiments,  $R^{4A}$  can be a substituted heteroaryl. Examples of suitable heteroaryls are described herein. In some embodiments,  $R^{4A}$  can be an optionally substituted monocyclic heteroaryl. In other embodiments,  $R^{4A}$  can be an optionally substituted bicyclic heteroaryl, for example, an optionally substituted 1H-pyrrolo[2,3-b]pyridine.

**[0114]** In yet still other embodiments,  $R^{4A}$  can be an optionally substituted heterocyclyl. In some embodiments,  $R^{4A}$  can be an unsubstituted heterocyclyl. In other embodiments,  $R^{4A}$  can be a substituted heterocyclyl. In some embodiments,  $R^{4A}$  can be an optionally substituted monocyclic heterocyclyl. In other embodiments,  $R^{4A}$  can be an optionally substituted bicyclic heterocyclyl.

**[0115]** When  $R^{4A}$  is substituted, one or more groups can be present. When two or more of the substituents are present, two or more of the substituents can be the same. In some embodiments, when multiple substituents are present on  $R^{4A}$ , at least one of the substituents is different from the remaining substituents. In some embodiments, all of the substituents present on  $R^{4A}$  are different. In some embodiments,  $R^{4A}$  can be substituted with one or more substituents selected from halogen,  $C_{1-6}$  alkyl, alkoxy, aryloxy, haloalkyl, haloalkoxy, hydroxyalkyl, N-sulfonamido, S-sulfonamido, sulfonyl, an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted heterocyclyl, carbonyl, C-carboxy,  $-CH_2-$ (mono-substituted amine) and  $CH_2-$ (di-substituted amine). In some embodiments, when  $R^{4A}$  is a substituted aryl, the aryl can be substituted with one or more groups selected from  $C_1-$

<sub>6</sub> alkyl, alkoxy, aryl (for example, phenyl), cyano, halogen, haloalkyl and haloalkoxy. In some embodiments, when R<sup>4A</sup> is a substituted cycloalkyl, the cycloalkyl can be substituted with C<sub>1-6</sub> alkyl, alkoxy, halogen and haloalkyl. In some embodiments, when R<sup>4A</sup> is a substituted heterocyclyl, the heterocyclyl can be substituted with C<sub>1-6</sub> alkyl, alkoxy, halogen, haloalkyl, aryl(C<sub>1-6</sub> alkyl) and C-carboxy. In some embodiments, the substituted heterocyclyl of R<sup>4A</sup> can be substituted with a substituted or an unsubstituted benzyl.

**[0116]** The pyridazinone ring can be connected to R<sup>4A</sup> via a substituted or unsubstituted alkylene. In some embodiments, Z<sup>1A</sup> can be 0. In other embodiments, Z<sup>1A</sup> can be 1. In still other embodiments, Z<sup>1A</sup> can be 2. In yet still other embodiments, Z<sup>1A</sup> can be 3. In some embodiments, Z<sup>1A</sup> can be 4. In some embodiments, Z<sup>2A</sup> can be 0. In other embodiments, Z<sup>2A</sup> can be 1. In still other embodiments, Z<sup>2A</sup> can be 2. In yet still other embodiments, Z<sup>2A</sup> can be 3. In some embodiments, Z<sup>2A</sup> can be 4. In some embodiments, Z<sup>1A</sup> can be 1, and Z<sup>2A</sup> can be 0. In other embodiments, Z<sup>1A</sup> and Z<sup>2A</sup> can be both 1. In still other embodiments, Z<sup>1A</sup> and Z<sup>2A</sup> can be both >1. In yet still other embodiments, at least one of Z<sup>1A</sup> and Z<sup>2A</sup> can be 1. In some embodiments, at least one of Z<sup>1A</sup> and Z<sup>2A</sup> can be 1, and the other of Z<sup>1A</sup> and Z<sup>2A</sup> can be >1.

**[0117]** In other embodiments, G<sup>1A</sup> can be R<sup>5A</sup>. As with R<sup>4A</sup>, R<sup>5A</sup> can be a variety of groups. In some embodiments, R<sup>5A</sup> can be an optionally substituted aryl. In some embodiments, R<sup>5A</sup> can be an optionally substituted naphthyl. In other embodiments, R<sup>5A</sup> can be an optionally substituted phenyl. In some embodiments, R<sup>5A</sup> can be an unsubstituted phenyl. In other embodiments, R<sup>5A</sup> can be a substituted phenyl. One or more groups can be present on a substituted phenyl. For example, the substituted phenyl can be a mono-substituted phenyl, such as an ortho-substituted phenyl, a meta-substituted phenyl or a para-substituted phenyl. As another example, the substituted phenyl can be a di-substituted phenyl, such as a 2,5-di-substituted phenyl, 2,4-di-substituted phenyl and 2,3-di-substituted phenyl. In some embodiments, the substituted phenyl can be substituted with 3 or more substituents.

**[0118]** In other embodiments, R<sup>5A</sup> can be an optionally substituted cycloalkyl or an optionally substituted cycloalkenyl. For example, R<sup>5A</sup> can be a substituted or an unsubstituted C<sub>4-6</sub> cycloalkyl. In some embodiments, R<sup>5A</sup> can be an unsubstituted cycloalkyl. In other embodiments, R<sup>5A</sup> can be a substituted cycloalkyl.

**[0119]** In still other embodiments, R<sup>5A</sup> can be an optionally substituted heteroaryl. In some embodiments, R<sup>5A</sup> can be an unsubstituted heteroaryl. In other embodiments, R<sup>5A</sup> can be a substituted heteroaryl. In some embodiments, R<sup>5A</sup> can be an optionally substituted monocyclic heteroaryl. In other embodiments, R<sup>5A</sup> can be an optionally substituted bicyclic heteroaryl.

**[0120]** In yet still other embodiments,  $R^{5A}$  can be an optionally substituted heterocyclyl. In some embodiments,  $R^{5A}$  can be an unsubstituted heterocyclyl. In other embodiments,  $R^{5A}$  can be a substituted heterocyclyl. In some embodiments,  $R^{5A}$  can be an optionally substituted monocyclic heterocyclyl. In other embodiments,  $R^{5A}$  can be an optionally substituted bicyclic heterocyclyl.

**[0121]** When  $R^{5A}$  is substituted, one or more groups can be present. When two or more of the substituents are present, two or more of the substituents can be the same. In some embodiments, when multiple substituents are present on  $R^{5A}$ , at least one of the substituents is different from the remaining substituents. In some embodiments, all of the substituents present on  $R^{5A}$  are different. In some embodiments,  $R^{5A}$  can be substituted with one or more substituents selected from halogen,  $C_{1-6}$  alkyl, alkoxy, aryloxy, haloalkyl, haloalkoxy, hydroxyalkyl, N-sulfonamido, S-sulfonamido, sulfonyl, an optionally substituted aryl, an optionally substituted cycloalkyl, an optionally substituted heterocyclyl, carbonyl, C-carboxy,  $-CH_2$ -(mono-substituted amine) and  $CH_2$ -(di-substituted amine). In some embodiments, when  $R^{5A}$  is a substituted aryl, the aryl can be substituted with one or more groups selected from  $C_{1-6}$  alkyl, alkoxy, halogen and haloalkyl. In other embodiments, when  $R^{5A}$  is a substituted aryl, the aryl can be substituted with one or more groups selected from  $C_{1-6}$  alkyl, alkoxy, aryl (for example, phenyl), cyano, halogen, haloalkyl and haloalkoxy. In some embodiments, when  $R^{5A}$  is a substituted cycloalkyl, the cycloalkyl can be substituted with  $C_{1-6}$  alkyl, alkoxy, halogen and haloalkyl. In some embodiments, when  $R^{5A}$  is a substituted heterocyclyl, the heterocyclyl can be substituted with  $C_{1-6}$  alkyl, alkoxy, halogen, haloalkyl, aryl( $C_{1-6}$  alkyl) and C-carboxy. In some embodiments, the substituted heterocyclyl of  $R^{5A}$  can be substituted with a substituted or an unsubstituted benzyl.

**[0122]** In some embodiments,  $R^{1A}$  is not mono-substituted amine, such as  $-NH$ -alkyl. In other embodiments,  $R^{1A}$  is not di-substituted amine. For example, in some embodiments,  $R^{1A}$  is not  $-N(alkyl)_2$ , including  $-N(CH_3)_2$ . In some embodiments,  $R^{6A}$  is not  $C_{1-6}$  alkyl. In still other embodiments,  $R^{1A}$  is not an optionally substituted heterocyclyl. In other embodiments,  $R^{1A}$  is not an optionally substituted N-linked heterocyclyl.

**[0123]** In some embodiments, the fused bicyclic nitrogen-containing ring system of Formula (II) can be connected to  $R^{4A}$  to form a cyclic compound, for example, a compound of Formula (Ih). In other embodiments, the fused bicyclic nitrogen-containing ring system of Formula (II) can be connected to  $R^{5A}$  to form a cyclic compound, such as a compound of Formula (Ij). In some embodiments, when  $R^{1A}$  is  $R^{10A}$ , then  $R^{10A}$  and  $R^{4A}$  can be taken together and include  $L^{1A}$ , wherein  $L^{1A}$  connects  $R^{10A}$  and  $R^{4A}$  to form an 11- to 20-membered ring, or wherein when  $R^{1A}$



is  $R^{10A}$ , then  $R^{10A}$  and  $R^{5A}$  can be taken together and include  $L^{1A}$ , wherein  $L^{1A}$  connects  $R^{10A}$  and  $R^{5A}$  to form an 11- to 20-membered ring; wherein  $R^{10A}$  can be an optionally substituted  $-CH_2-$ , an optionally substituted  $-CH=CH-$ , O (oxygen), S (sulfur), or  $NR^{11A}$ ; and wherein  $R^{11A}$  can be hydrogen or  $C_{1-6}$  alkyl. In some embodiments,  $R^{10A}$  can be  $NR^{11A}$ . For example,  $R^{10A}$  can be NH. In other embodiments,  $R^{10A}$  can be an optionally substituted  $-CH_2-$ . In still other embodiments,  $R^{10A}$  can be O (oxygen). In yet still other embodiments,  $R^{10A}$  can be S (sulfur).

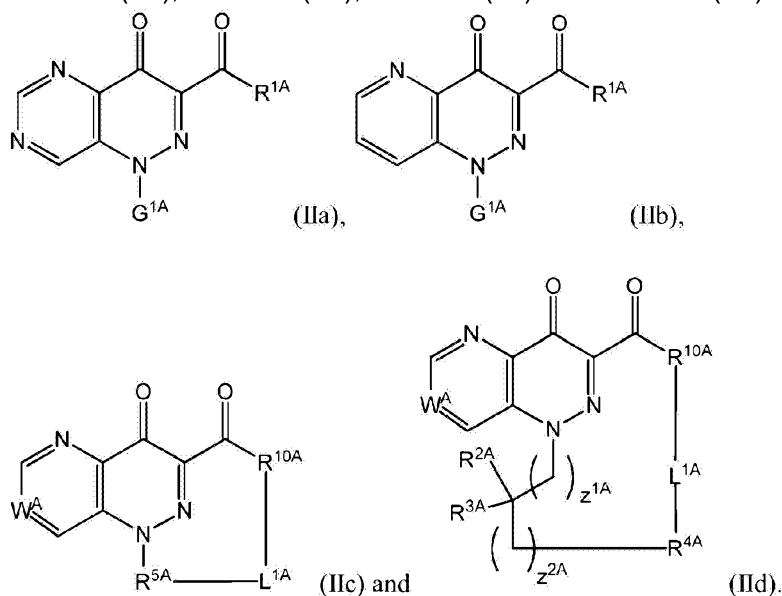
**[0124]** With respect to  $L^{1A}$ , in some embodiments,  $L^{1A}$  can be  $-L^{2A}-$ . In some embodiments, when  $L^{1A}$  is  $-L^{2A}-$ ,  $L^{2A}$  can be selected from an optionally substituted alkylene, an optionally substituted alkenylene, an optionally substituted heteroalkylene and an optionally substituted heteroalkenylene. In some embodiments,  $L^{2A}$  can be an optionally substituted alkylene, for example, an optionally substituted  $C_{4-7}$  alkylene. In other embodiments,  $L^{2A}$  can be an optionally substituted alkenylene, such as an optionally substituted  $C_{4-7}$  alkenylene. In still other embodiments,  $L^{2A}$  can be an optionally substituted heteroalkylene. Examples of suitable optionally substituted heteroalkylenes include the following: an optionally substituted  $-(CH_2)_3-O-$ , an optionally substituted  $-(CH_2)_4-O-$ , an optionally substituted  $-(CH_2)_5-O-$ , an optionally substituted  $-(CH_2)_3-S-$ , an optionally substituted  $-(CH_2)_4-S-$ , an optionally substituted  $-(CH_2)_5-S-$ , an optionally substituted  $-(CH_2)_3-NH-$ , an optionally substituted  $-(CH_2)_4-NH-$ , and an optionally substituted  $-(CH_2)_5-NH-$ . In yet still other embodiments,  $L^{2A}$  can be an optionally substituted heteroalkenylene, such as an optionally substituted  $-(CH_2)(CH=CH)(CH_2)-O-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)-O-$ , an optionally substituted  $-(CH_2)(CH=CH)(CH_2)_2-O-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)_2-O-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)-S-$ , an optionally substituted  $-(CH_2)(CH=CH)(CH_2)_2-S-$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)_2-S$ , an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)-NH-$ , an optionally substituted  $-(CH_2)(CH=CH)(CH_2)_2-NH-$  and an optionally substituted  $-(CH_2)_2(CH=CH)(CH_2)_2-NH-$ . In some embodiments,  $L^{2A}$  can be an optionally substituted  $-(CH_2)_3-O-$ , an optionally substituted  $-(CH_2)_4-O-$ , or an optionally substituted  $-(CH_2)_5-O-$ . In other embodiments,  $L^{2A}$  can be an optionally substituted  $C_3$  oxygen-containing heteroalkenylene, an optionally substituted  $C_4$  oxygen-containing heteroalkenylene, or an optionally substituted  $C_5$  oxygen-containing heteroalkenylene.

**[0125]** In other embodiments,  $L^{1A}$  can be  $-L^{3A}-L^{4A}-L^{5A}-$ , wherein  $L^{3A}$  can be an optionally substituted  $C_{1-6}$  alkylene;  $L^{4A}$  can be an optionally substituted cycloalkyl, an optionally substituted aryl, an optionally substituted heteroaryl, an optionally substituted heterocyclyl, O (oxygen), S (sulfur), or  $NR^{11A}$ ; and  $L^{5A}$  can be an optionally substituted  $C_{1-6}$  alkylene or an optionally substituted heteroalkylene. In some embodiments,  $L^{3A}$  can be an optionally

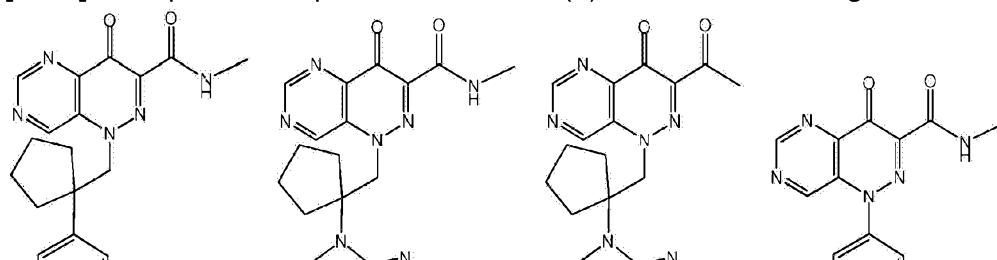
substituted  $C_{1-4}$  alkylene;  $L^{4A}$  can be optionally substituted cycloalkyl, optionally substituted aryl, or optionally substituted heteroaryl; and  $L^{5A}$  can be an optionally substituted  $C_{1-4}$  alkylene. In other embodiments,  $L^{3A}$  can be an optionally substituted  $C_{1-4}$  alkylene;  $L^{4A}$  can be O (oxygen), S (sulfur), or  $NR^{11A}$ ; and  $L^{5A}$  can be an optionally substituted  $C_{1-4}$  alkylene. In still other embodiments,  $L^{3A}$  can be optionally substituted  $C_{2-4}$  alkylene;  $L^{4A}$  can be optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted heterocyclyl, O (oxygen), S (sulfur), or  $NR^{11A}$ ; and  $L^{5A}$  can be optionally substituted  $C_{2-4}$  alkylene.

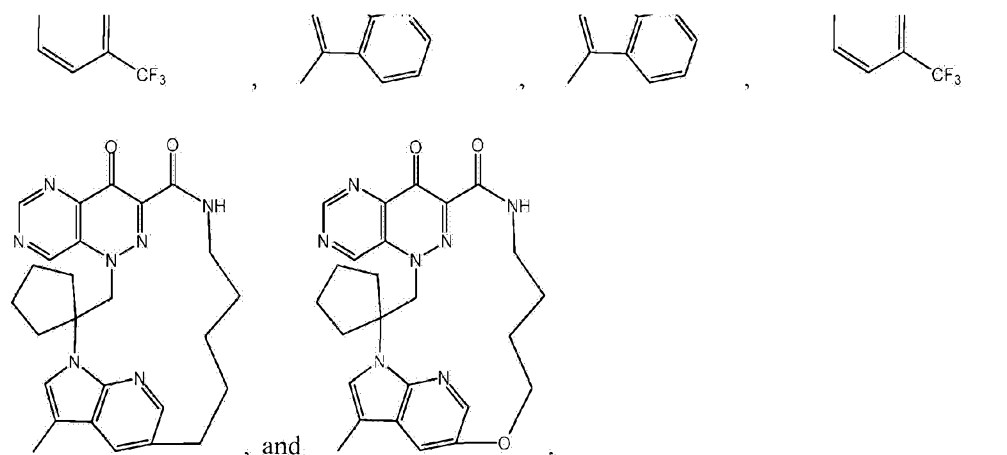
**[0126]** In some embodiments, including those disclosed herewith respect to Formula (II),  $W^A$  can be -N (nitrogen)-. In other embodiments, including those disclosed herewith respect to Formula (II),  $W^A$  can be  $-CH_2-$ . In some embodiments, one or more of the carbon atoms of the fused-bicyclic nitrogen-containing ring system of Formula (II) can be substituted. For example, one or both of the carbon atoms adjacent to  $W^A$  can be substituted carbon instead of -CH- and/or  $W^A$  can be substituted carbon instead of -CH-.

**[0127]** In some embodiments, a compound of Formula (II) can be a compound selected from Formula (IIa), Formula (IIb), Formula (IIc) and Formula (IId):



**[0128]** Examples of compounds of Formula (II) include the following:



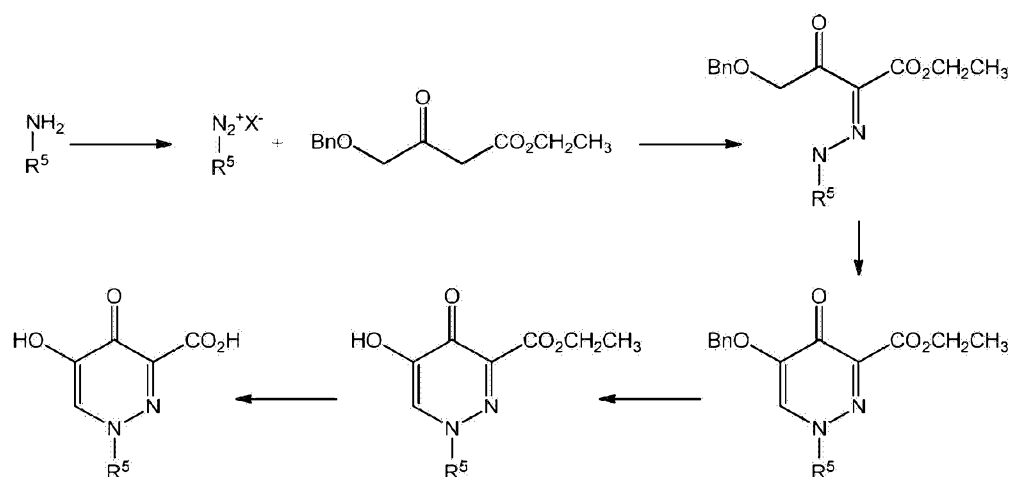


or a pharmaceutically acceptable salt of any of the foregoing.

### Synthesis

[0129] Compounds of Formulae (I) and (II), and those described herein may be prepared in various ways. Some compounds of Formulae (I) and (II) can be obtained commercially and/or prepared utilizing known synthetic procedures. General synthetic routes to the compounds of Formulae (I) and (II), and some examples of starting materials used to synthesize the compounds of Formulae (I) and (II) are shown and described herein. The routes shown and described herein are illustrative only and are not intended, nor are they to be construed, to limit the scope of the claims in any manner whatsoever. Those skilled in the art will be able to recognize modifications of the disclosed syntheses and to devise alternate routes based on the disclosures herein; all such modifications and alternate routes are within the scope of the claims.

#### Scheme 1

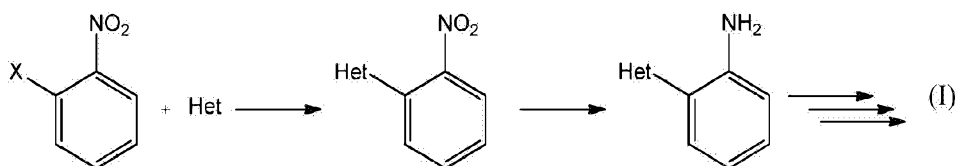


[0130] One method for forming a compound of Formula (I) where  $G^1$  is  $R^5$  is shown in Scheme 1. An amine having the formula of  $R^5-NH_2$  can be converted to a diazonium salt having the formula  $R^5-N_2^+X^-$ , wherein  $X^-$  is an inorganic or organic anion, using methods known to those

skilled in the art (for example,  $\text{NaNO}_2$ ,  $\text{HCl}$ ). When  $\text{R}^5$  is an optionally substituted phenyl group, the  $\text{R}^5\text{-NH}_2$  can be an optionally substituted aniline. The diazonium salt can undergo a diazonium coupling reaction with a beta-keto ester using methods and conditions known to those skilled in the art. An example of a suitable beta-keto ester is shown in Scheme 1, and examples of suitable conditions include mildly acidic or neutral conditions. The 6-membered pyridazinone ring can be formed via a cyclization reaction with N,N-dimethylformamide-dimethyl acetal (DMF-DMA). The benzyl group can be cleaved, and the ester group can be undergo hydrolysis to form a compound of Formula (I). Cleavage of the benzyl group can be accomplished using palladium on carbon (Pd/C). Hydrolysis of the ester can be achieved using NaOH. In some instances, the benzyl group can be cleaved prior to the hydrolysis of the ester group. In other instances, the ester group can be hydrolyzed to a carboxylic acid prior to cleavage of the benzyl group.

**[0131]** When  $\text{R}^5$  is substituted, a variety of methods can be used to add one or more substituents to  $\text{R}^5$ . For example, when  $\text{R}^5$  is substituted with an optionally substituted heterocyclyl, the optionally substituted heterocyclyl can be added via an addition-elimination reaction to a halogen substituted compound having the formula  $\text{R}^5\text{-NO}_2$ . In some embodiments, a halogen substituted  $\text{R}^5\text{-NO}_2$  can undergo ipso-substitution using an optionally substituted heterocyclyl. The resulting substituted nitro compound can be reduced to an amine using methods known to those skilled in the art (for example, Raney nickel,  $\text{PtO}_2$  or Pd/C). A compound of Formula (I) can then be obtained following the general reaction scheme shown in Scheme 1. A general scheme starting with an example of a nitro compound is provided in Scheme 2. In Scheme 2, the phenyl ring can be further substituted with one or more substituents.

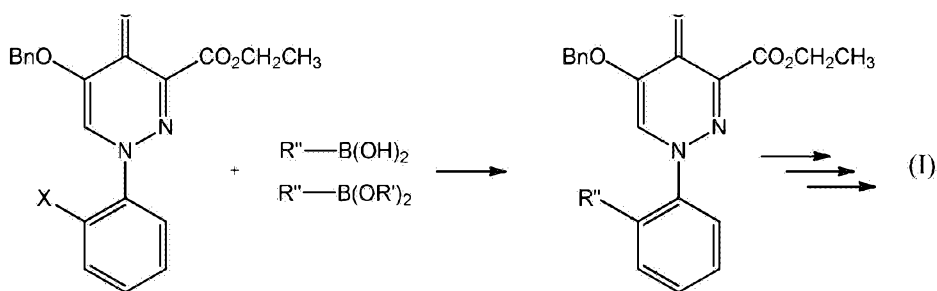
Scheme 2



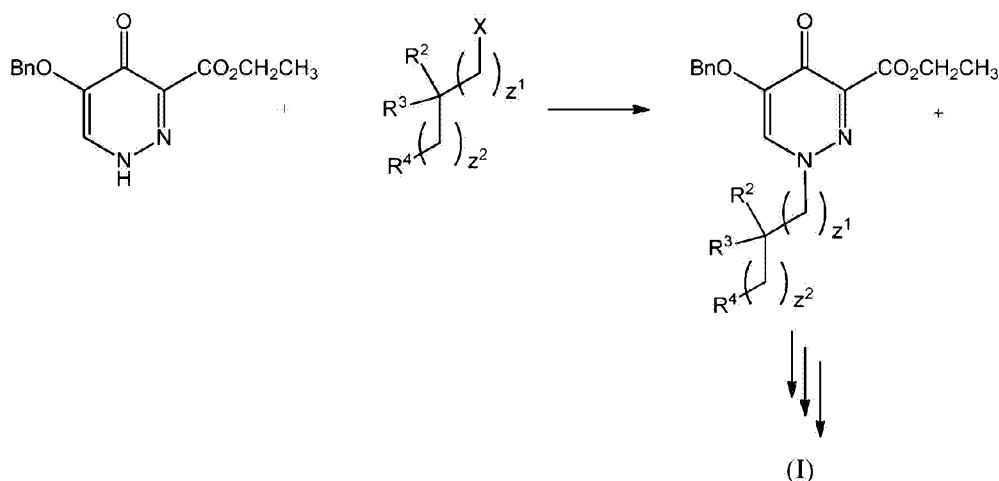
X = halogen and Het = optionally substituted heterocyclyl

**[0132]** Another method for adding one or more substituents to form a substituted  $\text{R}^5$  is using a boronic acid or boronic ester. In some embodiments, a boronic acid or boronic ester can be used in a Suzuki coupling type-reaction to add one or more substituents to  $\text{R}^5$ . Suitable conditions include using a palladium catalyst and a base (for example,  $\text{Pd(PPh}_3)_4$  and  $\text{K}_2\text{CO}_3$ ). A non-limiting example using a boronic acid or boronic ester to form a substituted  $\text{R}_5$  is shown in Scheme 3. In Scheme 3, the phenyl ring can be further substituted with one or more substituents. A compound of Formula (I) can be obtained via the general reaction scheme shown in Scheme 1. In Scheme 3, X can be a halogen and  $\text{R}''$  can be an optionally substituted alkyl or an optionally substituted aryl.

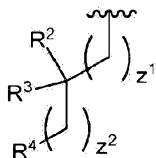
Scheme 3



Scheme 4



**[0133]** A method for forming a compound of Formula (I) where  $G^1$  is

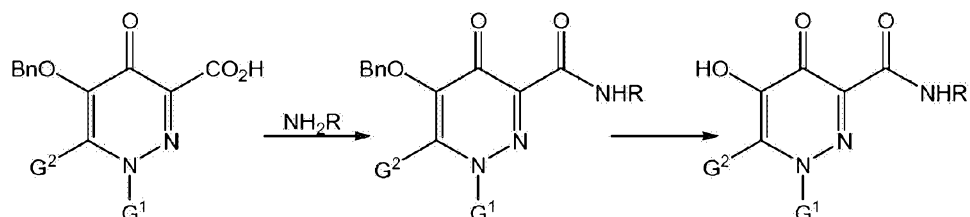


is shown in Scheme 4. As illustrated in Scheme 4, the nitrogen can be alkylated. A compound of Formula (I) can be obtained after the benzyl group is cleaved and the ester group undergoes hydrolysis.

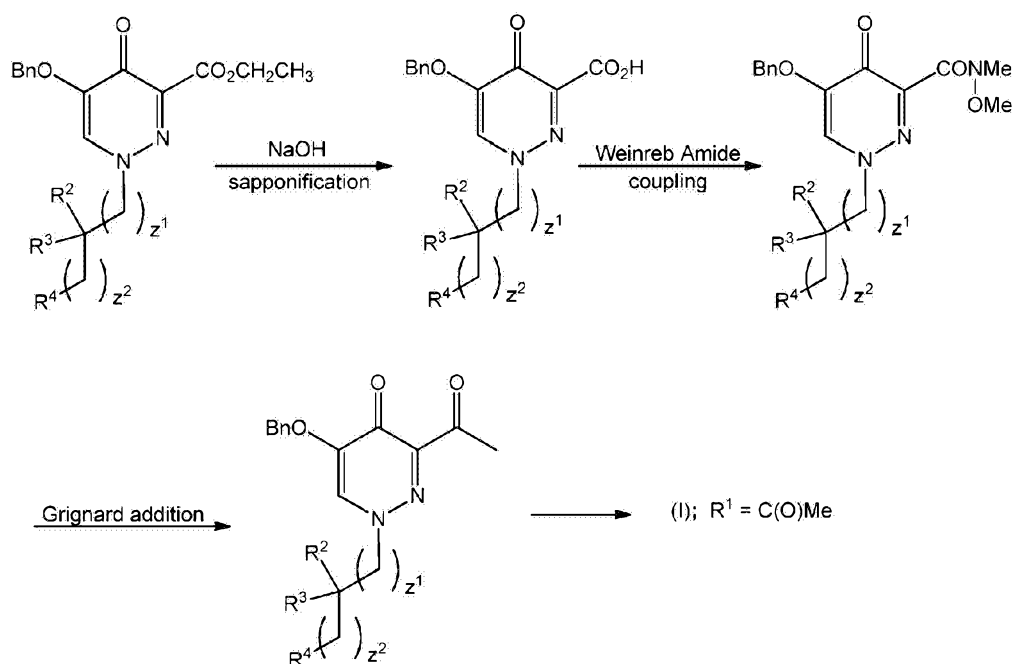
**[0134]** Various methods can be used to form a group other than a hydroxy or  $C_{1-6}$  alkoxy at  $R^1$ . The ester group can undergo hydrolysis to form a carboxylic acid. The carboxylic acid can then be transformed using methods known to those skilled in the art to form the desired  $R^1$  group. For example, an optionally substituted amine and the carboxylic acid group can undergo a coupling reaction to form an optionally substituted amide group. Suitable coupling reagents can be used, including 2-(1H-Benzotriazole-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate (HBTU). After formation of the  $R^1$  group, the benzyl group can be cleaved using methods known to those skilled in the art, including those described herein, and a compound of Formula (I) can be obtained. Scheme 5 shows a general reaction scheme for obtaining compounds of Formula (I) where  $R^1$  is a group other than a hydroxy or  $C_{1-6}$  alkoxy, and  $G^1$  and  $G^2$  are as defined above. Additional information with respect to preparing

compounds of Formula (I) is provided in U.S. Patent No. 4,345,934, U.S. Publication No. U.S. 2009/281107A1, U.S. Publication No. U.S. 2010/197651A1, PCT Publication No. WO 2011/120153, Miyamoto et al., Chem. Pharm. Bull., (1989) 37:93 and Miyamoto et al., Chem. Pharm. Bull., (1988) 36:1321.

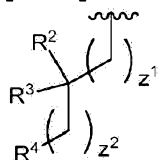
Scheme 5



Scheme 6

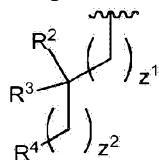


**[0135]** A method for forming a compound of Formula (I) where  $G^1$  may be



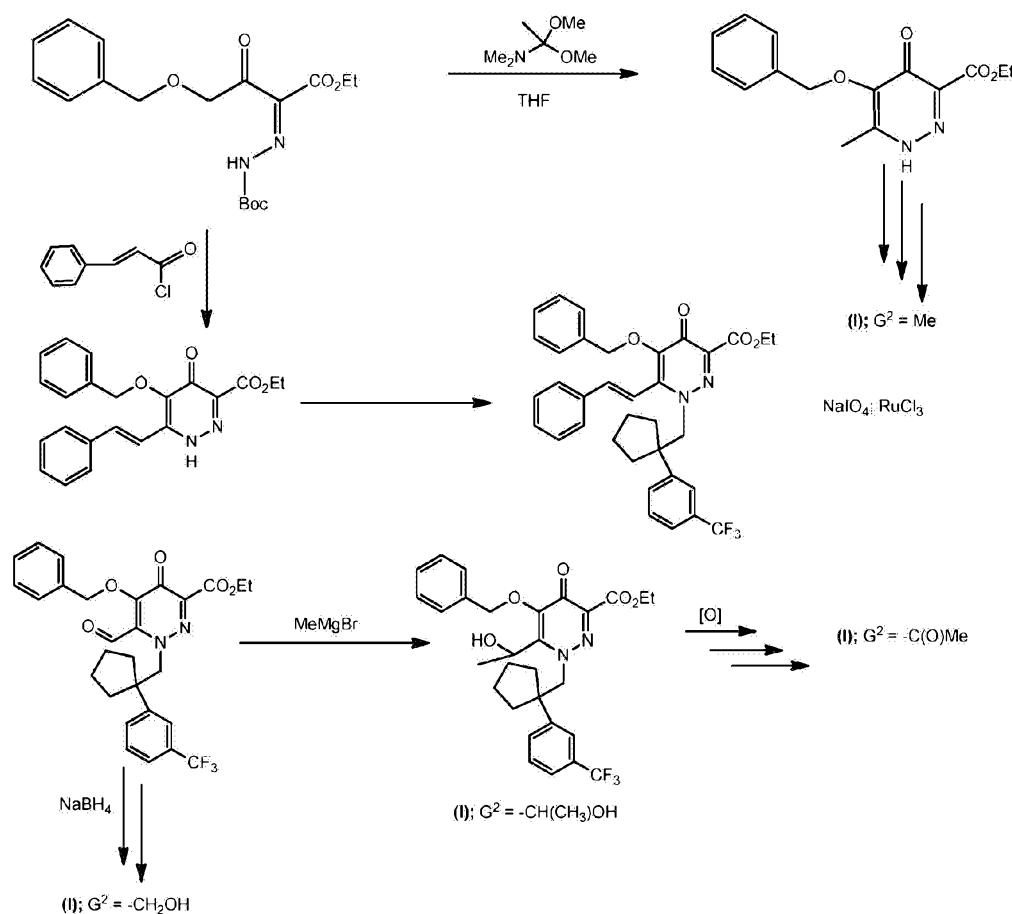
and  $R^1$  may be an alkyl, such as methyl, is shown in Scheme 6. As illustrated in Scheme 6, the ester group can undergo hydrolysis to form a carboxylic acid. The carboxylic acid can then be transformed using methods known to those skilled in the art to form the desired  $R^1$  group. For example, an amide and the carboxylic acid group can undergo a coupling reaction to form a substituted amide group. Examples of suitable amides include Weinreb amides, such as  $\text{HNMe(OMe)}$ . Suitable coupling reagents are known to those skilled in the art and include 2-(1H-Benzotriazole-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate (HBTU). The compound including the substituted amide group may be reacted with a suitable Grignard

reagent to form Formula (I), where  $G^1$  may be



and  $R^1$  may be an alkyl (for example, methyl). Additional information with respect to preparing compounds of Formula (I) is provided in Imada et al., J. Med. Chem., 2006, 49(13): 3809-3825, and Clark et al., Bioorg.Med.Chem.Lett., 2004, 14(12): 3299-3302.

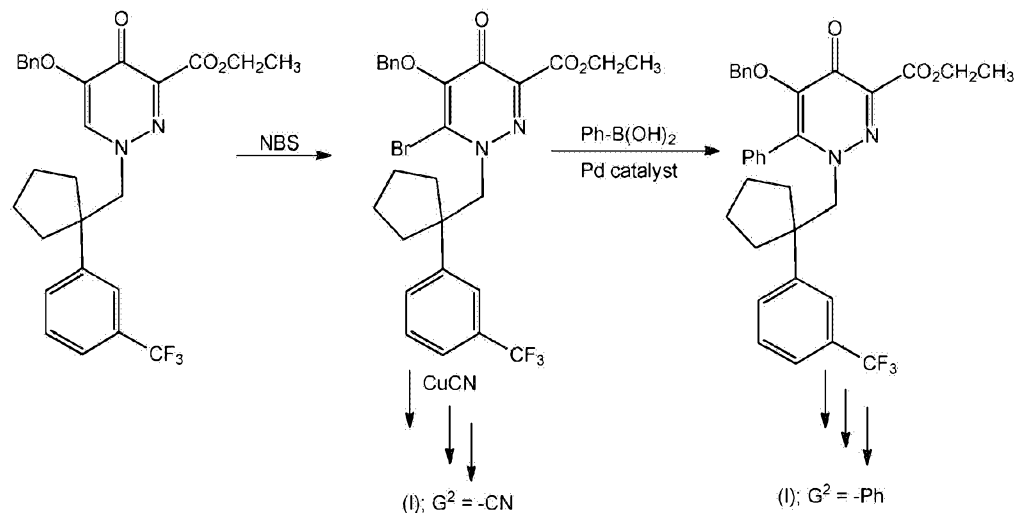
Scheme 7



**[0136]** Example methods for forming a compound of Formula (I) where  $G^2$  is an optionally substituted  $C_{1-6}$  alkyl;  $-CH_2OH$ ;  $-CH(Y^1)(OH)$ ,  $-C(O)Y^1$  are shown in Scheme 7. For instance, a 6-membered pyridazinone ring can be formed via a cyclization of the starting material with *N,N*-dimethylacetamide-dimethyl acetal or cinnamoyl chloride. An example of using cinnamoyl chloride is provided in U.S. Publication No. 2012/0022251. After cyclization, the 6-membered pyridazinone ring can be further modified to form a compound of Formula (I) where  $G^2$  is an optionally substituted  $C_{1-6}$  alkyl. The nitrogen of the 6-membered pyridazinone ring may be alkylated using methods known to those skilled in the art. To form compounds where  $G^2$  is a  $C_{1-6}$  alkyl;  $-CH_2OH$ ;  $-CH(Y^1)(OH)$ ,  $-C(O)Y^1$ , the exocyclic styrene alkene moiety may be oxidatively cleaved to afford an aldehyde, for example, via ozonolysis or using a sodium

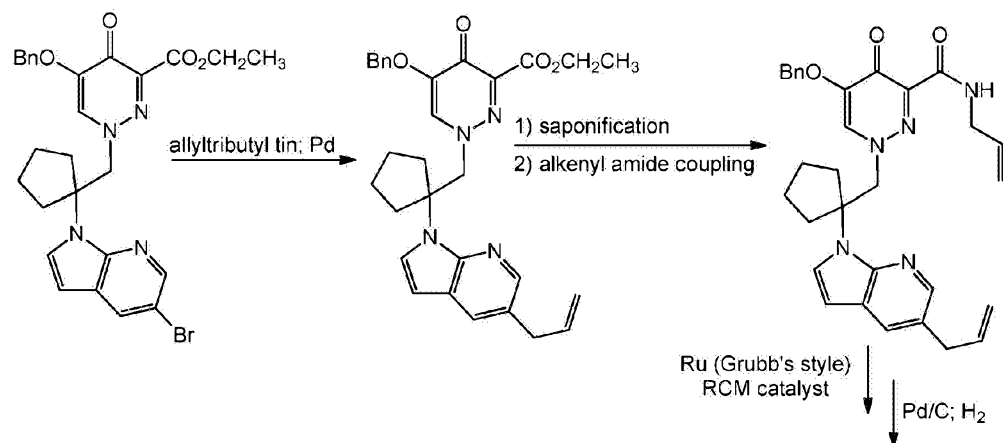
periodate - ruthenium trichloride mixture or the like. The aldehyde may be reduced to afford an alcohol or reacted with a Grignard reagent under appropriate conditions. For example, where  $G^2$  is  $-\text{CH}_2\text{OH}$ , the aldehyde may be reduced using sodium borohydride; and where  $G^2 = -\text{CH}(\text{CH}_3)\text{OH}$ , the aldehyde may be reacted with a Grignard reagent. The alcohol may be oxidized to form a ketone at  $G^2$  (for example,  $G^2$  is  $\text{C}(\text{O})\text{Me}$ ) using appropriate conditions known to those skilled in the art, such as ozonolysis.

Scheme 8

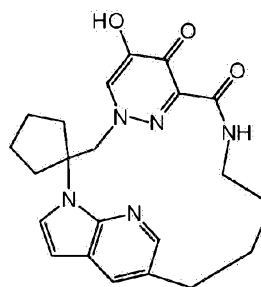


**[0137]** A method for forming a compound of Formula (I) where  $G^2$  is  $-\text{CN}$ ; or an optionally substituted aryl is shown in Scheme 8. For example, the  $\beta$  position of the  $\alpha,\beta$ -unsaturated ketone in the 6-membered pyridazinone ring may be brominated using NBS (N-bromosuccinimide) under appropriate conditions to afford the vinyl bromide. An example of using NBS is described in WO 2012/039414. The vinyl bromide may be treated with  $\text{CuCN}$  under appropriate conditions, for example as described in U.S. Patent No. 5,202,323 to afford a compound of Formula (I) where  $G^2$  is  $-\text{CN}$ . The vinyl bromide may be reacted with an aryl boronic acid (such as phenyl boronic acid) under appropriate conditions (for example, using a palladium catalyst) followed by further modification to afford a compound of Formula (I) where  $G^2$  is an optionally substituted aryl.

Scheme 9

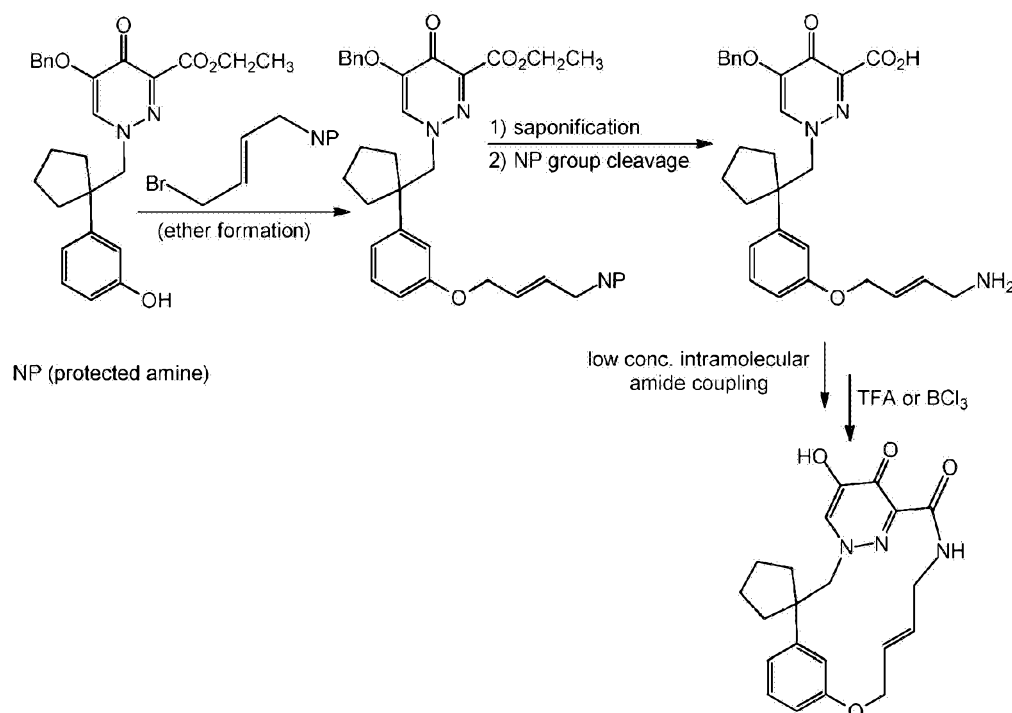






**[0138]** Example methods for forming a compound of Formula (I) that includes a macrocyclic ring formed from  $R^{10}$ -L<sup>1</sup>-R<sup>4</sup> are shown in Schemes 9 and 10. In Scheme 9, the starting material may be reacted with allyltributyl tin in the presence of a metal catalyst, such as palladium, to afford the allyl intermediate. The ester of the allyl intermediate may be hydrolyzed to afford an intermediate that includes a carboxylic acid moiety, which can be then reacted with an allyl amine via a coupling reaction to afford a diene intermediate. Suitable coupling reagents can be used, including 2-(1H-Benzotriazole-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate (HBTU). The diene intermediate can undergo a ring closing olefin metathesis macrocyclization using a suitable catalyst, for example, a Grubb's type catalyst to afford the alkene compound. Examples of suitable Grubb's type catalysts are described in in Tetrahedron Letters (2003), 44(11):2401-2404. The alkene may be hydrogenated, and the benzyl group may be cleaved, for example, using hydrogen (H<sub>2</sub>) over Pd/C to afford to a compound of Formula (I).

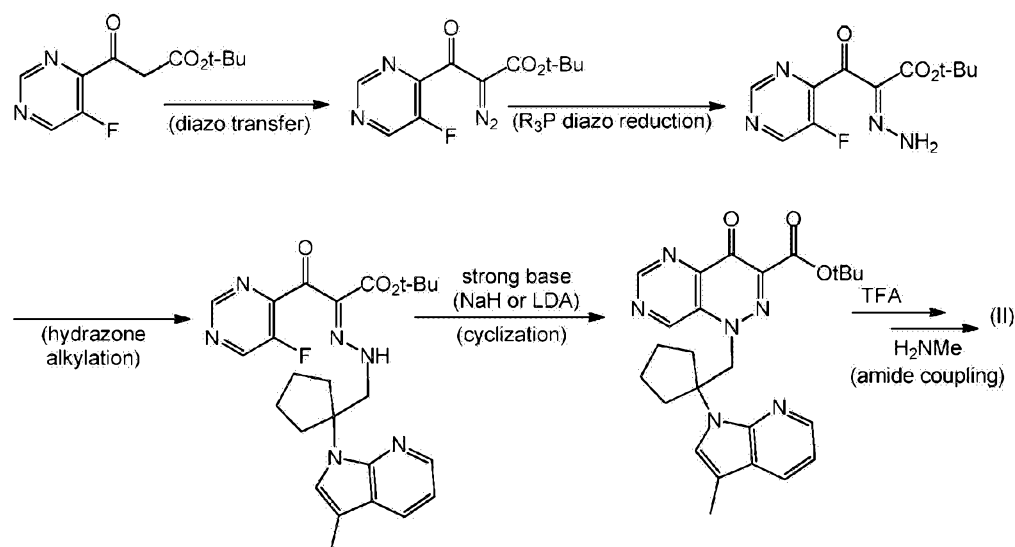
Scheme 10



**[0139]** In Scheme 10, the starting material may be reacted with an allyl bromide that includes a protected amine to afford a protected amine intermediate. The ester of the protected amine

intermediate may be hydrolyzed to afford an intermediate that includes a carboxylic acid moiety and then the protecting group of the amine may be removed. The carboxylic acid moiety can be reacted with the amine via an intramolecular macrolactamization coupling reaction, for example as described in Chemical Communications (2002), (12):1280-1281, and WO 2009/004146, to afford the macrolactam intermediate. The benzyl group of the macrolactam intermediate may be cleaved, for example, using TFA or  $\text{BCl}_3$  to afford to compounds of Formula (I).

Scheme 11



**[0140]** A method for forming a compound of Formula (II) where  $\text{R}^{1\text{A}}$  is a mono-substituted amine is shown in Scheme 11. For example, the starting may be reacted with acetamidobenzenesulfonyl azide (ABSA) under appropriate conditions using methods and conditions known to those skilled in the art, for example, as described in WO 2011/120153, to afford the diazo intermediate. The diazo intermediate may be reduced under appropriate conditions using methods and conditions known to those skilled in the art, for example using trimethyl phosphine as described in WO 2011/120153 or tributyl phosphine as described in Chem. Pharm. Bull. (1988), 36:1321-1327, to afford the hydrazide intermediate. The hydrazide intermediate may be alkylated under appropriate conditions using methods and conditions known to those skilled in the art to afford the alkyl hydrazine intermediate. The alkyl hydrazine intermediate may be cyclized using a strong base (such as sodium hydride or  $\text{LDA}$ ), for example as described in Chem. Pharm. Bull. (1989), 37:93-98, to afford the pyrimido[5,4-*c*]pyridazin-4(1*H*)-one intermediate. The tert-butyl ester of the pyrimido[5,4-*c*]pyridazin-4(1*H*)-one intermediate may be cleaved using an acid, such as  $\text{TFA}$ , to afford an intermediate that includes a carboxylic acid moiety. The carboxylic acid moiety can be reacted with methyl amine via a coupling reaction to afford the a compound of Formula (II). Suitable coupling reagents can be used, including 2-(1*H*-Benzotriazole-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate (HBTU).

### **Pharmaceutical Compositions**

**[0141]** Some embodiments described herein relate to a pharmaceutical composition, that can include an effective amount of one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt thereof) and a pharmaceutically acceptable carrier, diluent, excipient or combination thereof.

**[0142]** The term "pharmaceutical composition" refers to a mixture of one or more compounds disclosed herein with other chemical components, such as diluents or carriers. The pharmaceutical composition facilitates administration of the compound to an organism. Pharmaceutical compositions can also be obtained by reacting compounds with inorganic or organic acids such as hydrochloric acid, hydrobromic acid, sulfuric acid, nitric acid, phosphoric acid, methanesulfonic acid, ethanesulfonic acid, p-toluenesulfonic acid, and salicylic acid. Pharmaceutical compositions will generally be tailored to the specific intended route of administration.

**[0143]** The term "physiologically acceptable" defines a carrier, diluent or excipient that does not abrogate the biological activity and properties of the compound.

**[0144]** As used herein, a "carrier" refers to a compound that facilitates the incorporation of a compound into cells or tissues. For example, without limitation, dimethyl sulfoxide (DMSO) is a commonly utilized carrier that facilitates the uptake of many organic compounds into cells or tissues of a subject.

**[0145]** As used herein, a "diluent" refers to an ingredient in a pharmaceutical composition that lacks pharmacological activity but may be pharmaceutically necessary or desirable. For example, a diluent may be used to increase the bulk of a potent drug whose mass is too small for manufacture and/or administration. It may also be a liquid for the dissolution of a drug to be administered by injection, ingestion or inhalation. A common form of diluent in the art is a buffered aqueous solution such as, without limitation, phosphate buffered saline that mimics the composition of human blood.

**[0146]** As used herein, an "excipient" refers to an inert substance that is added to a pharmaceutical composition to provide, without limitation, bulk, consistency, stability, binding ability, lubrication, disintegrating ability etc., to the composition. A "diluent" is a type of excipient.

**[0147]** The pharmaceutical compositions described herein can be administered to a human patient *per se*, or in pharmaceutical compositions where they are mixed with other active ingredients, as in combination therapy, or carriers, diluents, excipients or combinations thereof. Proper formulation is dependent upon the route of administration chosen. Techniques for formulation and administration of the compounds described herein are known to those skilled in the art.

**[0148]** The pharmaceutical compositions disclosed herein may be manufactured in a manner

that is itself known, e.g., by means of conventional mixing, dissolving, granulating, dragee-making, levigating, emulsifying, encapsulating, entrapping or tableting processes. Additionally, the active ingredients are contained in an amount effective to achieve its intended purpose. Many of the compounds used in the pharmaceutical combinations disclosed herein may be provided as salts with pharmaceutically compatible counterions.

**[0149]** Multiple techniques of administering a compound exist in the art including, but not limited to, oral, rectal, topical, aerosol, injection and parenteral delivery, including intramuscular, subcutaneous, intravenous, intramedullary injections, intrathecal, direct intraventricular, intraperitoneal, intranasal and intraocular injections. In some embodiments, an effective amount of one or more compounds of Formula (I), or a pharmaceutically acceptable salt thereof, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be administering intramuscular. In other embodiments, an effective amount of one or more compounds of Formula (I), or a pharmaceutically acceptable salt thereof, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be administering intranasal. In still other embodiments, an effective amount of one or more compounds of Formula (I), or a pharmaceutically acceptable salt thereof, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be administering intradermal. In yet still other embodiments, an effective amount of one or more compounds of Formula (I), or a pharmaceutically acceptable salt thereof, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be administering orally.

**[0150]** When administered orally, one or more compounds described herein (e.g., a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be formulated as tablets, pills, dragees, capsules, liquids, gels, syrups, slurries, suspensions and the like, for oral ingestion by a subject to be treated. Injectables can be prepared in conventional forms, either as liquid solutions or suspensions, solid forms suitable for solution or suspension in liquid prior to injection, or as emulsions. Pharmaceutical compositions for intranasal delivery may also include drops and sprays often prepared to assist in simulating nasal secretions.

**[0151]** One may also administer the compound in a local rather than systemic manner, for example, via injection of the compound directly into the infected area, often in a depot or sustained release formulation. Furthermore, one may administer the compound in a targeted drug delivery system, for example, in a liposome coated with a tissue-specific antibody. The liposomes will be targeted to and taken up selectively by the organ.

**[0152]** The compositions may, if desired, be presented in a pack or dispenser device which may contain one or more unit dosage forms containing the active ingredient. The pack may for example comprise metal or plastic foil, such as a blister pack. The pack or dispenser device may be accompanied by instructions for administration. The pack or dispenser may also be

accompanied with a notice associated with the container in form prescribed by a governmental agency regulating the manufacture, use, or sale of pharmaceuticals, which notice is reflective of approval by the agency of the form of the drug for human or veterinary administration. Such notice, for example, may be the labeling approved by the U.S. Food and Drug Administration for prescription drugs, or the approved product insert. Compositions that can include a compound described herein formulated in a compatible pharmaceutical carrier may also be prepared, placed in an appropriate container, and labeled for treatment of an indicated condition.

**Methods of Use:**

**[0153]** Described herein is a method of ameliorating, treating and/or preventing an orthomyxovirus infection, which can include administering an effective amount of one or more compounds described herein, or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing).

**[0154]** Also described herein is a method of inhibiting an orthomyxovirus viral replication, which can include contacting a cell infected with the orthomyxovirus virus with an effective amount of a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing). The present invention also relates to a compound of Formula (I) or a compound of Formula (II), or a pharmaceutically acceptable salt of a compound of Formula (I) or a compound of Formula (II), for use in ameliorating or treating an orthomyxovirus.

**[0155]** In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to treat and/or ameliorate an influenza viral infection. In other embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to prevent an influenza viral infection.

**[0156]** In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to inhibit the replication an influenza virus. In some embodiments, an effective amount of one or more compounds of Formulae (I), or a pharmaceutically acceptable salt of the foregoing and/or a pharmaceutical composition that includes one or more compounds described herein

(e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to inhibit the influenza polymerase complex. In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used for inhibiting and/or reducing the endonuclease activity of an influenza endonuclease that can include contacting the active site of the endonuclease with a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing. In some embodiments, one or more compounds described herein inhibits and/or reduces the ability of the endonuclease to cleave the mRNA.

**[0157]** In some embodiments, including those embodiments in the previous paragraphs, the influenza viral infection can be an influenza A viral infection. In other embodiments, including those embodiments in the previous paragraphs, the influenza viral infection can be an influenza B viral infection. In still other embodiments, including those embodiments in the previous paragraphs, the influenza viral infection can be an influenza C viral infection. In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be used to treat and/or ameliorate one or more subtypes of influenza. For example, a compound of Formula (I), or a pharmaceutically acceptable salt thereof, can be used to treat H1N1 and/or H3N2. In addition or in the alternative, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be used to treat H2N2, H5N1 and/or H7N9. In some embodiments, a compound described herein (a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be effective against more than 1 subtype of influenza. For example, a compound described herein (a compound of Formula (I), or a pharmaceutically acceptable salt thereof) can be effective against 2, 3, 4, and/or 5 or more subtypes of influenza.

**[0158]** In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to treat and/or ameliorate an upper respiratory viral infection attributed to (directly and/or indirectly) an influenza virus infection. In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to treat and/or ameliorate a lower respiratory viral infection (directly and/or indirectly) an influenza virus infection. In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used to treat and/or ameliorate one or more symptoms of an influenza virus infection (such as those described herein). In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a

pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used treat and/or ameliorate bronchiolitis and/or tracheobronchitis due to an influenza virus infection. In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used treat and/or ameliorate pneumonia due to an influenza virus infection. In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used treat and/or ameliorate cough due to an influenza virus infection.

**[0159]** In some embodiments, an effective amount of one or more compounds of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and/or a pharmaceutical composition that includes one or more compounds described herein (e.g., a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing) can be used lessen the severity of one or more symptoms of an influenza infection. Examples of symptoms include, but are not limited to, the following: fever, chills, cough, sore throat, runny nose, stuffy nose, muscle aches, body aches, headache, fatigue, vomiting and/or diarrhea.

**[0160]** As used herein, the terms "prevent" and "preventing," mean a subject does not develop an infection because the subject has an immunity against the infection, or if a subject becomes infected, the severity of the disease is less compared to the severity of the disease if the subject has not been administered/received the compound. Examples of forms of prevention include prophylactic administration to a subject who has been or may be exposed to an infectious agent, such as an orthomyxovirus (e.g., an influenza virus).

**[0161]** As used herein, the terms "treat," "treating," "treatment," "therapeutic," and "therapy" do not necessarily mean total cure or abolition of the disease or condition. Any alleviation of any undesired signs or symptoms of a disease or condition, to any extent can be considered treatment and/or therapy. Furthermore, treatment may include acts that may worsen the subject's overall feeling of well-being or appearance.

**[0162]** The terms "therapeutically effective amount" and "effective amount" are used to indicate an amount of an active compound, or pharmaceutical agent, that elicits the biological or medicinal response indicated. For example, a therapeutically effective amount of compound can be the amount needed to prevent, alleviate or ameliorate symptoms of disease or prolong the survival of the subject being treated. This response may occur in a tissue, system, animal or human and includes alleviation of the signs or symptoms of the disease being treated. Determination of an effective amount is well within the capability of those skilled in the art, in view of the disclosure provided herein. The therapeutically effective amount of the compounds

disclosed herein required as a dose will depend on the route of administration, the type of animal, including human, being treated, and the physical characteristics of the specific animal under consideration. The dose can be tailored to achieve a desired effect, but will depend on such factors as weight, diet, concurrent medication and other factors which those skilled in the medical arts will recognize.

**[0163]** As used herein, a "subject" refers to an animal that is the object of treatment, observation or experiment. "Animal" includes cold- and warm-blooded vertebrates and invertebrates such as fish, shellfish, reptiles and, in particular, mammals. "Mammal" includes, without limitation, mice, rats, rabbits, guinea pigs, dogs, cats, sheep, goats, cows, horses, primates, such as monkeys, chimpanzees, and apes, and, in particular, humans. In some embodiments, the subject is human.

**[0164]** Various indicators for determining the effectiveness of a method for treating an orthomyxovirus viral infection are known to those skilled in the art. Example of suitable indicators include, but are not limited to, a reduction in viral load, a reduction in viral replication, a reduction in time to seroconversion (virus undetectable in patient serum), a reduction of morbidity or mortality in clinical outcomes, and/or other indicator of disease response.

**[0165]** In some embodiments, an effective amount of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, is an amount that is effective to reduce viral titers to a lower level, for example, from about  $10E4$  TCID<sub>50</sub>/mL (TCID = tissue culture infectious dose) to about  $10E3$  TCID<sub>50</sub>/mL, or to about 100 TCID<sub>50</sub>/mL, or to about 10 TCID<sub>50</sub>/mL. In some embodiments, an effective amount of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, is an amount that is effective to reduce viral load compared to the viral load before administration of the compound of Formula (I), or a pharmaceutically acceptable salt thereof. For example, wherein the viral load is measure before administration of the compound of Formula (I), or a pharmaceutically acceptable salt thereof, and again after initiation of the treatment regime with the compound of Formula (I), or a pharmaceutically acceptable salt thereof (for example, 10 days after initiation of treatment). In some embodiments, an effective amount of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, can be an amount that is effective to reduce viral load to lower than about  $10E4$  TCID<sub>50</sub>/mL. In some embodiments, an effective amount of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, is an amount that is effective to achieve a reduction in viral titer in a nasal/pharyngeal swab or nasal wash sample of the subject in the range of about 1.5-log to about a 2.5-log reduction or about a 3-log to about a 4-log reduction compared to the viral load before administration of the compound of Formula (I), or a pharmaceutically acceptable salt thereof. For example, wherein the viral load is measure before administration of the compound of Formula (I), or a pharmaceutically acceptable salt thereof, and again after initiation of the treatment regime with the compound of Formula (I), or a pharmaceutically acceptable salt thereof (for example, 10 days after initiation of treatment).

**[0166]** In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt of the foregoing, can result in one or more overall quality of life health, such as reduced



illness duration, reduced illness severity, reduced time to return to normal health and normal activity, and reduced time to alleviation of one or more symptoms of orthomyxovirus infection, compared to a subject who is untreated. In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt of the foregoing, can result in a reduction in the length and/or severity of one or more symptoms associated with an orthomyxovirus infection compared to an untreated subject. Symptoms of an orthomyxovirus infection are described herein and include but not limited to cough, myalgia (muscle pain), nasal obstruction, sore throat, fatigue, headache and fever. In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt of the thereof, can result in a reduction in one or more secondary complications associated with an orthomyxovirus infection, including but not limited to otitis media (ear inflammation), sinusitis, bronchitis and pneumonia compared to an untreated subject.

**[0167]** In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt of the foregoing, can result in at least a 1, 2, 3, 4, 5, 10, 15, 20, 25, 50, 75, 100-fold or more reduction in the replication of an orthomyxovirus relative to pre-treatment levels in a subject, as determined after initiation of the treatment regime (for example, 10 days after initiation of treatment). In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt of the foregoing, can result in a reduction of the replication of an orthomyxovirus relative to pre-treatment levels in the range of about 2 to about 5 fold, about 10 to about 20 fold, about 15 to about 40 fold, or about 50 to about 100 fold. In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt thereof, can result in a reduction of orthomyxovirus replication in the range of 1 to 1.5 log, 1.5 log to 2 log, 2 log to 2.5 log, 2.5 to 3 log, or 3 to 3.5 log reduction of orthomyxovirus replication compared to the reduction of orthomyxovirus reduction achieved by oseltamivir (Tamiflu®), or may achieve the same reduction as that of oseltamivir (Tamiflu®) therapy in a shorter period of time, for example, in one day, two days, three days, or four days as compared to the reduction achieved after 5 days of oseltamivir (Tamiflu®) therapy.

**[0168]** After a period of time, infectious agents can develop resistance to one or more therapeutic agents. The term "resistance" as used herein refers to a viral strain displaying a delayed, lessened and/or null response to a therapeutic agent(s). For example, after treatment with an antiviral agent, the viral load of a subject infected with a resistant virus may be reduced to a lesser degree compared to the amount in viral load reduction exhibited by a subject infected with a non-resistant strain. In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered to a subject infected with an influenza virus that is resistant to one or more different anti-influenza agents (for example, amantadine, rimantadine and/or oseltamivir). In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered to a subject infected with an influenza virus that is resistant to a M2 protein inhibitor. In some embodiments, development of resistant influenza strains is delayed when subjects are treated with a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, compared to the development of influenza strains resistant to other influenza drugs.

**[0169]** In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can decrease the percentage of subjects that experience complications from an influenza viral infection compared to the percentage of subjects that experience complication being treated with oseltamivir. For example, the percentage of subjects being treated with a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, that experience complications can be 10%, 25%, 40%, 50%, 60%, 70%, 80% and 90% less compared to subjects being treated with oseltamivir.

**[0170]** In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt thereof, or a pharmaceutical composition that includes a compound described herein, can be used in combination with one or more additional agent(s). In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt thereof, can be used in combination with one or more agents currently used in a conventional standard of care for treating influenza. For example, the additional agent can be amantadine (adamantan-1-amine, Symmetrel), rimantadine (Flumadine), zanamivir (Relenza) and oseltamivir (Tamiflu). For the treatment of influenza, additional agents include but are not limited to a neuraminidase inhibitor, a M2 protein inhibitor, a polymerase inhibitor, a PB2 inhibitor, peramivir ((1S,2S,3S,4R)-3-[(1S)-1-acetamido-2-ethylbutyl]-4-(diaminomethylideneamino)-2-hydroxycyclopentane-1-carboxylic acid, BioCryst Pharmaceuticals), laninamivir ((4S,5R,6R)-5-acetamido-4-carbamimidamido-6-[(1R,2R)-3-hydroxy-2-methoxypropyl]-5,6-dihydro-4H-pyran-2-carboxylic acid), favipiravir (T-705, 6-fluoro-3-hydroxy-2-pyrazinecarboxamide), laninamivir octanoate ((3R,4S)-3-acetamido-4-guanidino-2-((1S,2S)-2-hydroxy-1-methoxy-3-(octanoyloxy)propyl)-3,4-dihydro-2H-pyran-6-carboxylic acid) fludase (DAS181, NexBio), ADS-8902 (amantadine HCl/oseltamivir/ribavirin, Adamas Pharmaceuticals), an immuno-modulator (for example, a Type 1 interferon), beraprost (4-[2-hydroxy-1-[(E)-3-hydroxy-4-methyloct-1-en-6-ynyl]-2,3,3a,8b-tetrahydro-1H-cyclopenta[b][1]benzofuran-5-yl]butanoic acid), Neugene®, ribavirin, (R)-3-((5-fluoro-2-(5-fluoro-1H-pyrrolo[2,3-b]pyridin-3-yl)pyrimidin-4-yl)amino)-4,4-dimethylpentanoic acid (CAS Reg. No. 1422050-75-6), (2S,3S)-3-((5-fluoro-2-(5-fluoro-1H-pyrrolo[2,3-b]pyridin-3-yl)pyrimidin-4-yl)amino)bicyclo[2.2.2]octane-2-carboxylic acid (CAS Reg. No. 1259366-34-1, VX-787), FluMist Quadrivalent® (MedImmune), Fluarix® Quadrivalent (GlaxoSmithKline), Fluzone® Quadrivalent (Sanofi Pasteur), Flucelvax® (Novartis) and FluBlok® (Protein Sciences). In some embodiments, a compound of Formula (I), or a pharmaceutically acceptable salt thereof, or a pharmaceutical composition that includes a compound described herein, can be used in combination with oseltamivir.

**[0171]** Type 1 interferons are known to those skilled in the art. A non-limiting list of examples include: alpha-interferons, beta-interferons, delta-interferons, omega-interferons, tau-interferons, x-interferons, consensus interferons and asialo-interferons. Type 1 interferons can be pegylated. Examples of specific type 1 interferons include interferon alpha 1A, interferon alpha 1B, interferon alpha 2A, interferon alpha 2B, pegylated-interferon alpha 2a (PEGASYS, Roche), recombinant interferon alpha 2a (ROFERON, Roche), inhaled interferon alpha 2b (AERX, Aradigm), pegylated-interferon alpha 2b (ALBUFERON, Human Genome Sciences/Novartis, PEGINTRON, Schering), recombinant interferon alpha 2b (INTRON A,

Schering), pegylated interferon alpha 2b (PEG-INTRON, Schering, VIRAFERONPEG, Schering), interferon beta-1a (REBIF, Serono, Inc. and Pfizer), consensus interferon alpha (INFERGEN, Valeant Pharmaceutical).

**[0172]** In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered with one or more additional agent(s) together in a single pharmaceutical composition. In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered with one or more additional agent(s) as two or more separate pharmaceutical compositions. For example, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered in one pharmaceutical composition, and at least one of the additional agents can be administered in a second pharmaceutical composition. If there are at least two additional agents, one or more of the additional agents can be in a first pharmaceutical composition that includes a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and at least one of the other additional agent(s) can be in a second pharmaceutical composition.

**[0173]** The order of administration of a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, with one or more additional agent(s) can vary. In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered prior to all additional agents. In other embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered prior to at least one additional agent. In still other embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered concomitantly with one or more additional agent(s). In yet still other embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered subsequent to the administration of at least one additional agent. In some embodiments, a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, can be administered subsequent to the administration of all additional agents.

**[0174]** In some embodiments, the combination of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, in combination with one or more additional agent(s) can result in an additive effect. In some embodiments, the combination of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, in combination with one or more additional agent(s) can result in a synergistic effect. In some embodiments, the combination of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, in combination with one or more additional agent(s) can result in a strongly synergistic effect. In some embodiments, the combination of a compound of Formula (I), or a pharmaceutically acceptable salt thereof, in combination with one or more additional agent(s) is not antagonistic.

**[0175]** As used herein, the term "antagonistic" means that the activity of the combination of compounds is less compared to the sum of the activities of the compounds in combination when the activity of each compound is determined individually (i.e. as a single compound). As

used herein, the term "synergistic effect" means that the activity of the combination of compounds is greater than the sum of the individual activities of the compounds in the combination when the activity of each compound is determined individually. As used herein, the term "additive effect" means that the activity of the combination of compounds is about equal to the sum of the individual activities of the compound in the combination when the activity of each compound is determined individually.

**[0176]** A potential advantage of utilizing a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, in combination with one or more of the additional agent(s) described above, including pharmaceutically acceptable salts and prodrugs thereof, may be a reduction in the required amount(s) of the one or more additional agents, including pharmaceutically acceptable salts and prodrugs thereof, that is effective in treating a disease condition disclosed herein (for example, influenza), as compared to the amount required to achieve the same therapeutic result when one or more of the additional agents, including pharmaceutically acceptable salts and prodrugs thereof, are administered without a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing. For example, the amount of an additional agent described above, including a pharmaceutically acceptable salt and prodrug thereof, can be less when administered in combination with a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, compared to the amount of additional agent, including a pharmaceutically acceptable salt and prodrug thereof, needed to achieve the same viral load reduction when administered as a monotherapy. Another potential advantage of utilizing a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, in combination with one or more of the additional agent(s) described above, including pharmaceutically acceptable salts and prodrugs thereof, is that the use of two or more compounds having different mechanisms of action can create a higher barrier to the development of resistant viral strains compared to the barrier when a compound is administered as monotherapy.

**[0177]** Additional advantages of utilizing a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, in combination with one or more of the additional agent(s) described above, including pharmaceutically acceptable salts and prodrugs thereof, may include little to no cross resistance between a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and the one or more additional agent(s) described above (including pharmaceutically acceptable salts and prodrugs thereof); different routes for elimination of a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and the one or more additional agent(s) described above (including pharmaceutically acceptable salts and prodrugs thereof); little to no overlapping toxicities between a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and the one or more additional agent(s) described above (including pharmaceutically acceptable salts and prodrugs thereof); little to no significant effects on cytochrome P450; and/or little to no pharmacokinetic interactions between a compound of Formulae (I) and/or (II), or a pharmaceutically acceptable salt of the foregoing, and the one or more additional agent(s) described above, including pharmaceutically acceptable salts and prodrugs thereof.

**[0178]** As will be readily apparent to one skilled in the art, the useful *in vivo* dosage to be administered and the particular mode of administration will vary depending upon the age, weight, the severity of the affliction, and mammalian species treated, the particular compounds employed, and the specific use for which these compounds are employed. The determination of effective dosage levels, that is the dosage levels necessary to achieve the desired result, can be accomplished by one skilled in the art using routine methods, for example, human clinical trials and *in vitro* studies.

**[0179]** The dosage may range broadly, depending upon the desired effects and the therapeutic indication. Alternatively dosages may be based and calculated upon the surface area of the patient, as understood by those of skill in the art. Although the exact dosage will be determined on a drug-by-drug basis, in most cases, some generalizations regarding the dosage can be made. The daily dosage regimen for an adult human patient may be, for example, an oral dose of between 0.01 mg and 3000 mg of each active ingredient, preferably between 1 mg and 700 mg, e.g. 5 to 200 mg. The dosage may be a single one or a series of two or more given in the course of one or more days, as is needed by the subject. In some embodiments, the compounds will be administered for a period of continuous therapy, for example for a week or more, or for months or years.

**[0180]** In instances where human dosages for compounds have been established for at least some condition, those same dosages may be used, or dosages that are between about 0.1% and 500%, more preferably between about 25% and 250% of the established human dosage. Where no human dosage is established, as will be the case for newly-discovered pharmaceutical compositions, a suitable human dosage can be inferred from ED<sub>50</sub> or ID<sub>50</sub> values, or other appropriate values derived from *in vitro* or *in vivo* studies, as qualified by toxicity studies and efficacy studies in animals.

**[0181]** In cases of administration of a pharmaceutically acceptable salt, dosages may be calculated as the free base. As will be understood by those of skill in the art, in certain situations it may be necessary to administer the compounds disclosed herein in amounts that exceed, or even far exceed, the above-stated, preferred dosage range in order to effectively and aggressively treat particularly aggressive diseases or infections.

**[0182]** Dosage amount and interval may be adjusted individually to provide plasma levels of the active moiety which are sufficient to maintain the modulating effects, or minimal effective concentration (MEC). The MEC will vary for each compound but can be estimated from *in vitro* data. Dosages necessary to achieve the MEC will depend on individual characteristics and route of administration. However, HPLC assays or bioassays can be used to determine plasma concentrations. Dosage intervals can also be determined using MEC value. Compositions should be administered using a regimen which maintains plasma levels above the MEC for 10-90% of the time, preferably between 30-90% and most preferably between 50-90%. In cases of local administration or selective uptake, the effective local concentration of the drug may not be related to plasma concentration.

[0183] It should be noted that the attending physician would know how to and when to terminate, interrupt, or adjust administration due to toxicity or organ dysfunctions. Conversely, the attending physician would also know to adjust treatment to higher levels if the clinical response were not adequate (precluding toxicity). The magnitude of an administered dose in the management of the disorder of interest will vary with the severity of the condition to be treated and to the route of administration. The severity of the condition may, for example, be evaluated, in part, by standard prognostic evaluation methods. Further, the dose and perhaps dose frequency, will also vary according to the age, body weight, and response of the individual patient. A program comparable to that discussed above may be used in veterinary medicine.

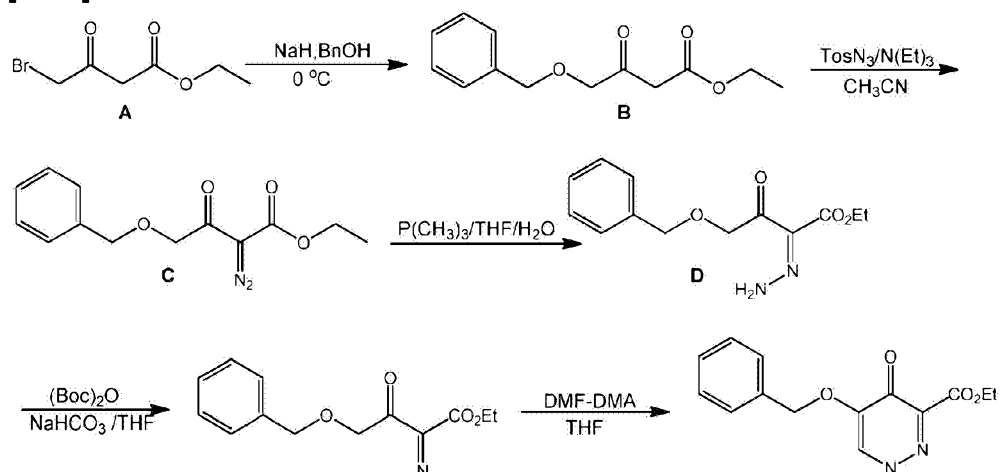
[0184] Compounds disclosed herein can be evaluated for efficacy and toxicity using known methods. For example, the toxicology of a particular compound, or of a subset of the compounds, sharing certain chemical moieties, may be established by determining *in vitro* toxicity towards a cell line, such as a mammalian, and preferably human, cell line. The results of such studies are often predictive of toxicity in animals, such as mammals, or more specifically, humans. Alternatively, the toxicity of particular compounds in an animal model, such as mice, rats, rabbits, or monkeys, may be determined using known methods. The efficacy of a particular compound may be established using several recognized methods, such as *in vitro* methods, animal models, or human clinical trials. When selecting a model to determine efficacy, the skilled artisan can be guided by the state of the art to choose an appropriate model, dose, route of administration and/or regime.

## EXAMPLES

[0185] Additional embodiments are disclosed in further detail in the following examples, which are not in any way intended to limit the scope of the claims.

### EXAMPLE 1

[0186]





**[0187]** To a stirred solution of NaH (21.8 g, 912 mmol, 3.0 eq.) in THF (300 mL) was added BnOH (32.8 g, 304.0 mmol, 1.0 eq.) under a N<sub>2</sub> atmosphere at 0°C. After addition, the mixture was stirred for 30 min. Compound **A** (63.5 g, 304.0 mmol, 1.0 eq.) was added portionwise, and the mixture was allowed to warm to ambient temperature and stirred for 12 h. The product was followed by TLC using petroleum ether (PE):EtOAc = 5:1. The mixture was poured into 2M HCl solution to adjust to ~pH 6. The solution was extracted with EtOAc (200 mL x 3). The combined organic phases were dried over Na<sub>2</sub>SO<sub>4</sub>, filtered and concentrated. The residue was purified by column chromatography on silica gel (PE:EtOAc = 30:1 to 5:1) to give **B** as a colorless oil (46 g, 88.5 %). <sup>1</sup>HNMR (CDCl<sub>3</sub>) δ 7.39-7.29 (m, 5H), 4.59 (s, 2H), 4.17-4.24 (q, 2H), 4.14 (s, 2H), 3.53 (s, 2H), 1.31-1.22 (t, 3H).

**[0188]** To a stirred solution of **B** (10.0 g, 42.3 mmol, 1.0 eq.) in CH<sub>3</sub>CN (20 mL) under a N<sub>2</sub> atmosphere at 0°C, was added TosN<sub>3</sub> (8.35 g, 42.3 mmol, 1.0 eq.) and TEA (12.84 g, 127.1 mmol, 3.0 eq.). The mixture was stirred at 0 °C for 2 h. The mixture was warmed to room temperature (RT) and stirred for 6 h. The progress of the reaction was followed by TLC (PE:EtOAc = 5:1). After complete conversion was observed, the solvent was removed under reduced pressure, and the residue was purified by column chromatography on silica gel (PE:EtOAc = 30:1 to 5:1) to give **C** as a colorless oil (4.5 g, 40.5%). <sup>1</sup>HNMR (CDCl<sub>3</sub>) δ 7.39-7.26 (m, 5H), 4.64 (s, 2H), 4.60 (s, 2H), 4.29-4.24 (q, 2H), 1.32-1.28 (t, 3H).

**[0189]** To a solution of **C** (4.04 g, 15.4 mmol, 1.0 eq.) in THF (5 mL) was added P(CH<sub>3</sub>)<sub>3</sub>/THF solution (16.9 mL, 16.9 mM, 1.1 eq.) at RT. The mixture was stirred for 15 min (indicated by TLC, PE:EtOAc =2:1) and then quenched with water (2.8 mL). The mixture was stirred for 15 min and concentrated under reduced pressure. The crude residue was purified by column chromatography on silica gel (PE:EtOAc = 5:1 to 2:1) to give **D** as a yellow solid (4.0 g, 98.2%). <sup>1</sup>HNMR (CDCl<sub>3</sub>) δ 7.39-7.24 (m, 5H), 4.66-4.66 (s, 1H), 4.66-4.61 (s, 2H), 4.53-4.53 (s, 1H), 4.31-4.24 (m, 2 H), 1.35-1.29 (m, 3H).

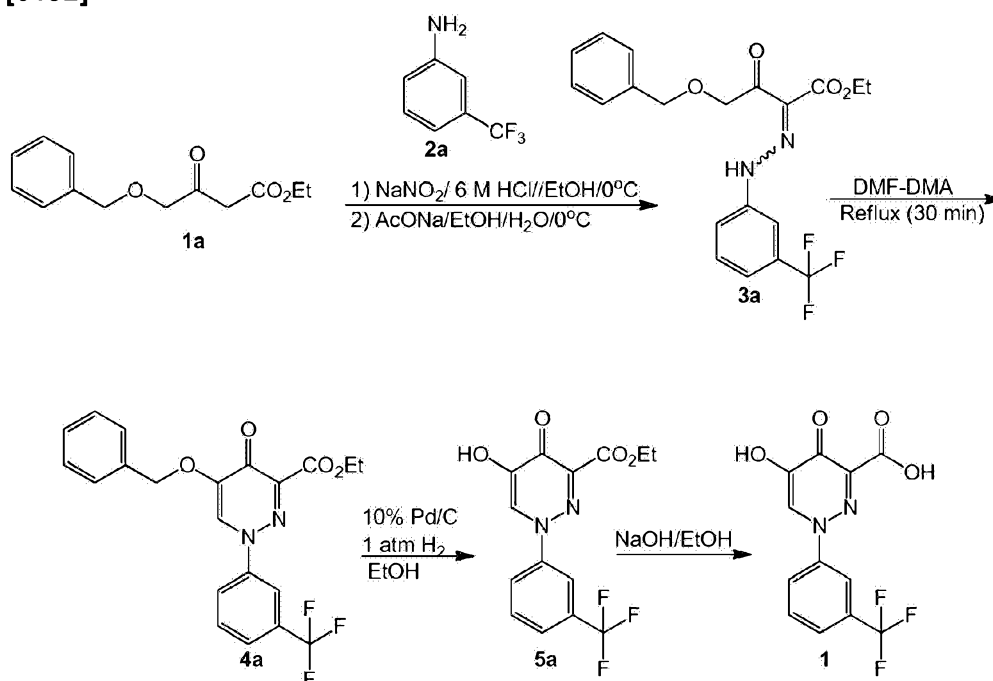
**[0190]** To a stirred solution of **D** (20.0 g, 75.7 mmol, 1.0 eq.) in THF (100 mL) was added NaHCO<sub>3</sub> (19.1 g, 227.3 mmol, 3.0 eq.) and (Boc)<sub>2</sub>O (22.84 g, 113.6 mmol, 1.5 eq.). The mixture was heated to reflux for 6 h and monitored by TLC (PE:EtOAc =2:1). After complete conversion was observed, the solution was concentrated under reduced pressure. The residue was dissolved in EtOAc (200 mL) and washed with water (80 mL x 2). The organic layer was separated, dried over Na<sub>2</sub>SO<sub>4</sub> and filtered. The mixture was concentrated under reduced pressure, and the residue was purified by column chromatography on silica gel (PE:EtOAc = 8:1) to give **E** as a white solid (15 g, 54.30%). <sup>1</sup>HNMR (CDCl<sub>3</sub>) δ 11.59 (s, 1H), 7.40-7.26 (m, 5H), 4.71-4.61 (m, 2H), 4.39 (s, 2H), 4.71-4.27 (q, 2H), 1.70-1.48 (m, 9H), 1.38-1.24 (t, 3H).

**[0191]** To a solution of **E** (4.2 g, 11.5 mmol, 1 eq.) in THF (100 mL) at RT, was added DMF-DMA (6.15 g, 51.7 mmol, 4.5 eq.). The mixture was stirred at RT for 16 h. After complete conversion was observed as indicated by TLC, the reaction was treated with water (5~6 mL) and stirred for 30 min. The solvent was evaporated under reduced pressure at 40-50°C. The residue was crystallized from EtOAc to give the pure product as a white solid, (0.5 g). The mother liquor was concentrated and purified by column chromatography on silica gel (DCM:MeOH = 50:1 to 10:1) to give **F** as a solid (2.4 g, 75.95%).  $^1\text{H}$ NMR ( $\text{CD}_3\text{OD}$ )  $\delta$  8.22 (s, 1H), 7.48-7.46 (m, 2H), 7.41-7.34 (m, 3H), 5.20 (s, 2H), 4.41-4.36 (q, 2H), 1.39-1.35 (t, 3H). LCMS (ESI)  $m/z$   $[\text{M}+\text{H}]^+ = 275.2$  (calc. = 274.1). Retention Time = 1.097 min.

## EXAMPLE 2

### 5-hydroxy-4-oxo-1-(3-(trifluoromethyl)phenyl)-1,4-dihydropyridazine-3-carboxylic acid (1)

**[0192]**



**[0193]** A mixture of **2a** (3.2 g, 20 mmol) and 6 M HCl aqueous solution (20 mL, 120 mmol) was stirred at 0 °C. To the mixture was added a solution of  $\text{NaNO}_2$  (1.66 g, 24 mmol) in H<sub>2</sub>O (5 mL) dropwise. After addition, the mixture was stirred for 15 min. The resulting aqueous solution was added to a suspension of **1a** (4.7 g, 20 mmol) and NaOAc (9.84 g, 120 mmol) in EtOH (40 mL) at 0°C. After complete conversion, the mixture was poured into water and extracted with AcOEt (30 mL x 3). The combined organic phases were washed with a sat.  $\text{NaHCO}_3$  aqueous solution



and brine, dried over  $\text{MgSO}_4$ , and concentrated under reduced pressure. Crude **3a** (5.6 g) can be used without further purification.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  14.79 (s, 0.5H), 12.94 (s, 0.5H), 7.70-7.30 (m, 9H), 4.76 (s, 1H), 4.73 (s, 1H), 4.70 (s, 1H), 4.67 (s, 1H), 4.39 (t,  $J = 7.2$  Hz, 1H), 4.32 (t,  $J = 7.2$  Hz, 1H), 1.43-1.37 (m, 3H).

**[0194]** A solution of **3a** (4.8 g, 12 mmol) in DMF-DMA (33 mL) was heated to reflux for 2.5 h. After complete conversion, the reaction was cooled to RT. The precipitate was collected by suction-filtration. The filter cake was washed with a small amount of EtOAc and dried over in vacuum to give pure **4a** as a white solid (3.5 g, 69.7 %).  $^1\text{H}$  NMR (400 MHz,  $\text{DMSO}-d_6$ )  $\delta$  8.89 (s, 1H), 8.16 (s, 1H), 8.11 (d,  $J = 7.6$  Hz, 1H), 7.89-7.82 (m, 2H), 7.49-7.39 (m, 5H), 5.52 (s, 2H), 4.33 (q,  $J = 7.2$  Hz, 2H), 1.29 (t,  $J = 7.2$  Hz, 3H).

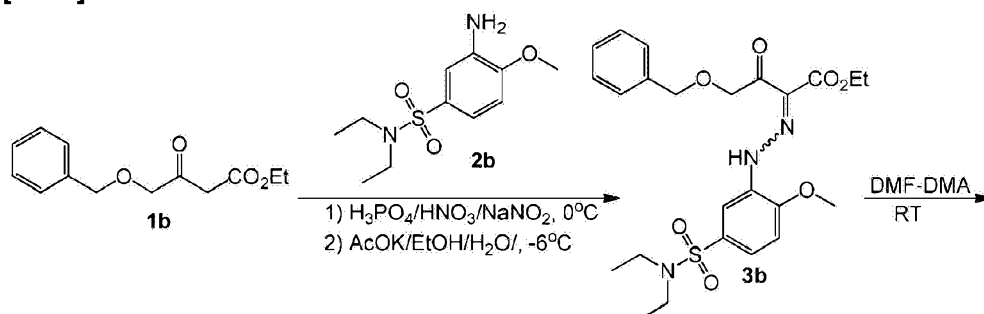
**[0195]** A suspension of **4a** (418 mg, 1.0 mmol) and Pd/C (50 mg) in EtOH/THF (1:1, 10 mL) was stirred at RT under  $\text{H}_2$  atmosphere (15 psi.) for 30 min. After complete conversion, the mixture was filtered through a pad of celite. The filtrate was concentrated under reduced pressure. The crude product was crystallized in EtOAc to give pure **5a** as a white solid (300 mg, 91.4 %).  $^1\text{H}$  NMR (400 MHz,  $\text{CD}_3\text{OD}$ )  $\delta$  8.72 (s, 1H), 8.15 (s, 1H), 8.07 (d,  $J = 7.2$  Hz, 1H), 7.84-7.78 (m, 2H), 4.44 (q,  $J = 7.2$  Hz, 2H), 1.41 (t,  $J = 7.2$  Hz, 3H).

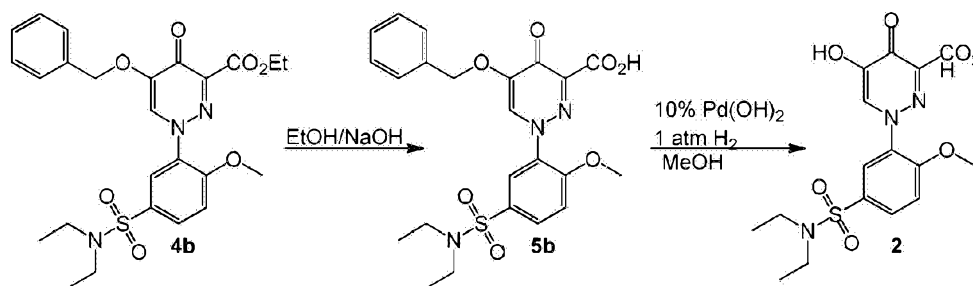
**[0196]** To a solution of **5a** (328 mg, 1.0 mmol) in MeOH (5 mL) was added 1 N NaOH aqueous solution (3 mL, 3.0 mmol). The mixture was stirred at RT for 3 h. After complete conversion, MeOH was removed via vacuum. The aqueous phase was acidified with 1 N hydrochloride to pH = 4. A white solid was precipitated from the mixture. The solid was collected by filtration, washed with water and dried over in vacuum to provide compound **1** as a white solid (120 mg, 40.0 %). LCMS (ESI)  $m/z = 300.8$   $[\text{M}+\text{H}]^+$ .

### EXAMPLE 3

#### 1-(5-(N,N-diethylsulfamoyl)-2-methoxyphenyl)-5-hydroxy-4-oxo-1,4-dihydropyridazine-3-carboxylic acid (2)

**[0197]**



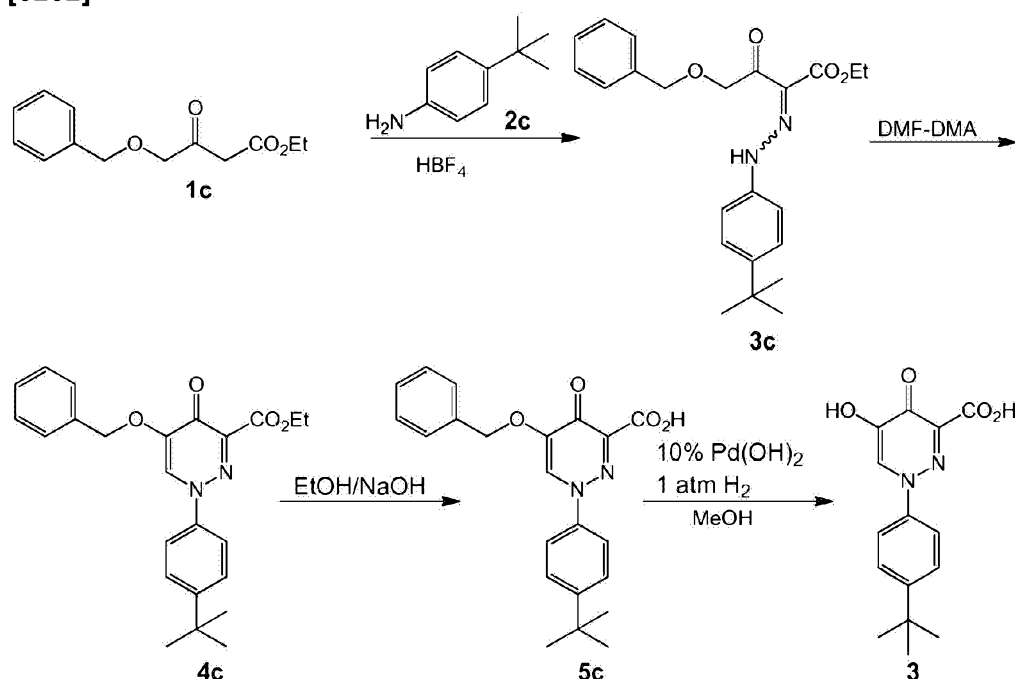


**[0198]** To a solution of **2b** (1 g, 3.87 mmol) in HNO<sub>3</sub> (2 mL) and H<sub>3</sub>PO<sub>4</sub> (3 mL) was added a solution of NaNO<sub>2</sub> (400 mg, 5.85 mmol) in H<sub>2</sub>O (20 mL) at 0 °C dropwise. The mixture was stirred for 0.5 h at the same temperature. The resulting aqueous solution was then added to a suspension of **1b** (1.38 g, 5.85 mmol) and AcOK (10 g, 102 mmol) in EtOH (80 mL) at 0°C. The reaction was warmed to RT and stirred for 3 h. The mixture was basified to pH = 9 with sat. aq. NaHCO<sub>3</sub> solution. The mixture was extracted with EtOAc (60 mL x 3). The combined organic phases were dried over Na<sub>2</sub>SO<sub>4</sub>, filtered and concentrated via vacuum. The residue was purified by column chromatography on silica gel (10% EA in PE) to give pure **3b** as a white solid (1.0 g, 35%). <sup>1</sup>H NMR (400 MHz, CD<sub>3</sub>Cl) δ 8.16 (s, 1H), 7.62 (d, *J* = 8.8 Hz, 1H), 7.43-7.39 (m, 5H), 6.99 (d, *J* = 8.8 Hz, 1H), 4.74 (s, 2H), 4.68 (s, 2H), 4.29 (q, *J* = 7.2 Hz, 2H), 4.06 (s, 3H), 3.26 (q, *J* = 7.2 Hz, 4H), 1.38 (t, *J* = 7.2 Hz, 3H), 1.15 (t, *J* = 7.2 Hz, 6H).

**[0199]** A mixture of **3b** (1.0 g, 1.98 mmol) in DMF-DMA (50 mL) was stirred for 3 h at RT. After complete conversion, the solvent was removed under reduced pressure, and the residue was crystallized with EtOAc to give pure **4b** as a yellow solid (0.5 g, 50.4 %). <sup>1</sup>H NMR (400 MHz, CD<sub>3</sub>Cl) δ 7.87 (s, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.71 (s, 1H), 7.42-7.32 (m, 5H), 7.07 (d, *J* = 8.4 Hz, 1H), 5.31 (s, 2H), 3.97 (s, 3H), 3.78 (s, 3H), 3.23 (q, *J* = 7.2 Hz, 4H), 1.16 (t, *J* = 7.2 Hz, 6H).

**[0200]** To a solution of **4b** (0.5 g, 1.0 mmol) in EtOH (5 mL) and water (5 mL) was added 2 N NaOH (0.8 mL, 16 mmol) at 0 °C. The mixture was stirred at the same temperature for 3 h. EtOH was removed under reduced pressure, and the aqueous phase was acidified to pH = 4 with 2 N HCl solution. The precipitate was collected by suction-filtration. The filter cake was washed with water and dried in vacuum to give **5b** as a white solid (0.3 g, 61.6%). <sup>1</sup>H NMR (400 MHz, CD<sub>3</sub>Cl) δ 8.05 (s, 1H), 7.87-7.85 (m, 2H), 7.40-7.36 (m, 5H), 7.09 (d, *J* = 8.0 Hz, 1H), 5.27 (s, 2H), 3.78 (s, 3H), 3.21 (q, *J* = 7.2 Hz, 4H), 1.16 (t, *J* = 7.2 Hz, 6H).

**[0201]** A mixture of **5b** (0.3 g, 0.62 mmol) and Pd(OH)<sub>2</sub> (0.2 g) in MeOH (20 mL) was stirred for 4 h under H<sub>2</sub> atmosphere (30 psi). After complete conversion, the mixture was filtered through a pad of celite. The filtrate was concentrated under reduced pressure. The residue was purified by prep-HPLC to give compound **2** as a white solid (100 mg, 41.0%). LCMS (ESI) *m/z* = 398.0 [M+H]<sup>+</sup>.

**EXAMPLE 4****1-(4-tert-butylphenyl)-5-hydroxy-4-oxo-1,4-dihydropyridazine-3-carboxylic acid (3)****[0202]**

**[0203]** A solution of **2c** (1.0 g, 9.7 mmol) in  $\text{HBF}_4$  (6 mL, 50 % in water) was cooled with an ice brine bath. To the solution was added a solution of  $\text{NaNO}_2$  (0.8 g, 11.4 mmol) in  $\text{H}_2\text{O}$  (10 mL) dropwise at  $0^\circ\text{C}$ . The reaction was stirred to keep the bath temperature between  $-5^\circ\text{C}$  and  $5^\circ\text{C}$  for 1 h. The in situ formed diazonium solution was added to a mixture of compound **1c** (2.3 g, 9.7 mmol) and  $\text{NaOAc}$  (1.23 g, 15 mmol) in EtOH (50 mL) at  $0^\circ\text{C}$ . After addition, the mixture was stirred at  $0^\circ\text{C}$  for 4 h. The resulting suspension was filtered. The filtrate was concentrated to provide the crude product, which was then purified by column chromatography on silica gel (PE:EtOAc = 20:1 to 10:1) to give pure **3c** as a colorless oil (600 mg, 23 %).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.43-7.18 (m, 9H), 4.74 (s, 2H), 4.68 (s, 2H), 4.37 (t,  $J = 7.2$ , 1H), 4.27 (t,  $J = 7.2$ , 1H), 1.40-1.21 (m, 12H).

**[0204]** A mixture of **3c** (0.6 g, 1.52 mmol) in DMF-DMA (50 mL) was stirred at RT for 3 h. After complete conversion, the mixture was concentrated under reduced pressure. The residue was treated with EtOAc (1 mL) and PE (10 mL). The solution was stirred for 10 min. The precipitate was collected by suction-filtration. The filter cake was washed with PE and dried in vacuum to give pure **4c** as a yellowish solid (0.3 g, 49 %). LCMS (ESI)  $m/z = 407.2$   $[\text{M}+\text{H}]^+$ .

[0205] To a solution of **4c** (0.3 g, 0.74 mmol) in EtOH (5 mL) and water (5 mL), was added 2 N NaOH (0.8 mL, 1.6 mmol) at 0°C. The mixture was stirred for 3 h. After complete conversion, the mixture was concentrated under reduced pressure to remove the EtOH. The aqueous phase was acidified to pH = 4 with 2 N HCl aq. solution. The mixture was extracted with EtOAc (3 mL x 3). The combined organic phases were dried over with Na<sub>2</sub>SO<sub>4</sub>, filtered and concentrated to give crude **5c** as a white solid (0.2 g, 71.0 %), which was used without further purification. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.19 (s, 1H), 7.52-7.50 (m, 2H), 7.45-7.36 (m, 7H), 5.39 (s, 2H), 1.34 (s, 9H).

[0206] A mixture of **5c** (0.2 g, 0.53 mmol) and Pd(OH)<sub>2</sub> (0.2 g) in MeOH (20 mL) was stirred for 4 h under a H<sub>2</sub> atmosphere (15 psi). After the reaction was completed, the mixture was filtered through a pad of celite and concentrated to give the crude product. The crude product was purified by prep-HPLC to give compound **3** as a white solid (100 mg, 65.7 %). LCMS (ESI) *m/z* = 289.1 [M+H]<sup>+</sup>.

[0207] Compound **4** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-fluoroaniline. LCMS (ESI) *m/z* = 249 [M-H] and 251 [M+H]<sup>+</sup>.

[0208] Compound **5** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 3-methoxyaniline. LCMS (ESI) *m/z* = 261 [M-H] and 263 [M+H]<sup>+</sup>.

[0209] Compound **6** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 3-phenoxyaniline. LCMS (ESI) *m/z* = 323 [M-H] and 324 [M+H]<sup>+</sup>.

[0210] Compound **7** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(trifluoromethyl)aniline. LCMS (ESI) *m/z* = 301 [M+H]<sup>+</sup> and 323 [M+Na]<sup>+</sup>.

[0211] Compound **8** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-isopropylaniline. LCMS (ESI) *m/z* = 275 [M+H]<sup>+</sup>.

[0212] Compound **9** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-phenoxyaniline. LCMS (ESI) *m/z* = 325 [M+H]<sup>+</sup>.

[0213] Compound **10** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2,3-dihydro-1H-inden-5-amine. LCMS (ESI) *m/z* = 273 [M+H]<sup>+</sup>.

[0214] Compound **11** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(piperidin-1-yl)aniline. LCMS (ESI) *m/z* = 316 [M+H]<sup>+</sup>.

[0215] Compound **12** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2,6-dimethylaniline. LCMS (ESI) *m/z* = 261 [M+H]<sup>+</sup> and 283 [M+Na]<sup>+</sup>.

[0216] Compound **13** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-methoxy-[1,1'-biphenyl]-3-amine. LCMS (ESI)  $m/z$  = 339 [M+H]<sup>+</sup>.

[0217] Compound **14** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(difluoromethoxy)aniline. LCMS (ESI)  $m/z$  = 299 [M+H]<sup>+</sup>.

[0218] Compound **15** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-methylquinolin-8-amine. LCMS (ESI)  $m/z$  = 298 [M+H]<sup>+</sup>.

[0219] Compound **16** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(tert-butyl)aniline. LCMS (ESI)  $m/z$  = 289 [M+H]<sup>+</sup>.

[0220] Compound **17** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using N-(3-aminophenyl)methanesulfonamide. LCMS (ESI)  $m/z$  = 348 [M+Na]<sup>+</sup> and 673 [2M+Na]<sup>+</sup>.

[0221] Compound **18** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using [1,1'-biphenyl]-2-amine. LCMS (ESI)  $m/z$  = 309 [M+H]<sup>+</sup> and 331 [M+Na]<sup>+</sup>.

[0222] Compound **19** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-((cyclohexyl(methyl)amino)methyl)aniline. LCMS (ESI)  $m/z$  = 358 [M+H]<sup>+</sup>.

[0223] Compound **20** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 3,5-bis(trifluoromethyl)aniline. LCMS (ESI)  $m/z$  = 369 [M+H]<sup>+</sup> and 391 [M+Na]<sup>+</sup>.

[0224] Compound **21** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(trifluoromethoxy)aniline. LCMS (ESI)  $m/z$  = 317 [M+H]<sup>+</sup>.

[0225] Compound **22** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 3-amino-N-butylbenzenesulfonamide. LCMS (ESI)  $m/z$  = 368 [M+H]<sup>+</sup>.

[0226] Compound **23** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-ethoxyaniline. LCMS (ESI)  $m/z$  = 277 [M+H]<sup>+</sup>, 299 [M+Na]<sup>+</sup> and 575 [2M+Na]<sup>+</sup>.

[0227] Compound **24** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(phenylsulfonyl)aniline. LCMS (ESI)  $m/z$  = 373 [M+H]<sup>+</sup> and 767 [2M+Na]<sup>+</sup>.

[0228] Compound **25** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-butoxyaniline. LCMS (ESI)  $m/z$  = 305 [M+H]<sup>+</sup>.

[0229] Compound **26** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 3,5-dimethoxyaniline. LCMS (ESI)  $m/z$  = 293  $[M+H]^+$ .

[0230] Compound **27** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-(trifluoromethyl)aniline. LCMS (ESI)  $m/z$  = 301  $[M+H]^+$ .

[0231] Compound **28** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-(piperidin-1-yl)aniline. LCMS (ESI)  $m/z$  = 316  $[M+H]^+$ .

[0232] Compound **29** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-(2-aminophenyl)ethanol. LCMS (ESI)  $m/z$  = 277  $[M+H]^+$ .

[0233] Compound **30** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 3-(trifluoromethoxy)aniline. LCMS (ESI)  $m/z$  = 317  $[M+H]^+$ .

[0234] Compound **31** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-(methylsulfonyl)aniline. LCMS (ESI)  $m/z$  = 311  $[M+H]^+$ .

[0235] Compound **32** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2,3-dihydrobenzo[b][1,4]dioxin-6-amine. LCMS (ESI)  $m/z$  = 291  $[M+H]^+$ .

[0236] Compound **33** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 1H-indazol-6-amine. LCMS (ESI)  $m/z$  = 273  $[M+H]^+$ .

[0237] Compound **34** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2'-ethyl-[1,1'-biphenyl]-2-amine. LCMS (ESI)  $m/z$  = 337  $[M+H]^+$ .

[0238] Compound **35** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using [1,1':2',1''-terphenyl]-2-amine. LCMS (ESI)  $m/z$  = 385  $[M+H]^+$ .

[0239] Compound **36** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2'-amino-[1,1'-biphenyl]-4-carbonitrile. LCMS (ESI)  $m/z$  = 334  $[M+H]^+$  and 356  $[M+Na]^+$ .

[0240] Compound **37** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4'-isobutyl-[1,1'-biphenyl]-2-amine. LCMS (ESI)  $m/z$  = 365  $[M+H]^+$ .

[0241] Compound **38** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2'-methyl-[1,1'-biphenyl]-2-amine. LCMS (ESI)  $m/z$  = 323  $[M+H]^+$ .

[0242] Compound **39** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2'-isopropyl-[1,1'-biphenyl]-2-amine. LCMS (ESI)  $m/z$  = 351  $[M+H]^+$ .

[0243] Compound **40** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2'-(trifluoromethoxy)-[1,1'-biphenyl]-2-amine. LCMS (ESI)  $m/z$  = 393  $[M+H]^+$ .

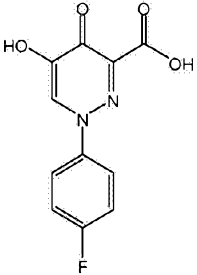
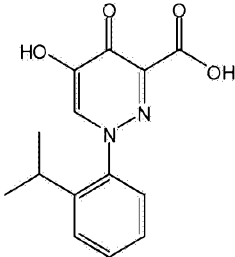
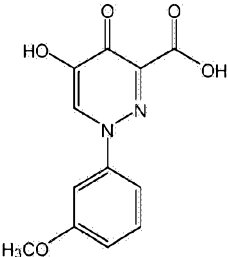
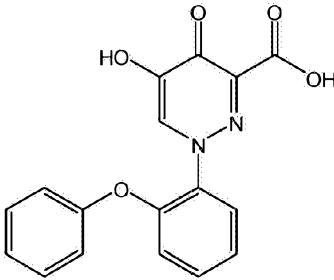
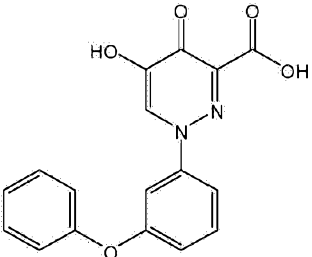
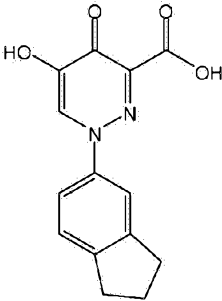
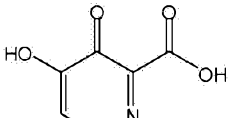
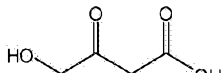
[0244] Compound **41** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 2-morpholinoaniline. LCMS (ESI)  $m/z$  = 318  $[M+H]^+$ .

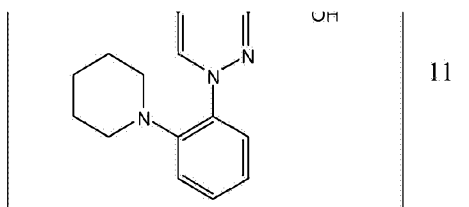
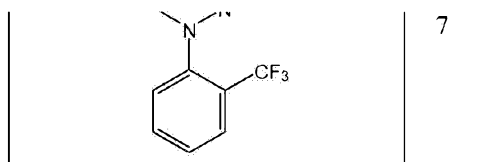
[0245] Compound **42** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 1H-indazol-5-amine. LCMS (ESI)  $m/z$  = 273  $[M+H]^+$ .

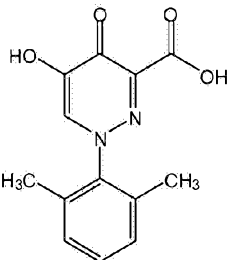
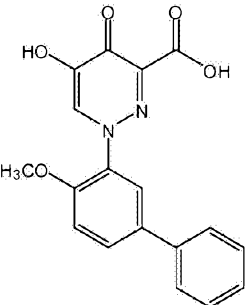
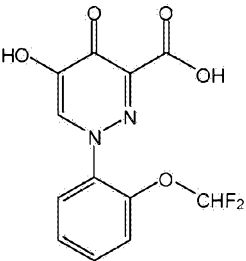
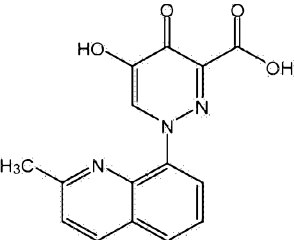
[0246] Compound **43** was obtained following one of the procedures for obtaining compounds 1, 2 or 3 using 4-phenoxyaniline. LCMS (ESI)  $m/z$  = 325  $[M+H]^+$ .

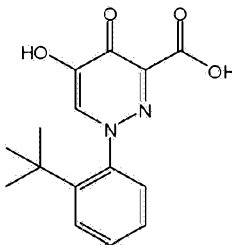
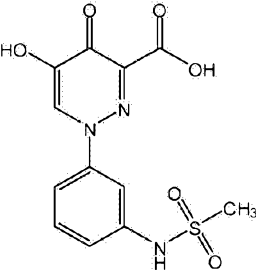
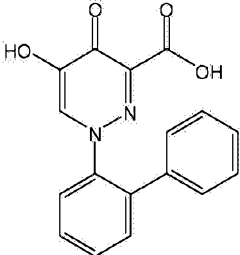
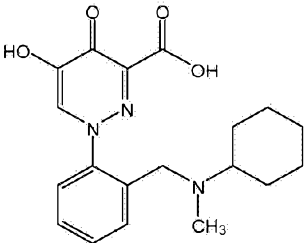
[0247] Compound **44** was obtained following the procedure for obtaining compound 24 except hydrolysis of the ethyl ester was not performed. LCMS (ESI)  $m/z$  = 401  $[M+H]^+$ .

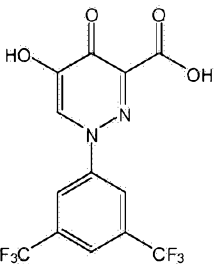
Table 1 - Compounds of Formula (I)

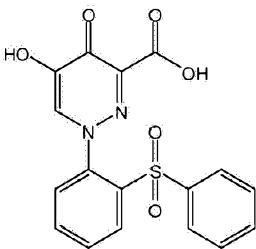
Structure	No.	Structure	No.
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	5		9
	6		10
			



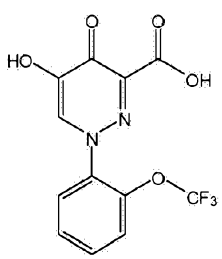
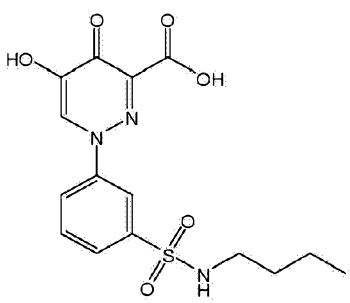
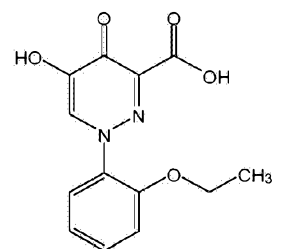
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	15

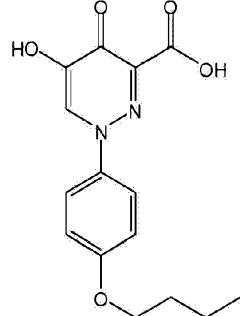
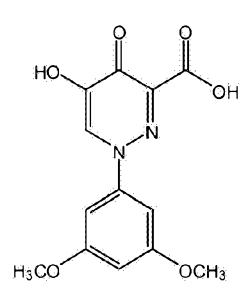
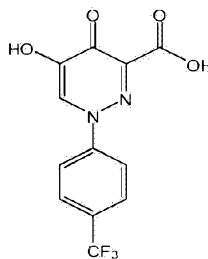
Structure	No.
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	18
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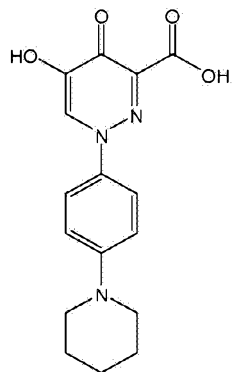
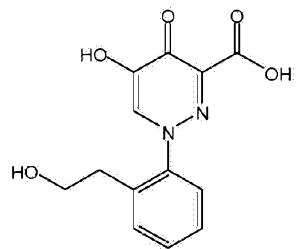
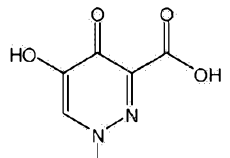
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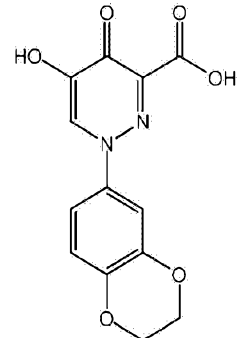
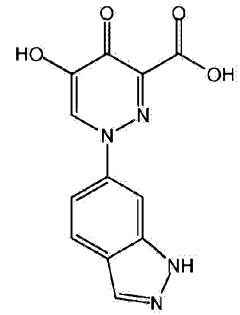
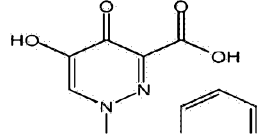
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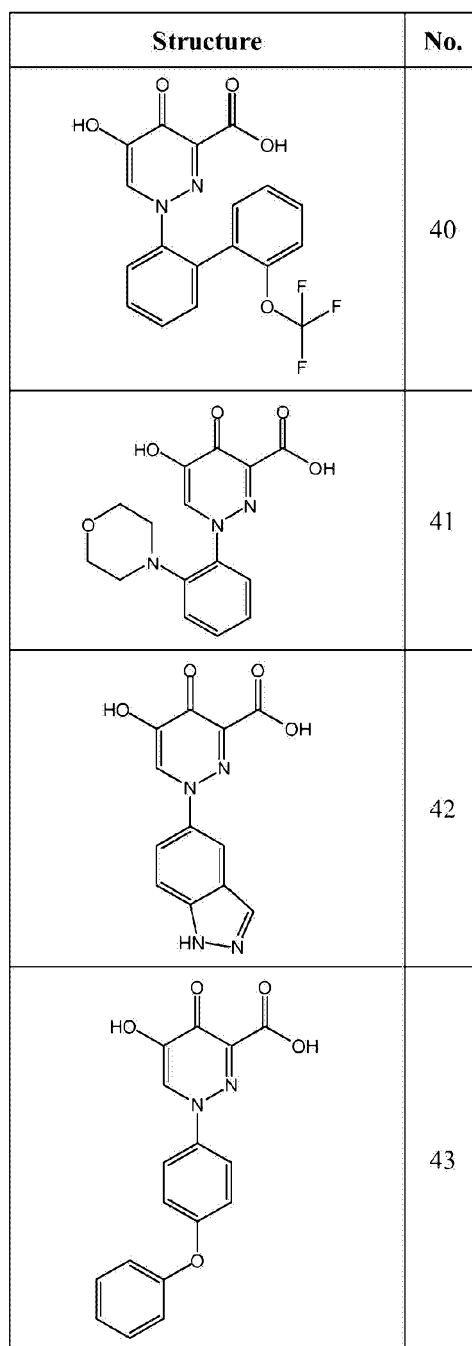
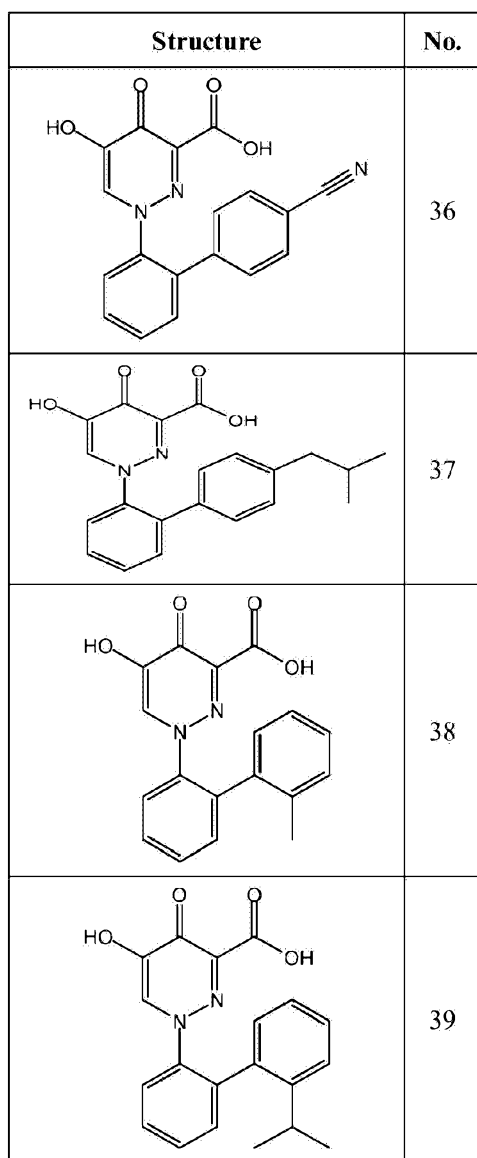
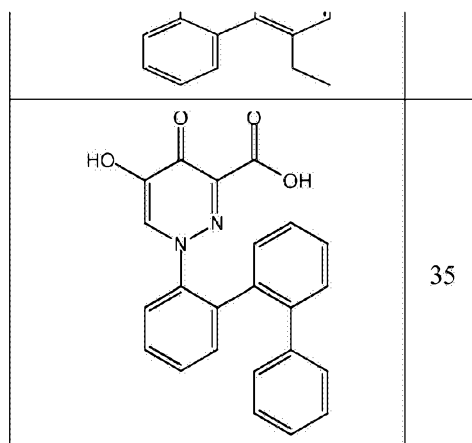
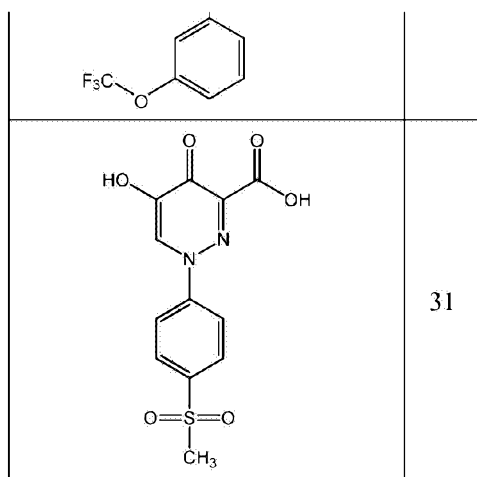


	21
	22
	23

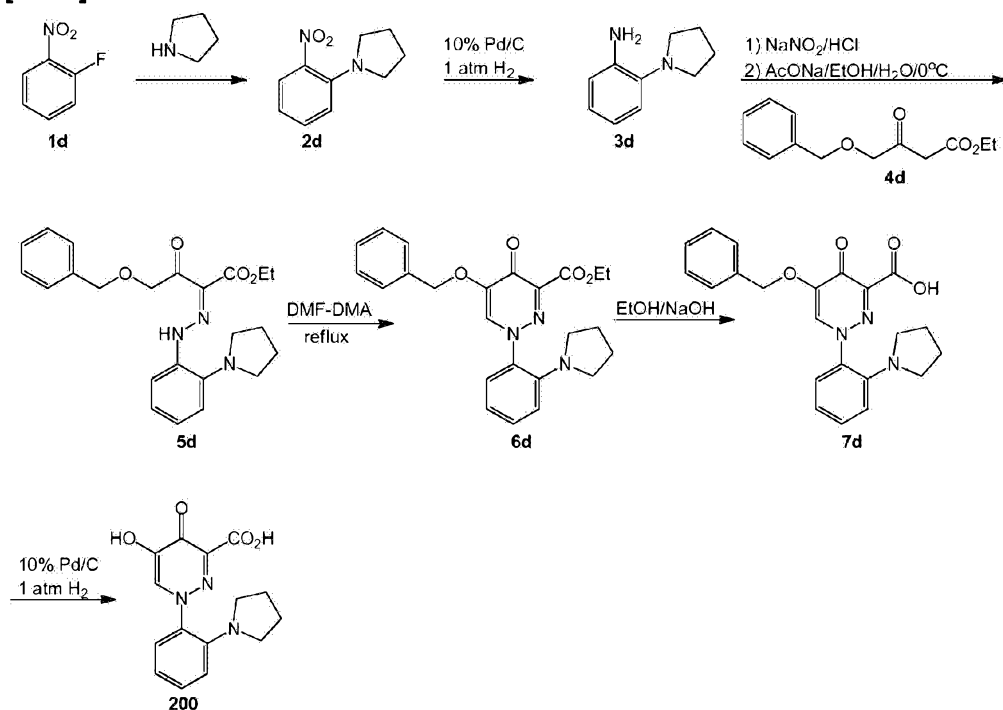
	25
	26
	27

Structure	No.
	28
	29
	30

Structure	No.
	32
	33
	34



Structure	No.
	44

**EXAMPLE 5****5-hydroxy-4-oxo-1-(2-(pyrrolidin-1-yl)phenyl)-1,4-dihydropyridazine-3-carboxylic acid (200)****[0248]**

**[0249]** A solution of **1d** (10.0 g, 70.9 mmol) in pyrrolidine (30 mL) was stirred at RT for 1 h. The solvent was evaporated under reduced pressure to give crude **2d** as a colorless oil (10.0 g, 73.5 %). The residue was used without further purification.

**[0250]** A mixture of **2d** (10.0 g, 52.0 mmol) and Pd/C (1.0 g) in MeOH (20 mL) was stirred

under H<sub>2</sub> atmosphere (15 psi) for 4 h. After complete conversion, the mixture was filtered through a pad of celite. The filtrate was concentrated under the reduced pressure. The residue was purified by column chromatography on silica gel (elution PE: EtOAc = 50:1 to 20:1) to give pure **3d** as a colorless oil (8.0 g, 95.2 %). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 6.94 (d, *J* = 8.0 Hz, 1H), 6.88-6.81 (m, 1H), 6.71-6.66 (m, 2H), 3.79 (s, 2H), 3.01-2.98 (m, 4H), 1.88-1.85 (m, 4H).

[0251] To a stirred solution of **3d** (743 mg, 4.59 mmol) in HCl (4.6 mL, 27.54 mmol) at 0 °C was added NaNO<sub>2</sub> (380 mg, 5.5 mmol) in H<sub>2</sub>O (10 mL). The solution was stirred at 0 °C for 40 min. The resulting aqueous solution was added to a suspension of **4d** (1.08 g, 4.59 mmol) and NaOAc (2.26 g, 27.54 mmol) in EtOH (10 mL) at 0 °C. After addition, the solution was stirred at 0 °C for 30 min and then warmed to RT. The reaction was kept on stirring for another 4 h. After complete conversion, the mixture was treated with EtOAc (30 mL). The organic phase was separated, washed with water and brine, and dried over with Na<sub>2</sub>SO<sub>4</sub>. The solvent was removed under the reduced pressure. The residue, **5d**, (4.0 g, 87.2 %) was used without further purification.

[0252] A solution of **5d** (0.8 g, 1.96 mmol) in DMF-DMA (10 mL) was stirred at RT for 4 h. The solution was concentrated in vacuum, and the residue was crystallized in EtOAc to give pure **6d** as a yellowish solid (400 mg, 48.69 %). <sup>1</sup>H NMR (400 MHz, CD<sub>3</sub>OD) δ 8.25 (s, 1H), 7.42-7.31 (m, 6H), 7.21 (d, *J* = 7.6 Hz, 1H), 6.94 (d, *J* = 8.4 Hz, 1H), 6.85-6.81 (m, 1H), 5.23 (s, 2H), 4.37 (q, *J* = 7.2 Hz, 2H), 2.81-2.78 (m, 4H), 1.74-1.70 (m, 4H), 1.35 (t, *J* = 7.2 Hz, 3H).

[0253] To a stirred solution of **6d** (0.4 g, 0.95 mmol) in EtOH (10 mL) was added 2 N NaOH solution (1.4 mL, 2.86 mmol) dropwise. After addition, the mixture was stirred at RT for 1 h. After complete conversion, the EtOH was removed via vacuum. The resulting aqueous phase was acidified with 1 N HCl solution to pH = 2. The precipitate was collected by suction-filtration. The filter cake was washed with water and dried in vacuum to give pure **7d** as a white solid (250 mg, 67.3 %).

[0254] A mixture of **7d** (250 mg, 0.64 mmol) and Pd/C (50 mg) in MeOH (10 mL) was stirred under H<sub>2</sub> atmosphere (15 psi) for 15 min. After complete conversion, the mixture was filtered through a pad of celite. The filtrate was concentrated via vacuum. The residue was crystallized in EtOH (10 mL) to give compound **200** as a yellowish solid (50 mg, 25.91 %). LCMS (ESI) *m/z* = 302.0 [M+H]<sup>+</sup>.

[0255] Compound **201** was obtained following the procedure for obtaining compound 200 using 1-chloro-2-nitro-4-(trifluoromethyl)benzene and pyrrolidine. LCMS (ESI) *m/z* = 370 [M+H]<sup>+</sup>.

[0256] Compound **202** was obtained following the procedure for obtaining compound 200 using 1-fluoro-2-nitrobenzene and 4-methylpiperidine. LCMS (ESI) *m/z* = 330 [M+H]<sup>+</sup>.

[0257] Compound **203** was obtained following the procedure for obtaining Compound 200 using 1-fluoro-2-nitrobenzene and 2-benzylpyrrolidine. LCMS (ESI)  $m/z$  = 392  $[M+H]^+$ .

[0258] Compound **204** was obtained following the procedure for obtaining compound 200 using 1-fluoro-2-nitrobenzene and 1-methylpiperazine. LCMS (ESI)  $m/z$  = 331  $[M+H]^+$ .

[0259] Compound **205** was obtained following the procedure for obtaining compound 200 using 1-fluoro-2-nitrobenzene and 1-ethylpiperazine. LCMS (ESI)  $m/z$  = 345  $[M+H]^+$ .

[0260] Compound **206** was obtained following the procedure for obtaining compound 200 using 1-fluoro-2-nitrobenzene and 4,4-dimethylpiperidine. LCMS (ESI)  $m/z$  = 344  $[M+H]^+$ .

[0261] Compound **207** was obtained following the procedure for obtaining compound 200 using 4-isopropylpiperidine. LCMS (ESI)  $m/z$  = 358  $[M+H]^+$ .

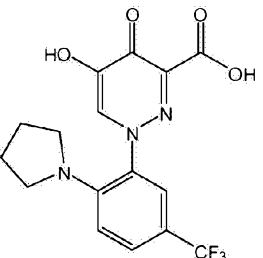
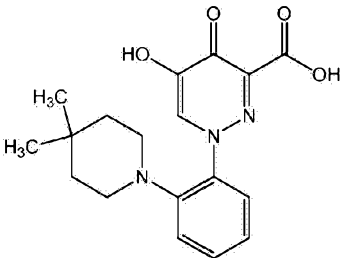
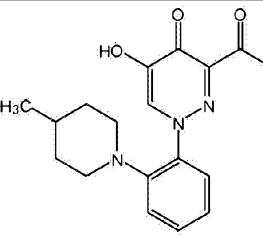
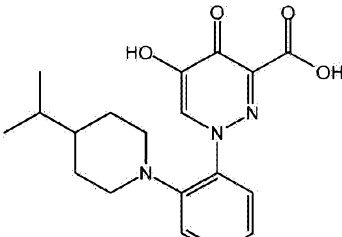
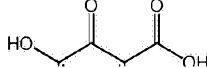
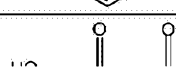
[0262] Compound **208** was obtained following the procedure for obtaining compound 200 using 4-(tert-butyl)piperidine hydrochloride. LCMS (ESI)  $m/z$  = 372  $[M+H]^+$ .

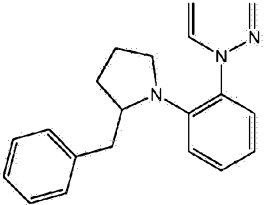
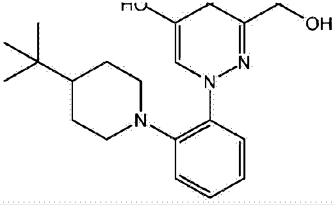
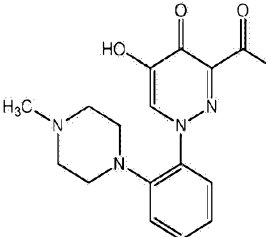
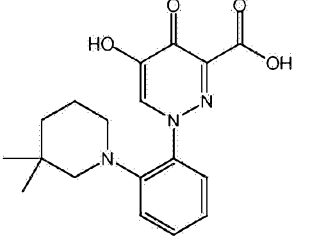
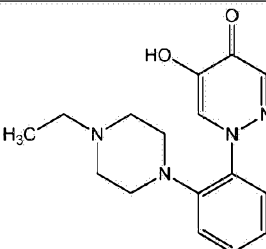
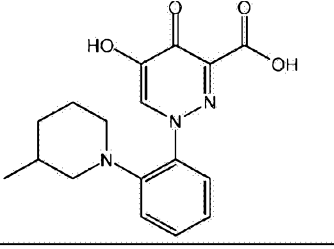
[0263] Compound **209** was obtained following the procedure for obtaining compound 200 using 3,3-dimethylpiperidine hydrochloride. LCMS (ESI)  $m/z$  = 344  $[M+H]^+$ .

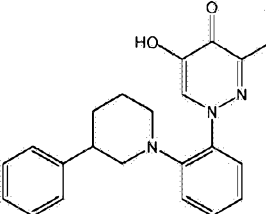
[0264] Compound **210** was obtained following the procedure for obtaining compound 200 using 3-methylpiperidine hydrochloride. LCMS (ESI)  $m/z$  = 330  $[M+H]^+$ .

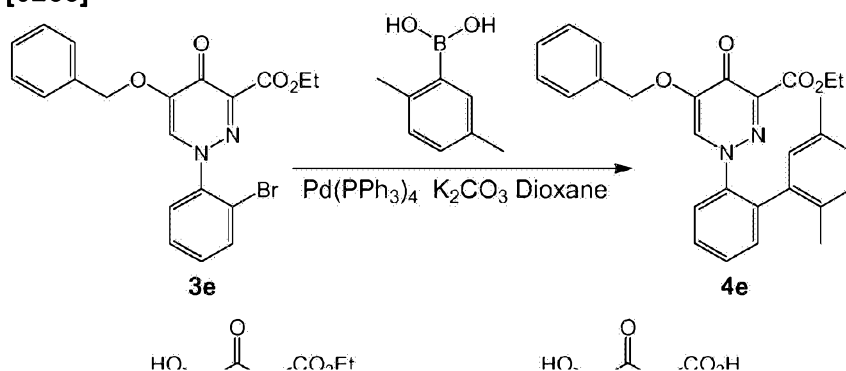
[0265] Compound **211** was obtained following the procedure for obtaining compound 200 using 3-phenylpiperidine. LCMS (ESI)  $m/z$  = 392  $[M+H]^+$ .

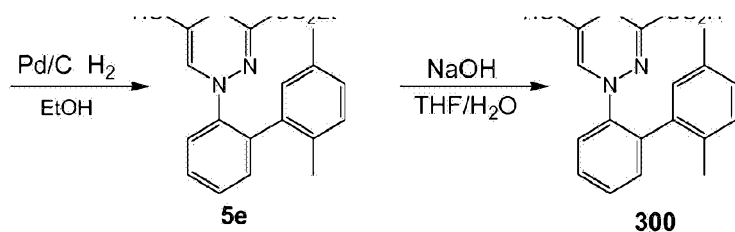
Table 2 - Compounds of Formula (I)

Structure	No.	Structure	No.
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	202		207
			

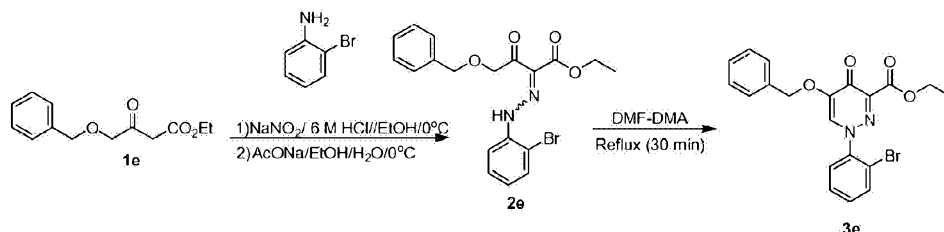
	203		208
	204		209
	205		210

Structure	No.
	211

**EXAMPLE 6****1-(2',5'-dimethylbiphenyl-2-yl)-5-hydroxy-4-oxo-1,4-dihydropyridazine-3-carboxylic acid (300)****[0266]**



**[0267]** Compound **3e** was prepared in accordance with the following reaction scheme as detailed below.



**[0268]** A mixture of 2-bromobenzaniline (3.4 g, 20 mmol) and 6 M HCl aqueous solution (20 mL, 120 mmol) was stirred at 0 °C. To the mixture was added a solution of NaNO<sub>2</sub> (1.66 g, 24 mmol) in H<sub>2</sub>O (5 mL) dropwise. After addition, the mixture was stirred for 15 min. The resulting aqueous solution was added to a suspension of **1e** (4.7 g, 20 mmol) and NaOAc (9.84 g, 120 mmol) in EtOH (40 mL) at 0 °C dropwise. Water (about 15 mL) was added to dissolve the NaOAc. After complete conversion, the mixture was poured into water and extracted with AcOEt (50 mL x 3). The combined organic phases were washed with sat. aq. NaHCO<sub>3</sub> solution and brine, dried over MgSO<sub>4</sub>, and concentrated under reduced pressure. Crude **2e** (6.3 g, 75.2%) was used without further purification. LCMS (ESI) *m/z* = 418.8, 420.9 [M+H]<sup>+</sup>.

**[0269]** A solution of **2e** (3.3 g, 8 mmol) in DMF-DMA (22 mL) was heated to reflux for 2.5 h. After complete conversion, the reaction was cooled to RT. The precipitate was collected by suction-filtration, and the filter cake was washed with a small amount of EtOAc/PE (1:1, 6 mL) and dried over in vacuum to give pure **3e** as a white solid (3.0 g, 87.4 %). LCMS (ESI) *m/z* = 429, 431 [M+H]<sup>+</sup>.

**[0270]** To a suspension of **3e** (500 mg, 1.16 mmol), 2,5-dimethylphenylboronic acid (210.3 mg, 1.40 mmol) and K<sub>2</sub>CO<sub>3</sub> (322 mg, 2.33 mmol) in dioxane (10 mL) was added Pd(PPh<sub>3</sub>)<sub>4</sub> (135 mg, 0.0168 mmol). The mixture was degassed for 5 min, and then refilled with N<sub>2</sub>. The reaction was stirred at 100°C under N<sub>2</sub> atmosphere for 2 h and then cooled to RT. The solid was filtered off, and the filtrate was concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (PE: EA =5:1 to 2: 1) to give pure **4e** as a white solid (389 mg, 73.3 %). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.53-7.41 (m, 3H), 7.27-7.14 (m, 7H), 7.01(s, 2H), 6.84 (s, 1H), 4.64-4.51 (m, 2H), 4.33 (q, *J* = 7.2 Hz, 2H), 2.23 (s, 3H), 1.81 (s, 3H), 1.31 (t, *J* = 7.2 Hz, 3H).

[0271] A mixture of **4e** (389 mg, 0.85 mmol) and Pd/C (50 mg) in EtOH (20 mL) was stirred under a H<sub>2</sub> atmosphere (15 psi) for 30 min. The solution was filtered through a pad of celite. The filtrate was concentrated to give the crude product as a white solid (249 mg, 80.5 %), which was used without further purification. LCMS (ESI)  $m/z$  = 365.0 [M+H]<sup>+</sup>.

[0272] To a solution of **5e** (249 mg, 0.68 mmol) in THF (3 mL) was added 1N NaOH solution (1.36 mL, 1.36 mmol). The mixture was stirred at RT for 2 h. After complete conversion, THF was removed under reduced pressure, and the aqueous phase was acidified with 1 N HCl to pH = 4. The precipitate was collected by suction-filtration. The filter cake was washed with water and dried in vacuum to give compound **300** as a white solid (130 mg, 56.9 %). LCMS (ESI)  $m/z$  = 336.9 [M+H]<sup>+</sup>.

[0273] Compound **301** was obtained following the procedure for obtaining compound 300 using (3,5-dimethylphenyl)boronic acid. LCMS (ESI)  $m/z$  = 337 [M+H]<sup>+</sup>.

[0274] Compound **302** was obtained following the procedure for obtaining compound 300 using (4-(tert-butyl)phenyl)boronic acid. LCMS (ESI)  $m/z$  = 365 [M+H]<sup>+</sup>.

[0275] Compound **303** was obtained following the procedure for obtaining compound 300 using p-tolylboronic acid. LCMS (ESI)  $m/z$  = 323 [M+H]<sup>+</sup>.

[0276] Compound **304** was obtained following the procedure for obtaining compound 300 using tert-butyl 4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-5,6-dihydropyridine-1(2H)-carboxylate. <sup>1</sup>H NMR (CD<sub>3</sub>OD): δ 1.45 (s, 9H). LCMS (ESI)  $m/z$  = 316 [M-Boc+H]<sup>+</sup>.

[0277] Compound **305** was obtained following the procedure for obtaining compound 300 using (4-fluoro-2-methylphenyl)boronic acid. LCMS (ESI)  $m/z$  = 341 [M+H]<sup>+</sup>.

[0278] Compound **306** was obtained following the procedure for obtaining compound 300 using (4-fluorophenyl)boronic acid. LCMS (ESI)  $m/z$  = 327 [M+H]<sup>+</sup>.

[0279] Compound **307** was obtained following the procedure for obtaining compound 300 using (4-(trifluoromethyl)phenyl)boronic acid. LCMS (ESI)  $m/z$  = 377 [M+H]<sup>+</sup> and 399 [M+Na]<sup>+</sup>.

[0280] Compound **308** was obtained following one of the procedures for obtaining compound 300 using 2-(cyclohex-1-en-1-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane. LCMS (ESI)  $m/z$  = 315 [M+H]<sup>+</sup>.

[0281] Compound **309** was obtained following the procedure for obtaining compound 300 using (2,3-dimethylphenyl)boronic acid. LCMS (ESI)  $m/z$  = 337 [M+H]<sup>+</sup>.



[0282] Compound **310** was obtained following the procedure for obtaining compound 300 using (2-isopropoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 367  $[M+H]^+$ .

[0283] Compound **311** was obtained following the procedure for obtaining compound 300 using (2-phenoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 401  $[M+H]^+$ .

[0284] Compound **312** was obtained following the procedure for obtaining compound 304 with the addition of a TFA/ $CH_2Cl_2$  step to cleave the Boc group. LCMS (ESI)  $m/z$  = 316  $[M+H]^+$ .

[0285] Compound **313** was obtained following the procedure for obtaining compound 300 using (1H-indol-6-yl)boronic acid. LCMS (ESI)  $m/z$  = 348  $[M+H]^+$ .

[0286] Compound **314** was obtained following the procedure for obtaining compound 300 using 2-isopropoxy-5-methylphenyl)boronic acid. LCMS (ESI)  $m/z$  = 381  $[M+H]^+$ .

[0287] Compound **315** was obtained following the procedure for obtaining compound 300 using (2-methoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 339  $[M+H]^+$ .

[0288] Compound **316** was obtained following the procedure for obtaining compound 300 using dibenzo[b,d]furan-4-ylboronic acid. LCMS (ESI)  $m/z$  = 399  $[M+H]^+$ .

[0289] Compound **317** was obtained following the procedure for obtaining compound 300 using (2-hydroxyphenyl)boronic acid with the modification that the boronic acid coupling product was alkylated using bromocyclohexane in DMF at RT using sodium iodide and potassium carbonate. LCMS (ESI)  $m/z$  = 407  $[M+H]^+$ .

[0290] Compound **318** was obtained following the procedure for obtaining compound 300 using (3-methoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 339  $[M+H]^+$ .

[0291] Compound **319** was obtained following the procedure for obtaining compound 300 using (2-hydroxyphenyl)boronic acid with the modification that the boronic acid coupling product was alkylated using bromocyclopentane in DMF at RT using sodium iodide and potassium carbonate. LCMS (ESI)  $m/z$  = 393  $[M+H]^+$ .

[0292] Compound **320** was obtained following the procedure for obtaining compound 300 using (1H-indol-5-yl)boronic acid. LCMS (ESI)  $m/z$  = 348  $[M+H]^+$ .

[0293] Compound **321** was obtained following the procedure for obtaining compound 300 using 4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-1H-indazole. LCMS (ESI)  $m/z$  = 362  $[M+H]^+$ .

[0294] Compound **322** was obtained following the procedure for obtaining compound 300 using (2-chloro-5-methoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 373  $[M+H]^+$ .

[0295] Compound **323** was obtained following the procedure for obtaining compound 300 using (3-chloro-5-methoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 373  $[M+H]^+$ .

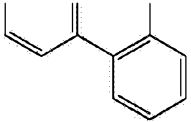
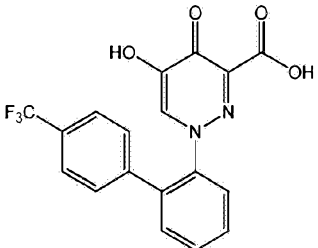
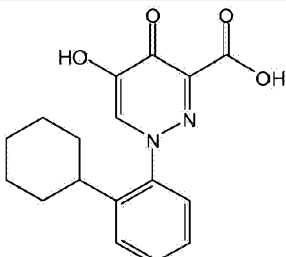
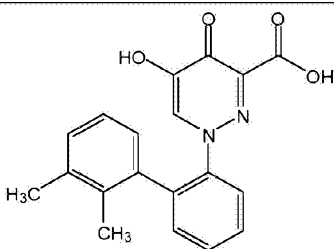
[0296] Compound **324** was obtained following the procedure for obtaining compound 300 using (1-methyl-1H-indol-6-yl)boronic acid with the modification that the ester/ether precursor was treated with methyl iodide and potassium carbonate in DMF prior to debenzylation and ester hydrolysis. LCMS (ESI)  $m/z$  = 362  $[M+H]^+$ .

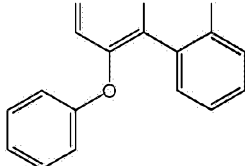
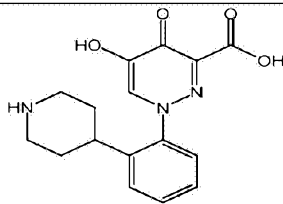
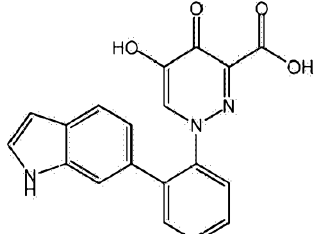
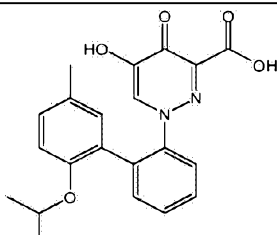
[0297] Compound **325** was obtained following the procedure for obtaining compound 300 using (2-isobutoxyphenyl)boronic acid. LCMS (ESI)  $m/z$  = 381  $[M+H]^+$ .

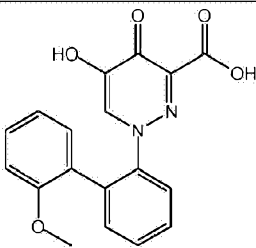
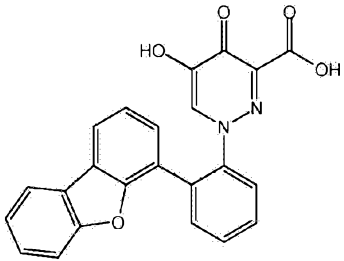
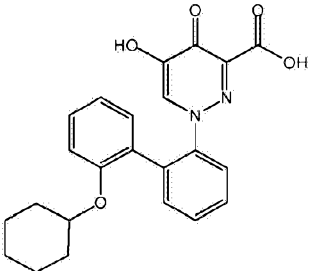

[0298] Compound **326** was obtained following the procedure for obtaining compound 300 using (3-ethoxy-5-methylphenyl)boronic acid. LCMS (ESI)  $m/z$  = 367  $[M+H]^+$ .

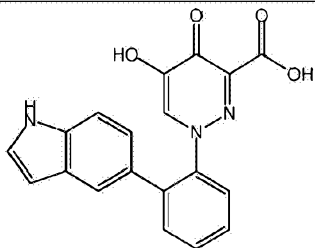
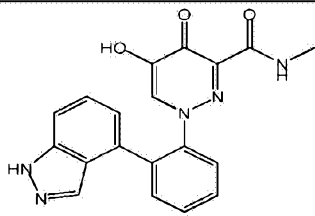
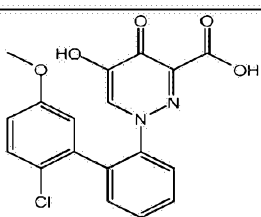
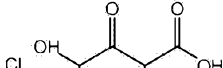
Table 3 - Compounds of Formula (I)

Structure	No.	Structure	No.
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	302		304
	305		310
	306		

	
	307
	308
	309

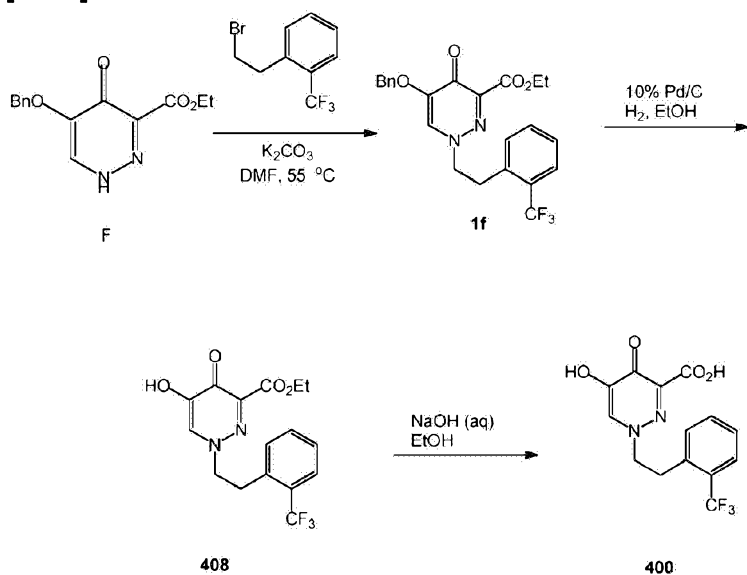
	311
	312
	313
	314

Structure	No.
	315
	316
	317
	

Structure	No.
	320
	321
	322
	

	318		323
	319		324

Structure	No.	Structure	No.
	325		326

**EXAMPLE 7****1-(2-(trifluoromethyl)phenethyl)-1,4-dihydro-5-hydroxy-4-oxopyridazine-3-carboxylic acid (400)****[0299]**

[0300] Potassium carbonate (0.20 g, 1.5 mmol) was added to a solution of compound **F** (80 mg, 2.9 mmol) and trifluoromethylphenethyl bromide (0.15 mL, 8.8 mmol), in DMF (1 mL). The reaction was heated at 55 °C for 30 min. The mixture was diluted with EtOAc (50 mL) and washed H<sub>2</sub>O (3x), brine (1x), dried (Na<sub>2</sub>SO<sub>4</sub>), and concentrated. The crude mixture was chromatographed (SiO<sub>2</sub>, EtOAc:hexane) to provide **1f** (80 mg, 62%).

[0301] Compound **1f** (80 mg, 1.8 mmol) was hydrogenated over 10% Pd/C (4 mg) in THF/EtOH (1 mL, 50% v/v) for 2 h. The catalyst was removed by filtration, and the filtrate was concentrated. The crude product was recrystallized from hexane/CH<sub>2</sub>Cl<sub>2</sub> to provide compound **408** (51 mg, 61%). LCMS (DUIS)  $m/z$  = 357 [M+H]<sup>+</sup>.

[0302] Sodium hydroxide (1.0 mL, 2.0 M in H<sub>2</sub>O) was added to a solution of compound **408** (48 mg, 1.1 mmol) in EtOH (5 mL). The reaction was stirred at RT for 4 h. The mixture was concentrated and then acidified with 1M HCl to give a precipitate which was collected by filtration to give compound **400** as a white solid (3.7 mg, 10%). LCMS (ESI)  $m/z$  = 329 [M+H]<sup>+</sup> and 392 [M+CH<sub>3</sub>CN+Na]<sup>+</sup>.

[0303] Compound **401** was obtained following the procedure for obtaining compound 400 using (2-bromoethyl)benzene. LCMS (ESI)  $m/z$  = 261 [M+H]<sup>+</sup>.

[0304] Compound **402** was obtained following the procedure for obtaining compound 400 using (3-bromopropyl)benzene. LCMS (ESI)  $m/z$  = 275 [M+H]<sup>+</sup>, 287 [M+Na]<sup>+</sup> and 338 [M+CH<sub>3</sub>CN+Na]<sup>+</sup>.

[0305] Compound **403** was obtained following the procedure for obtaining compound 400 using 3-(bromomethyl)-1,1'-biphenyl. LCMS (ESI)  $m/z$  = 323 [M+H]<sup>+</sup>, 345 [M+Na]<sup>+</sup> and 667 [2M+Na]<sup>+</sup>.

[0306] Compound **404** was obtained following the procedure for obtaining compound 400 using tert-butyl 3-(2-bromoethyl)-1H-indole-1-carboxylate. LCMS (ESI)  $m/z$  = 400 [M+H]<sup>+</sup>, 422 [M+Na]<sup>+</sup> and 344 [M+H-C<sub>4</sub>H<sub>8</sub>]<sup>+</sup>.

[0307] Compound **405** was obtained following the procedure for obtaining compound 400 using 1-(1-(bromomethyl)cyclopentyl)-3-(trifluoromethyl)benzene, with the modifications that step 1 of the reaction was heated at 85 °C for 24 h and step 3 was not performed. LCMS (ESI)  $m/z$  = 409 [M-H]<sup>-</sup> and 455 [M+HCO<sub>2</sub>]<sup>-</sup>.

[0308] Compound **406** was obtained following the procedure for obtaining compound 400 using 1-(1-(bromomethyl)cyclopentyl)-3-(trifluoromethyl)benzene, with the modification that

step 1 of the reaction was heated at 85 °C for 24 h. LCMS (ESI)  $m/z$  = 381  $[M-H]^-$  and 763  $[2M-H]^-$ .

**[0309]** Compound **407** was obtained following the procedure for obtaining compound 404 with the modification that compound 404 was treated with trifluoroacetic acid in dichloromethane. LCMS (ESI)  $m/z$  = 300  $[M+H]^+$  and 322  $[M+Na]^+$ .

**[0310]** Compound **408** was obtained following the procedure for obtaining compound 400 using 1-(2-bromoethyl)-2-(trifluoromethyl)benzene with the modification that step 3 was not performed. LCMS (ESI)  $m/z$  = 357  $[M+H]^+$ .

**[0311]** Compound **409** was obtained following the procedure for obtaining compound 400 using benzyl bromide. LCMS (ESI)  $m/z$  = 247  $[M+H]^+$ .

**[0312]** Compound **410** was obtained following the procedure for obtaining compound 400 using (1-(bromomethyl)cyclopentyl)benzene with the modification that step 1 of the reaction was heated at 85 °C for 24 h. LCMS (ESI)  $m/z$  = 315  $[M+H]^+$ .

**[0313]** Compound **411** was obtained following the procedure for obtaining compound 410 with the modification that step 3 was not performed. LCMS (ESI)  $m/z$  = 343  $[M+H]^+$ .

**[0314]** Compound **412** was obtained following the procedure for obtaining compound 400 using 1-(2-bromoethyl)-3-(trifluoromethyl)benzene. LCMS (ESI)  $m/z$  = 327  $[M-H]^-$ .

**[0315]** Compound **413** was obtained following the procedure for obtaining compound 400 using 1-(2-bromoethyl)-2-methoxybenzene. LCMS (ESI)  $m/z$  = 289  $[M-H]^-$ .

**[0316]** Compound **414** was obtained following the procedure for obtaining compound 400 using 1-(2-bromoethyl)-3-methoxybenzene. LCMS (ESI)  $m/z$  = 289  $[M-H]^-$ .

**[0317]** Compound **415** was obtained following the procedure for obtaining compound 400 using 1-(2-bromoethyl)-4-methoxybenzene. LCMS (ESI)  $m/z$  = 289  $[M-H]^-$ .

**[0318]** Compound **416** was obtained following the procedure for obtaining compound 400 using 1-(1-bromo-2-methylpropan-2-yl)-4-methylbenzene with the modification that step 1 of the reaction was heated at 95 °C for 96 h. LCMS (ESI)  $m/z$  = 301  $[M-H]^-$ .

**[0319]** Compound **417** was obtained following the procedure for obtaining compound 400 using 4-(2-bromoethyl)-1,2-dimethoxybenzene. LCMS (ESI)  $m/z$  = 319  $[M-H]^-$ .

**[0320]** Compound **418** was obtained following the procedure for obtaining compound 400

using 2-bromo-3,4-dihydronaphthalen-1(2H)-one with the modifications that step 1 of the reaction was performed at RT for 1 h and step 2 was stopped after 1 h. LCMS (ESI)  $m/z$  = 301  $[M+H]^+$ .

[0321] Compound **419** was obtained following the procedure for obtaining compound 400 using 1-(1-(bromomethyl)cyclopentyl)-3,5-bis(trifluoromethyl)benzene with the modification that step 1 of the reaction was heated at 85 °C for 24 h. LCMS (ESI)  $m/z$  = 449  $[M-H]^-$ .

[0322] Compound **420** was obtained following the procedure for obtaining compound 419 with the modification that step 3 was not performed. LCMS (ESI)  $m/z$  = 477  $[M-H]^-$  and 523  $[M-HCO_2]^-$ .

[0323] Compound **421** was obtained following the procedure for obtaining compound 400 using (2-bromoethyl)cyclohexane. LCMS (ESI)  $m/z$  = 267  $[M+H]^+$ .

[0324] Compound **422** was obtained following the procedure for obtaining compound 400 using (1-(1H-pyrrolo[2,3-b]pyridin-1-yl)cyclopentyl)methanol with the modification that the alkylation was carried out under Mitsunobu conditions ( $Ph_3P$ ; DEAD; THF; RT to 85 °C for 12 h). LCMS (ESI)  $m/z$  = 353  $[M-H]^-$ .

[0325] Compound **423** was obtained following the procedure for obtaining compound 400 using 1-(2-bromoethyl)naphthalene. LCMS (ESI)  $m/z$  = 311  $[M+H]^+$ .

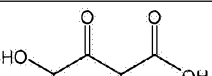
[0326] Compound **424** was obtained following the procedure for obtaining compound 400 using 1-(1-(bromomethyl)cyclopropyl)-3-(trifluoromethyl)benzene. LCMS (ESI)  $m/z$  = 353  $[M-H]^-$ .

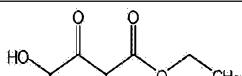
[0327] Compound **425** was obtained following the procedure for obtaining compound 400 using (1-(3-methyl-1H-pyrrolo[2,3-b]pyridin-1-yl)cyclopentyl)methanol with the modification that the alkylation was carried out under Mitsunobu conditions ( $Ph_3P$ ; DIAD; THF; RT to 80 °C for 8 h). LCMS (ESI)  $m/z$  = 367  $[M-H]^-$ .

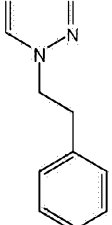
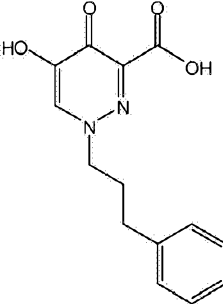
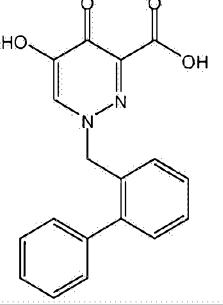
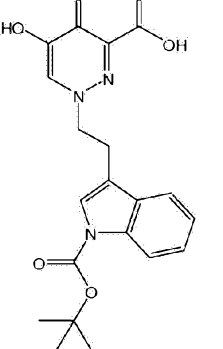
[0328] Compound **426** was obtained following the procedure for obtaining compound 400 using 1-(1-(bromomethyl)cyclopropyl)-4-chlorobenzene. LCMS (ESI)  $m/z$  = 321  $[M+H]^+$ .

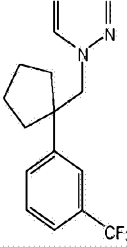
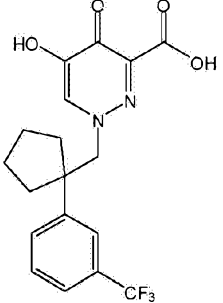
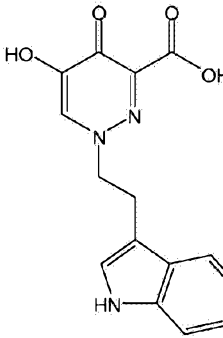
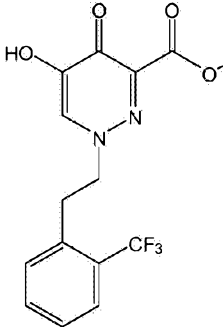
[0329] Compound **427** was obtained following the procedure for obtaining compound 400 using 2-(2-bromoethyl)naphthalene. LCMS (ESI)  $m/z$  = 311  $[M+H]^+$ .

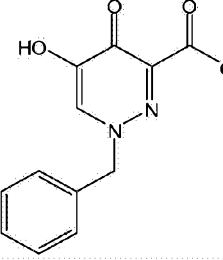
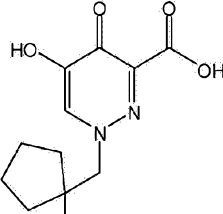
Table 4 - Compounds of Formula (I)

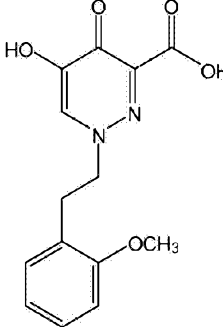
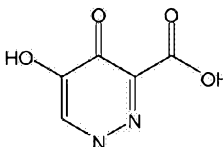
Structure	No.
	

Structure	No.
	


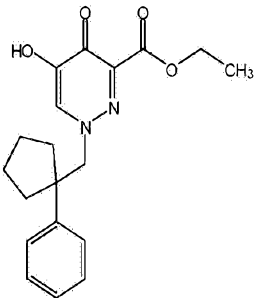
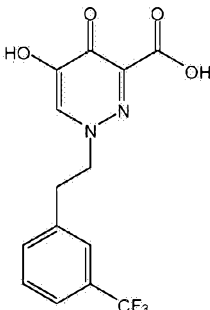
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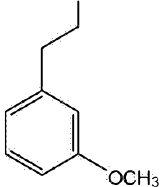
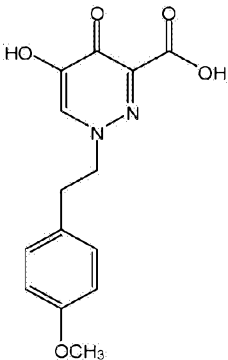
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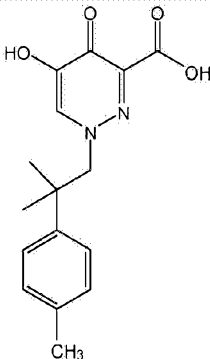
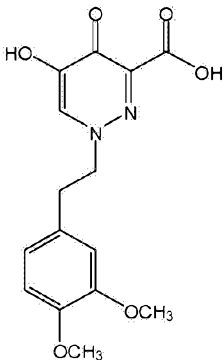
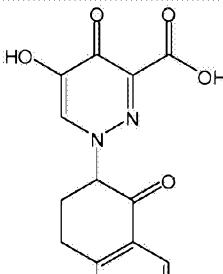
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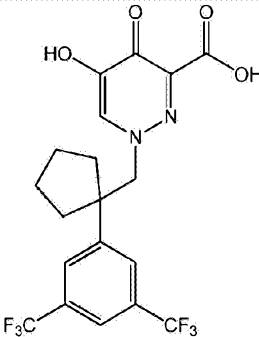
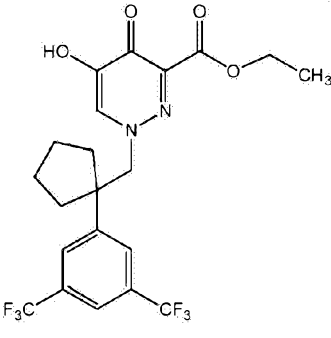
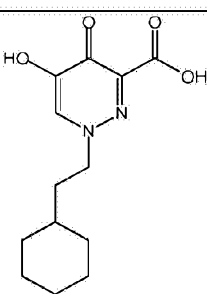
Structure	No.
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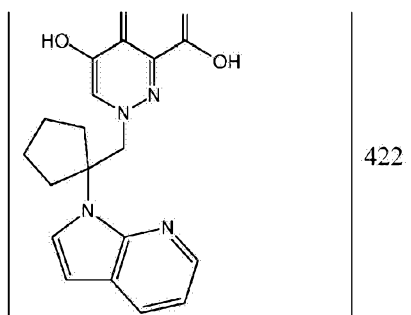


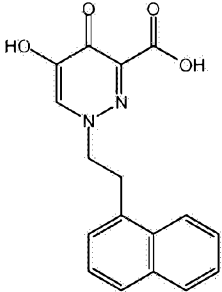
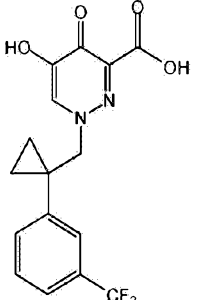
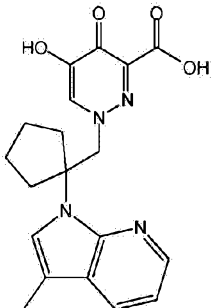
	
	411
	412

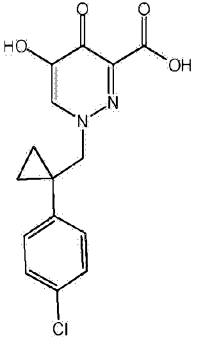
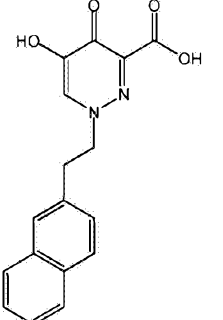
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Structure	No.
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	418

Structure	No.
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	420
	421



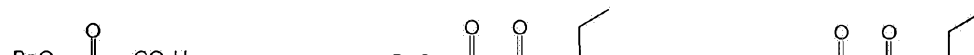
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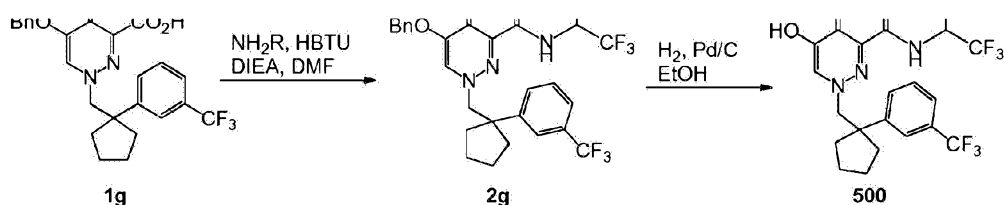
Structure	No.
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	427

**EXAMPLE 8A**

**5-hydroxy-4-oxo-N-(1,1,1-trifluorobutan-2-yl)-1-((1-(3-(trifluoromethyl)phenyl)cyclopentyl)methyl)-1,4-dihydropyridazine-3-carboxamide (500)**

[0330]

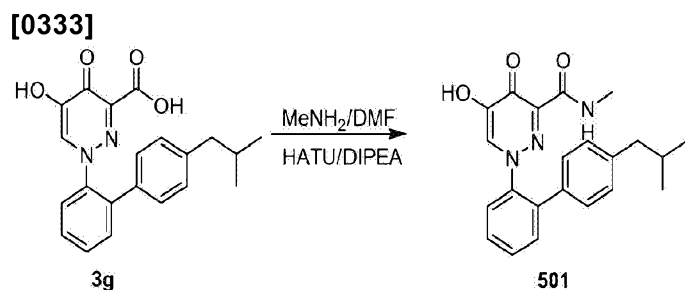




**[0331]** Diisopropylethylamine (52  $\mu$ L, 0.30 mmol) was added to a solution of **1g** (28 mg, 0.059 mmol), trifluorobutamine hydrochloride (30 mg, 0.18 mmol) and HBTU (33 mg, 0.89 mmol) in DMF (0.3 mL). The mixture was stirred at RT for 1.5 h. The reaction was diluted with EtOAc (20 mL) and washed successively with 1N HCl, water (3x) and brine. The reaction was purified by chromatography (10 g column, elution gradient 50% ethyl acetate/hexane - 100% ethyl acetate to provide **2g** (27 mg, 78%).

**[0332]** Compound **2g** was deprotected by treatment with an atmospheric pressure (balloon) of H<sub>2</sub>(g) over 10% Pd/C (3 mg) in ethanol (10 mL) for 1.5 h. The mixture was filtered to remove the catalyst and concentrated to provide pure compound **500** (22.4 mg). LCMS (ESI) *m/z* = 492 [M+H]<sup>+</sup>.

### EXAMPLE 8B



**[0334]** To a stirred solution of **3g** (182 mg, 0.50 mmol), HATU (380 mg, 1.0 mmol) and DIPEA (516 mg, 4.0 mmol) in DMF (20 mL) was added MeNH<sub>2</sub>.HCl (134 mg, 2.0 mmol). The mixture was stirred at RT for 4 h. After complete conversion, the solvent was removed under reduced pressure. The residue was purified by prep-HPLC to give compound **501** as a white solid (50 mg, 26.5 %). LCMS (ESI) *m/z* = 378.1 [M+H]

**[0335]** Compound **502** was obtained following the procedure for obtaining compound 500 using 3,3-difluoropyrrolidine. LCMS (ESI)  $m/z$  = 470  $[M-H]^-$  and 941  $[2M-H]^-$ .

**[0336]** Compound **503** was obtained following the procedure for obtaining compound 500 using 1-(trifluoromethyl)cyclopentanamine. LCMS (ESI)  $m/z$  = 516  $[M-H]^-$  and 1033  $[2M-H]^-$ .

[0337] Compound **504** was obtained following the procedure for obtaining compound 500 using dimethylamine. LCMS (ESI)  $m/z$  = 408  $[M-H]^-$  and 454  $[M-HCO_2]^-$ .

[0338] Compound **505** was obtained following the procedure for obtaining compound 500 using 2,2,2-trifluoroethanamine. LCMS (ESI)  $m/z$  = 462  $[M-H]^-$ .

[0339] Compound **506** was obtained following the procedure for obtaining compound 500 using methanamine and 1-((1-(3,5-bis(trifluoromethyl)phenyl)cyclopentyl)methyl)-5-hydroxy-4-oxo-1,4-dihydropyridazine-3-carboxylic acid. LCMS (ESI)  $m/z$  = 462  $[M-H]^-$ .

[0340] Compound **507** was obtained following the procedure for obtaining Compound 500 using cyclopropanamine. LCMS (ESI)  $m/z$  = 420  $[M-H]^-$ .

[0341] Compound **508** was obtained following the procedure for obtaining compound 500 using cyclopropanamine and 1-((1-(3,5-bis(trifluoromethyl)phenyl)cyclopentyl)methyl)-5-hydroxy-4-oxo-1,4-dihydropyridazine-3-carboxylic acid. LCMS (ESI)  $m/z$  = 488  $[M-H]^-$  and 977  $[2M-H]^-$ .

[0342] Compound **509** was obtained following the procedure for obtaining compound 500 using phenylmethanamine. LCMS (ESI)  $m/z$  = 470  $[M-H]^-$ .

[0343] Compound **510** was obtained following the procedure for obtaining compound 500 using cyclopropylmethyl amine. LCMS (ESI)  $m/z$  = 436  $[M-H]^-$ .

[0344] Compound **511** was obtained following the procedure for obtaining compound 500 using methanamine. LCMS (ESI)  $m/z$  = 394  $[M-H]^-$  and 789  $[2M-H]^-$ .

[0345] Compound **512** was obtained following the procedure for obtaining compound 500 using methanesulfonamide with the modification that a mixed anhydride was first prepared using ethyl chloroformate in place of HBTU and methanesulfonamide was subsequently added in a separate step. LCMS (ESI)  $m/z$  = 459  $[M-H]^-$ .

[0346] Compound **513** was obtained following the procedure for obtaining compound 500 using compound 406 and 3,4-dichlorobenzylamine with the modification that trifluoroacetic acid at 55 °C was used in place of Pd/C/H<sub>2</sub> to remove the O-benzyl group. LCMS (ESI)  $m/z$  = 540  $[M+H]^+$ .

[0347] Compound **514** was obtained following the procedure for obtaining compound 500 using cyclopentanamine. LCMS (ESI)  $m/z$  = 448  $[M-H]^-$ .

[0348] Compound **515** was obtained following the procedure for obtaining compound 500

using cyclobutanamine. LCMS (ESI)  $m/z = 434$   $[M-H]^-$ .

[0349] Compound **516** was obtained following the procedure for obtaining compound 500 using cyclohexanamine. LCMS (ESI)  $m/z = 462$   $[M-H]^-$ .

[0350] Compound **517** was obtained following the procedure for obtaining compound 500 using aniline. LCMS (ESI)  $m/z = 456$   $[M-H]^-$ .

[0351] Compound **518** was obtained following the procedure for obtaining compound 500 using compound 35 and methanamine. LCMS (ESI)  $m/z = 398$   $[M+H]^+$ .

[0352] Compound **519** was obtained following the procedure for obtaining compound 500 using compound 39 and methanamine. LCMS (ESI)  $m/z = 364$   $[M+H]^+$ .

[0353] Compound **520** was obtained following the procedure for obtaining compound 500 using compound 40 and methanamine. LCMS (ESI)  $m/z = 406$   $[M+H]^+$ .

[0354] compound **521** was obtained following the procedure for obtaining compound 500 using compound 313 and methanamine. LCMS (ESI)  $m/z = 361$   $[M+H]^+$ .

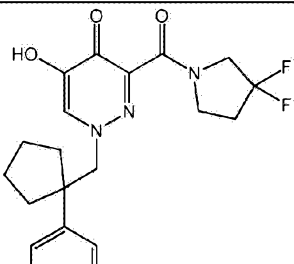
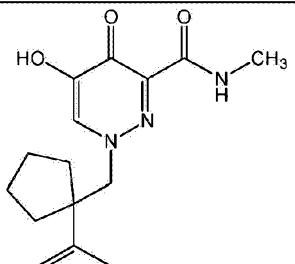
[0355] Compound **522** was obtained following the procedure for obtaining compound 500 using compound 314 and methanamine. LCMS (ESI)  $m/z = 394$   $[M+H]^+$ .

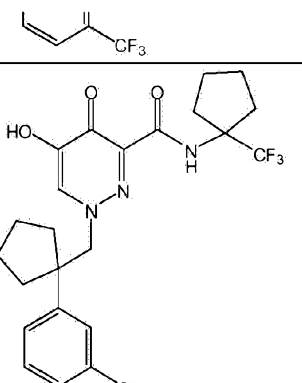
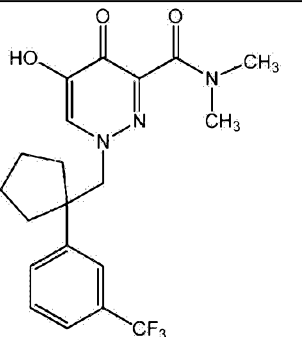
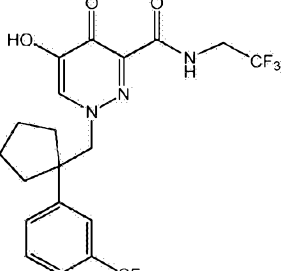
[0356] Compound **523** was obtained following the procedure for obtaining compound 500 using compound 406 and 4-chlorobenzylamine with the modification that trifluoroacetic acid at 55 °C was used in place of Pd/C/H<sub>2</sub> to remove the O-benzyl group. LCMS (ESI)  $m/z = 504$   $[M+H]^+$ .

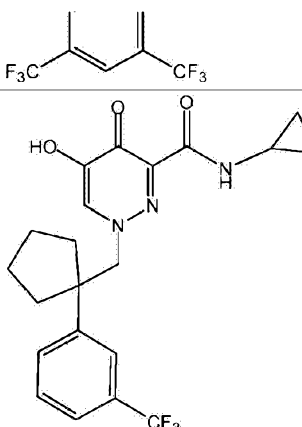
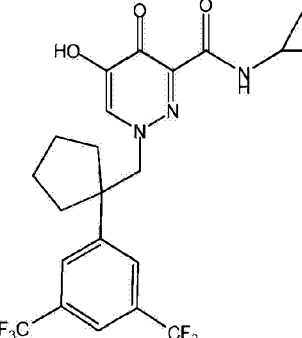
[0357] Compound **524** was obtained following the procedure for obtaining compound 500 using compound 406 and 4-methylbenzylamine. LCMS (ESI)  $m/z = 484$   $[M+H]^+$ .

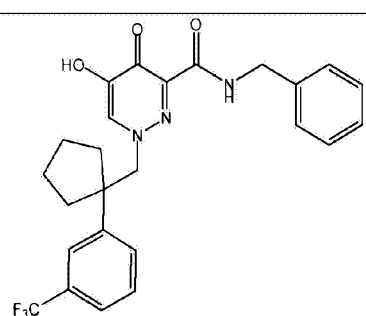
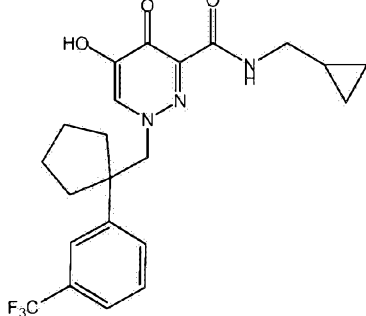
[0358] Compound **525** was obtained following the procedure for obtaining compound 500 using compound 406 and 4-methoxybenzyl amine. LCMS (ESI)  $m/z = 500$   $[M-H]^-$ .

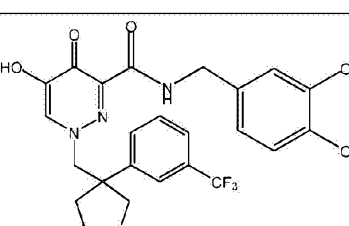
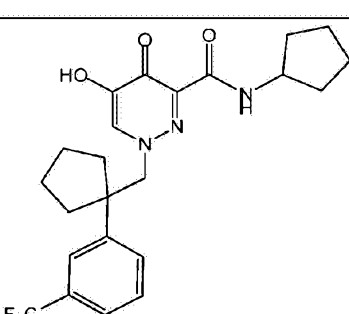
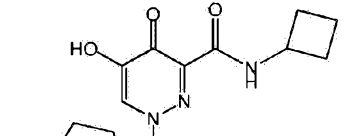
Table 5 - Compounds of Formula (I)

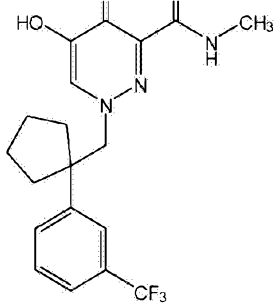
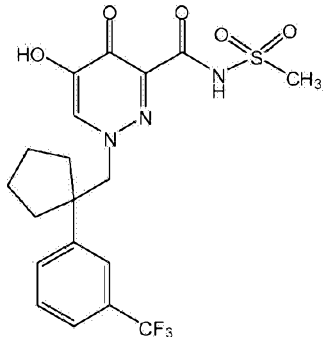
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Structure	No.
	506

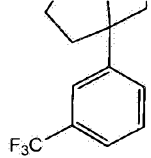
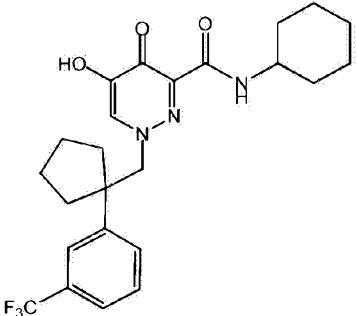
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	504
	505

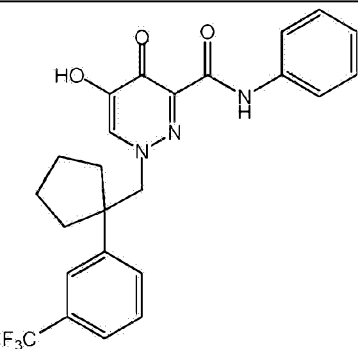
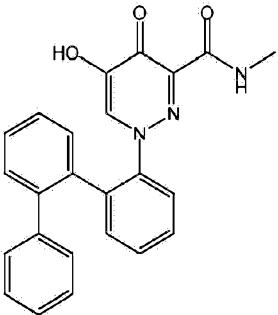
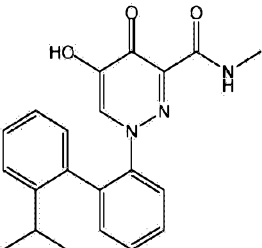
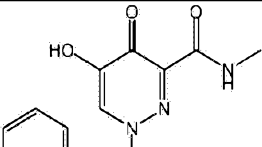
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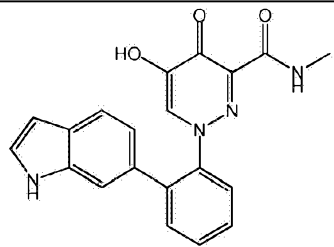
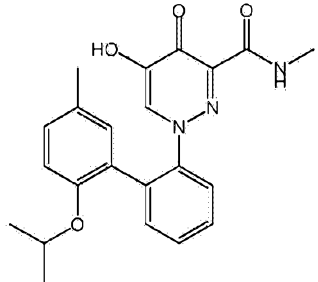
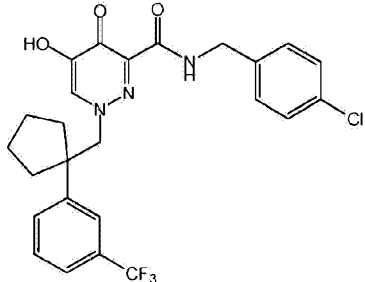
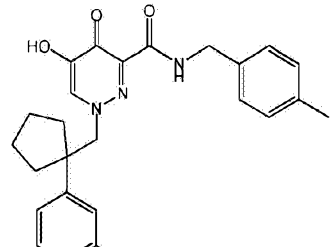
Structure	No.
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	510

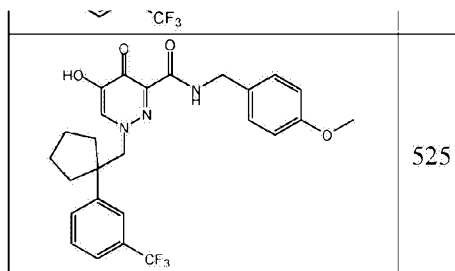
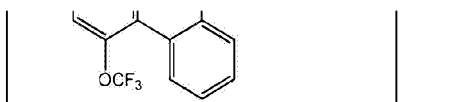
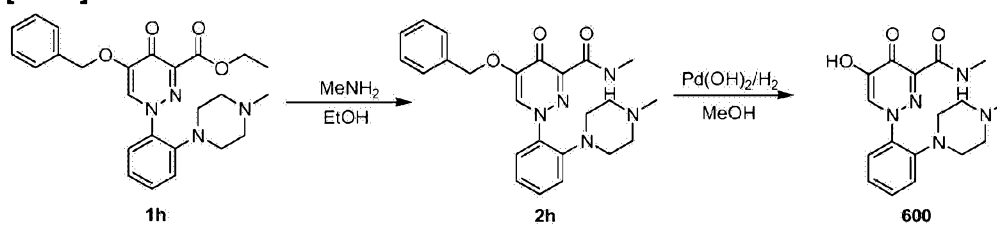
Structure	No.
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Structure	No.
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Structure	No.
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	523
	524

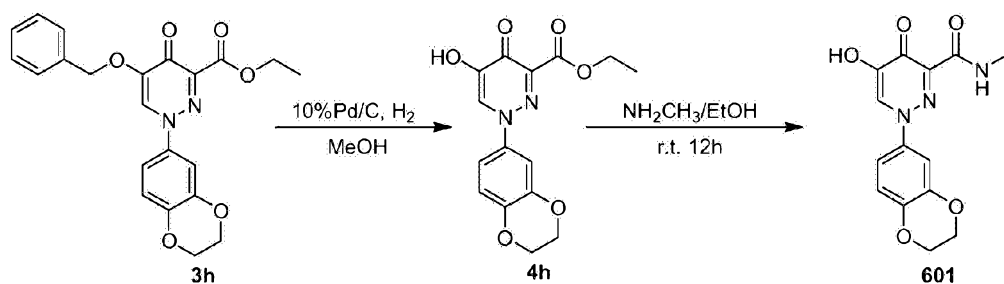
**EXAMPLE 9A****1,4-dihydro-5-hydroxy-N-methyl-1-(2-(4-methylpiperazin-1-yl)phenyl)-4-oxopyridazine-3-carboxamide (600)****[0359]**

**[0360]** To a solution of 30% methylamine in EtOH (20 mL), was added one portion of **1h** (200 mg, 0.47 mmol). The mixture was stirred at RT for 3 h. After complete conversion, the solvent was removed under reduced pressure. The residue containing **2h** was used without further purification.

**[0361]** A mixture of **2h** (100 mg, 0.23 mmol) and Pd (OH)<sub>2</sub> (30 mg) in MeOH (20 mL) was stirred at 20 °C for 4 h under H<sub>2</sub> atmosphere (15 psi). After the reaction was completed, the mixture was filtered through a pad of celite and concentrated to give a crude product, which was then purification by crystallization in EtOH to give compound **600** as a yellowish solid (50 mg, 63.2 %). LCMS (ESI) *m/z* = 344.2 [M+H]<sup>+</sup>.

**EXAMPLE 9B****1,4-dihydro-1-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)-5-hydroxy-N-methyl-4-oxopyridazine-3-carboxamide (601)****[0362]**





**[0363]** A suspension of **3h** (200 mg, 0.49 mmol) and 10% Pd/C (50 mg) in EtOH/DMF (1:1, 10 mL) was stirred at RT under H<sub>2</sub> atmosphere (1.0 atm.) for 30 min. After complete conversion, the mixture was filtered through a pad of celite. The filtrate was concentrated under reduced pressure. The residue was crystallized in PE:EtOAc (1:3) to give the pure **4h** as a yellowish solid (130 mg, 83.4 %).

**[0364]** To a solution of 30% methylamine in EtOH (10 mL), was added one portion of **4h** (130 mg, 0.41 mmol). The mixture was stirred at RT for 12 h. After complete conversion, the solvent was removed under reduced pressure. The residue was re-dissolved by EtOH (10 mL) and concentrated in the vacuum to provide compound **601** as a yellowish solid (100 mg, 80.4%). LCMS (ESI)  $m/z$  = 303.9 [M+H]<sup>+</sup>.

**[0365]** Compound **602** was obtained following the procedure for obtaining compound 601 using ammonia and the compound **1g**. LCMS (ESI)  $m/z$  = 380 [M-H]<sup>-</sup> and 761 [2M-H]<sup>-</sup>.

**[0366]** Compound **603** was obtained following the procedure for obtaining compound 601 using methylamine and compound 24. LCMS (ESI)  $m/z$  = 386 [M+H]<sup>+</sup>.

**[0367]** Compound **604** was obtained following the procedure for obtaining compound 600 using methylamine and compound 413. LCMS (ESI)  $m/z$  = 304 [M+H]<sup>+</sup>.

**[0368]** Compound **605** was obtained following the procedure for obtaining compound 601 using benzylamine and compound 24. LCMS (ESI)  $m/z$  = 462 [M+H]<sup>+</sup>.

**[0369]** Compound **606** was obtained following the procedure for obtaining compound 601 using methylamine and compound 421. LCMS (ESI)  $m/z$  = 280 [M+H]<sup>+</sup>.

**[0370]** Compound **607** was obtained following the procedure for obtaining compound 600 using methylamine and compound 416. LCMS (ESI)  $m/z$  = 314 [M-H]<sup>-</sup>.

**[0371]** Compound **608** was obtained following the procedure for obtaining compound 600 using methylamine and compound 412. LCMS (ESI)  $m/z$  = 340 [M-H]<sup>-</sup>.

[0372] Compound **609** was obtained following the procedure for obtaining compound 600 using methylamine and compound 422. LCMS (ESI)  $m/z$  = 366  $[M-H]^-$ .

[0373] Compound **610** was obtained following the procedure for obtaining compound 601 using methylamine and compound 319. LCMS (ESI)  $m/z$  = 406  $[M+H]^+$ .

[0374] Compound **611** was obtained following the procedure for obtaining compound 601 using methylamine and compound 318. LCMS (ESI)  $m/z$  = 352  $[M+H]^+$ .

[0375] Compound **612** was obtained following the procedure for obtaining compound 601 using methylamine and compound 322. LCMS (ESI)  $m/z$  = 386  $[M+H]^+$ .

[0376] Compound **613** was obtained following the procedure for obtaining compound 601 using methylamine and compound 320. LCMS (ESI)  $m/z$  = 361  $[M+H]^+$ .

[0377] Compound **614** was obtained following the procedure for obtaining compound 601 using methylamine and compound 423. LCMS (ESI)  $m/z$  = 324  $[M+H]^+$ .

[0378] Compound **615** was obtained following the procedure for obtaining compound 601 using methylamine and compound 205. LCMS (ESI)  $m/z$  = 358  $[M+H]^+$ .

[0379] Compound **616** was obtained following the procedure for obtaining compound 601 using methylamine and compound 209. LCMS (ESI)  $m/z$  = 357  $[M+H]^+$ .

[0380] Compound **617** was obtained following the procedure for obtaining compound 601 using methylamine and compound 24. LCMS (ESI)  $m/z$  = 372  $[M+H]^+$ .

[0381] Compound **618** was obtained following the procedure for obtaining compound 601 using methylamine and compound 313 with the modification that the ester/ether precursor was treated with methyl iodide and potassium carbonate in DMF prior to debenzylation and amide formation. LCMS (ESI)  $m/z$  = 375  $[M+H]^+$ .

[0382] Compound **619** was obtained following the procedure for obtaining compound 601 using methylamine and compound 316 or following the procedure for obtaining compound 300 using (5a,9a-dihydrodibenzo[b,d]furan-2-yl)boronic acid. LCMS (ESI)  $m/z$  = 450  $[M+H]^+$ .

[0383] Compound **620** was obtained following the procedure for obtaining compound 601 using methylamine and compound 320 with the modification that the ester/ether precursor was treated with methyl iodide and potassium carbonate in DMF prior to debenzylation and amide formation. LCMS (ESI)  $m/z$  = 375  $[M+H]^+$ .

[0384] Compound **621** was obtained following the procedure for obtaining compound 600 using methylamine and compound 424. LCMS (ESI)  $m/z$  = 366 [M-H]<sup>-</sup>.

[0385] Compound **622** was obtained following the procedure for obtaining compound 600 using methylamine and compound 425. LCMS (ESI)  $m/z$  = 380 [M-H]<sup>-</sup>.

[0386] Compound **623** was obtained following the procedure for obtaining compound 600 using 2-methylbenzyl amine and compound 406. LCMS (ESI)  $m/z$  = 380 [M-H]<sup>-</sup>.

[0387] Compound **624** was obtained following the procedure for obtaining compound 600 using 2-methoxybenzyl amine and compound 406. LCMS (ESI)  $m/z$  = 500 [M-H]<sup>-</sup>.

[0388] Compound **625** was obtained following the procedure for obtaining compound 600 using benzo[d][1,3]dioxol-5-ylmethanamine and compound 406. LCMS (ESI)  $m/z$  = 514 [M-H]<sup>-</sup>.

[0389] Compound **626** was obtained following the procedure for obtaining compound 601 using ammonia and compound 424. LCMS (ESI)  $m/z$  = 352 [M-H]<sup>-</sup>.

[0390] Compound **627** was obtained following the procedure for obtaining compound 601 using methylamine and compound 410. LCMS (ESI)  $m/z$  = 328 [M+H]<sup>+</sup>.

[0391] Compound **628** was obtained by first following the procedure for obtaining compound 6d using 1,2,3,4-tetrahydroquinoline and then following the procedure for obtaining compound 601 using methylamine. LCMS (ESI)  $m/z$  = 377 [M+H]<sup>+</sup>.

[0392] Compound **629** was obtained following the procedure for obtaining compound 601 using methylamine and compound 323. LCMS (ESI)  $m/z$  = 386 [M+H]<sup>+</sup>.

[0393] Compound **630** was obtained following the procedure for obtaining compound 601 using methylamine and compound 325. LCMS (ESI)  $m/z$  = 394 [M+H]<sup>+</sup>.

[0394] Compound **631** was obtained by first following the procedure for obtaining compound 3e using (2-(piperidin-1-yl)phenyl)boronic acid and then following the procedure for obtaining compound 601 using methylamine. LCMS (ESI)  $m/z$  = 405 [M+H]<sup>+</sup>.

[0395] Compound **632** was obtained by first following the procedure for obtaining compound 6d using indoline and then following the procedure for obtaining compound 601 using methylamine. LCMS (ESI)  $m/z$  = 363 [M+H]<sup>+</sup>.

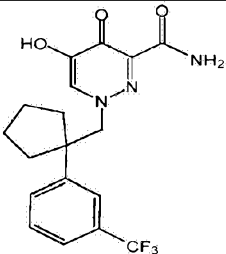
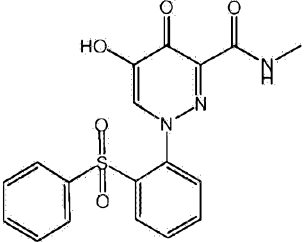
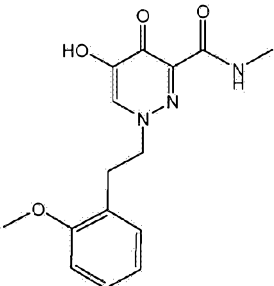
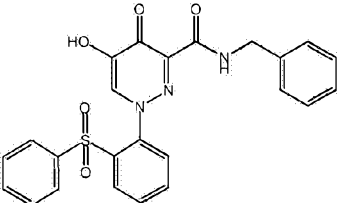
[0396] Compound **633** was obtained following the procedure for obtaining compound 601 using methylamine and compound 326. LCMS (ESI)  $m/z$  = 380 [M+H]<sup>+</sup>.

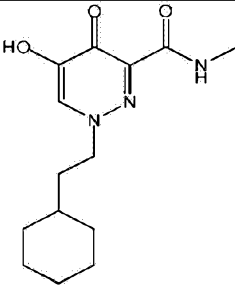
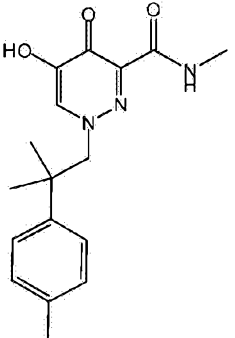
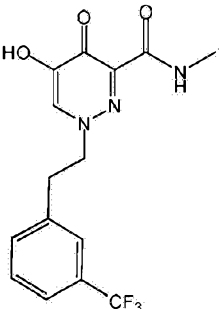
[0397] Compound **634** was obtained following the procedure for obtaining compound 601 using methylamine and compound 426. LCMS (ESI)  $m/z$  = 334  $[M+H]^+$ .

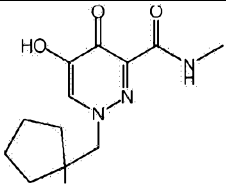
[0398] Compound **635** was obtained following the procedure for obtaining compound 601 using methylamine and compound 427. LCMS (ESI)  $m/z$  = 324  $[M+H]^+$ .

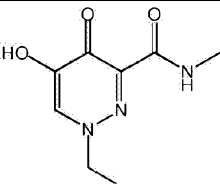
[0399] Compound **636** was obtained following the procedure for obtaining compound 614 with the modification that compound 614 was treated with acetic anhydride and diisopropyl ethyl amine in dichloromethane at RT for 2 h. LCMS (ESI)  $m/z$  = 366  $[M+H]^+$ .

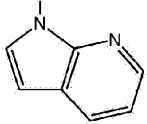
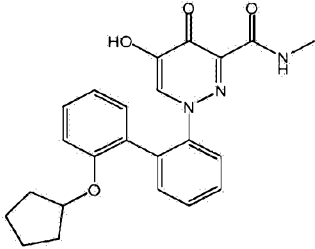
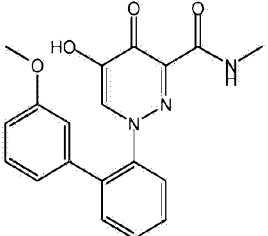
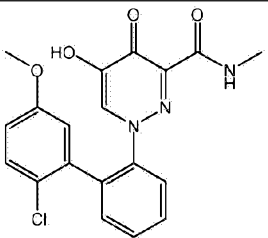
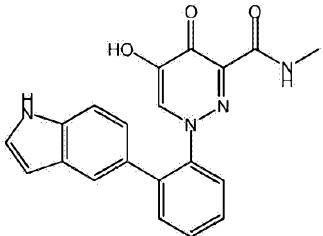
Table 6 - Compound of Formula (I)

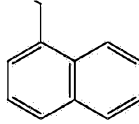
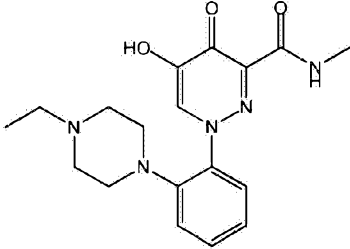
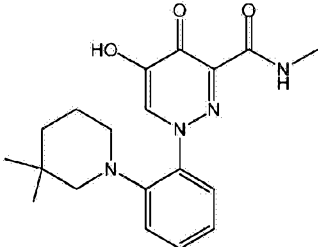
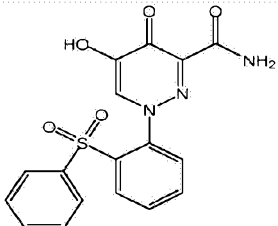
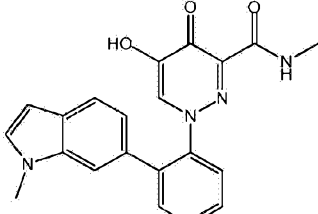
Structure	No.
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	603
	604
	605

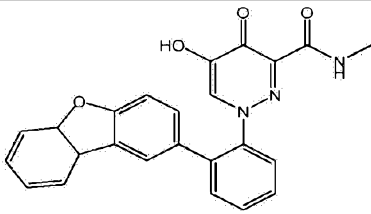
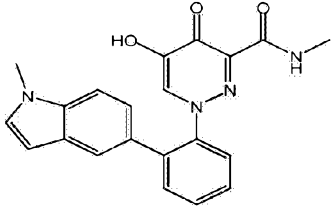
Structure	No.
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	607
	608

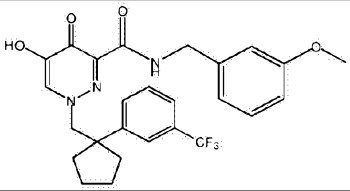
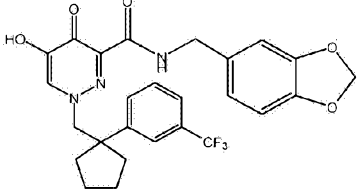
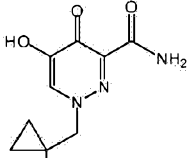
Structure	No.
	609

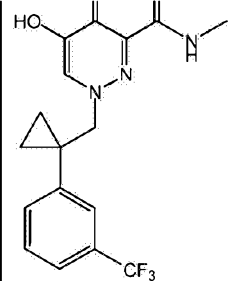
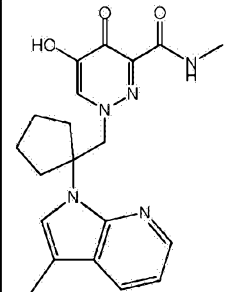
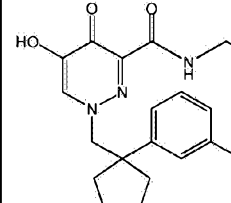
Structure	No.
	614

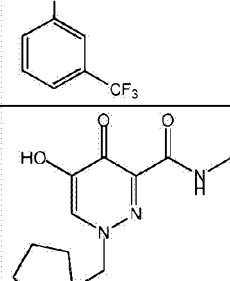
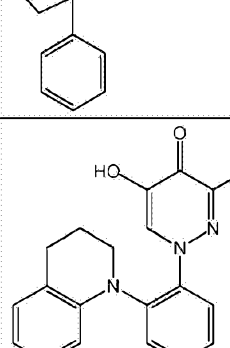
	
	610
	611
	612
	613

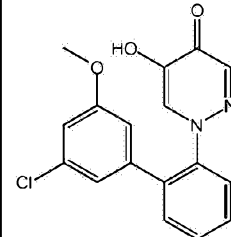
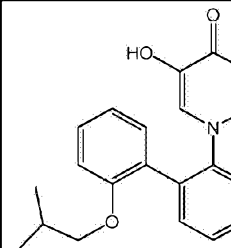
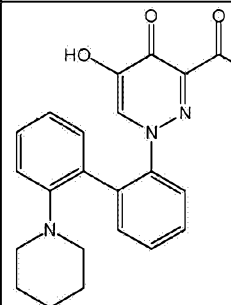
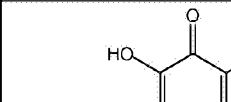
	
	615
	616
	617
	618

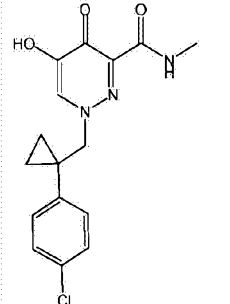
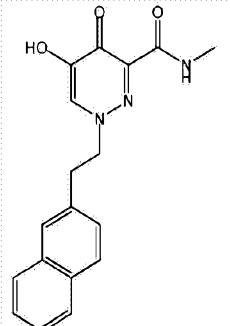
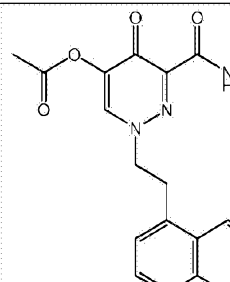
Structure	No.
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	620

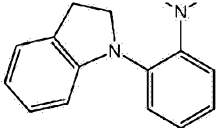
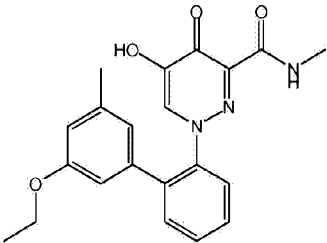
Structure	No.
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	626

	621
	622
	623

	627
	628

Structure	No.
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	630
	631
	632

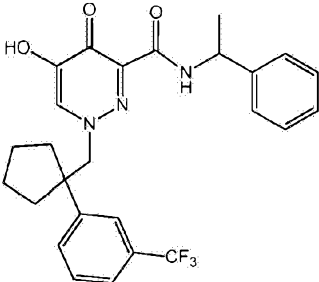
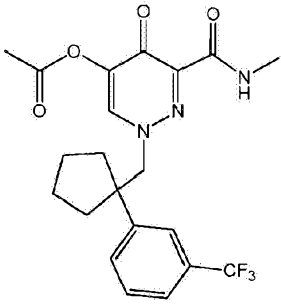
Structure	No.
	634
	635
	636

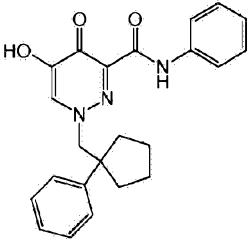
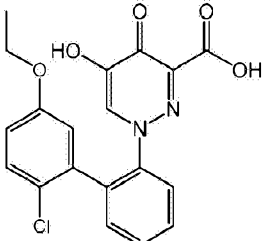
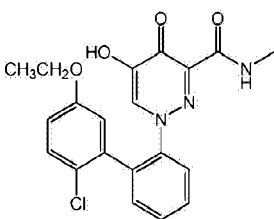
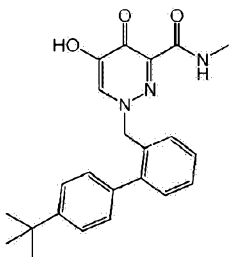
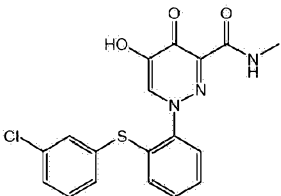
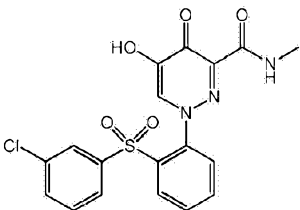
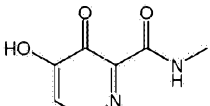
	632
	633

**EXAMPLE 10****Compounds of Formulae (I) and (II)**

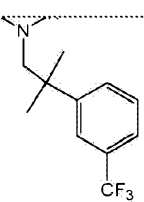
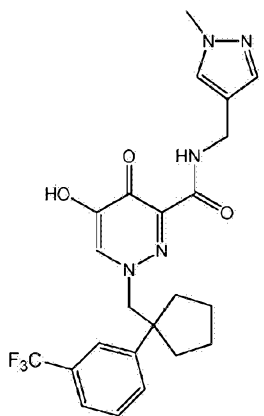
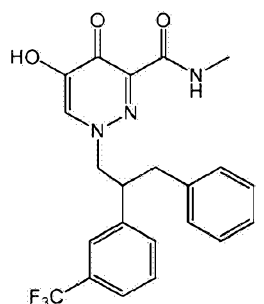
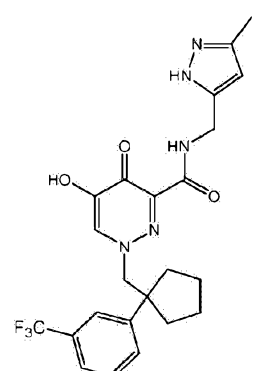
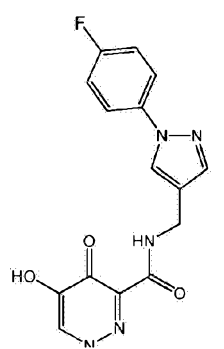
**[0400]** The foregoing syntheses are exemplary and can be used as a starting point to prepare additional compounds of Formulae (I) and (II). Examples of additional compounds of Formulae (I) and (II) are shown in Tables 7-9. These compounds can be prepared in various ways, including those synthetic schemes shown and described herein. Those skilled in the art will be able to recognize modifications of the disclosed syntheses and to devise routes based on the disclosures herein; all such modifications and alternate routes are within the scope of the claims.

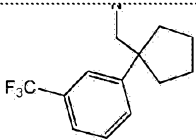
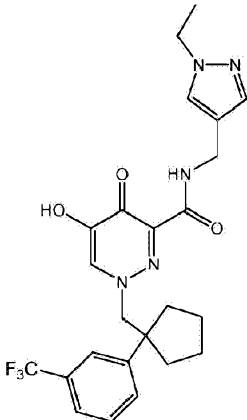
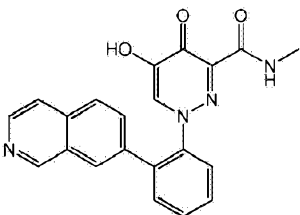
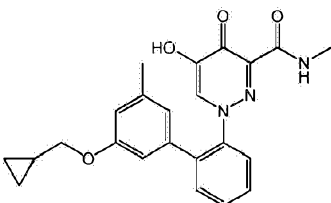
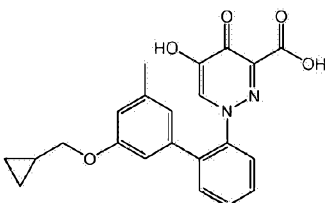
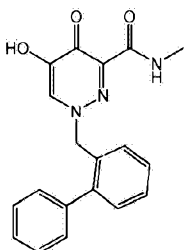
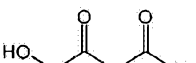
**Table 7**

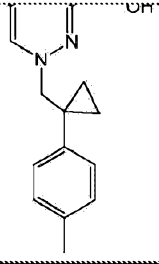
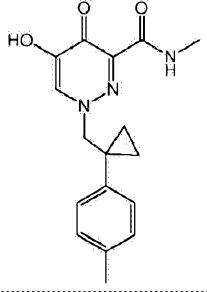
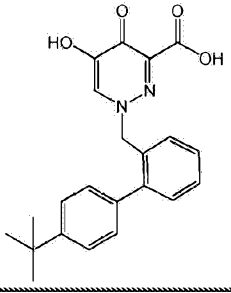
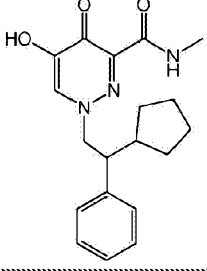
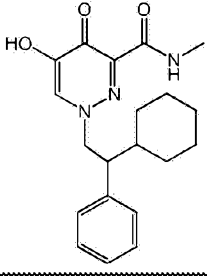
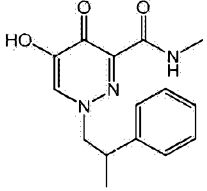
Structure	No.	[M+H] <sup>+</sup>
	637	486
	638	438


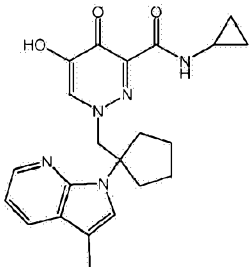
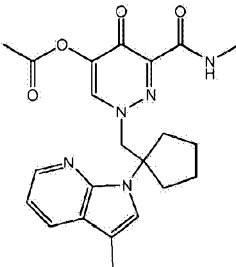
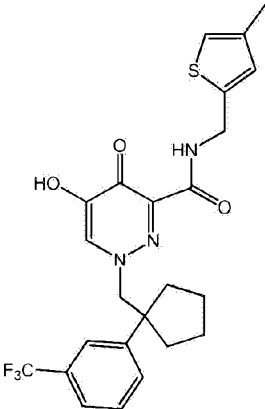
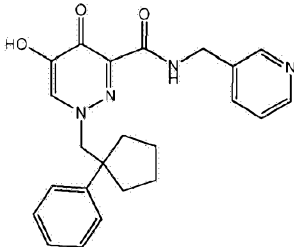
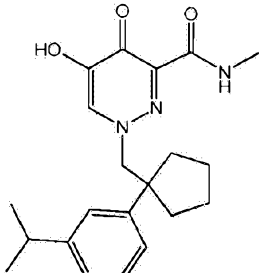
Structure	No.	[M+H] <sup>+</sup>
	639	390
	640	387
	641	400
	642	392
	643	388
	644	420
		

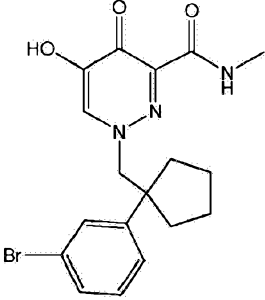
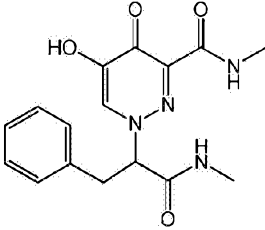
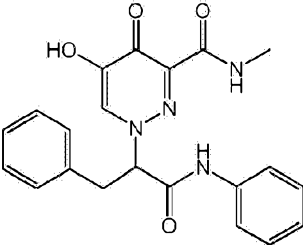
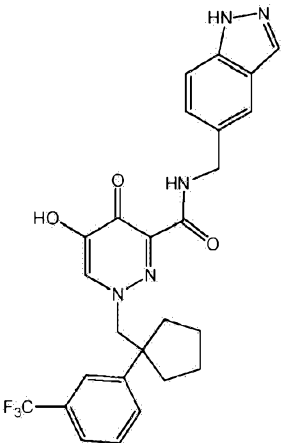
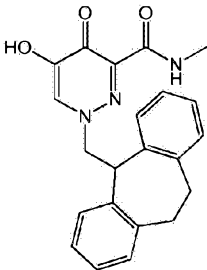


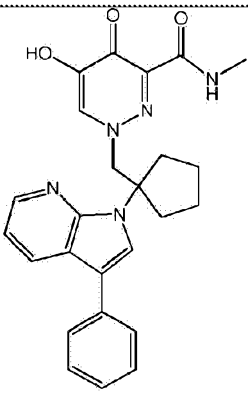
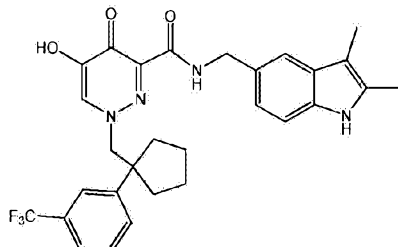
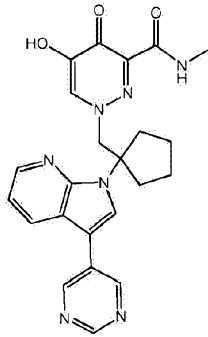
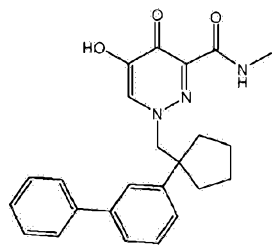
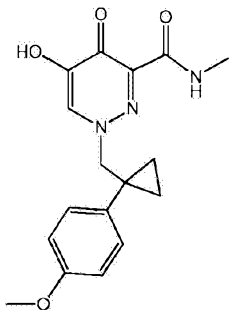

Structure	No.	[M+H] <sup>+</sup>
	645	370
	646	476
	647	432
	648	476
	649	556

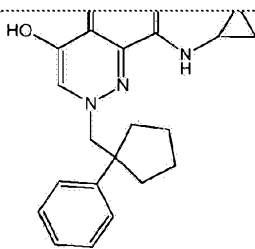
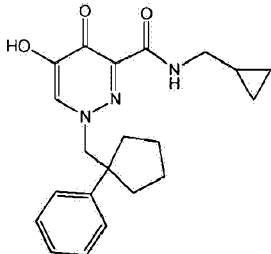
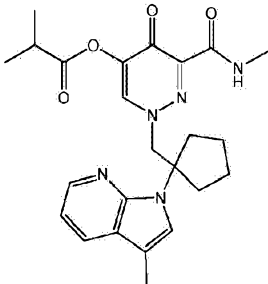
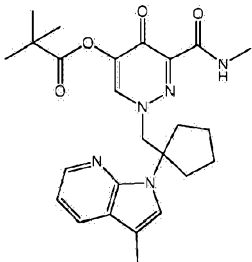
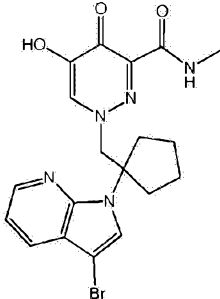
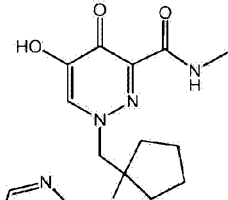
Structure	No.	[M+H] <sup>+</sup>
		
	650	490
	651	373
	652	406
	653	393
	654	336
		

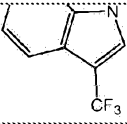
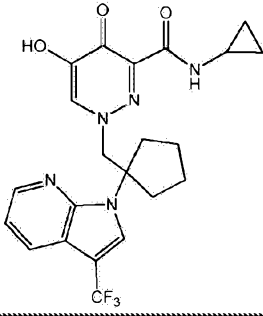
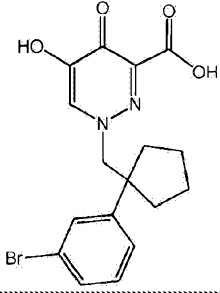
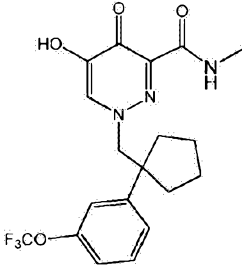
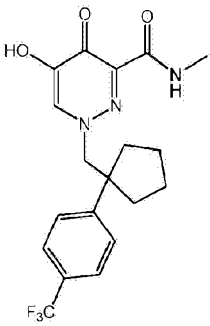
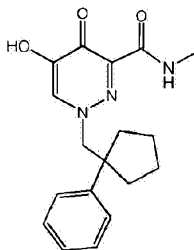
Structure	No.	[M+H] <sup>+</sup>
	655	301
	656	314
	657	379
	658	342
	659	356
	660	350

Structure	No.	[M+H] <sup>+</sup>
		
	661	408
	662	424
	663	492
	664	405
	665	370


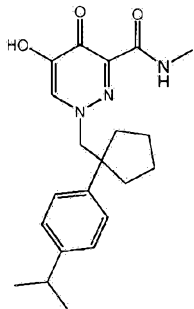
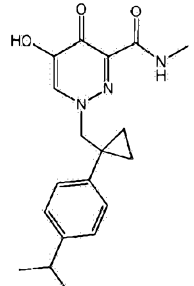
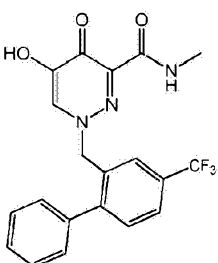
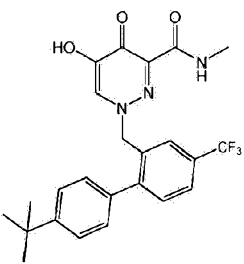
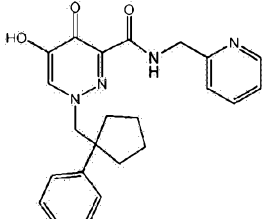
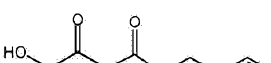
Structure	No.	[M+H] <sup>+</sup>
	666	407
	667	331
	668	393
	669	512
	670	376

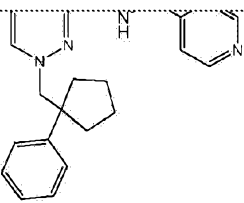
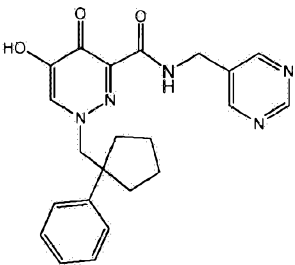
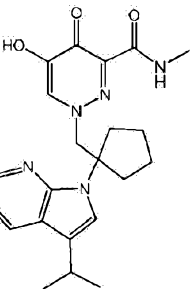
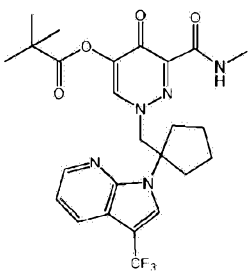
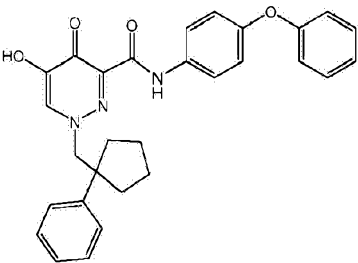
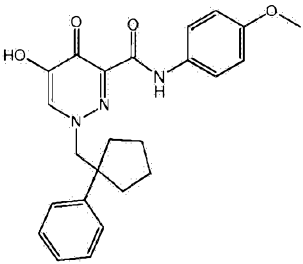
Structure	No.	[M+H] <sup>+</sup>
	671	444
	672	539
	673	446
	674	404
	675	330
		

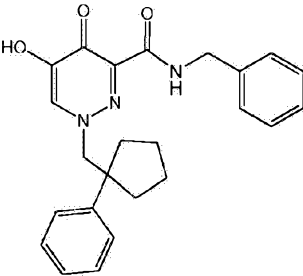
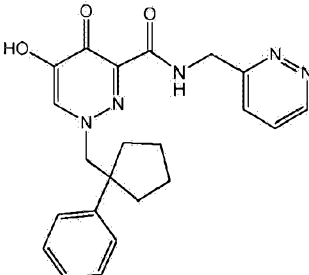
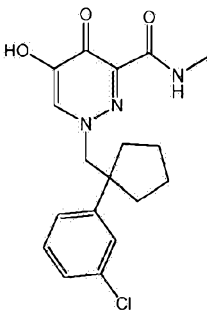
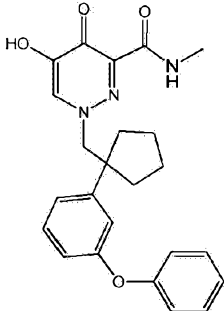
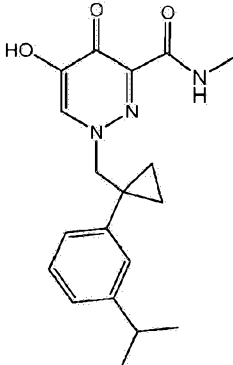
Structure	No.	[M+H] <sup>+</sup>
	676	354
	677	368
	678	452
	679	466
	680	446
	681	436

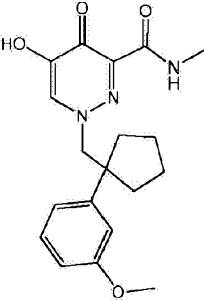
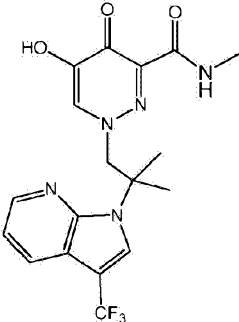
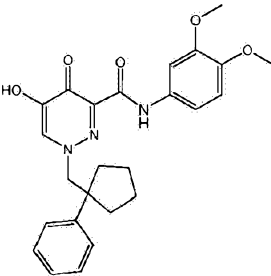
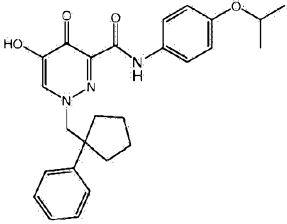
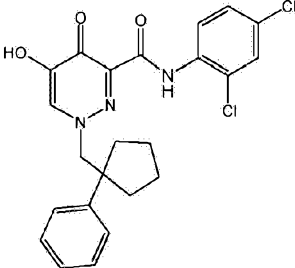
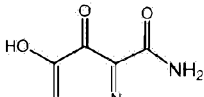
Structure	No.	[M+H] <sup>+</sup>
		
	682	462
	683	393
	684	412
	685	396
	686	404

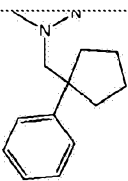
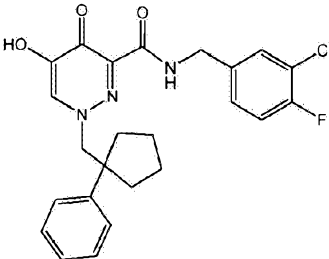
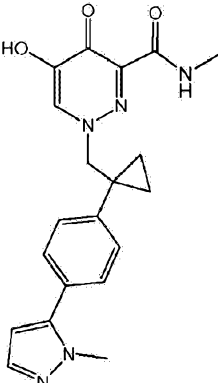
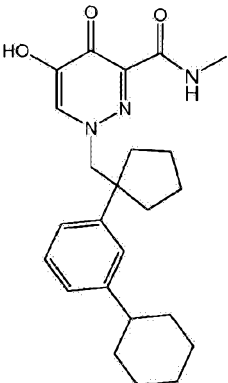
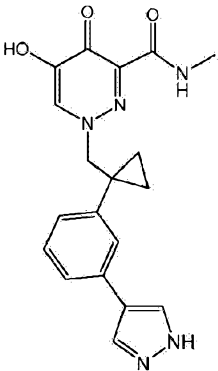


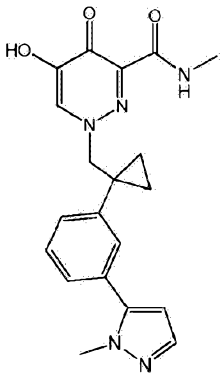
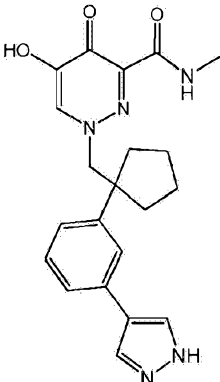
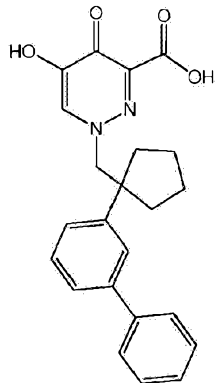
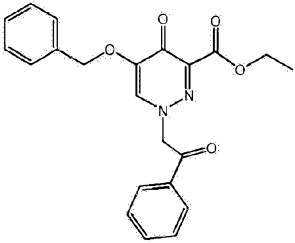
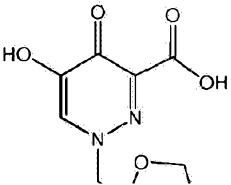
Structure	No.	[M+H] <sup>+</sup>
		
	687	370
	688	342
	689	404
	690	460
	691	405
		

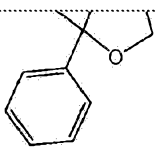
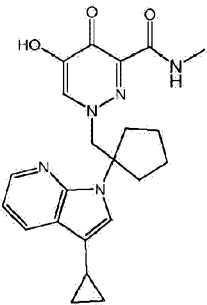
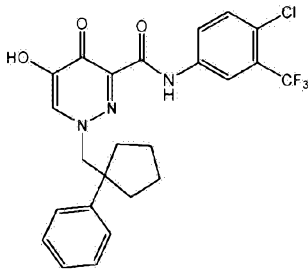
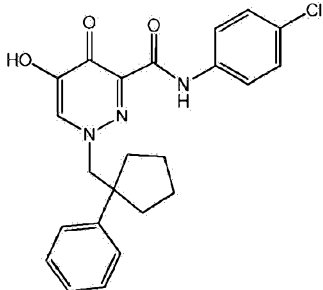
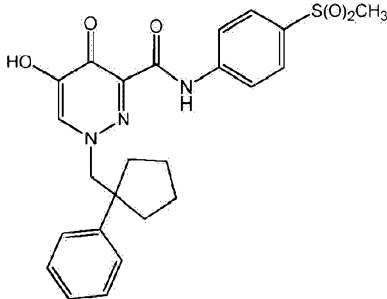
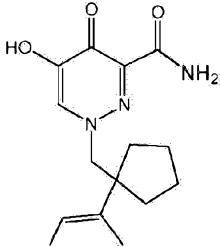
Structure	No.	[M+H] <sup>+</sup>
	692	405
	693	406
	694	410
	695	520
	696	482
	697	420

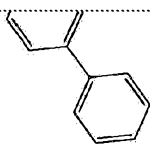
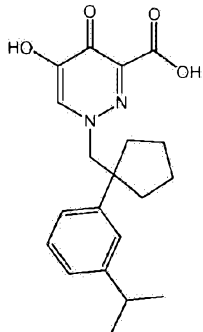
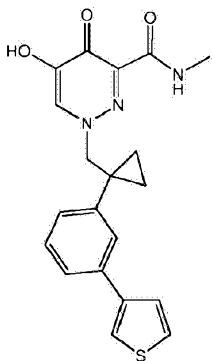
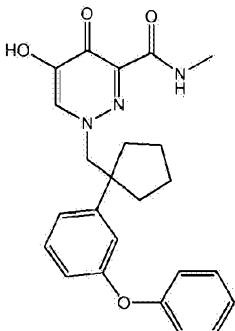
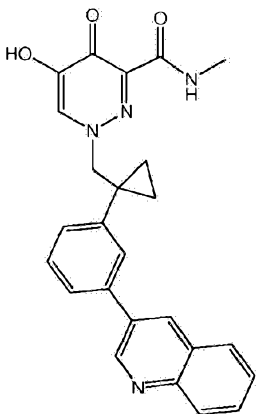
Structure	No.	[M+H] <sup>+</sup>
	698	404
	699	406
	700	362
	701	420
	702	342

Structure	No.	[M+H] <sup>+</sup>
	703	358
	704	410
	705	450
	706	448
	707	458
		

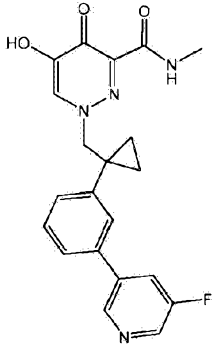
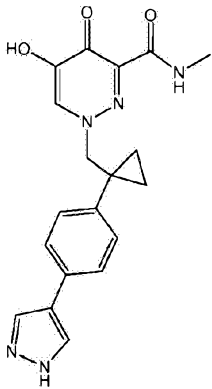
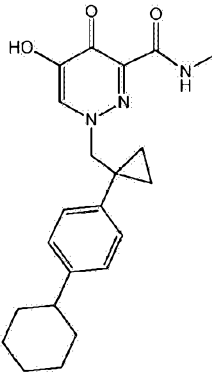
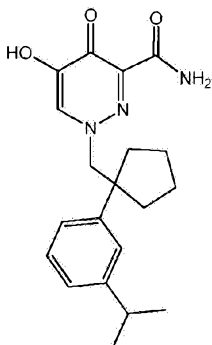
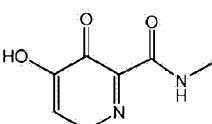
Structure	No.	[M+H] <sup>+</sup>
	708	314
	709	456
	710	380
	711	410
	712	366

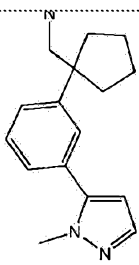
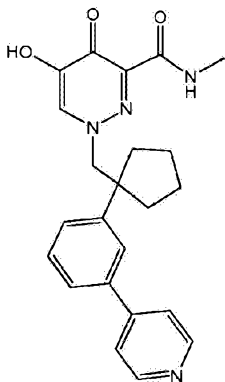
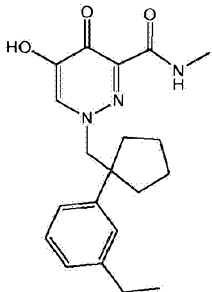
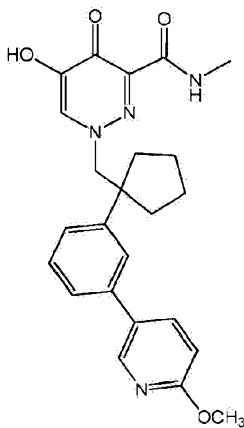
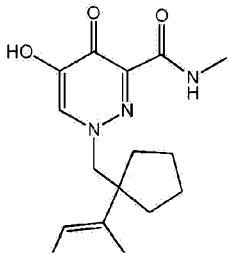
Structure	No.	[M+H] <sup>+</sup>
	713	380
	714	394
	715	391
	716	393
	717	319

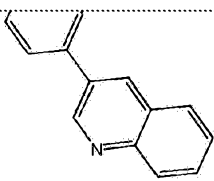
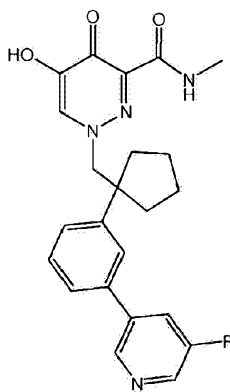
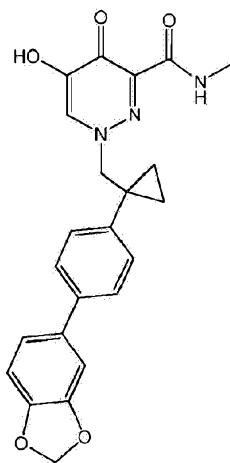
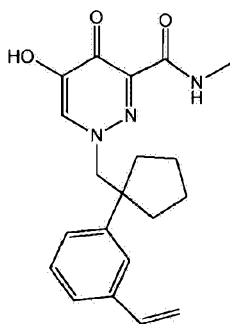
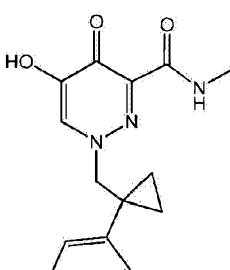
Structure	No.	[M+H] <sup>+</sup>
		
	718	408
	719	492
	720	424
	721	468
	722	390

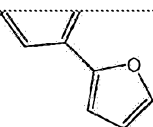
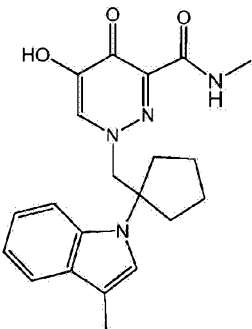
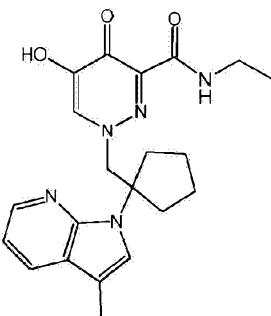
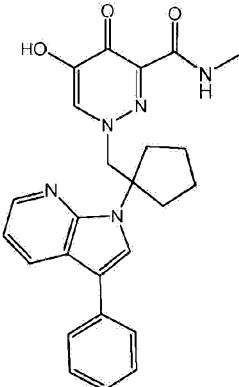
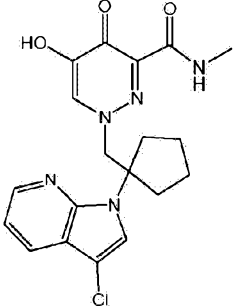
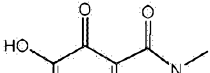
Structure	No.	[M+H] <sup>+</sup>
		
	723	357
	724	382
	725	420
	726	427

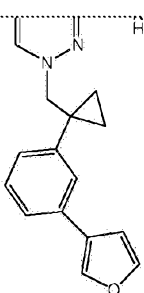
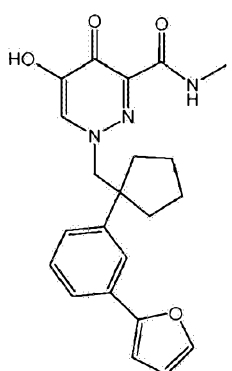
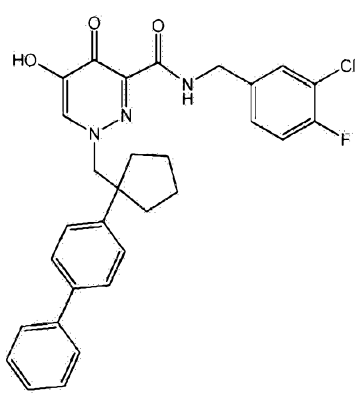
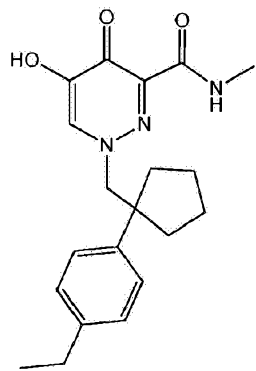
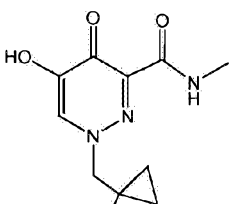


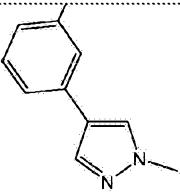
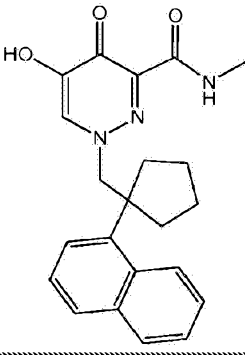
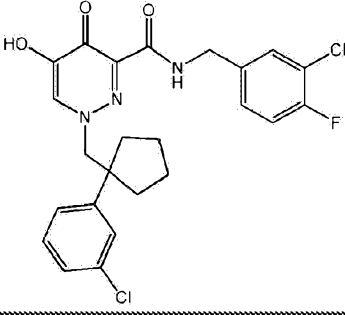
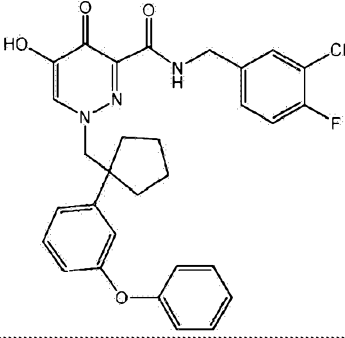
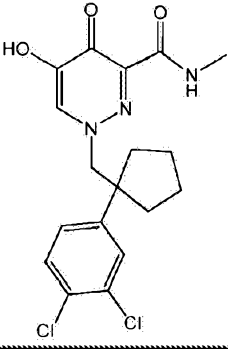

Structure	No.	[M+H] <sup>+</sup>
	727	395
	728	366
	729	382
	730	356
		

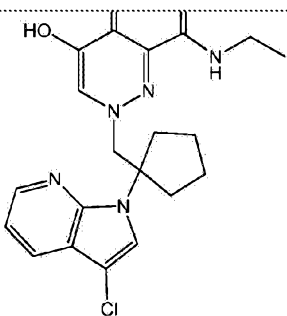
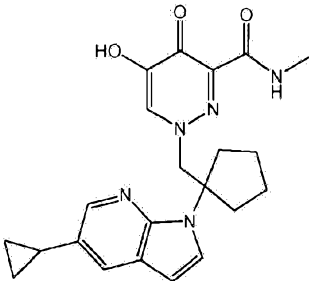
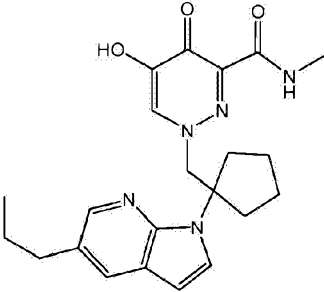
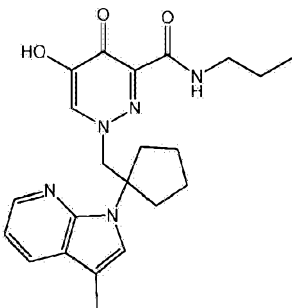
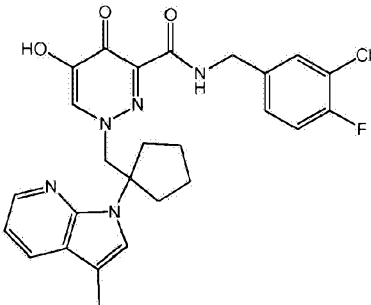
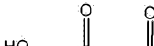
Structure	No.	[M+H] <sup>+</sup>
	731	408
	732	405
	733	356
	734	435
	735	455

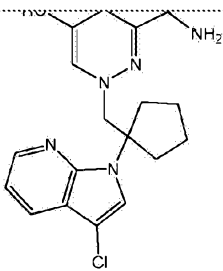
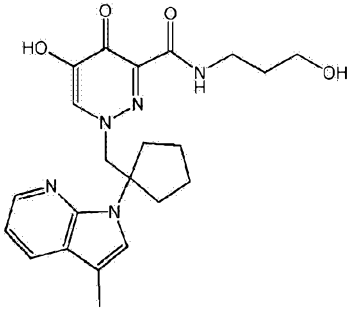
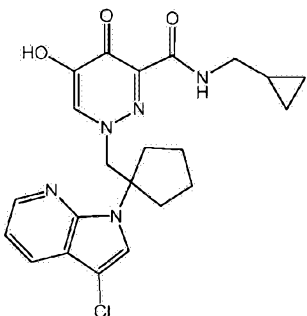
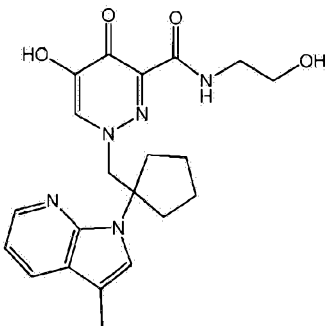
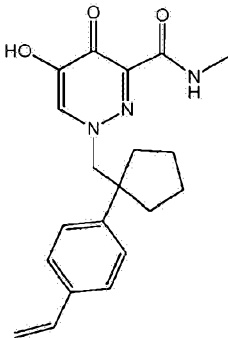
Structure	No.	[M+H] <sup>+</sup>
		
	736	423
	737	420
	738	354
	739	366

Structure	No.	[M+H] <sup>+</sup>
		
	740	381
	741	396
	742	444
	743	402
		

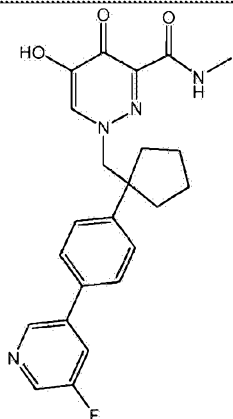
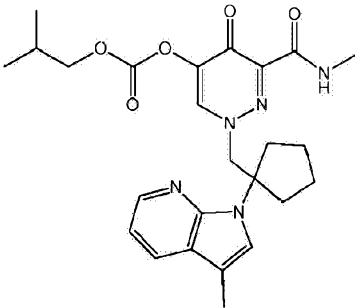
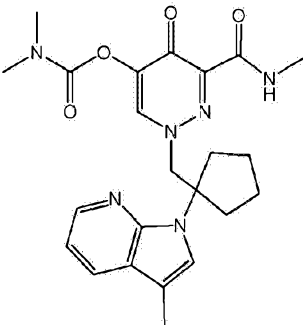
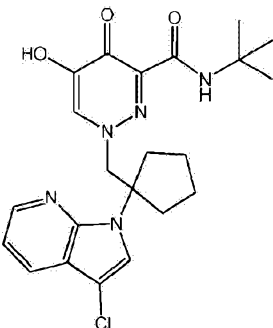
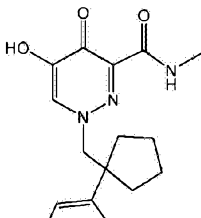
Structure	No.	[M+H] <sup>+</sup>
	744	366
	745	394
	746	533
	747	356
	748	380

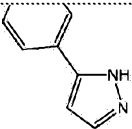
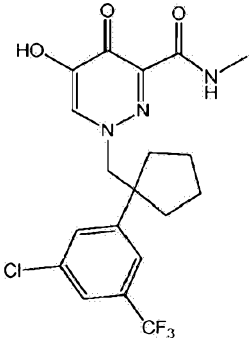
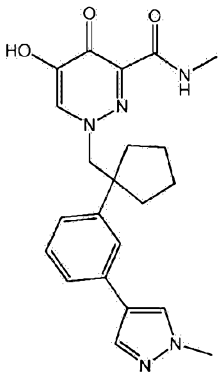
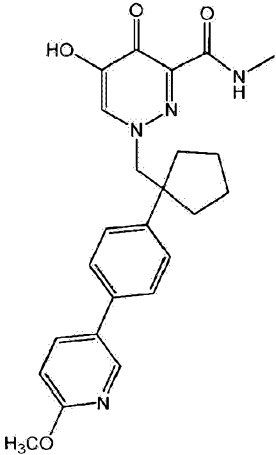
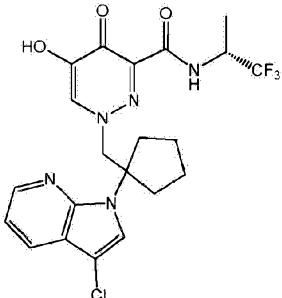
Structure	No.	[M+H] <sup>+</sup>
		
	749	378
	750	490
	751	549
	752	396
		

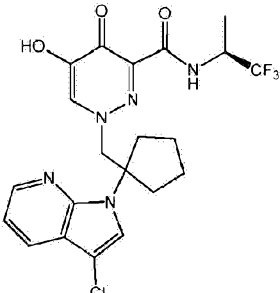
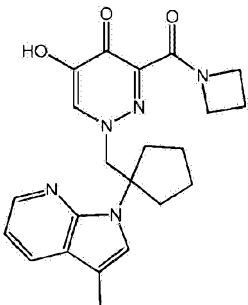
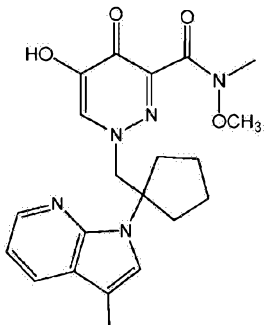
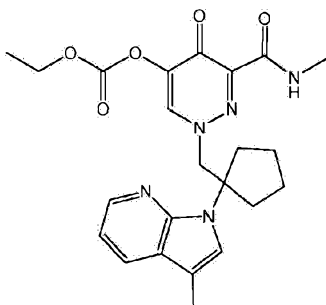
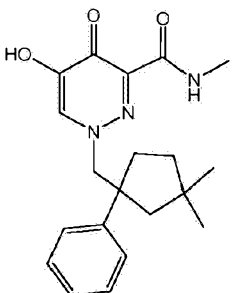
Structure	No.	[M+H] <sup>+</sup>
	753	416
	754	408
	755	410
	756	410
	757	510
		

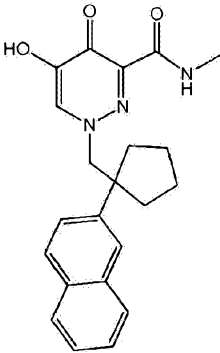
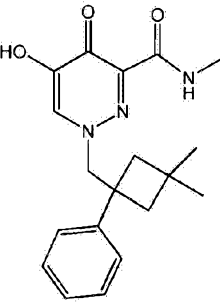
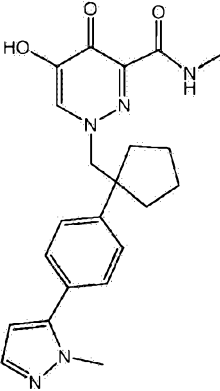
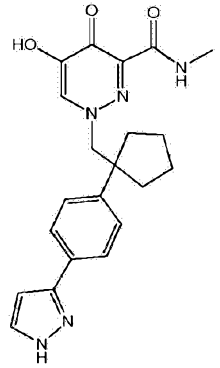
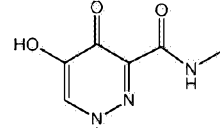
Structure	No.	[M+H] <sup>+</sup>
	758	388
	759	426
	760	442
	761	412
	762	354

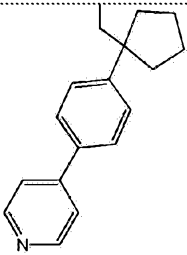
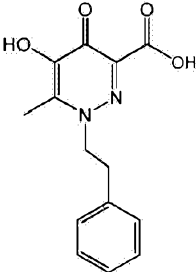
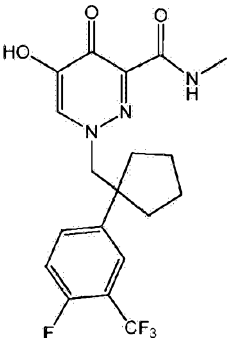
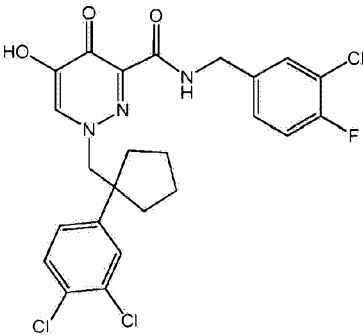
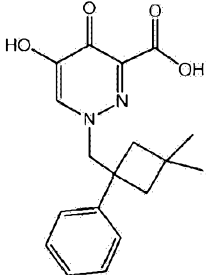
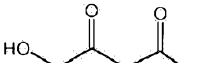


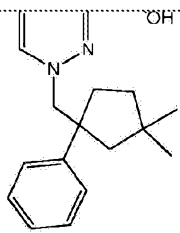
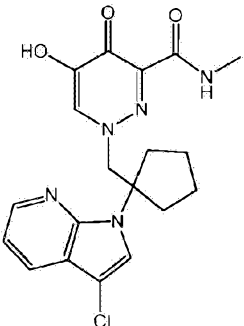
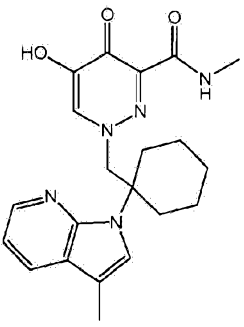
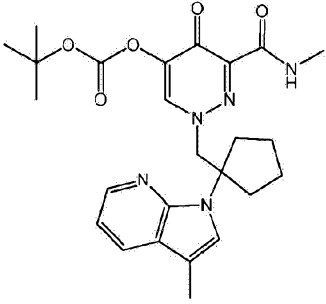
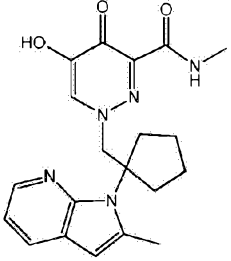
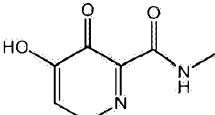
Structure	No.	[M+H] <sup>+</sup>
	763	423
	764	482
	765	453
	766	444
	767	394

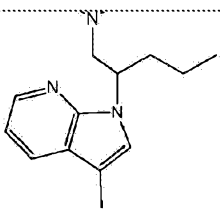
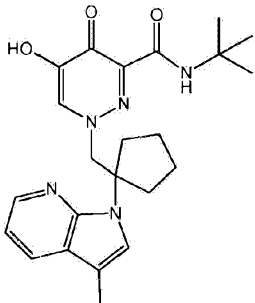
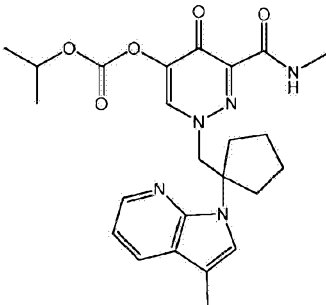
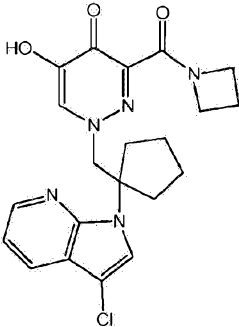
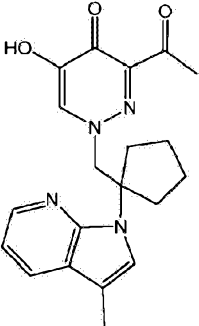
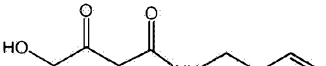
Structure	No.	[M+H] <sup>+</sup>
		
	768	430
	769	408
	770	435
	771	484

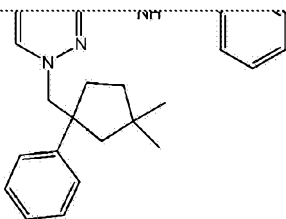
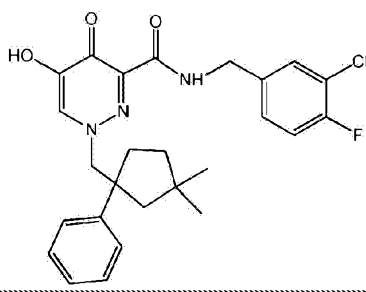
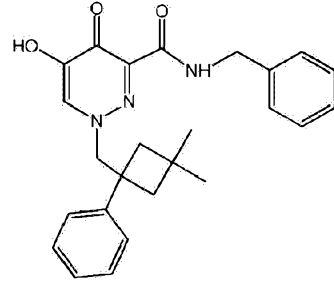
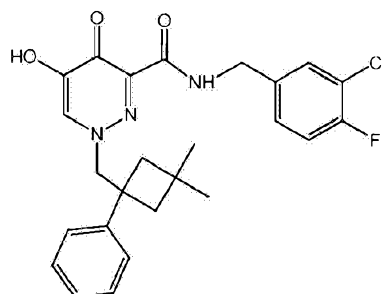
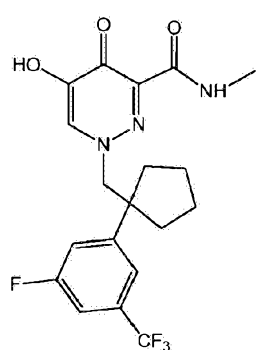
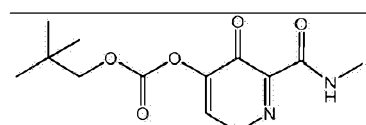
Structure	No.	[M+H] <sup>+</sup>
	772	484
	773	408
	774	412
	775	454
	776	356

Structure	No.	[M+H] <sup>+</sup>
	777	378
	778	342
	779	408
	780	394
		

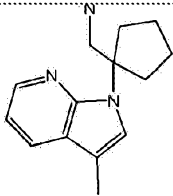
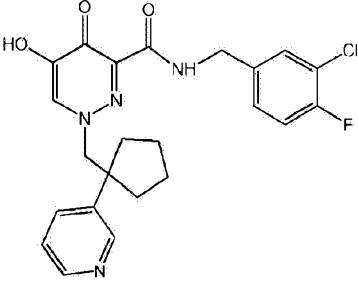
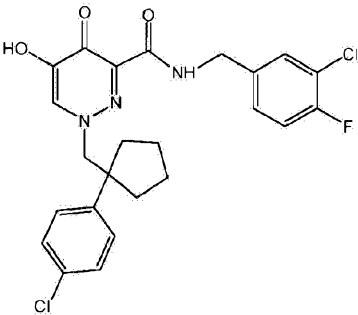
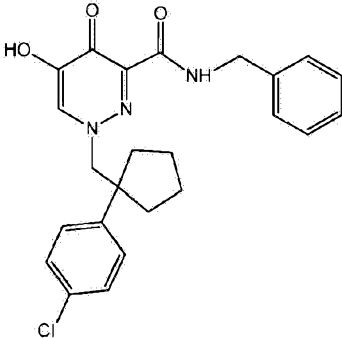
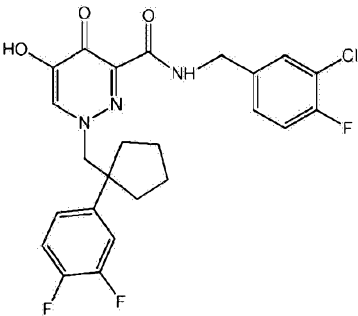
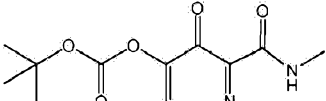
Structure	No.	[M+H] <sup>+</sup>
	781	405
	782	275
	783	414
	784	524
	785	329
		

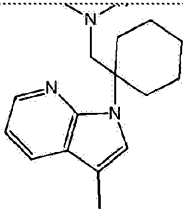
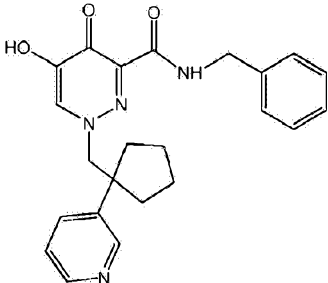
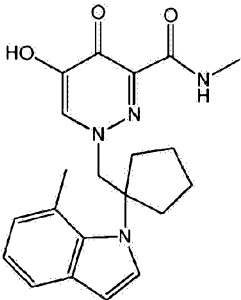
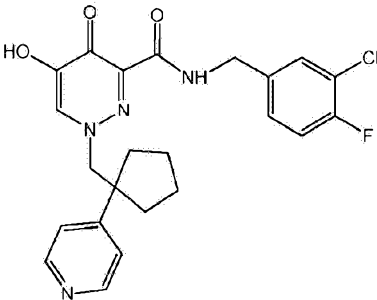
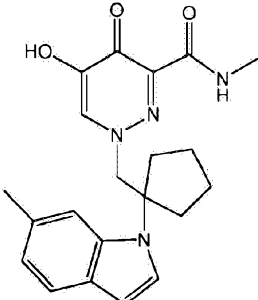
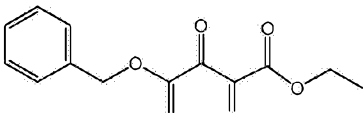
Structure	No.	[M+H] <sup>+</sup>
	786	343
	787	401
	788	396
	789	482
	790	382
		

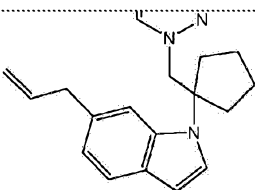
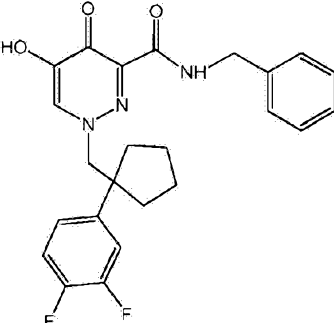
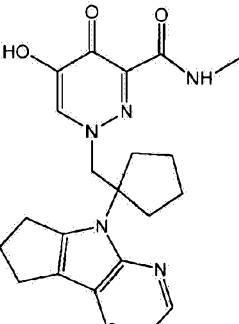
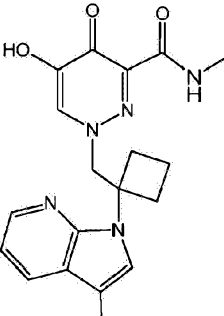
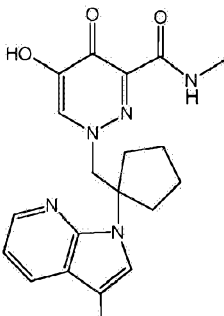
Structure	No.	[M+H] <sup>+</sup>
	791	370
	792	424
	793	468
	794	428
	795	367
		

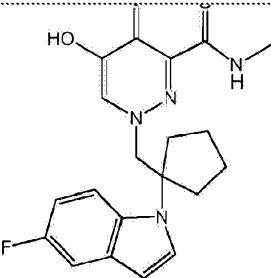
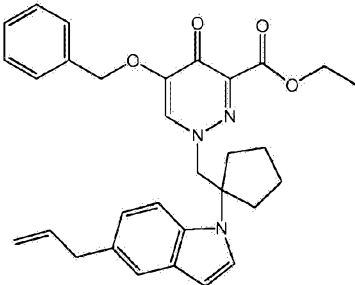
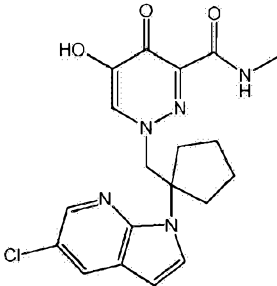
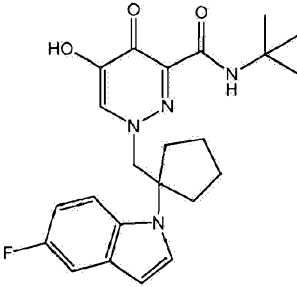
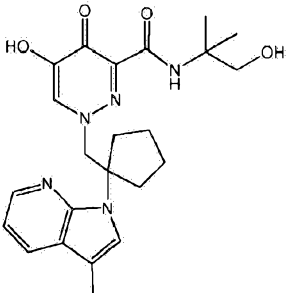
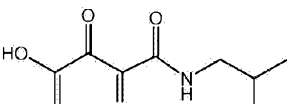
Structure	No.	[M+H] <sup>+</sup>
	796	432
	797	484
	798	418
	799	470
	800	414
		

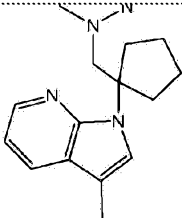
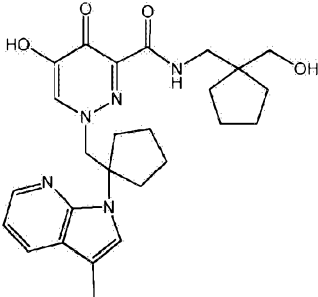
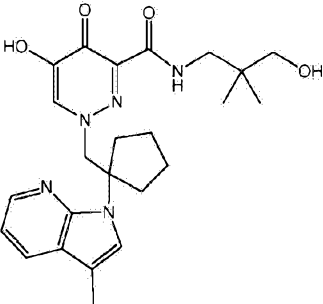
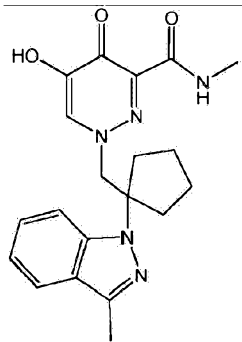
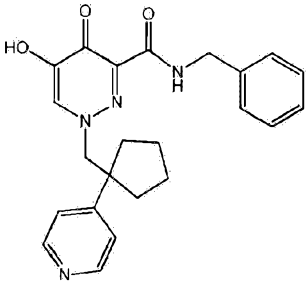
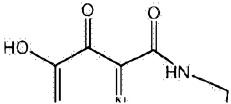


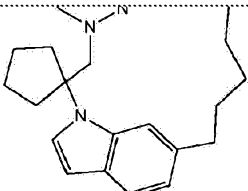
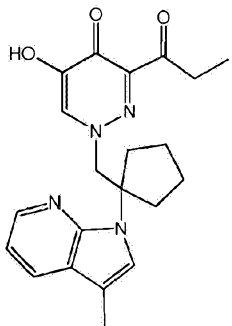
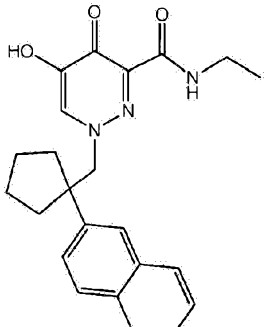
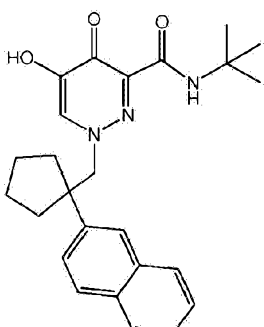
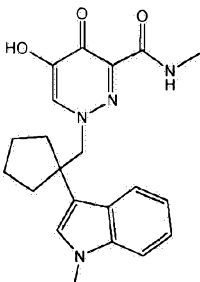
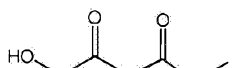
Structure	No.	[M+H] <sup>+</sup>
	801	496
	802	457
	803	490
	804	438
	805	492
		

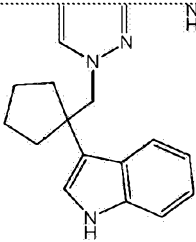
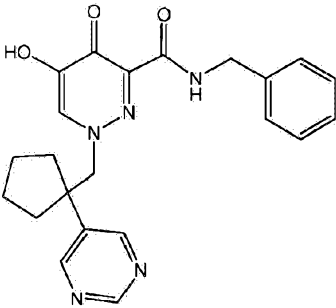
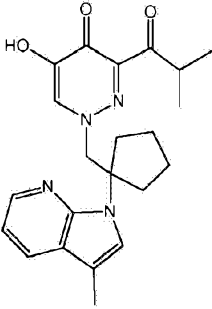
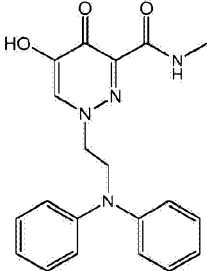
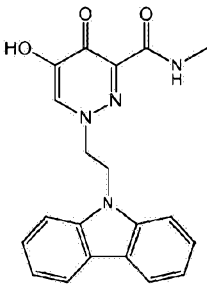
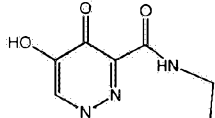
Structure	No.	[M+H] <sup>+</sup>
	806	496
	807	405
	808	381
	809	457
	810	381
		

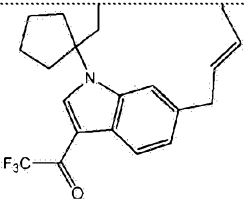
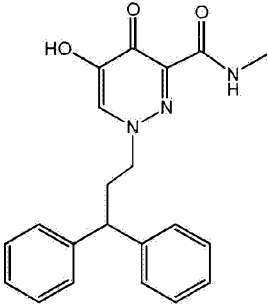
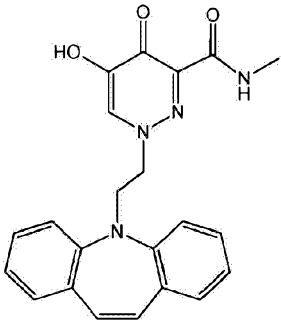
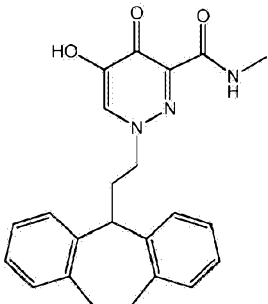
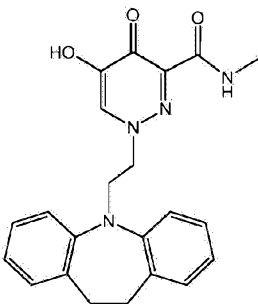
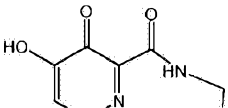
Structure	No.	[M+H] <sup>+</sup>
	811	512
	812	440
	813	408
	814	368
	815	402

Structure	No.	[M+H] <sup>+</sup>
	816	385
	817	512
	818	402
	819	427
	820	440
		

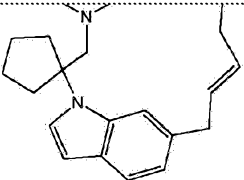
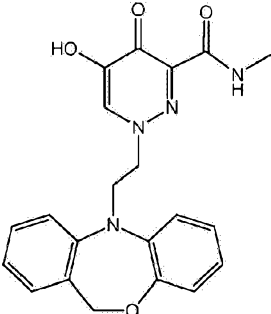
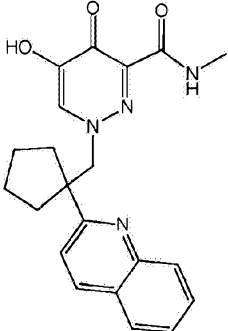
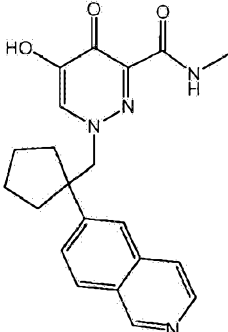
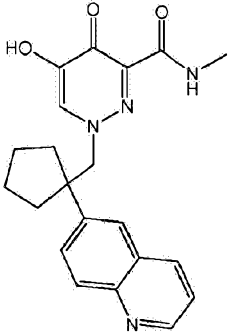

Structure	No.	[M+H] <sup>+</sup>
	821	424
	822	480
	823	454
	824	382
	825	405
		

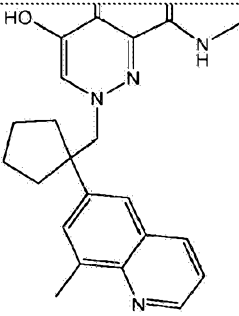
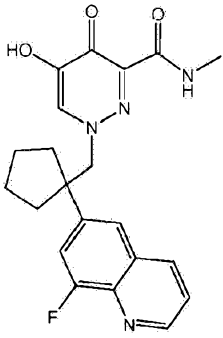
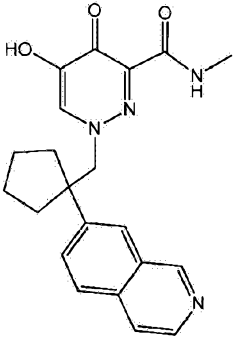
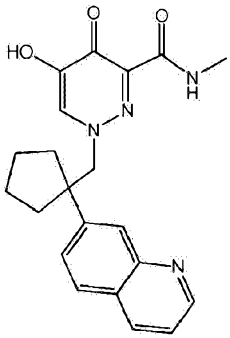
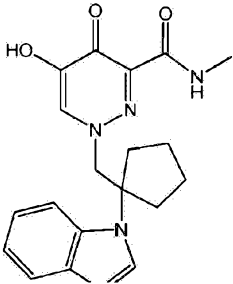
Structure	No.	[M+H] <sup>+</sup>
	826	421
	827	381
	828	392
	829	420
	830	381
		

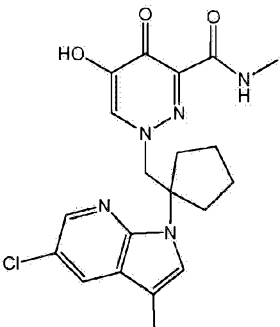
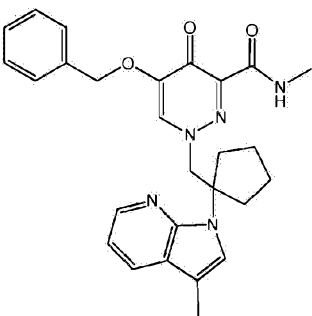
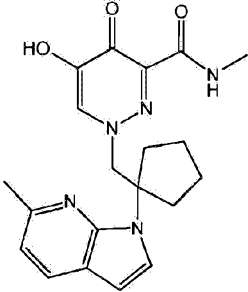
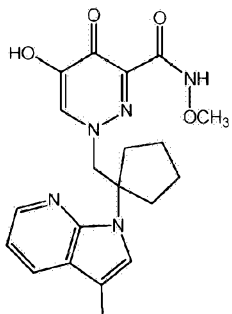
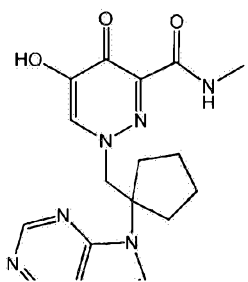
Structure	No.	[M+H] <sup>+</sup>
	831	367
	832	406
	833	395
	834	365
	835	363
		

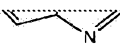
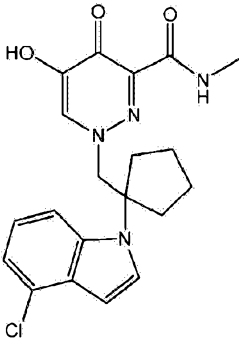
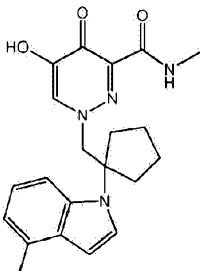
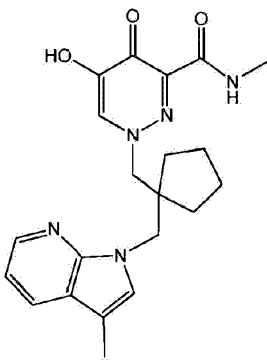
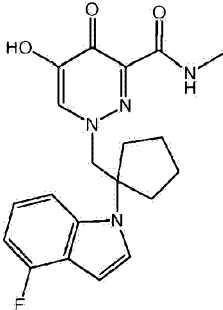
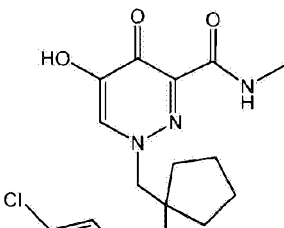
Structure	No.	[M+H] <sup>+</sup>
	836	515
	837	364
	838	389
	839	390
	840	391
		

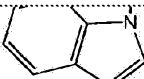
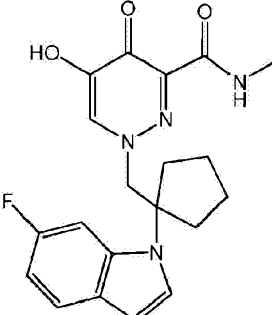
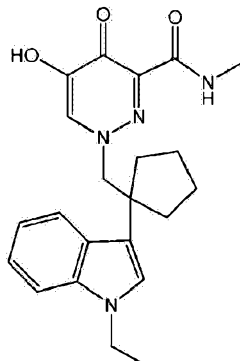
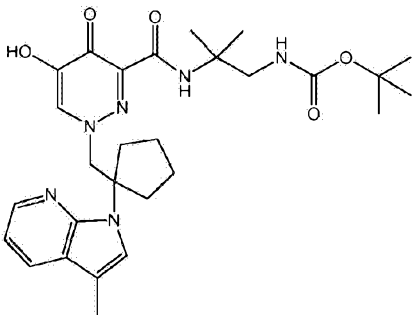
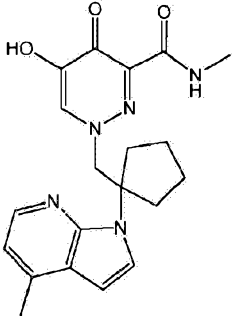
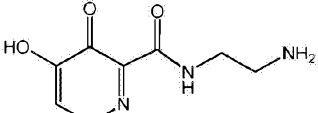


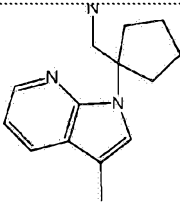
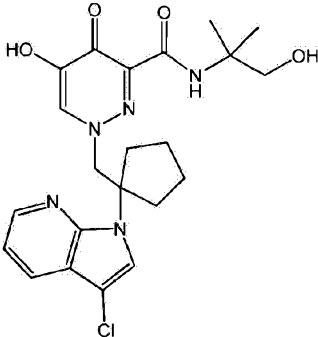
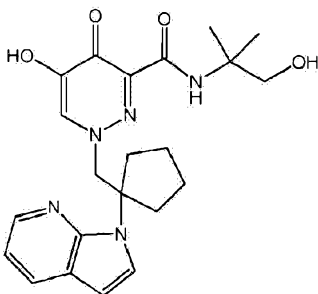
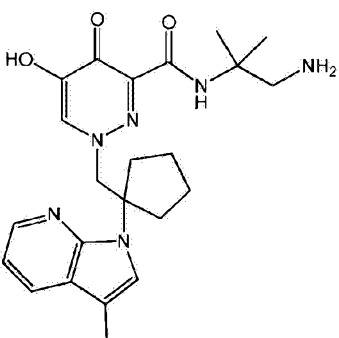
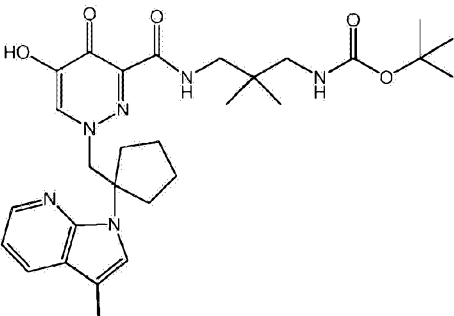

Structure	No.	[M+H] <sup>+</sup>
	841	419
	842	393
	843	379
	844	379
	845	379
		

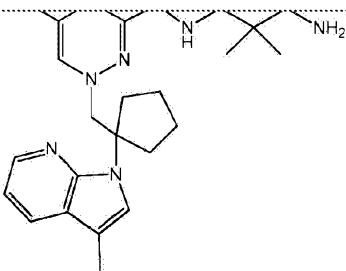
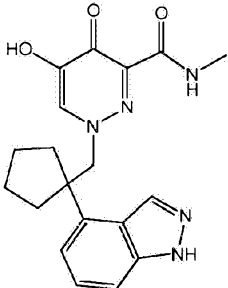
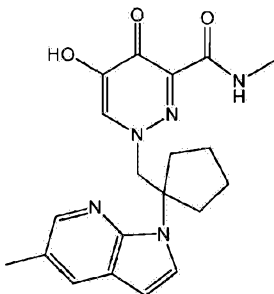
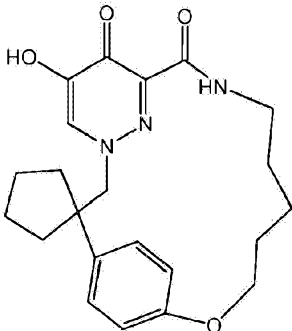
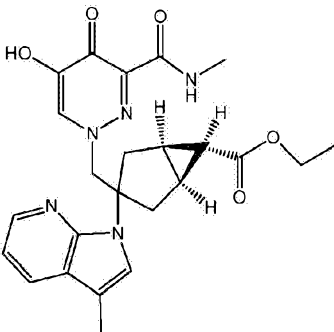

Structure	No.	[M+H] <sup>+</sup>
	846	393
	847	397
	848	379
	849	379
	850	367

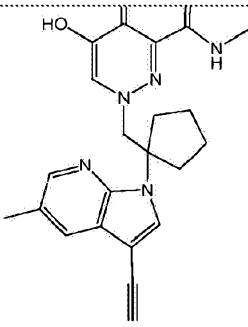
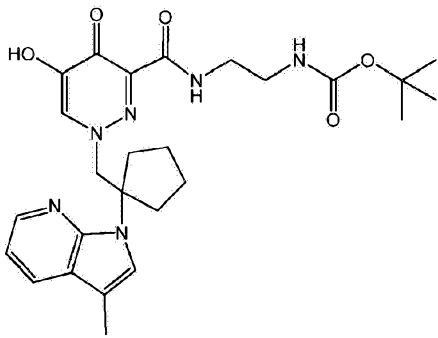
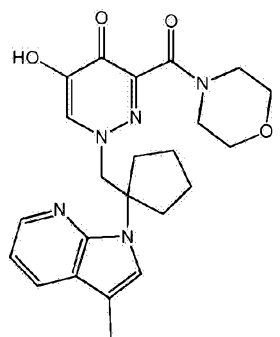
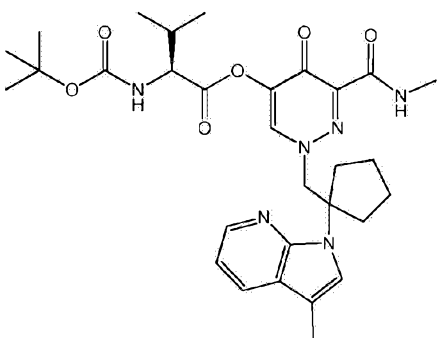
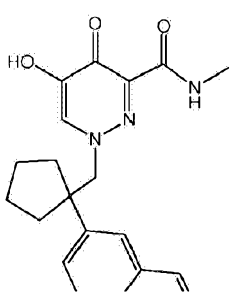
Structure	No.	[M+H] <sup>+</sup>
	851	416
	852	472
	853	382
	854	398
	855	370

Structure	No.	[M+H] <sup>+</sup>
		
	856	401
	857	381
	858	396
	859	385
	860	401

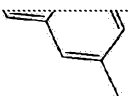
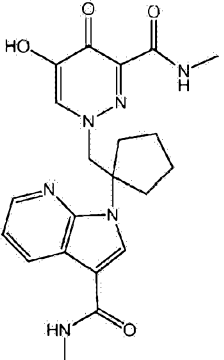
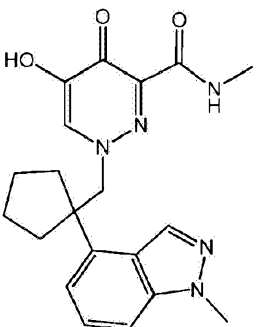
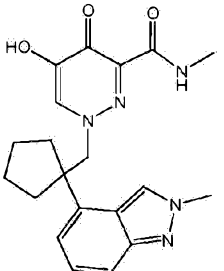
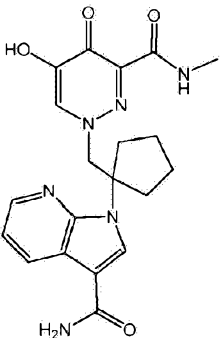
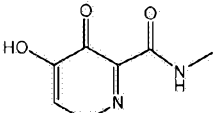
Structure	No.	[M+H] <sup>+</sup>
		
	861	385
	862	395
	863	539
	864	382
		

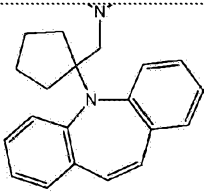
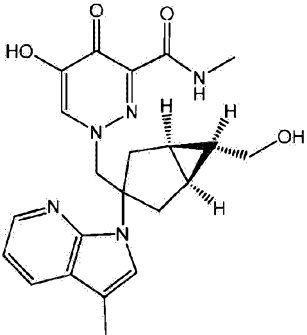
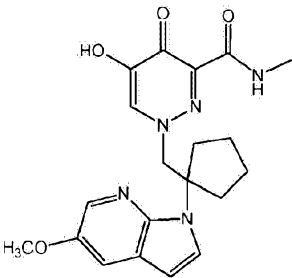
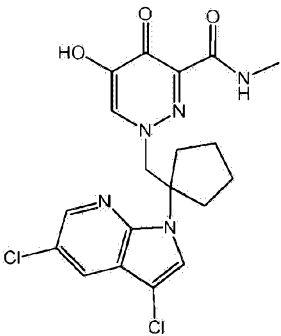
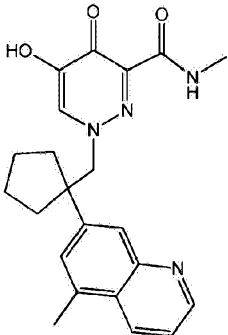
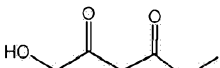
Structure	No.	[M+H] <sup>+</sup>
	865	411
	866	460
	867	426
	868	439
	869	553
		

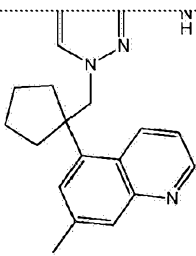
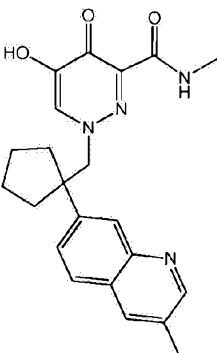
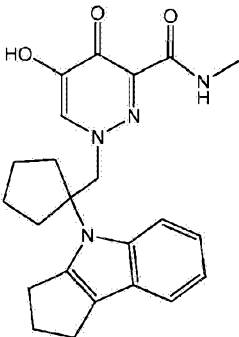
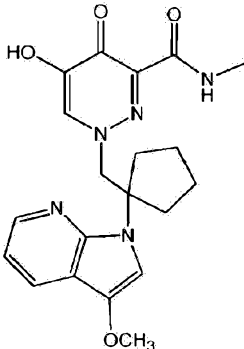
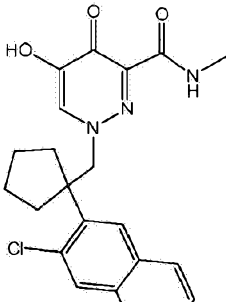
Structure	No.	[M+H] <sup>+</sup>
	870	453
	871	368
	872	382
	873	398
	874	466
		

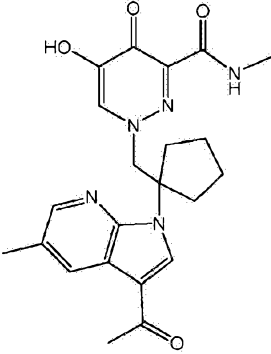
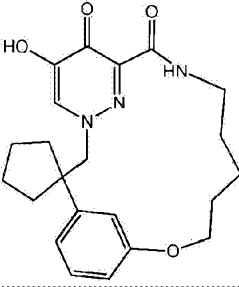
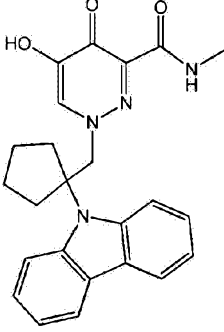
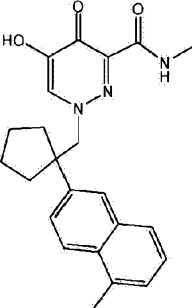
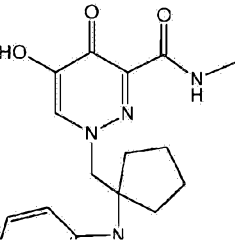
Structure	No.	[M+H] <sup>+</sup>
	875	406
	876	511
	877	438
	878	581
	879	392



Structure	No.	[M+H] <sup>+</sup>
		
	880	425
	881	382
	882	382
	883	411
		

Structure	No.	[M+H] <sup>+</sup>
	884	443
	885	424
	886	398
	887	437
	888	393
		

Structure	No.	[M+H] <sup>+</sup>
	889	393
	890	393
	891	407
	892	398
	893	412

Structure	No.	[M+H] <sup>+</sup>
	894	424
	895	398
	896	417
	897	392
	898	415

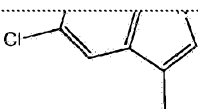
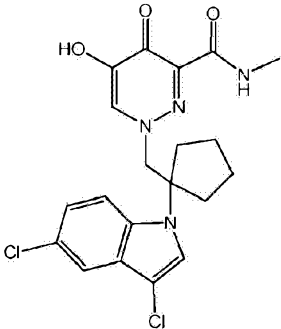
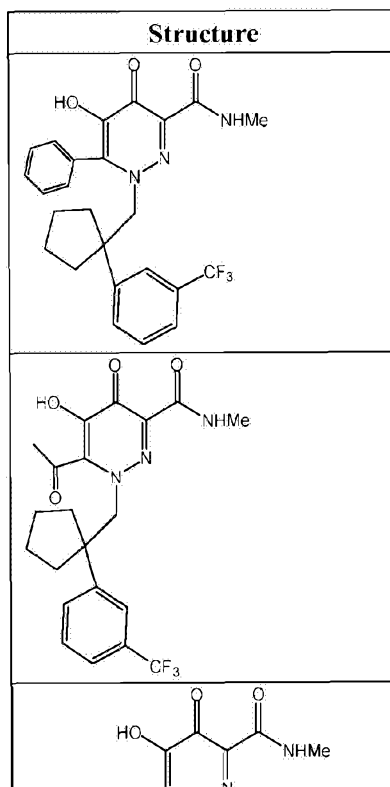
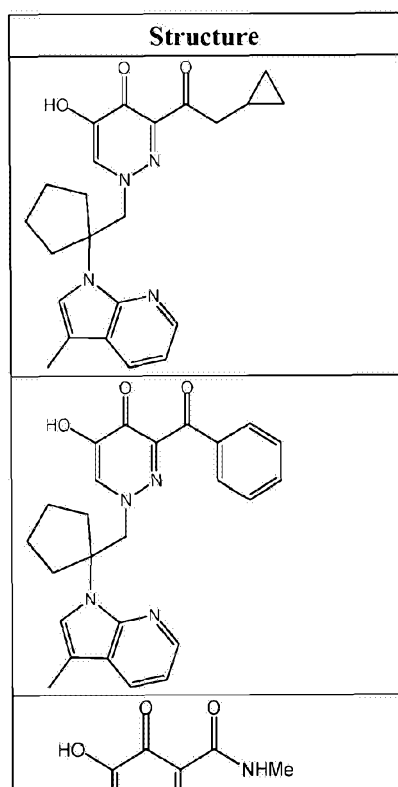
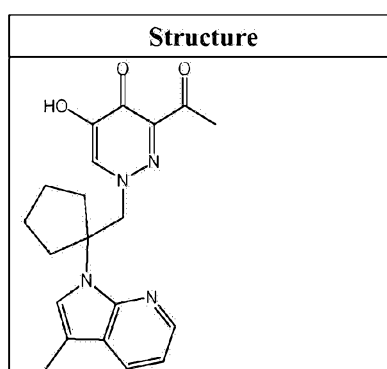
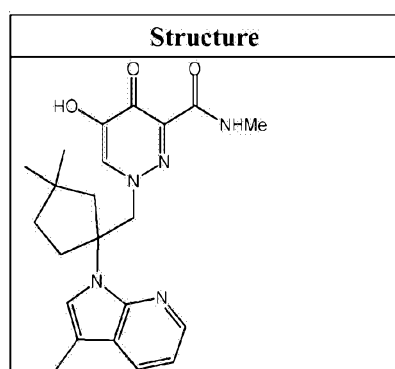
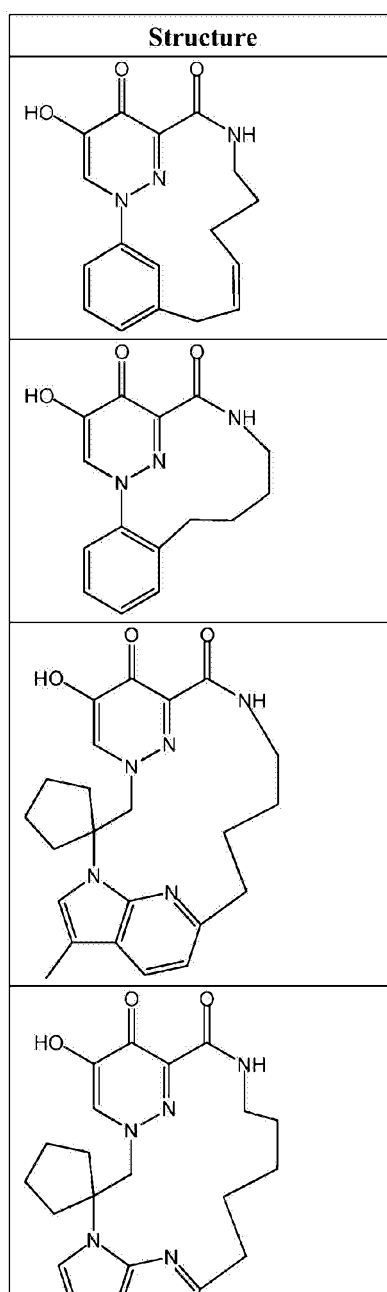
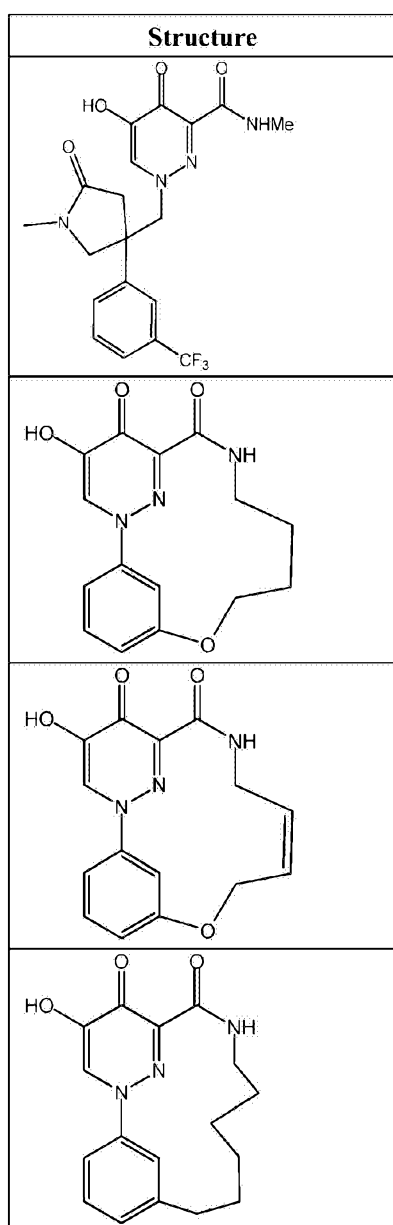
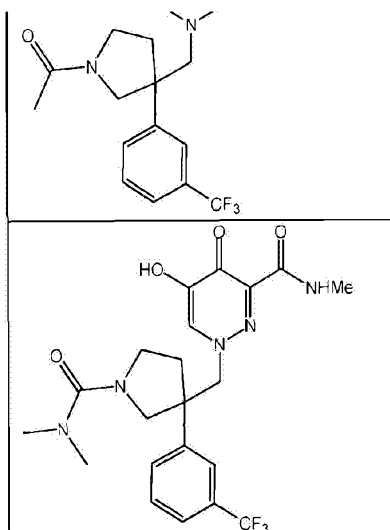
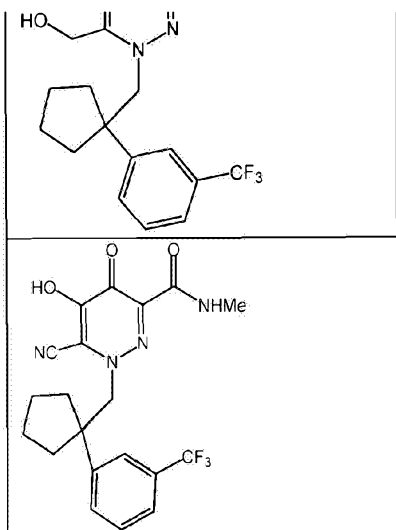
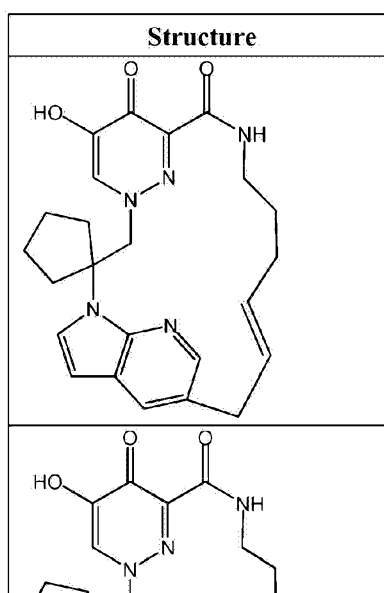
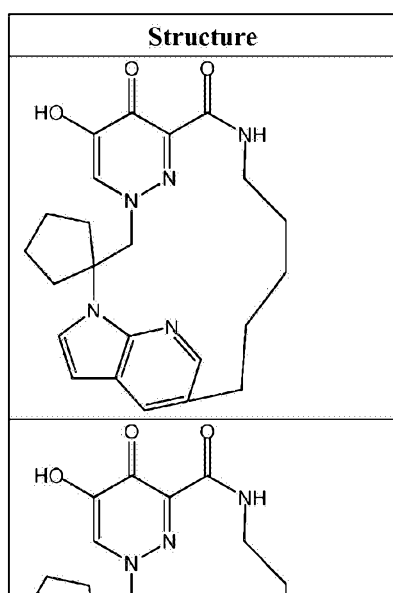
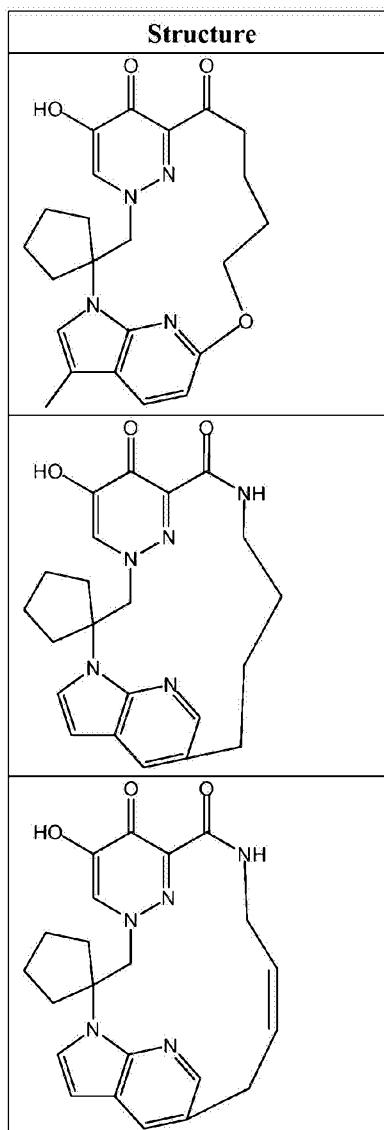
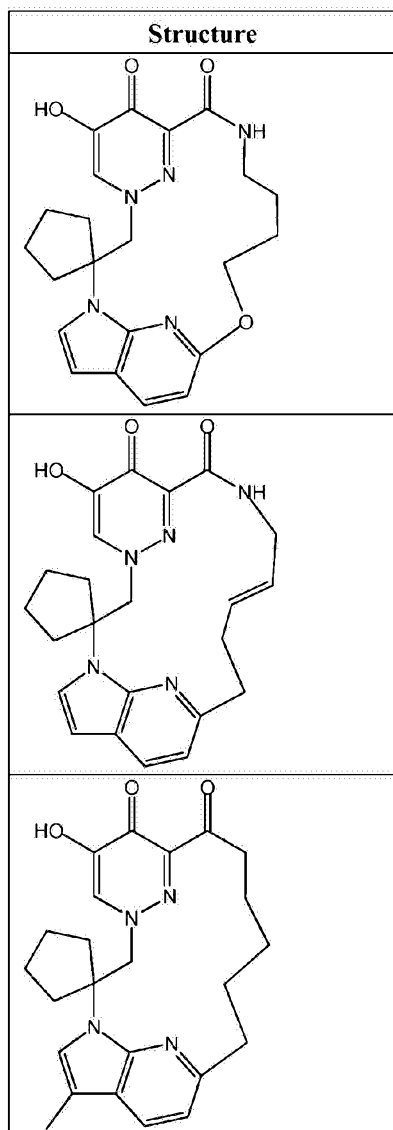
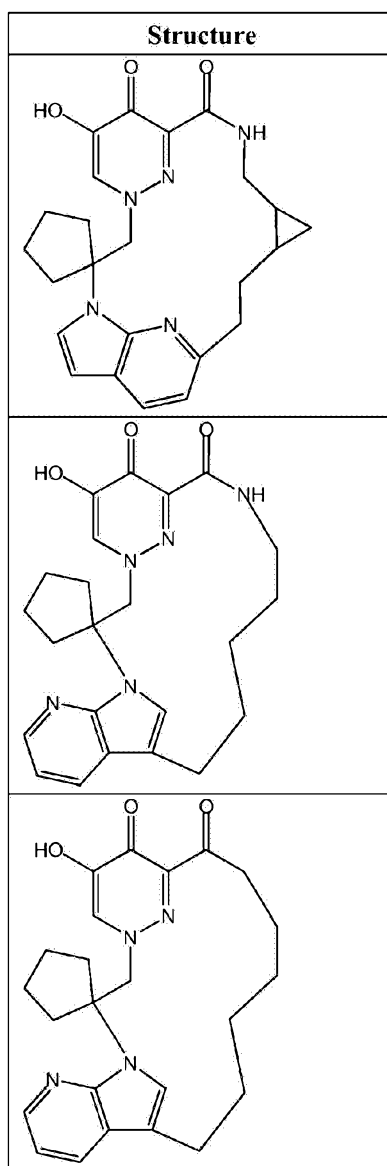
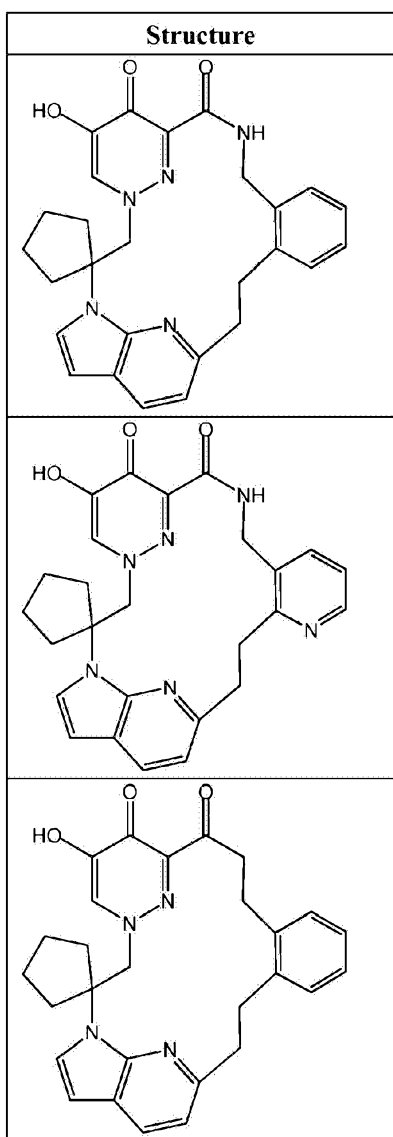
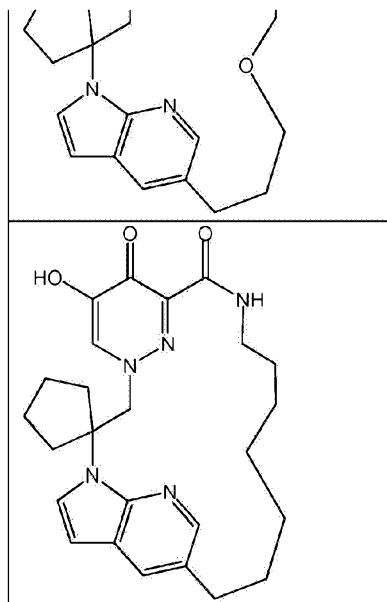
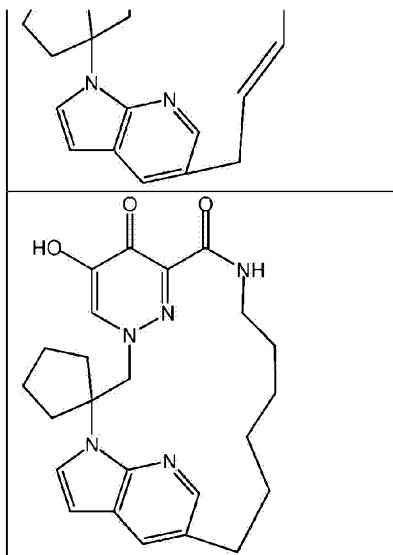
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Table 8 – Compounds of Formula (I)











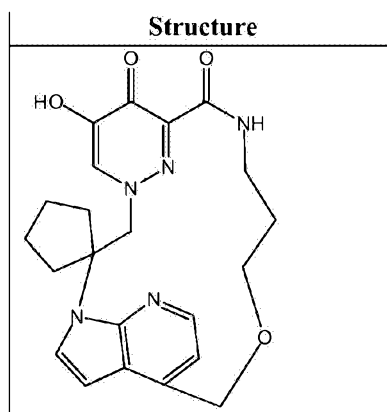
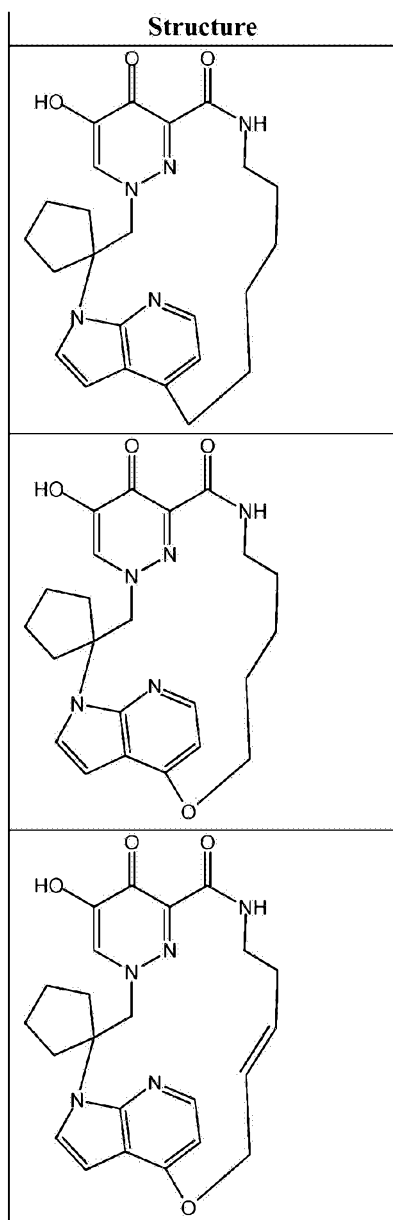
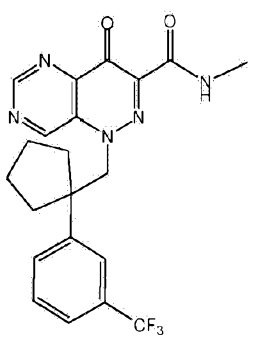
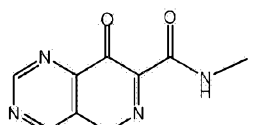
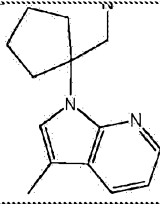
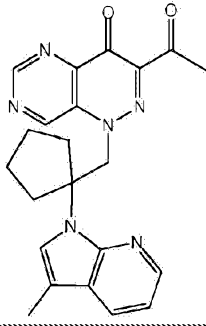
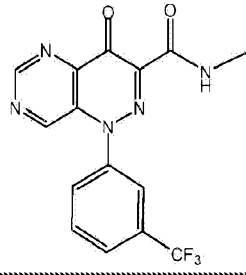
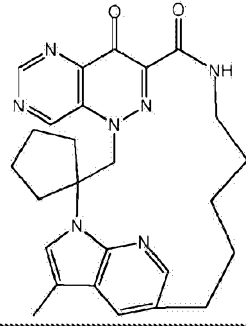
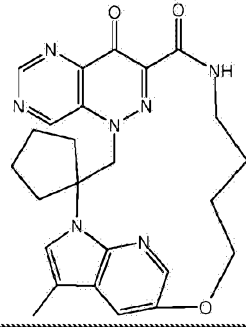


Table 9 - Compounds of Formula (II)

Structure



Structure






**EXAMPLE 11**

**Influenza Antiviral Assay**

**[0401]** Human lung carcinoma A549 cells (ATCC, Manassas, VA) were plated at a density of  $5 \times 10^4$  cells/mL ( $5 \times 10^3$  cells/well) in assay media (Ham's F12 media supplemented with 0.3% FBS, 1% penicillin/streptomycin (all Mediatech, Manassas, VA) and 1% DMSO (Sigma-Aldrich, St Louis, MO)) in black 96-well plates. Alternatively, Madin-Darby canine kidney epithelial cells (MDCK, ATCC), were plated at a density of  $1 \times 10^5$  cells/mL ( $1 \times 10^4$  cells/well) in assay media (DMEM supplemented with 0.3% FBS, 1% penicillin/streptomycin and 1% DMSO) in 96-well plates. After 24 hours, serially diluted test compounds were added to cells and incubated for an additional 24 hours. Cells were infected with 250 IU/well of Influenza strain A549\_AWSN/33 (H1N1) (Virapur, San Diego CA) and incubated for 20 hours at 37°C, 5% CO<sub>2</sub>. The cell culture supernatant was aspirated off and 50 µL of 25 µM 2'-(4-Methylumbelliferyl)-α-D-N-acetylneuraminic acid (Sigma-Aldrich) dissolved in 33 mM MES, pH 6.5 (Emerald Biosystems, Bainbridge Island, WA) was added to the cells. After incubation for 45 mins at 30°C, reactions were stopped by addition of 150 µL stop solution (100 mM glycine, pH 10.5, 25% ethanol, all Sigma-Aldrich). Fluorescence was measured with excitation and emission filters of 355 and 460 nm, respectively, on a Victor X3 multi-label plate reader (Perkin Elmer, Waltham, MA). Cytotoxicity of uninfected parallel cultures was determined by addition of 100 µL of CellTiter-Glo® reagent (Promega, Madison, WI), and incubation for 10 mins at RT. Luminescence was measured on a Victor X3 multi-label plate reader.

**[0402]** Compounds of Formulae (I) and (II) are active in the assay as noted in Tables 10-17, where 'A' indicates an EC<sub>50</sub> < 20 µM, 'B' indicates an EC<sub>50</sub> of ≥20 µM and < 100 µM and 'C' indicates an EC<sub>50</sub> ≥ 100 µM.

**Table 10 - Activity of compounds**

<b>No.</b>	<b>% Inhibition</b>
1	C
2	C
4	C
6	C
7	C
9	C
10	C
11	C
17	C
18	C
19	C
20	C

No.	% Inhibition
21	C
24	C
35	A

Table 11 - Activity of compounds

No.	% Inhibition
203	B
206	B
207	B
210	C
211	B

Table 12 - Activity of compounds

No.	% Inhibition
314	C
319	A
320	C

Table 13 - Activity of compounds

No.	% Inhibition
400	C
401	C
402	C
403	C
404	C
405	A
406	A
407	C
408	B
409	C
410	A
411	A
412	C
416	B
421	C
422	A
423	C
424	B

No.	% Inhibition
-----	--------------

Table 14 - Activity of compounds

No.	% Inhibition
500	A
501	A
502	A
503	A
504	B
505	A
506	A
507	A
509	A
510	A
511	A
512	A
513	A
514	A
515	C
516	A
517	A
518	A
519	B
523	A
524	A
525	A

Table 15 – Activity of compounds

No.	% Inhibition
602	A
603	C
604	C
605	B
606	B
607	A
609	A
610	B
611	C
612	B
613	C
614	B
621	A

No.	% Inhibition
625	A
626	B
637	A
638	A
639	B
641	C
642	C
643	C
644	C
645	A
646	A
647	A
648	A

No.	% Inhibition
652	C
653	C
654	C
655	C
656	C
657	C
658	C
659	C
660	C
661	A
662	A
663	C
664	C

622	A
623	A
624	A

649	A
650	A
651	B

665	A
666	A
667	C

No.	% Inhibition
668	C
669	C
670	C
671	A
672	A
673	C
674	A
675	C
676	A
677	A
678	A

No.	% Inhibition
679	A
680	A
681	A
682	A
683	C
684	A
685	A
686	A
687	A
688	A
689	C

No.	% Inhibition
690	C
691	A
692	A
693	A
694	A
695	A
696	C
697	C
698	A
699	A

Table 16– Potency of compounds

No.	% Inhibition
700	A
701	A
702	A
703	A
704	A
705	C
706	C
707	A
708	A
709	A
710	C
711	A
712	C
713	C
714	C
718	A
719	C
720	C
721	C
722	C
723	B
724	C
725	A
726	A
727	C
728	C
729	C
730	A

No.	% Inhibition
731	C
732	C
733	A
734	C
735	C
736	C
737	A
738	A
739	C
740	A
741	A
742	A
743	A
744	C
745	A
746	C
747	A
748	C
749	A
750	A
751	C
752	A
753	A
754	A
755	A
756	A
757	A
758	A

No.	% Inhibition
759	A
760	A
761	A
762	A
763	A
764	A
765	B
766	A
767	A
768	A
769	C
770	A
771	A
772	A
773	A
774	A
775	A
776	A
777	A
778	B
779	C
780	A
781	A
782	C
783	A
784	A
785	C
786	C

No.	% Inhibition
787	A
788	A
789	A
790	A
791	A

No.	% Inhibition
792	A
793	A
794	A
795	A
796	C

No.	% Inhibition
797	A
798	C
799	A

Table 17- Potency of compounds

No.	% Inhibition
800	A
801	A
806	A
807	A
808	A
809	A
810	A
812	A
813	A
814	A
815	A
816	A
818	A
819	A
820	A
821	A
822	A
823	A
824	A
825	A
826	A
827	A
828	A
829	A
830	C
831	C
832	C
833	A
834	C
835	C
836	C
837	C
838	A
839	C

No.	% Inhibition
840	C
841	A
842	C
843	A
844	A
845	A
846	A
847	C
848	C
849	A
850	A
851	A
852	C
853	A
854	A
855	C
856	A
857	A
858	C
859	A
860	A
861	A
862	C
863	A
864	A
865	A
866	A
867	A
868	A
869	A
870	B
871	C
872	A
873	C



No.	% Inhibition
874	C
875	A
876	A
877	C
878	A
879	A
880	C
881	A
882	A
883	C
884	A
885	C
886	A
887	A
888	A
889	A
890	A
891	A
892	A
893	A
894	A
895	A
896	A
897	A
898	A
899	A

**EXAMPLE 12****EN PA FRET Inhibition Assay**

**[0403]** EN PA FRET inhibition assay was performed using a 19 nucleotide synthetic oligoribonucleotide substrate: 5'-FAM-AUUUUGUUUUUAAUAUUUC-BHQ-3' (Integrated DNA

Technologies, Inc., Coralville, IA) (SEQ. ID. NO. 1). Upon RNA cleavage, the fluorescent FAM group is released from the BHQ quencher. The PA sequence used to produce active enzyme is derived from any one of multiple influenza A virus strains (e.g., A/goose/Nanchang/3-120/01 (H3N2), A/Victoria/3/1975 (H3N2), A/Brisbane/10/2007 (H3N2), A/WSN/33 (H1N1), A/CA/4/2009 (H1N1), A/CA/5/2009 (H1N1), A/Shanghai/1/2013 (H7N9), A/Guizhou/1/2009 (H5N1)). The full length recombinant protein was expressed from a baculovirus vector in insect cells. Full length EN PA was used in this assay at an effective concentration of 1 to 10 Nm, together with 50 Nm FRET probe with a final volume of 20 ml cleavage buffer (20 Mm Tris Ph8, 100 Mm NaCl, 5% Glycerol, 10 Mm  $\beta$ -ME, 0.01% Tween-20, 2 Mm  $MnCl_2$ ).

**[0404]** Compounds described herein were added to a 384-well black polypropylene plate. Fluorescence was measured in a continuous mode up to 30 minutes with a Wallac 1420 Victor<sup>3</sup>V multilabel counter (PerkinElmer Life Sciences, Shelton, CT) (excitation 485 nm; emission 535 nm). Measured  $IC_{50}$  is defined as the concentration at which fluorescence is 50% that of the uninhibited control (DMSO).  $IC_{50}$  was calculated by fitting the data to the sigmoidal equation  $Y = \% \text{ Min} + (\% \text{ Max} - \% \text{ Min}) / (1 + X / IC_{50})$ , where Y corresponds to the percent relative enzyme activity, Max is the maximum enzyme activity in the presence of DMSO, Min is the inhibited activity at saturating concentration of compound, and X corresponds to the compound concentration. The  $IC_{50}$  values were derived from the mean of a minimum of two independent experiments.

**[0405]** Compounds of Formulae (I) and (II) are potent in the assay as noted in Tables 18-25, where 'A' indicates an  $IC_{50} < 100$  nM, 'B' indicates an  $IC_{50}$  of  $\geq 100$  nM and  $< 1000$  nM and 'C' indicates an  $IC_{50} \geq 1000$  nM

Table 18 – Potency of compounds

No.	Potency	2	B	4	B	6	B
1	B	3	B	5	B	7	B
8	C	18	B	28	C	38	B
9	B	19	B	29	B	39	B
10	B	20	B	30	C	40	B
11	B	21	A	31	B	41	B
12	B	22	B	32	B	42	B
13	B	23	B	33	B	43	B
14	C	24	A	34	B	44	C
15	B	25	C	35	A		
16	B	26	B	36	B		
17	B	27	B	37	B		

Table 19 - Potency of compounds

No.	Potency
200	B
201	B
202	B
203	B

No.	Potency
204	C
205	C
206	B
207	B
208	B
209	B
210	B
211	B

Table 20 - Potency of compounds

No.	Potency
300	B
301	B
302	B
303	B
304	C
305	B
306	B
307	B
308	B
309	C
310	B
311	A
312	C
313	B
314	B
315	B
316	B
317	A
318	B
319	B
320	B
321	C
322	B
323	B

No.	Potency
324	B
325	A

Table 21 - Potency of compounds

No.	Potency
400	A
401	B
402	B
403	A
404	A
405	C
406	A
407	B
408	C
409	B
410	A
411	B
412	A
413	A
414	A
415	B
416	A
417	B
418	B
419	A
420	B
421	B
422	A
423	B
424	B
425	B

Table 22 – Potency of compounds

No.	Potency
500	B
501	C

No.	Potency
502	C
503	B

No.	Potency
504	C
505	B

No.	Potency
506	B
507	B

No.	Potency
-----	---------

No.	Potency
-----	---------

No.	Potency
-----	---------

No.	Potency
-----	---------

NO.	POTENCY
508	B
509	B
510	B
511	B
512	B

NO.	POTENCY
513	B
514	B
515	B
516	B
517	B

NO.	POTENCY
518	B
519	B
520	C
521	C
522	B

NO.	POTENCY
523	B
524	B
525	B

Table 23 - Potency of compounds

No.	Potency
600	C
601	C
602	B
603	C
604	C
605	B
606	C
607	B
608	C
609	A
610	B
611	C
612	C
613	C
614	B
615	C
616	C
617	C
618	C
619	C
620	C
621	B
622	B
623	B
624	B
625	B
626	B
627	B
628	C
629	C

No.	Potency
630	B
632	C
633	C
636	C
639	B
644	B
645	A
646	A
648	A
649	A
650	A
654	B
655	A
656	B
658	B
659	B
660	B
661	A
662	A
663	B
664	B
665	A
666	A
669	A
670	B
671	B
674	A
676	A
677	A
678	A
679	A
680	A
681	A
682	A
683	A

No.	Potency
685	A
686	B
687	A
692	A
693	A
694	B
695	A

Table 24 – Potency of compounds

No.	Potency
700	A
701	A
703	A
704	A
708	A
709	A
718	A
720	A
722	A
723	A
730	A

No.	Potency
733	A
738	A
740	A
741	A
742	A
743	A
747	A
749	A
750	A
752	A
753	A

No.	Potency
754	A
755	A
756	A
757	A
758	A
759	A
760	A
761	A
762	A
764	A
765	C

No.	Potency
766	A
768	A
771	B
772	B
773	A
774	A
775	A
776	A
777	A
778	A
782	A

No.	Potency
783	A
784	B
785	A
786	A
787	A
788	A
789	A
790	A
791	B
792	A
793	B

No.	Potency
794	A
795	B
796	B
797	B
798	B
799	A

Table 25 – Potency of compounds

No.	Potency
800	A
801	A
802	A
803	A
804	A
805	A
806	A
807	A
808	A
809	A
810	A

No.	Potency
829	A
830	B
831	B
832	A
833	A
834	B
835	B
836	C
837	B
838	A
839	B

No.	Potency
856	A
857	A
858	B
859	A
860	A
861	A
862	B
863	B
864	A
865	A
866	A

812	A
813	A
814	A
815	A
816	A
818	A
819	A
820	A
821	A
822	A
823	A
824	B
825	B
826	A
827	A
828	A

840	B
841	B
842	B
843	A
844	A
845	A
846	A
847	A
848	A
849	A
850	A
851	A
852	C
853	A
854	A
855	B

867	A
868	A
869	B
870	A
871	A
872	A
873	B
874	B
875	A
876	A
877	B
878	A
879	A
880	A
881	A
882	A

No.	Potency
883	A
884	A
885	B
886	A
887	A
888	A

No.	Potency
889	A
890	A
891	A
892	A
893	A
894	A

No.	Potency
895	A
896	A
897	A
898	A
899	A

**[0406]** Furthermore, although the foregoing has been described in some detail by way of illustrations and examples for purposes of clarity and understanding, it will be understood by those of skill in the art that numerous and various modifications can be made without departing from the present disclosure.

## SEQUENCE LISTING

### [0407]

<110> Alios BioPharma, Inc. Beigelman, Leonid Hendricks, Robert Than Stoycheva, Antitsa Dimitrova Deval, Jerome Stevens, Sarah Katherine

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## REFERENCES CITED IN THE DESCRIPTION

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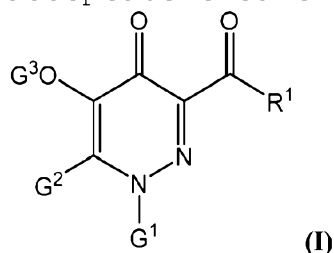
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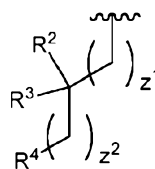
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## Patentkrav

1. Forbindelse med formel (I) eller et farmaceutisk acceptabelt salt deraf:



hvor:



G<sup>1</sup> er valgt fra gruppen, der består af R<sup>4</sup> og R<sup>5</sup>;

G<sup>2</sup> er hydrogen, halogen, -CN, en eventuelt substitueret C<sub>1-6</sub>alkyl, en eventuelt substitueret aryl, en eventuelt substitueret heteroaryl, -CH<sub>2</sub>OH, -CH(Y<sup>1</sup>)(OH) eller -C(O)Y<sup>1</sup>;

G<sup>3</sup> er valgt fra gruppen, der består af hydrogen, -C(O)Y<sup>2</sup>, -C(O)O-Y<sup>2</sup>, -(CH<sub>2</sub>)-OC(O)Y<sup>2</sup>, -(CH<sub>2</sub>)-OC(O)OY<sup>2</sup>, -(CHCH<sub>3</sub>)-OC(O)Y<sup>2</sup> og -(CHCH<sub>3</sub>)-OC(O)OY<sup>2</sup>;

Y<sup>1</sup> og Y<sup>2</sup> uafhængigt er en eventuelt substitueret C<sub>1-6</sub>alkyl eller en eventuelt substitueret aryl;

R<sup>1</sup> er valgt fra gruppen, der består af OR<sup>6</sup>, NH<sub>2</sub>, en eventuelt substitueret alkyl, en eventuelt substitueret aryl, en eventuelt substitueret monosubstitueret amin, en eventuelt substitueret disubstitueret amin, en eventuelt substitueret heterocyclyl, en eventuelt substitueret N-sulfonamido og en eventuelt substitueret alkoxyamin, eller R<sup>1</sup> er R<sup>10</sup>;

R<sup>2</sup> er hydrogen, C<sub>1-6</sub>alkyl, en eventuelt substitueret C<sub>3-6</sub>cycloalkyl, en eventuelt substitueret aryl, en eventuelt substitueret aryl(C<sub>1-6</sub>alkyl) eller en eventuelt substitueret C-amido;

R<sup>3</sup> er hydrogen eller C<sub>1-6</sub>alkyl;

eller R<sup>2</sup> og R<sup>3</sup> sammen med carbonatomet, hvortil de er bundet, danner en eventuelt substitueret C<sub>3-6</sub>cycloalkyl eller en eventuelt substitueret 5- til 6-leddet heterocyclyl, eller R<sup>2</sup> og R<sup>3</sup> sammen danner =O;

R<sup>4</sup> er valgt fra gruppen, der består af en eventuelt substitueret aryl, en eventuelt substitueret cycloalkyl, en eventuelt substitueret cycloalkenyl, en eventuelt substitueret heteroaryl og en eventuelt substitueret heterocyclyl;

5 eller R<sup>4</sup> er A<sup>1</sup>R<sup>A4</sup>R<sup>B4</sup>, hvor A<sup>1</sup> er CH eller N; og R<sup>A4</sup> og R<sup>B4</sup> hver for sig er en eventuelt substitueret phenyl;

R<sup>5</sup> er valgt fra gruppen, der består af en eventuelt substitueret aryl, en eventuelt substitueret cycloalkyl, en eventuelt substitueret cycloalkenyl, en eventuelt substitueret heteroaryl  
10 og en eventuelt substitueret heterocyclyl;

R<sup>6</sup> er valgt fra gruppen, der består af hydrogen, C<sub>1-6</sub>alkyl, -C(O)R<sup>7</sup> og -C(O)NR<sup>8</sup>R<sup>9</sup>;

R<sup>7</sup> er valgt fra gruppen, der består af hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl,  
15 heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub>alkyl), heteroaryl(C<sub>1-6</sub>alkyl) og heterocyclyl(C<sub>1-6</sub>alkyl); og

R<sup>8</sup> og R<sup>9</sup> uafhængigt er valgt fra gruppen, der består af hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub>alkyl),  
20 heteroaryl(C<sub>1-6</sub>alkyl) og heterocyclyl(C<sub>1-6</sub>alkyl);

eller R<sup>8</sup> og R<sup>9</sup> sammen med nitrogenatomet, hvortil de er bundet, danner en eventuelt substitueret heterocyclyl;

hvor, når R<sup>1</sup> er R<sup>10</sup>, så er R<sup>10</sup> og R<sup>4</sup> samlet og indbefatter L<sup>1</sup>, hvor L<sup>1</sup> forbinder R<sup>10</sup> og R<sup>4</sup> til frembringelse af en 11- til 20-  
25 leddet ring, eller hvor, når R<sup>1</sup> er R<sup>10</sup>, så er R<sup>10</sup> og R<sup>5</sup> samlet og indbefatter L<sup>1</sup>, hvor L<sup>1</sup> forbinder R<sup>10</sup> og R<sup>5</sup> til frembringelse af en 11- til 20-leddet ring;

R<sup>10</sup> er en eventuelt substitueret -CH<sub>2</sub>-, en eventuelt substitueret -CH=CH-, O (oxygen), S (svovl) eller NR<sup>11</sup>;

30 R<sup>11</sup> er hydrogen eller C<sub>1-6</sub>alkyl;

L<sup>1</sup> er -L<sup>2</sup>- eller -L<sup>3</sup>-L<sup>4</sup>-L<sup>5</sup>-;

L<sup>2</sup> er valgt fra gruppen, der består af en eventuelt substitueret alkylen, en eventuelt substitueret alkenylen, en eventuelt substitueret heteroalkylen og en eventuelt substitueret  
35 heteroalkenylen;

L<sup>3</sup> er en eventuelt substitueret C<sub>1-6</sub>alkylen;

L<sup>4</sup> er en eventuelt substitueret cycloalkyl, en eventuelt substitueret aryl, en eventuelt substitueret heteroaryl, en

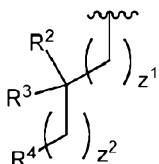
eventuelt substitueret heterocyclyl, O (oxygen), S (svovl) eller NR<sup>11</sup>; og

L<sup>5</sup> er en eventuelt substitueret C<sub>1-6</sub>alkylen eller en eventuelt substitueret heteroalkylen; og

5 Z<sup>1</sup> og Z<sup>2</sup> uafhængigt er 0, 1, 2, 3 eller 4.

2. Forbindelse ifølge krav 1 eller et farmaceutisk acceptabelt salt deraf,

hvor:



10 G<sup>1</sup> er ;

G<sup>2</sup> er hydrogen eller C<sub>1-6</sub>alkyl;

G<sup>3</sup> er valgt fra gruppen, der består af hydrogen, -C(O)Y<sup>2</sup>, -C(O)O-Y<sup>2</sup>, -(CH<sub>2</sub>)-OC(O)Y<sup>2</sup>, -(CH<sub>2</sub>)-OC(O)OY<sup>2</sup>, -(CHCH<sub>3</sub>)-OC(O)Y<sup>2</sup> og -(CHCH<sub>3</sub>)-OC(O)OY<sup>2</sup>;

15 Y<sup>2</sup> er C<sub>1-6</sub>alkyl;

R<sup>1</sup> er valgt fra gruppen, der består af OR<sup>6</sup>, NH<sub>2</sub>, monosubstitueret amin, disubstitueret amin, heterocyclyl og N-sulfonamido, hvor den monosubstituerede amin, en disubstitueret amin, heterocyclyl og N-sulfonamido hver eventuelt er substitueret med en eller

20 flere substituenten valgt fra gruppen, der består af alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(alkyl), heteroaryl(alkyl), (heterocyclyl)alkyl, hydroxy, alkoxy, acyl, cyano, halogen, thiocarbonyl, O-carbamyl, N-carbamyl, O-thiocarbamyl, N-thiocarbamyl, C-amido, N-amido, S-sulfonamido, N-sulfonamido, C-carboxy, O-carboxy, isocyanato, thiocyanato, isothiocyanato, nitro, silyl, sulfenyl, sulfinyl, sulfonyl, halogenalkyl, halogenalkoxy, trihalogenmethansulfonyl,

25 trihalogenmethansulfonamido, en amino, en monosubstitueret aminogruppe og en disubstitueret aminogruppe;

R<sup>2</sup> er hydrogen eller C<sub>1-6</sub>alkyl;

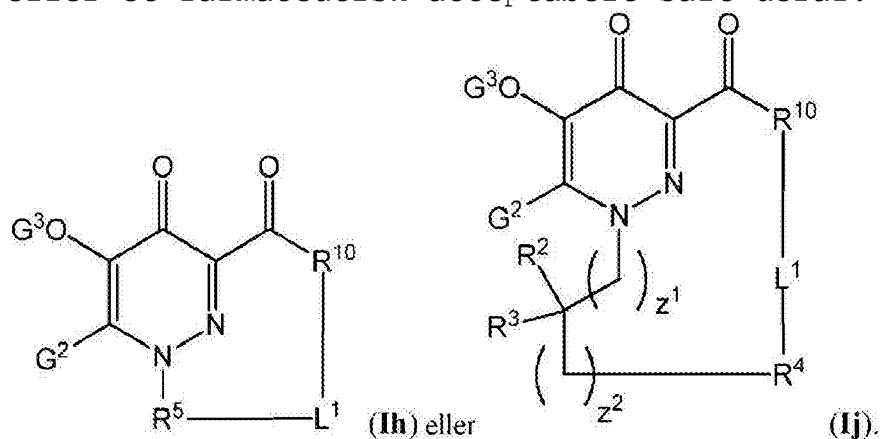
R<sup>3</sup> er hydrogen eller C<sub>1-6</sub>alkyl;

eller R<sup>2</sup> og R<sup>3</sup> sammen med carbonatomet, hvortil de er bundet, danner en eventuelt substitueret C<sub>3-6</sub>cycloalkyl eller en

35 eventuelt substitueret 5- til 6-leddet heterocyclyl; og fortrinsvis den eventuelt substituerede 5- til 6-leddede

heterocyclyl er en eventuelt substitueret piperidino eller en eventuelt substitueret pyrrolidino.

3. Forbindelse ifølge krav 1 eller et farmaceutisk acceptabelt salt deraf, der har strukturen med formel (Ih) eller formel (Ij) eller et farmaceutisk acceptabelt salt deraf:



4. Forbindelse ifølge krav 3 eller et farmaceutisk acceptabelt salt deraf, hvor  $L^2$  er en eventuelt substitueret alkylen eller en eventuelt substitueret alkenylen; og fortrinsvis  $L^2$  er en eventuelt substitueret  $C_{4-7}$ alkylen; eller fortrinsvis  $L^2$  er en eventuelt substitueret  $C_{4-7}$ alkenylen.

5. Forbindelse ifølge krav 3 eller et farmaceutisk acceptabelt salt deraf, hvor  $L^2$  er en eventuelt substitueret heteroalkylen; fortrinsvis en eventuelt substitueret oxygenholdig  $C_3$ -heteroalkenylen, en eventuelt substitueret oxygenholdig  $C_4$ -heteroalkenylen eller en eventuelt substitueret oxygenholdig  $C_5$ -heteroalkenylen; mere fortrinsvis en eventuelt substitueret  $-(CH_2)_3-O-$ , en eventuelt substitueret  $-(CH_2)_4-O-$  eller en eventuelt substitueret  $-(CH_2)_5-O-$ ; eller fortrinsvis  $L^2$  er en eventuelt substitueret  $-(CH_2)_3-S-$ , en eventuelt substitueret  $-(CH_2)_4-S-$ , en eventuelt substitueret  $-(CH_2)_5-S-$ , en eventuelt substitueret  $-(CH_2)_3-NH-$ , en eventuelt substitueret  $-(CH_2)_4-NH-$  eller en eventuelt substitueret  $-(CH_2)_5-NH-$ ; eller  $L^2$  er en eventuelt substitueret heteroalkenylen; fortrinsvis en eventuelt substitueret  $-(CH_2)(CH=CH)(CH_2)-O-$ , en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)-O-$ , en eventuelt substitueret  $-(CH_2)(CH=CH)(CH_2)_2-O-$ , en eventuelt substitueret  $-$

- $(CH_2)_2(CH=CH)(CH_2)_2-O-$ , en eventuelt substitueret -  
 $(CH_2)_2(CH=CH)(CH_2)-S-$ , en eventuelt substitueret -  
 $(CH_2)(CH=CH)(CH_2)_2-S-$ , en eventuelt substitueret -  
 $(CH_2)_2(CH=CH)(CH_2)_2-S-$  en eventuelt substitueret -  
 5  $(CH_2)_2(CH=CH)(CH_2)-NH-$ , en eventuelt substitueret -  
 $(CH_2)(CH=CH)(CH_2)_2-NH-$  eller en eventuelt substitueret -  
 $(CH_2)_2(CH=CH)(CH_2)_2-NH-$ .

6. Forbindelse ifølge krav 3 eller et farmaceutisk acceptabelt  
 10 salt deraf,

hvor:

$L^1$  er  $-L^3-L^4-L^5-$ ;

$L^3$  er en eventuelt substitueret  $C_{1-4}$ alkylen;

$L^4$  er en eventuelt substitueret cycloalkyl, en eventuelt  
 15 substitueret aryl eller en eventuelt substitueret heteroaryl;  
 og

$L^5$  er en eventuelt substitueret  $C_{1-4}$ alkylen; eller

hvor:

$L^1$  er  $-L^3-L^4-L^5-$ ;

20  $L^3$  er en eventuelt substitueret  $C_{1-4}$ alkylen;

$L^4$  er O (oxygen), S (svovl) eller  $NR^{11}$ ; og

$L^5$  er en eventuelt substitueret  $C_{1-4}$ alkylen; eller

hvor:

$L^1$  er  $-L^3-L^4-L^5-$ ;

25  $L^3$  er en eventuelt substitueret  $C_{2-4}$ alkylen;

$L^4$  er en eventuelt substitueret cycloalkyl, en eventuelt  
 substitueret aryl, en eventuelt substitueret heteroaryl, en  
 eventuelt substitueret heterocyclyl, O (oxygen), S (svovl) eller  
 $NR^{11}$ ; og

30  $L^5$  er en eventuelt substitueret  $C_{2-4}$ alkylen.

7. Forbindelse ifølge et hvilket som helst af kravene 3-6  
 eller et farmaceutisk acceptabelt salt deraf,

hvor:

35  $R^1$  er  $R^{10}$ , hvor  $R^{10}$  er  $NR^{11}$ ; og

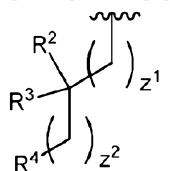
$R^{11}$  er H (hydrogen).

8. Forbindelse ifølge krav 1 eller et farmaceutisk acceptabelt

salt deraf, hvor  $R^1$  er  $OR^6$ ; fortrinsvis  $R^6$  er hydrogen; eller fortrinsvis  $R^6$  er  $C_{1-6}$ alkyl; eller fortrinsvis  $R^6$  er  $-C(O)R^7$ ; eller fortrinsvis  $R^6$  er  $-C(O)NR^8R^9$ ; eller hvor  $R^1$  er  $NH_2$ , en eventuelt substitueret monosubstitueret amin, en eventuelt substitueret disubstitueret amin, en eventuelt substitueret N-sulfonamido eller en eventuelt substitueret heterocyclyl; og fortrinsvis den eventuelt substituerede heterocyclyl er en N-koblet 5- til 6-leddet heterocyclyl, der indeholder mindst ét nitrogen i ringen.

9. Forbindelse ifølge krav 1 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^1$  er  $R^{10}$ , og hvor  $R^{10}$  er  $CH_2$  eller  $NR^{11}$ .

10. Forbindelse ifølge et hvilket som helst af kravene 8-9 eller et farmaceutisk acceptabelt salt deraf, hvor  $G^1$  er



11. Forbindelse ifølge krav 10 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^2$  er hydrogen eller  $C_{1-6}$ alkyl.

12. Forbindelse ifølge et hvilket som helst af kravene 10-11 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^3$  er hydrogen eller  $C_{1-6}$ alkyl.

13. Forbindelse ifølge krav 10 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^2$  og  $R^3$  sammen med carbonatomet, hvortil de er bundet, danner en eventuelt substitueret  $C_{3-6}$ cycloalkyl; fortrinsvis en usubstitueret  $C_{3-6}$ cycloalkyl; mere fortrinsvis en  $C_5$ cycloalkyl; eller fortrinsvis  $R^2$  og  $R^3$  sammen med carbonatomet, hvortil de er bundet, danner en eventuelt substitueret 5- til 6-leddet heterocyclyl.

14. Forbindelse ifølge et hvilket som helst af kravene 10-13 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^4$  er valgt fra gruppen, der består af en eventuelt substitueret cycloalkyl, en eventuelt substitueret aryl, en eventuelt substitueret



heteroaryl og en eventuelt substitueret heterocyclyl, hvor, når  $R^4$  er substitueret, så er  $R^4$  substitueret med en eller flere substituenten valgt fra gruppen, der består af halogen;  $C_{1-6}$ alkyl; alkoxy; aryloxy; halogenalkyl; halogenalkoxy; hydroxyalkyl; N-sulfonamido; S-sulfonamido; sulfonyl; en eventuelt substitueret aryl, hvor, når den eventuelt substituerede aryl er en substitueret aryl, så er aryl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, aryl, cyano, halogen, halogenalkyl og halogenalkoxy; en eventuelt substitueret cycloalkyl, hvor, når den eventuelt substituerede cycloalkyl er en substitueret cycloalkyl, så er cycloalkyl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, halogen og halogenalkyl; en eventuelt substitueret heterocyclyl, hvor, når den eventuelt substituerede heterocyclyl er en substitueret heterocyclyl, så er heterocyclyl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, halogen, halogenalkyl, aryl( $C_{1-6}$ alkyl) og C-carboxy; carbonyl; C-carboxy;  $-CH_2-$ (monosubstitueret amin) og  $CH_2-$ (disubstitueret amin).

15. Forbindelse ifølge krav 14 eller et farmaceutisk acceptabelt salt deraf, hvor den eventuelt substituerede aryl er en eventuelt substitueret phenyl; fortrinsvis en substitueret phenyl; mere fortrinsvis en monosubstitueret phenyl eller en disubstitueret phenyl.

16. Forbindelse ifølge et hvilket som helst af kravene 10-15 eller et farmaceutisk acceptabelt salt deraf, hvor  $Z^1$  er 0 eller 1.

17. Forbindelse ifølge et hvilket som helst af kravene 10-15 eller et farmaceutisk acceptabelt salt deraf, hvor  $Z^1$  er 2, 3 eller 4.

18. Forbindelse ifølge et hvilket som helst af kravene 10-17 eller et farmaceutisk acceptabelt salt deraf, hvor  $Z^2$  er 0 eller 1.

19. Forbindelse ifølge et hvilket som helst af kravene 10-17 eller et farmaceutisk acceptabelt salt deraf, hvor  $Z^2$  er 2, 3 eller 4.

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20. Forbindelse ifølge et hvilket som helst af kravene 1-9 eller et farmaceutisk acceptabelt salt deraf, hvor  $G^1$  er  $R^5$ ; og hvor  $R^5$  er en eventuelt substitueret aryl; fortrinsvis en eventuelt substitueret phenyl; mere fortrinsvis en monosubstitueret phenyl eller en disubstitueret phenyl.

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21. Forbindelse ifølge et hvilket som helst af kravene 1-9 eller et farmaceutisk acceptabelt salt deraf, hvor  $G^1$  er  $R^5$ ; og hvor  $R^5$  er en eventuelt substitueret cycloalkyl, en eventuelt substitueret heteroaryl eller en eventuelt substitueret heterocyclyl, hvor, når  $R^5$  er substitueret, så er  $R^5$  substitueret med en eller flere substituenter valgt fra gruppen, der består af halogen;  $C_{1-6}$ alkyl; alkoxy; aryloxy; halogenalkyl; halogenalkoxy; hydroxyalkyl; N-sulfonamido; S-sulfonamido; sulfonyl; en eventuelt substitueret aryl, hvor, når den eventuelt substituerede aryl er en substitueret aryl, så er aryl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, halogen og halogenalkyl; en eventuelt substitueret cycloalkyl, hvor, når den eventuelt substituerede cycloalkyl er en substitueret cycloalkyl, så er cycloalkyl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, halogen og halogenalkyl; en eventuelt substitueret heterocyclyl, hvor, når den eventuelt substituerede heterocyclyl er en substitueret heterocyclyl, så er heterocyclyl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, halogen, halogenalkyl, aryl( $C_{1-6}$ alkyl) og C-carboxy; carbonyl; C-carboxy;  $-CH_2-$ (monosubstitueret amin) og  $CH_2-$ (disubstitueret amin).

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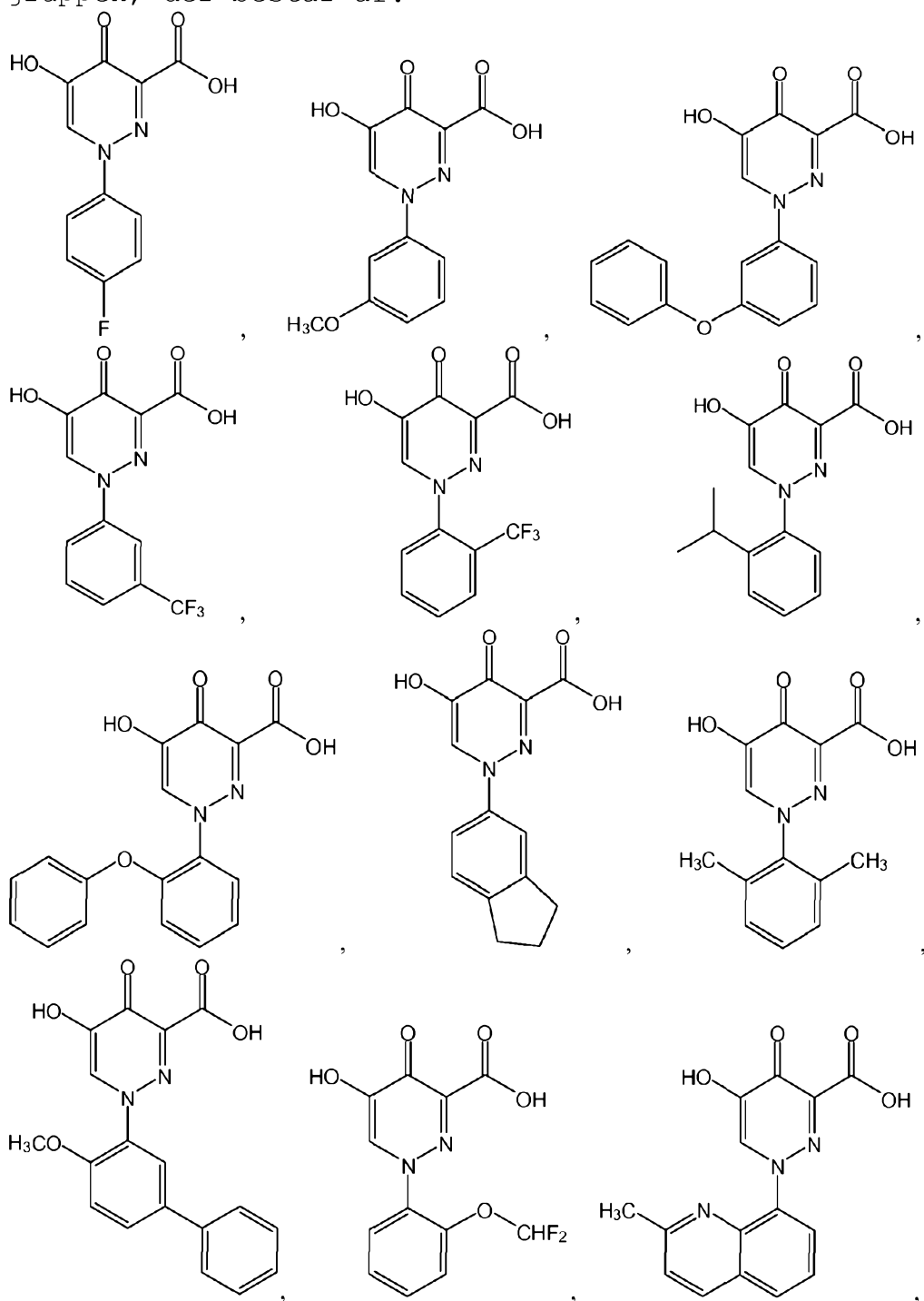
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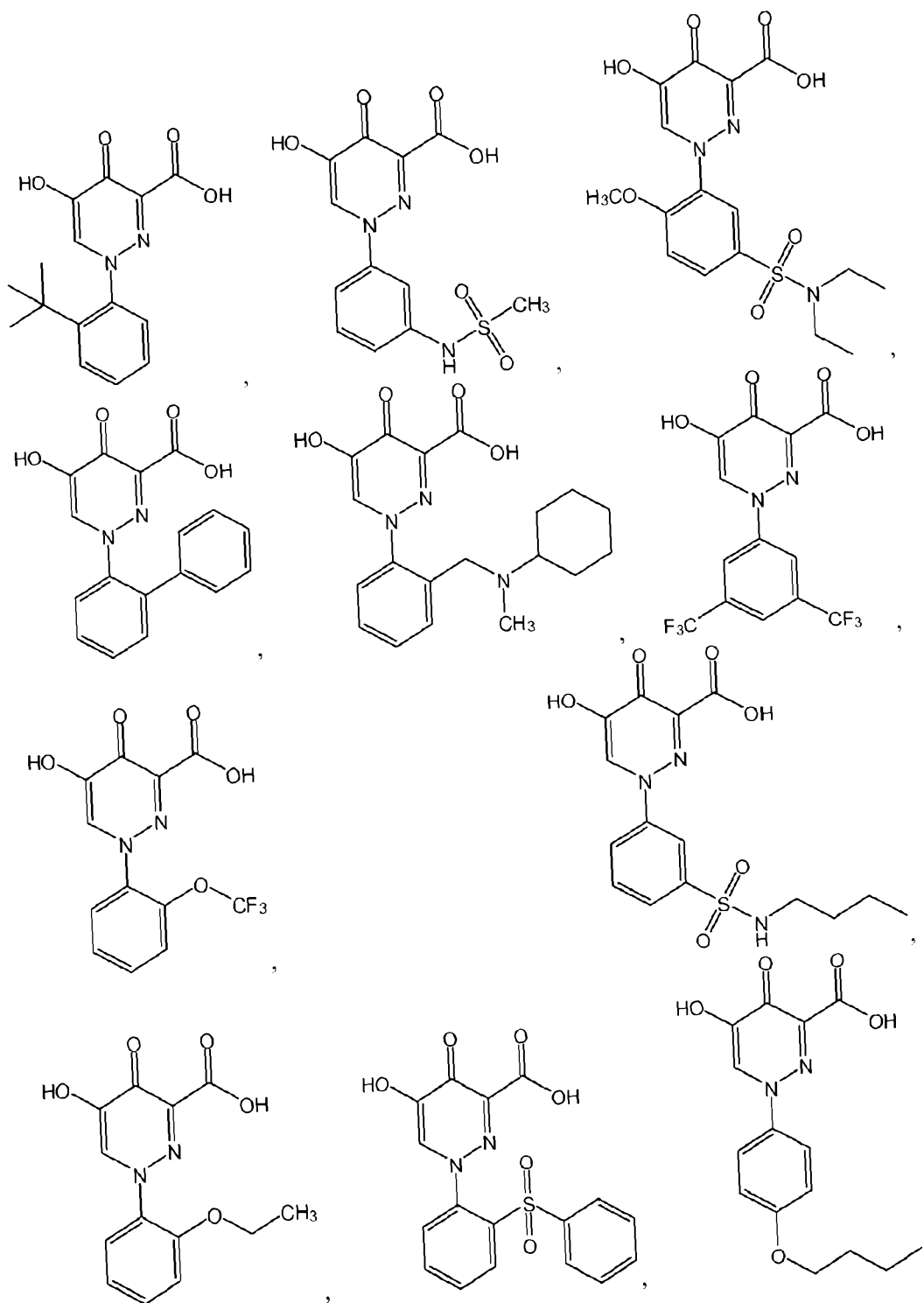
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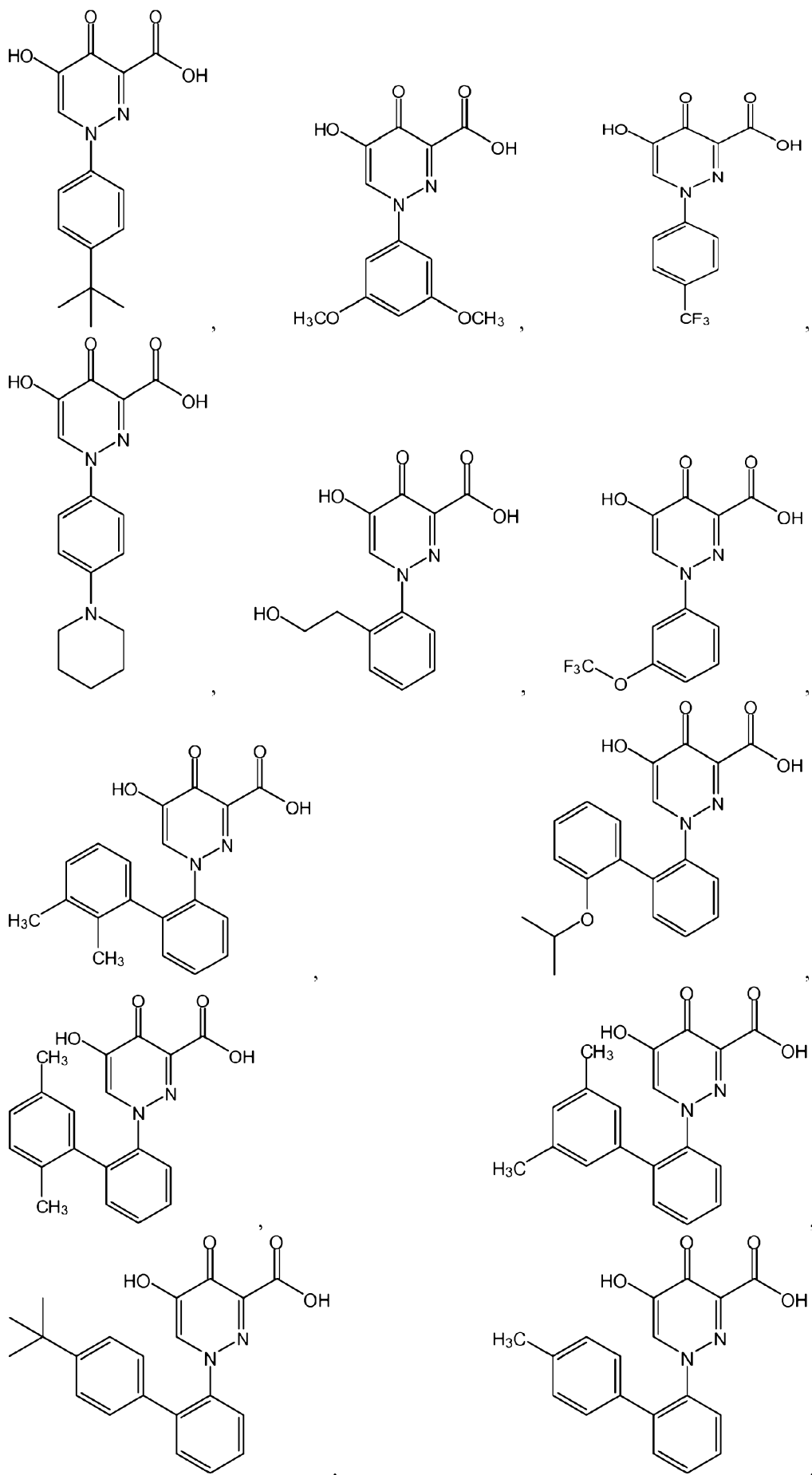
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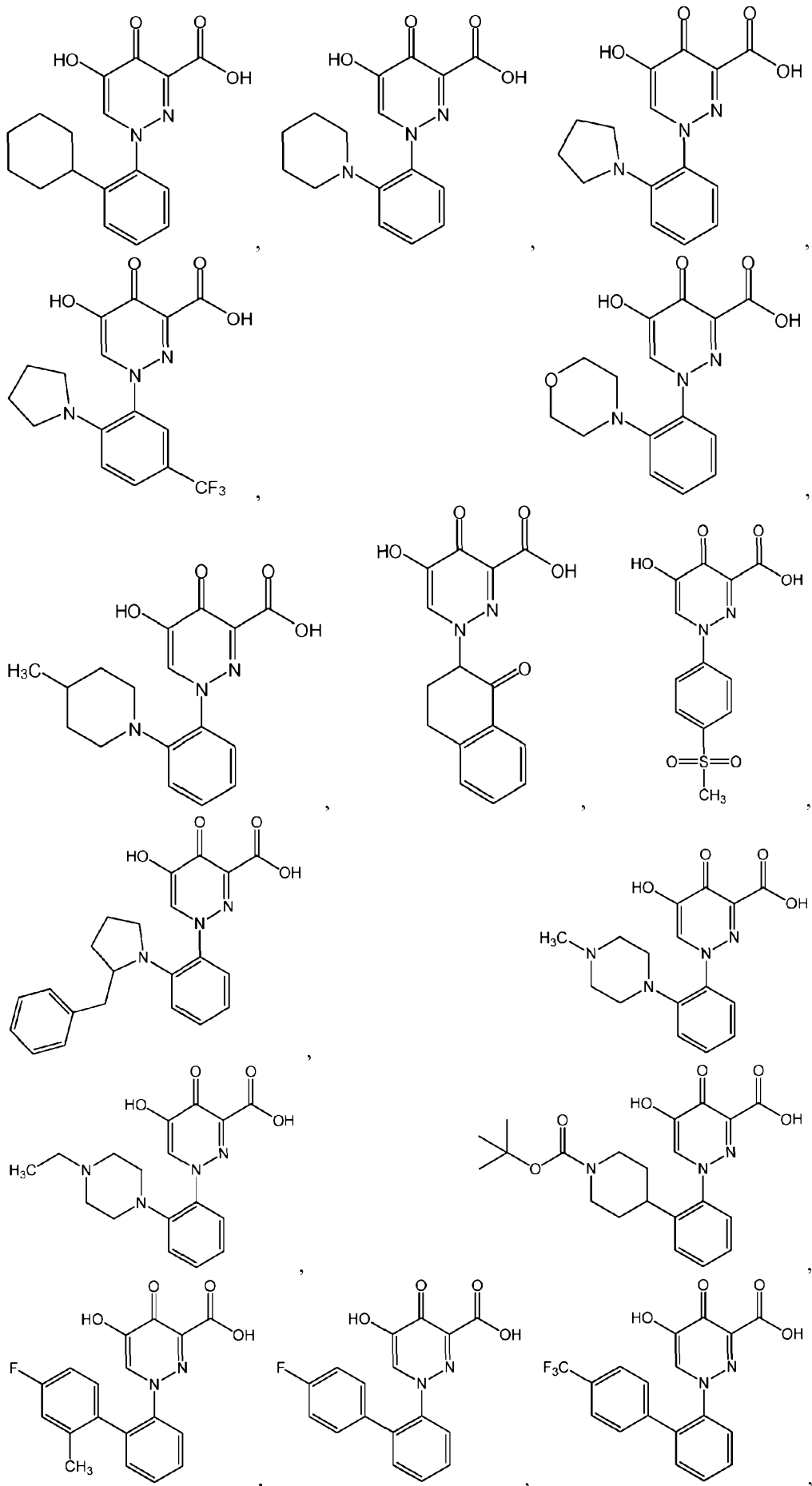
22. Forbindelse ifølge et hvilket som helst af kravene 1-21 eller et farmaceutisk acceptabelt salt deraf, hvor  $G^3$  er hydrogen.

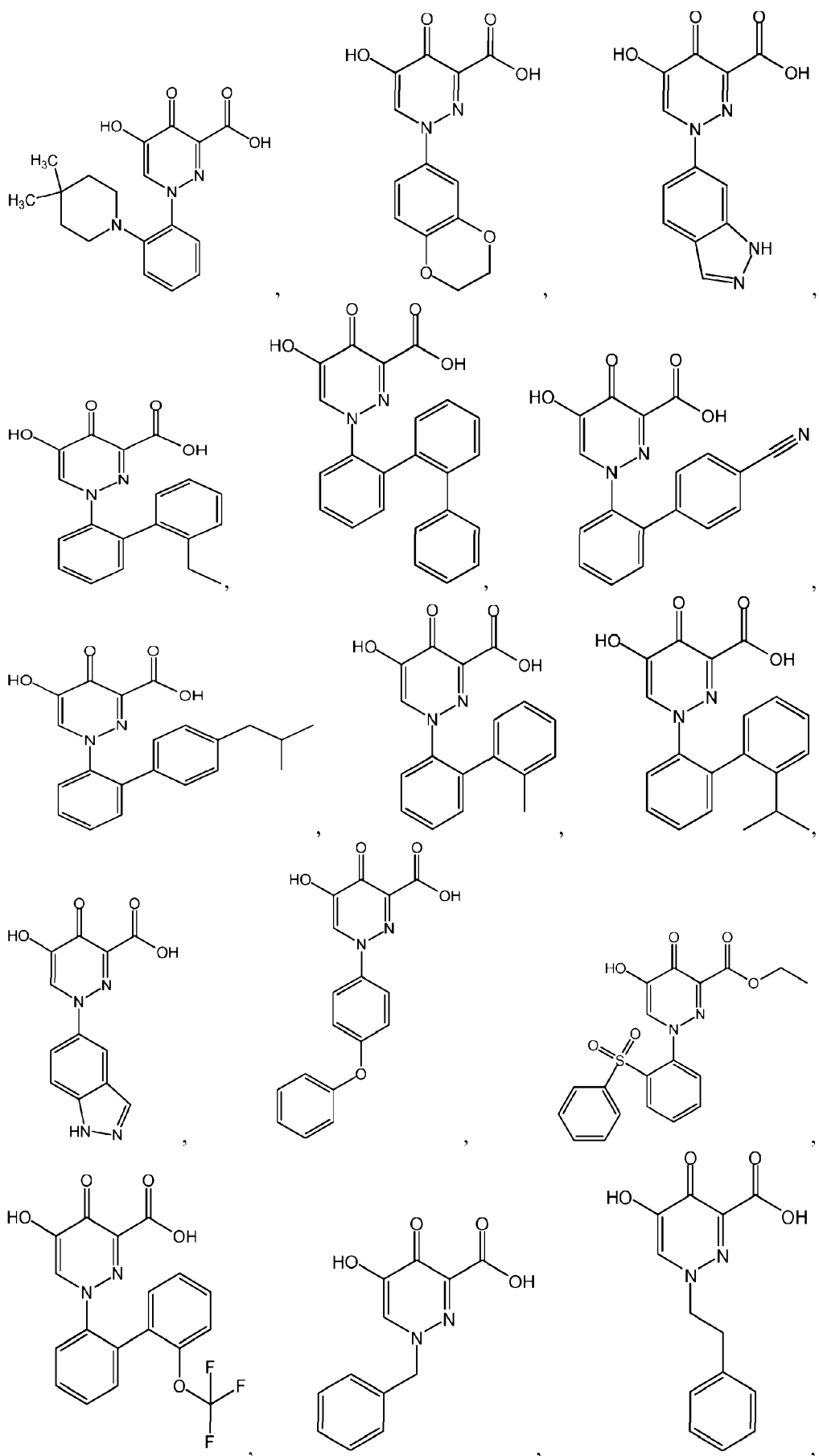
23. Forbindelse ifølge krav 1, hvor forbindelsen er valgt fra gruppen, der består af:

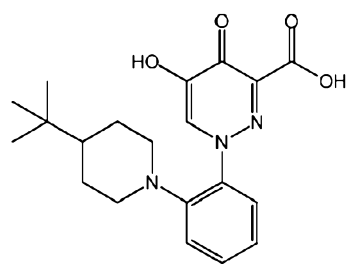
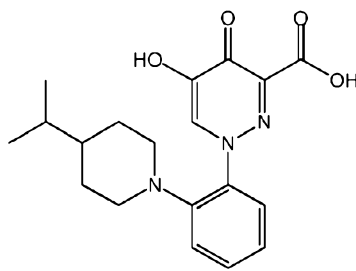
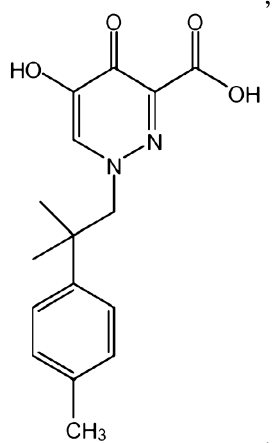
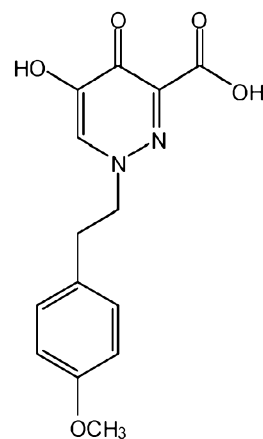
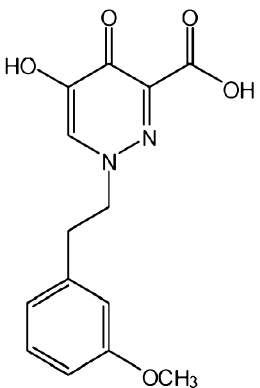
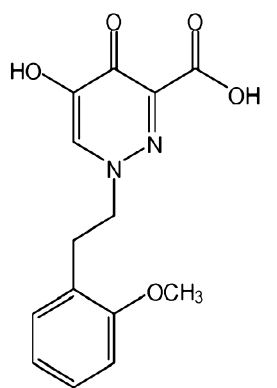
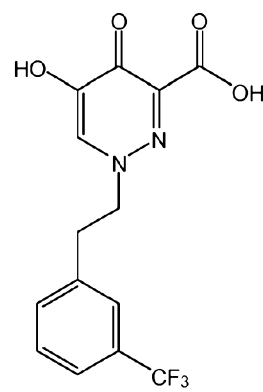
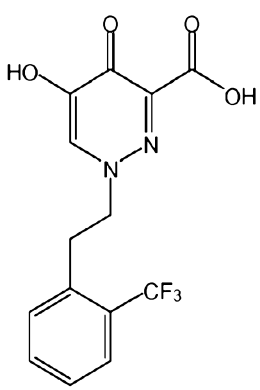
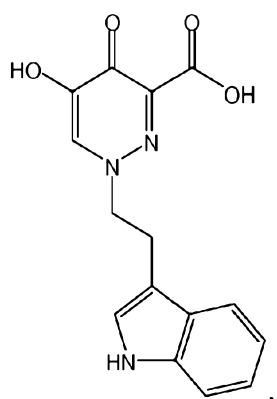
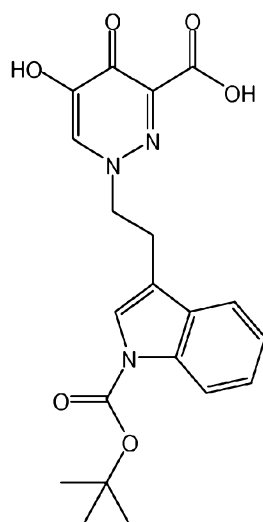
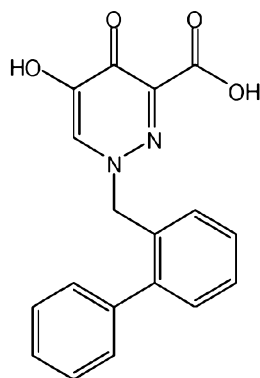
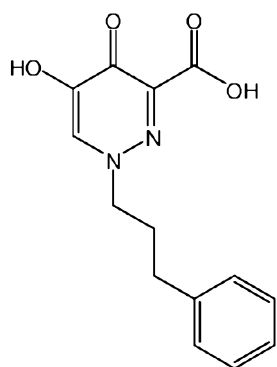




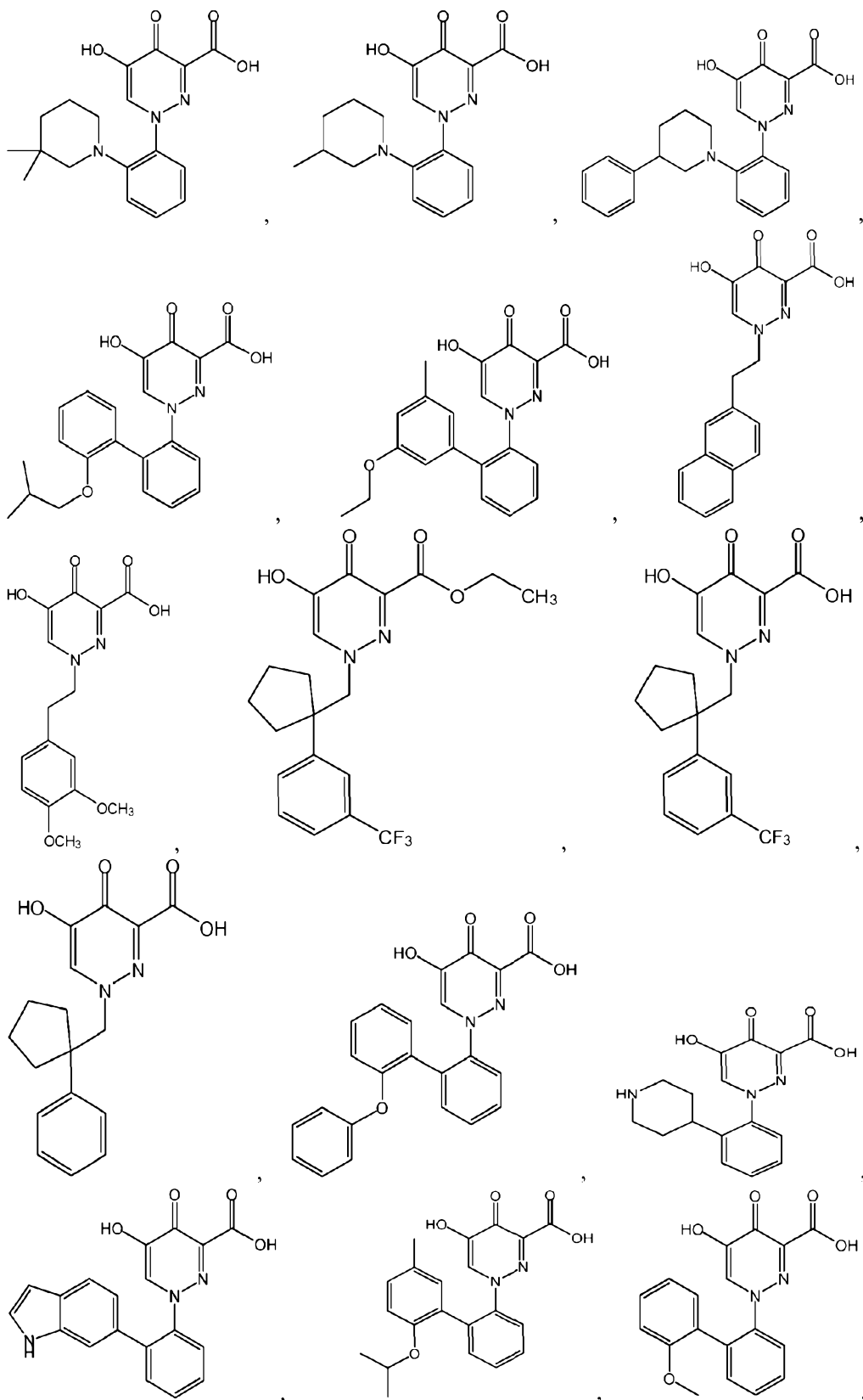


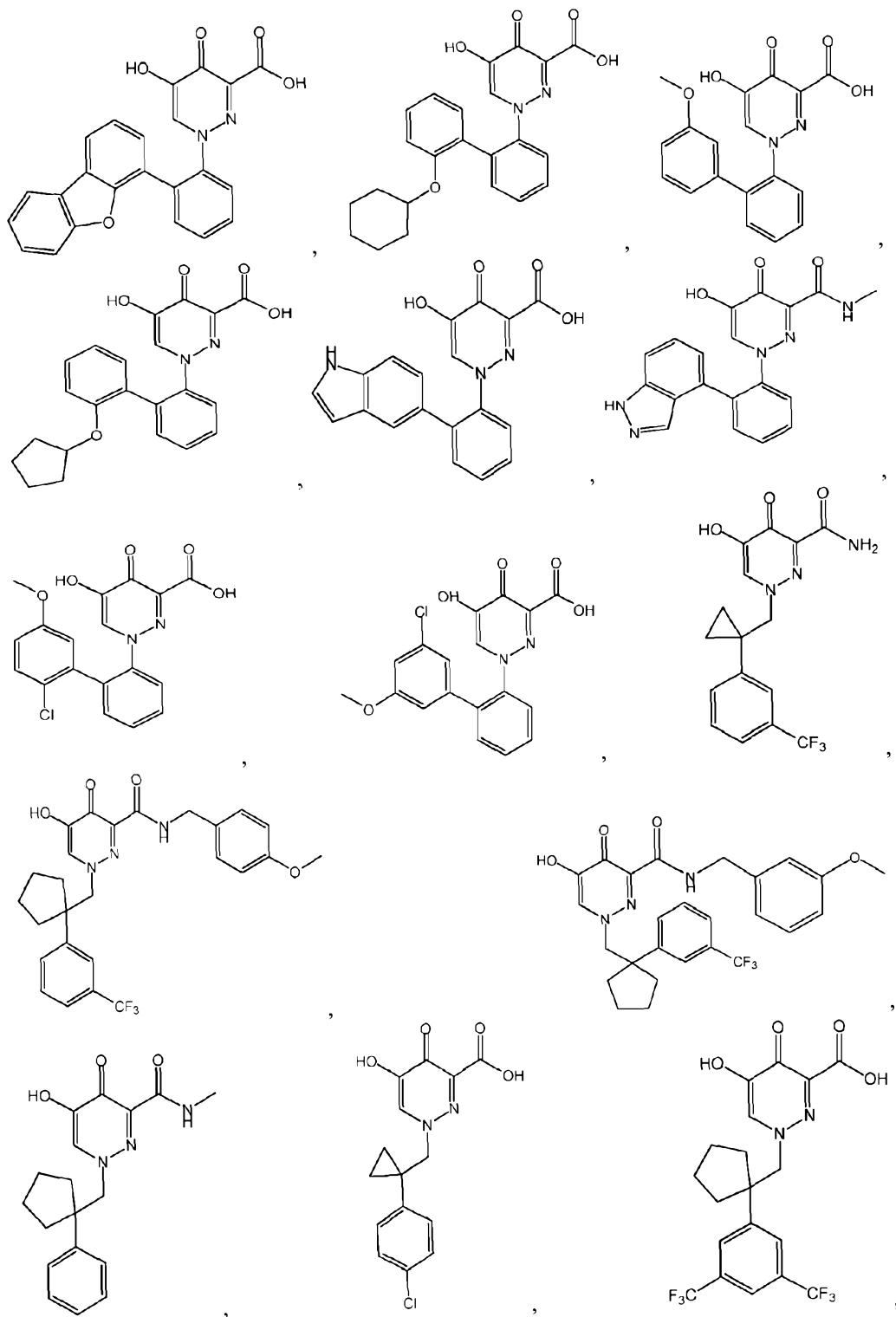


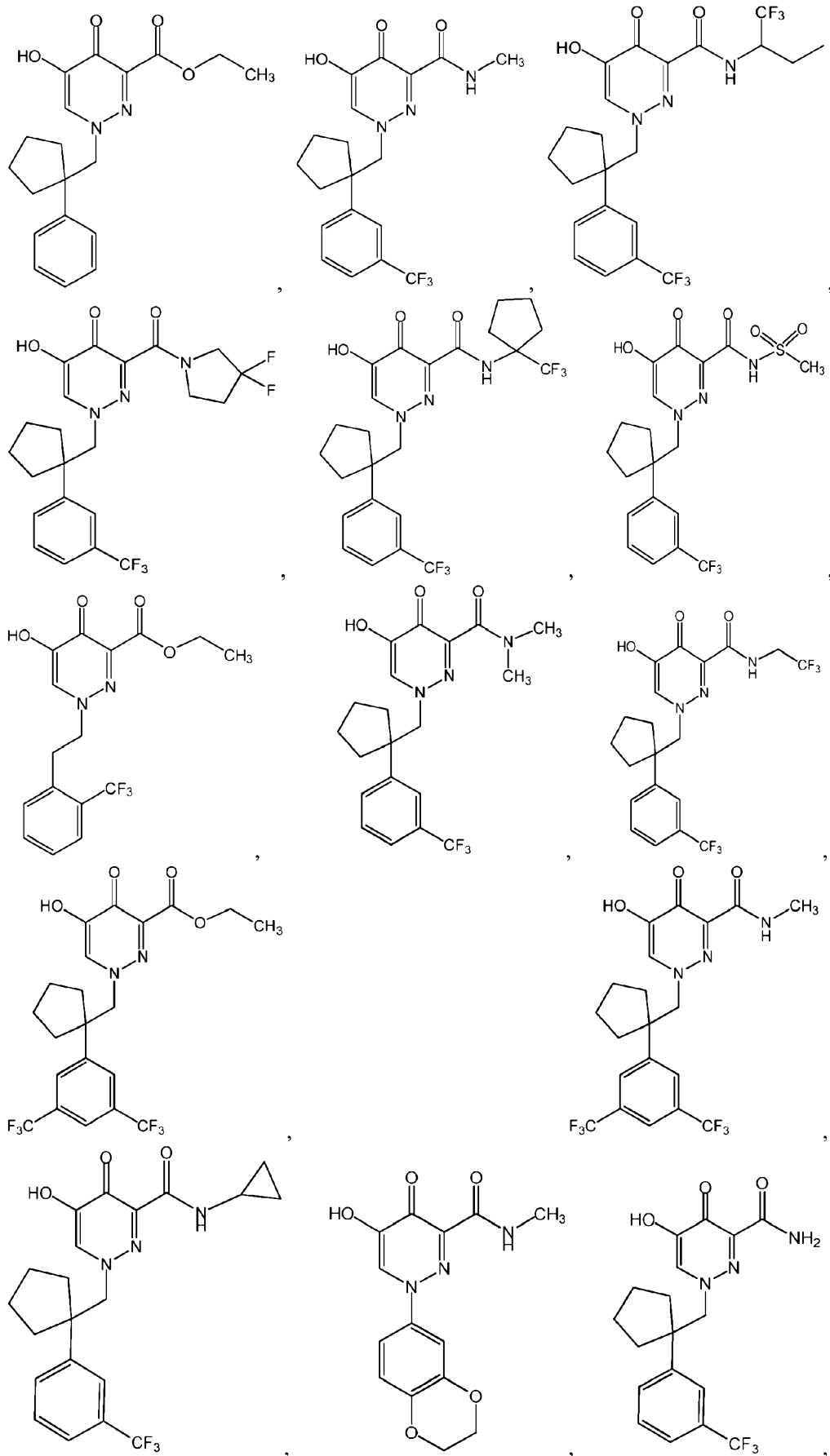


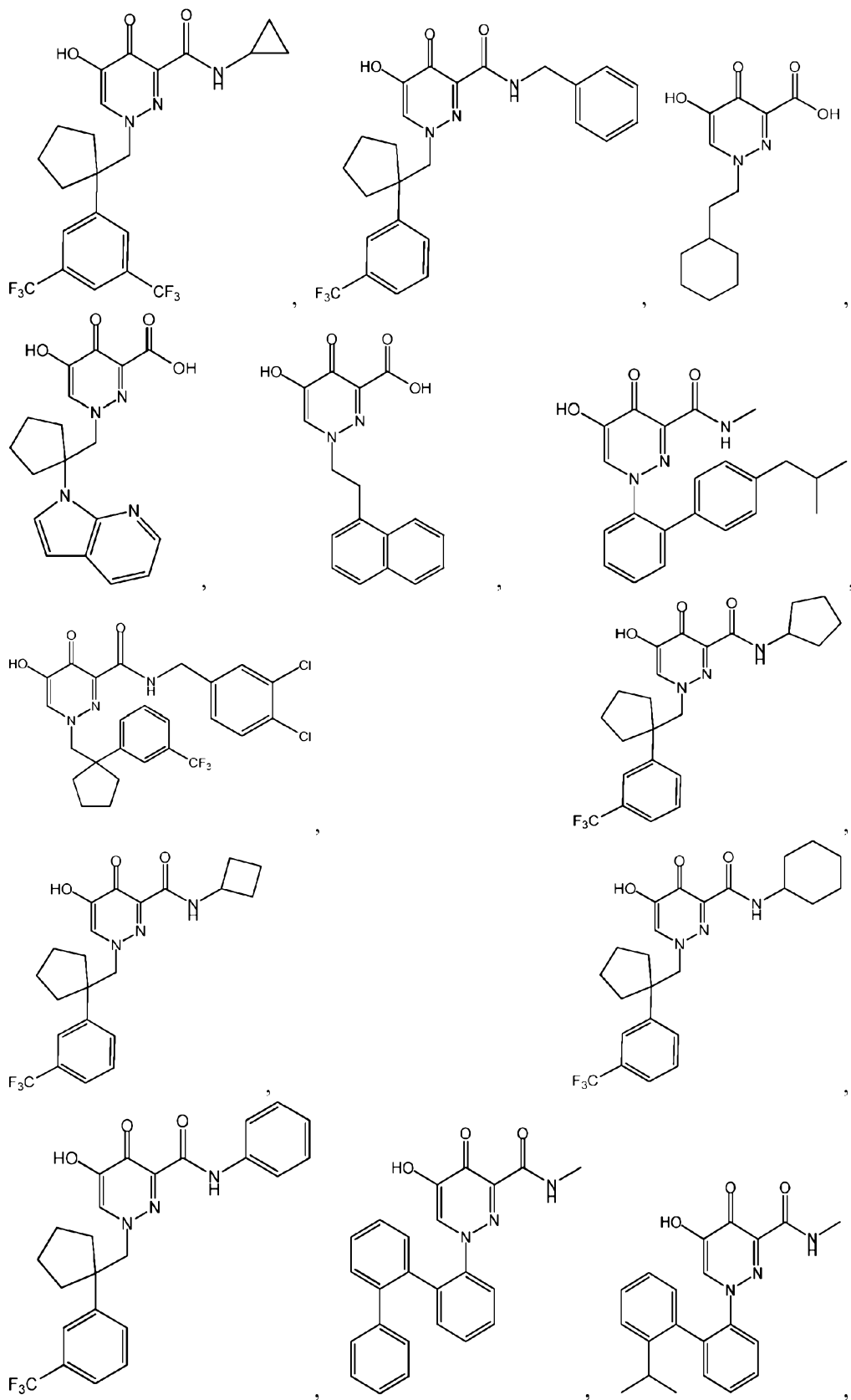


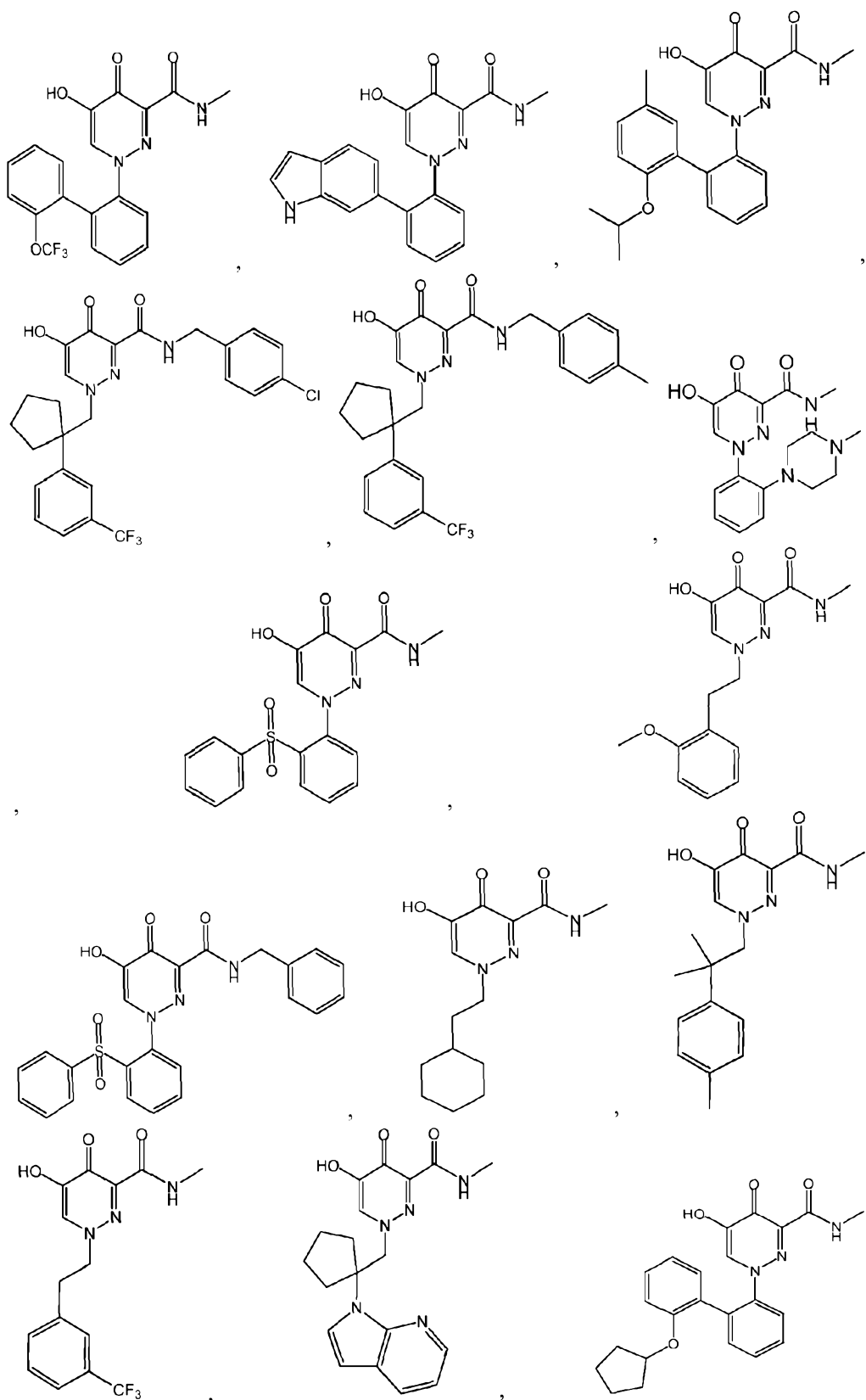


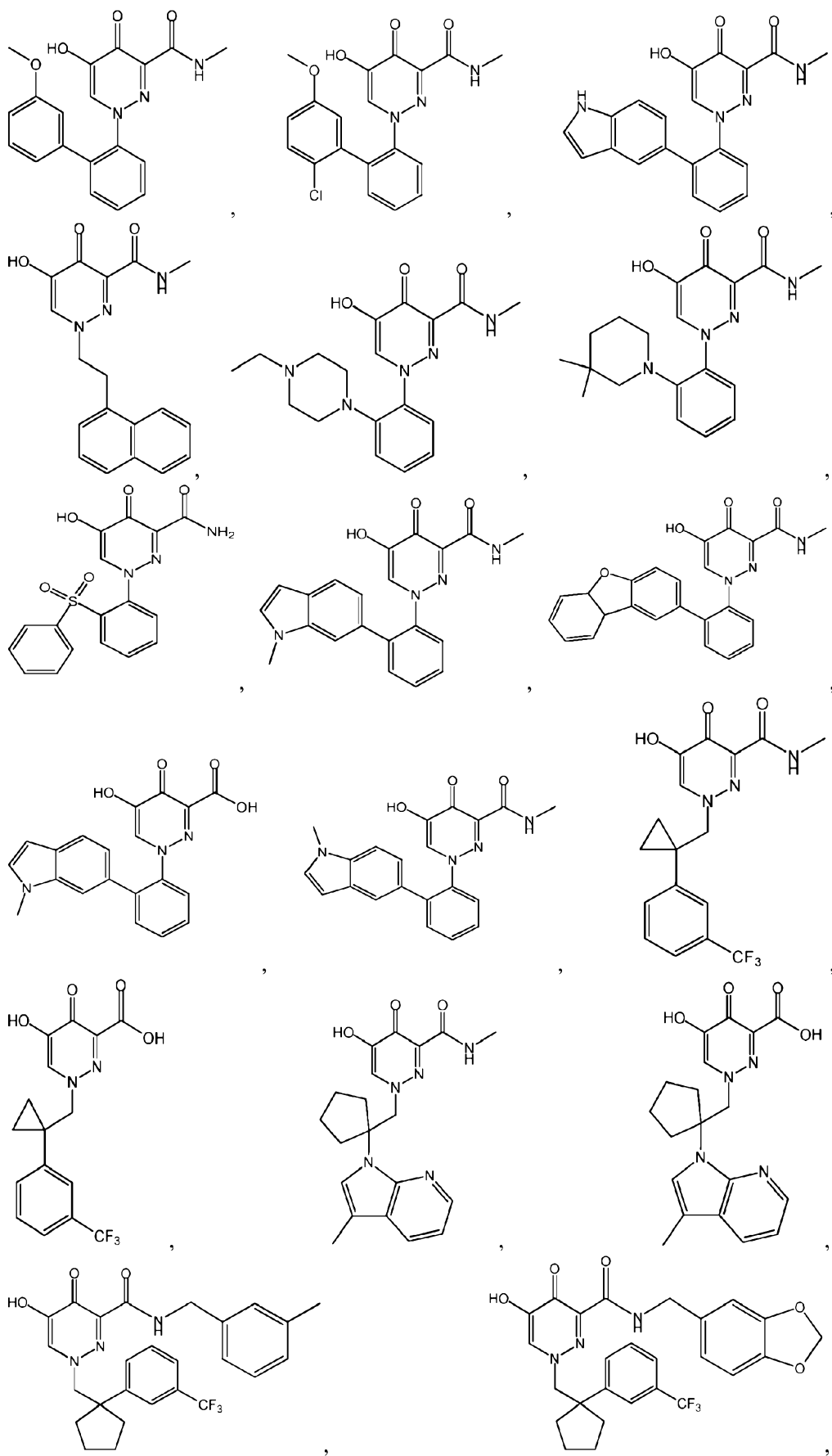


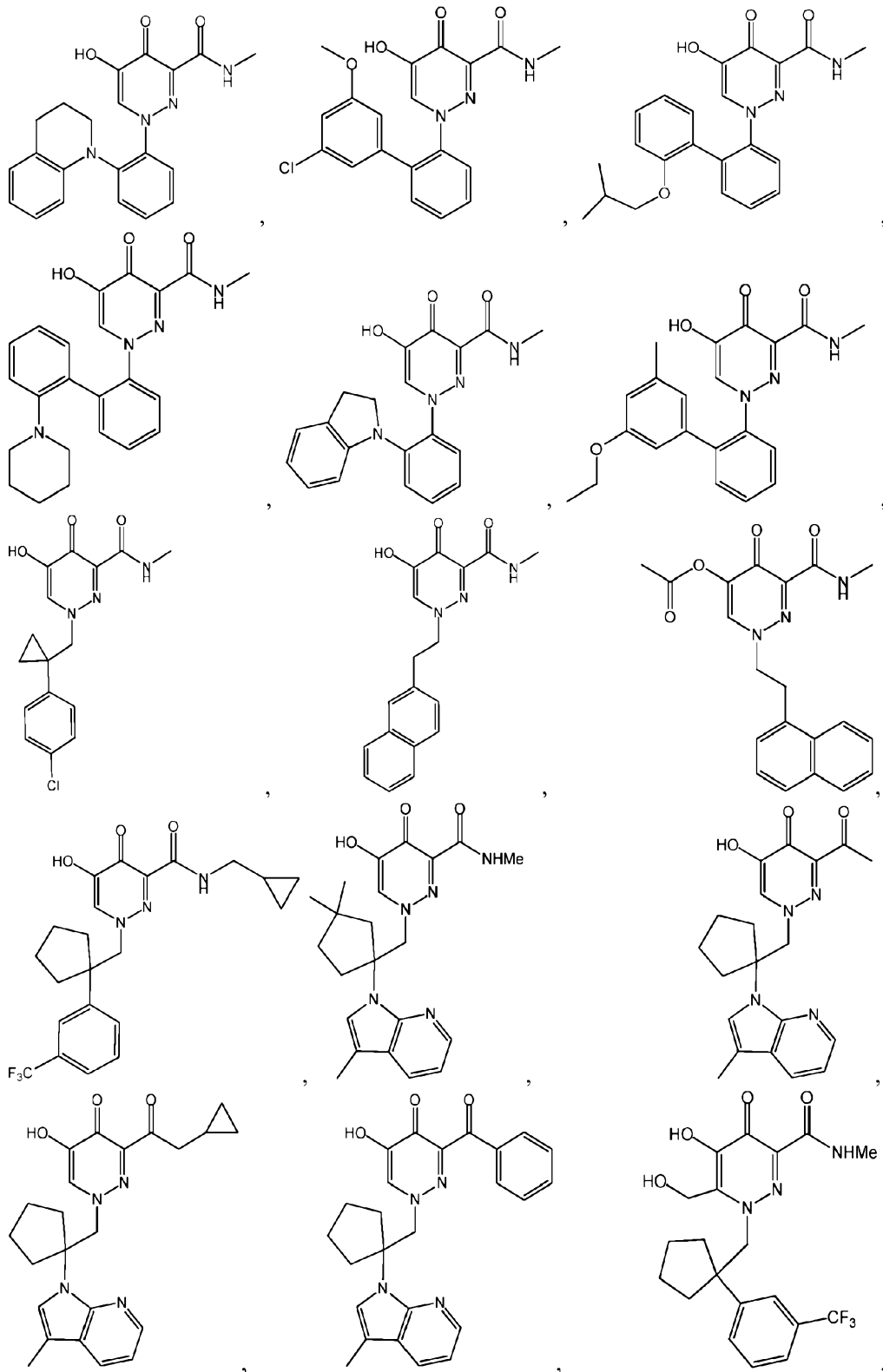


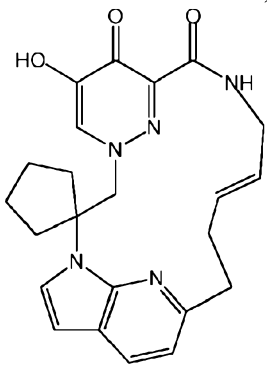
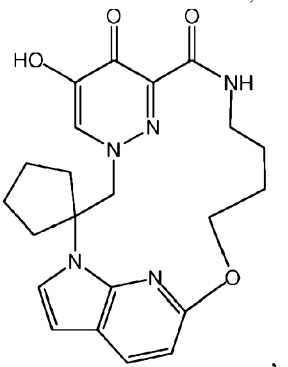
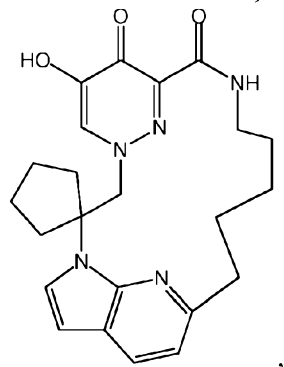
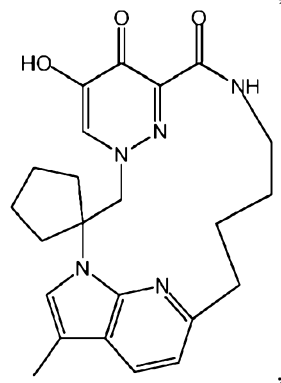
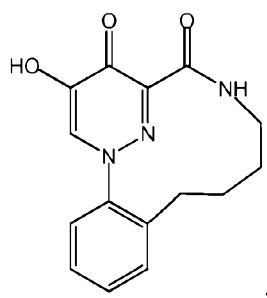
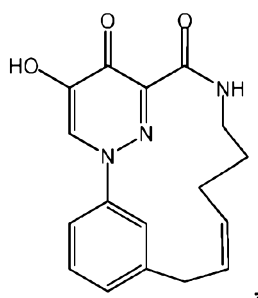
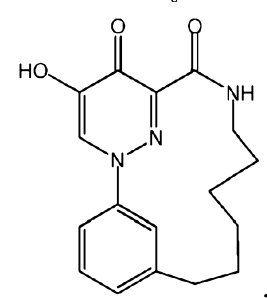
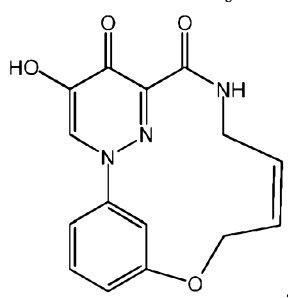
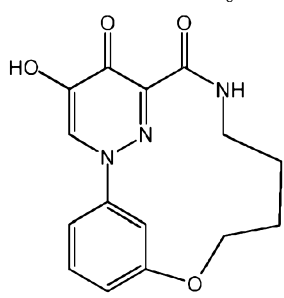
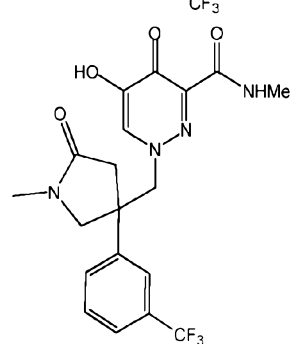
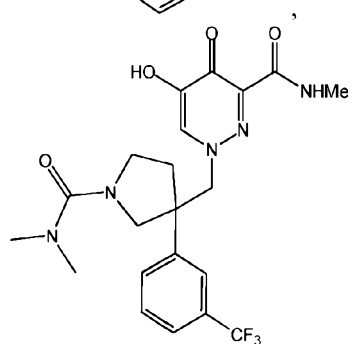
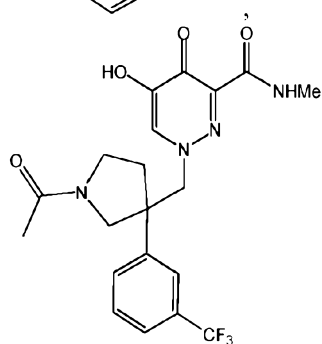
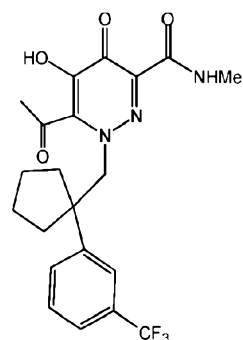
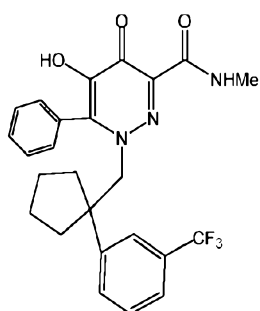
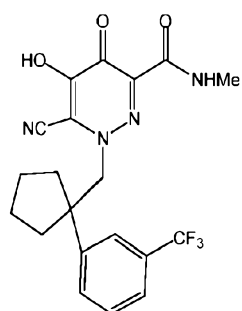




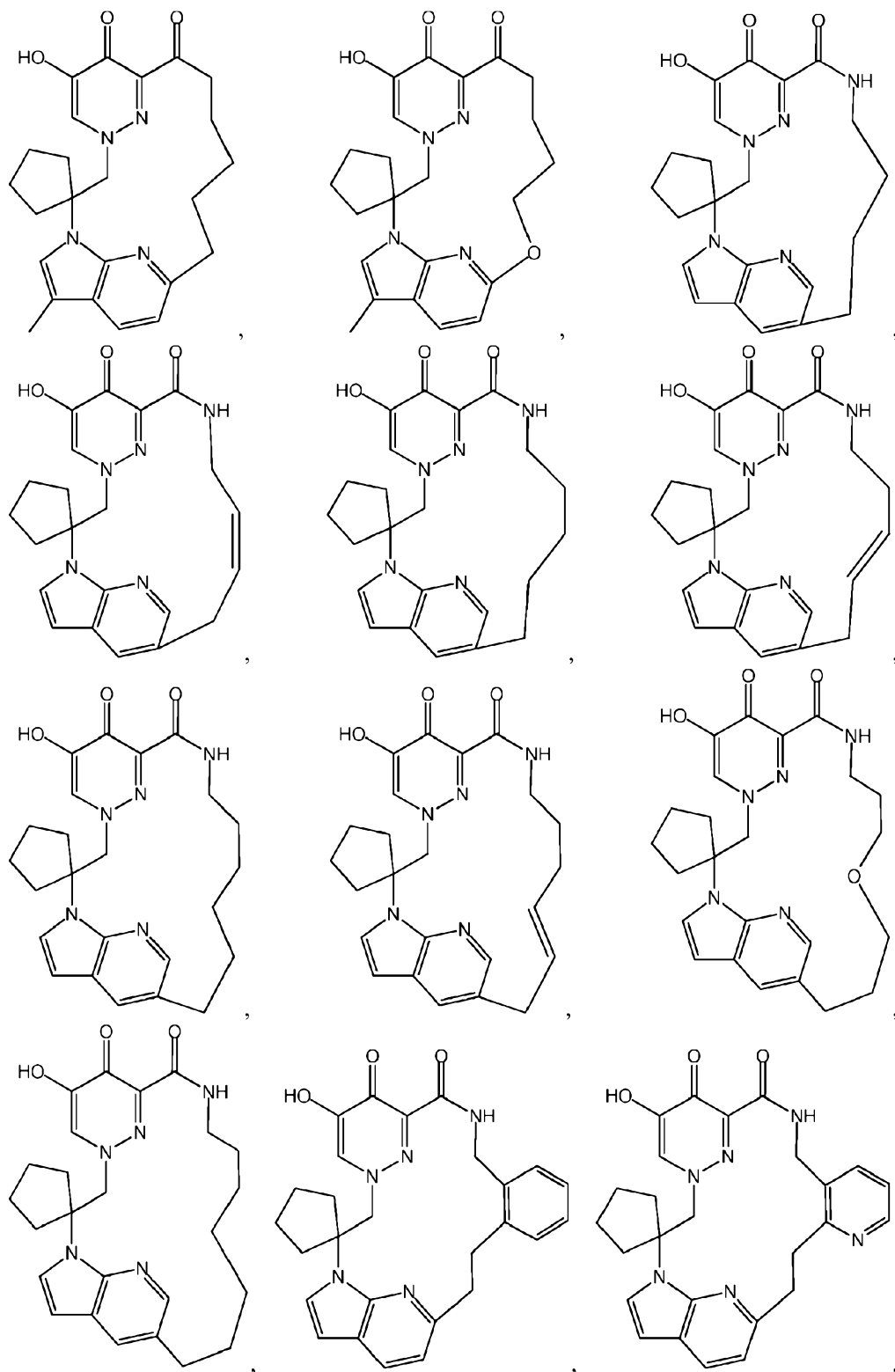


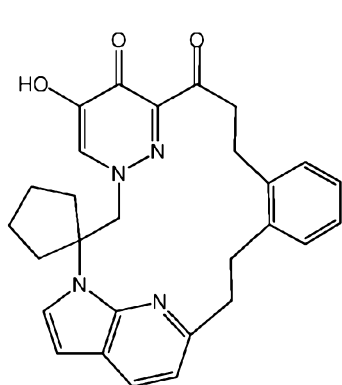




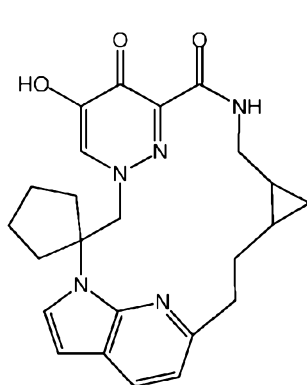




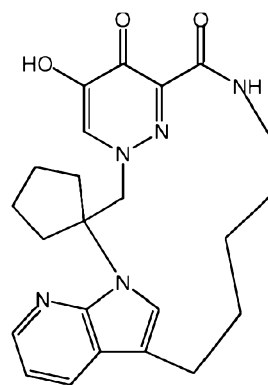




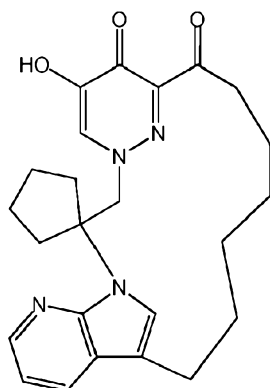
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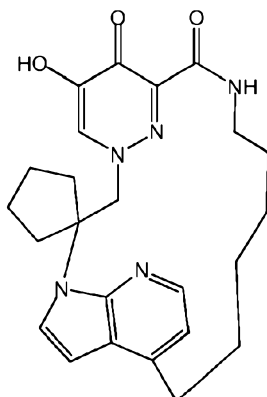
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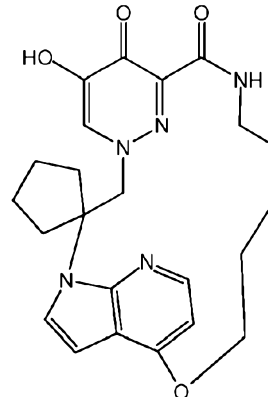
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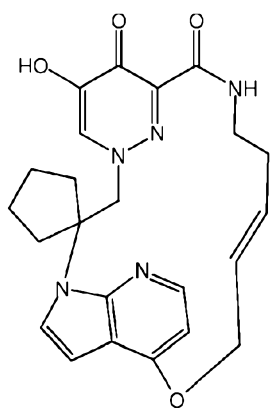
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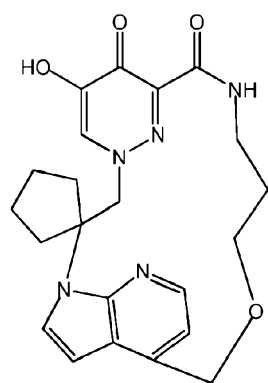
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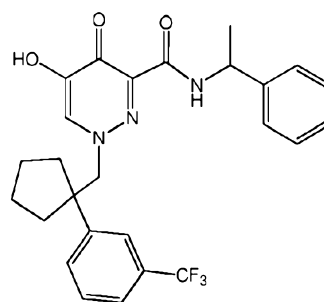
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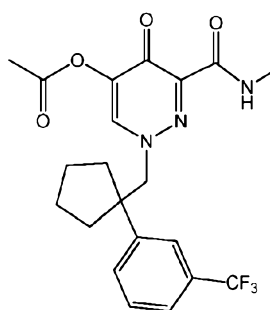
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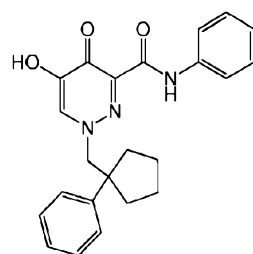
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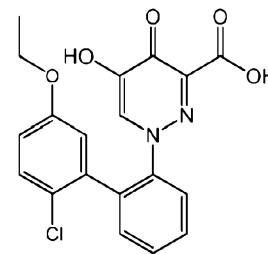
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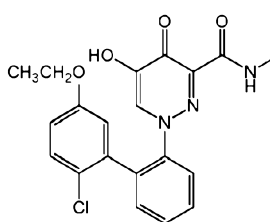
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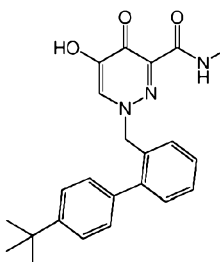
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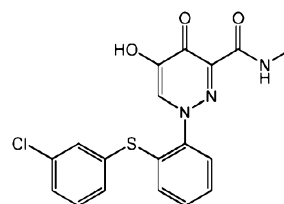
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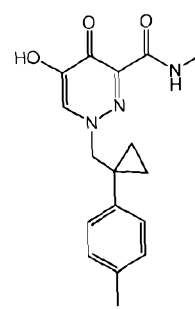
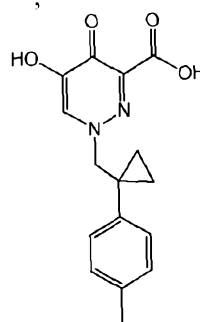
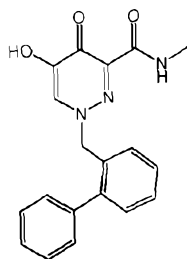
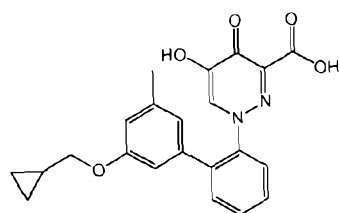
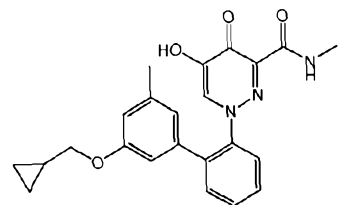
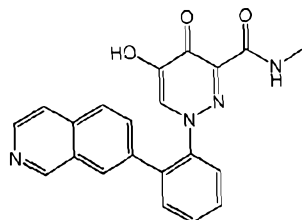
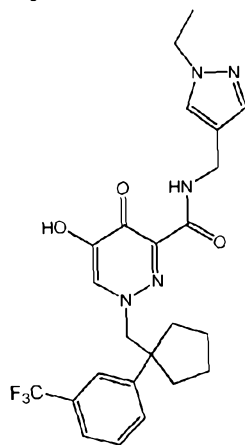
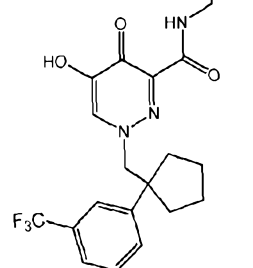
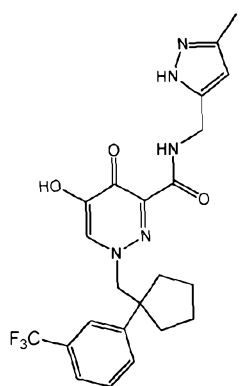
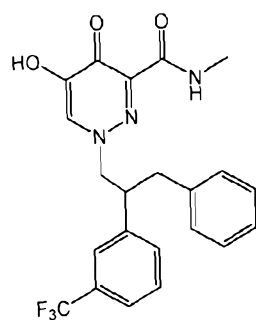
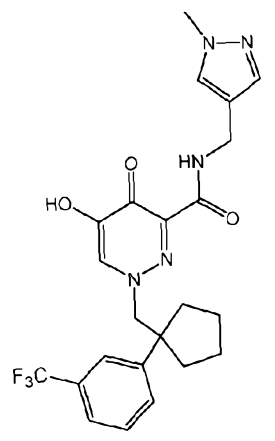
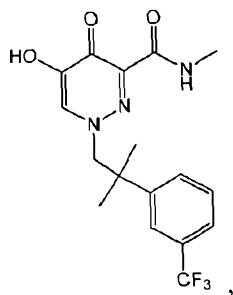
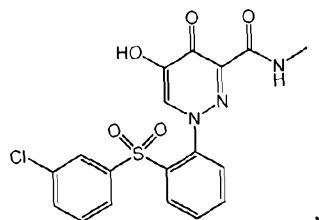
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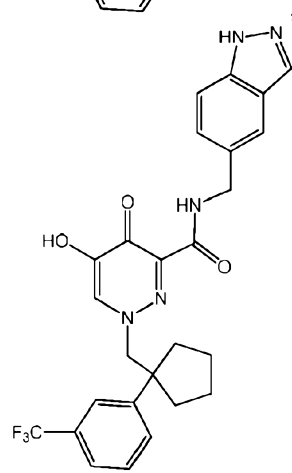
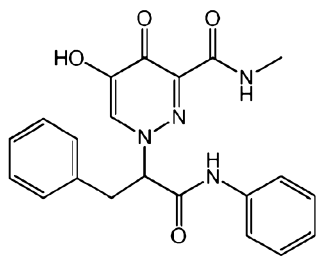
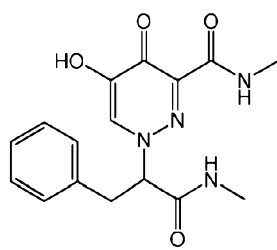
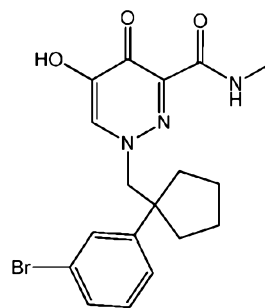
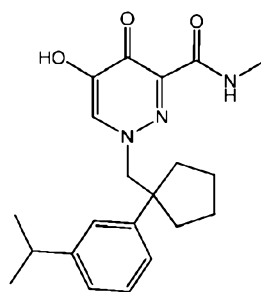
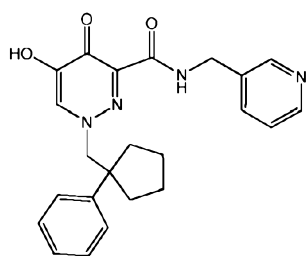
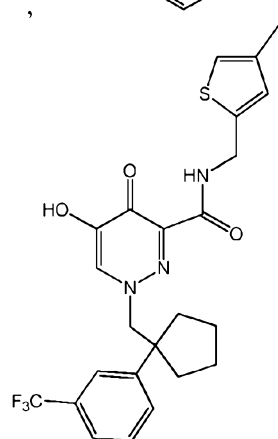
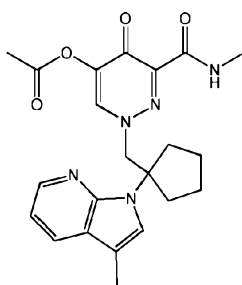
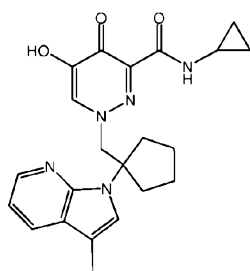
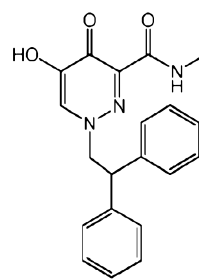
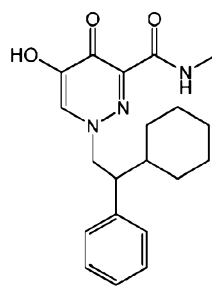
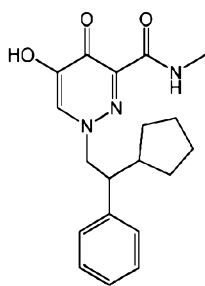
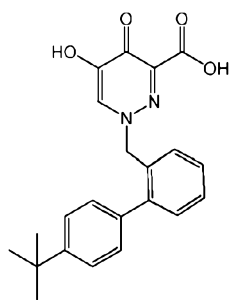


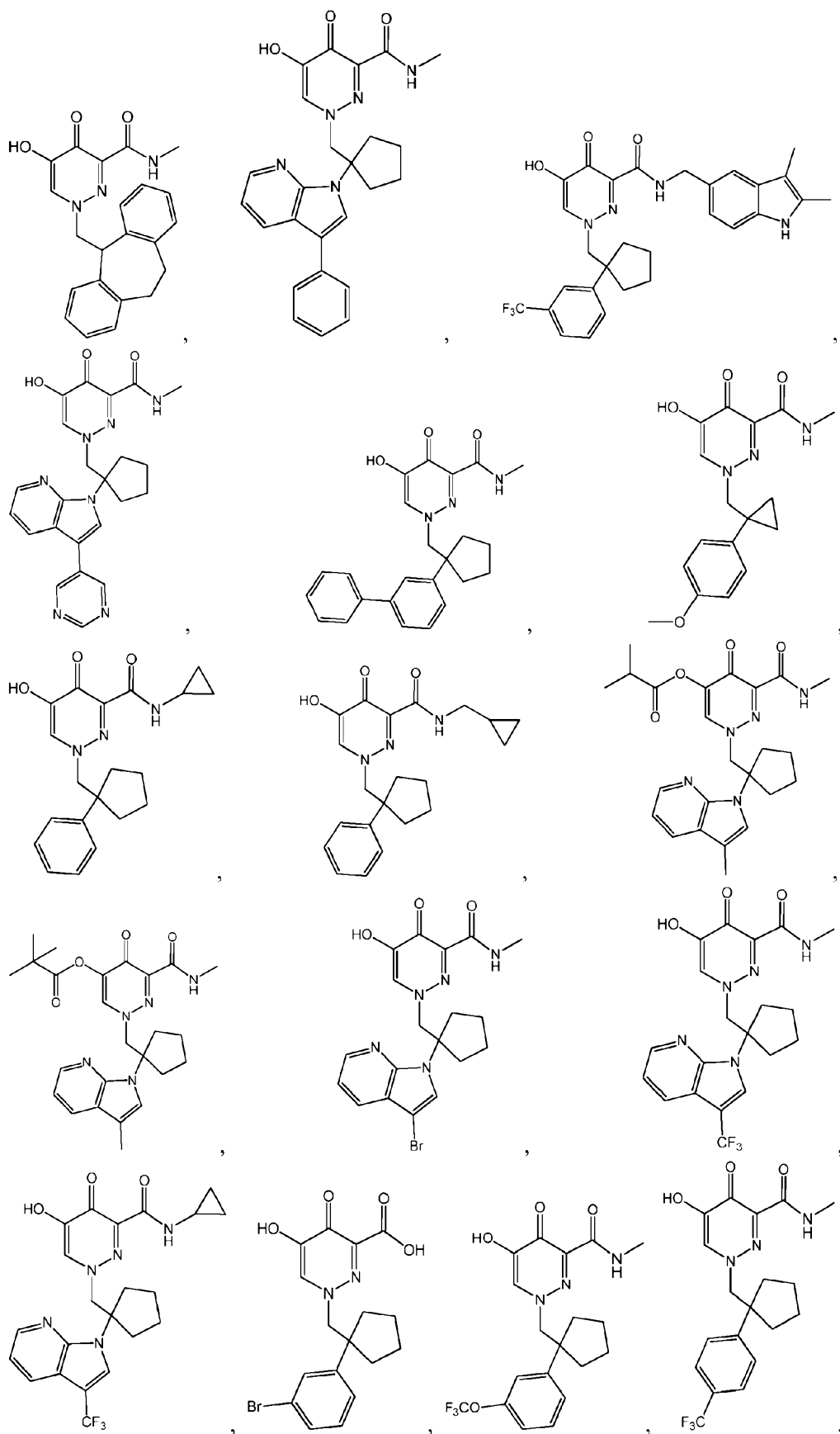
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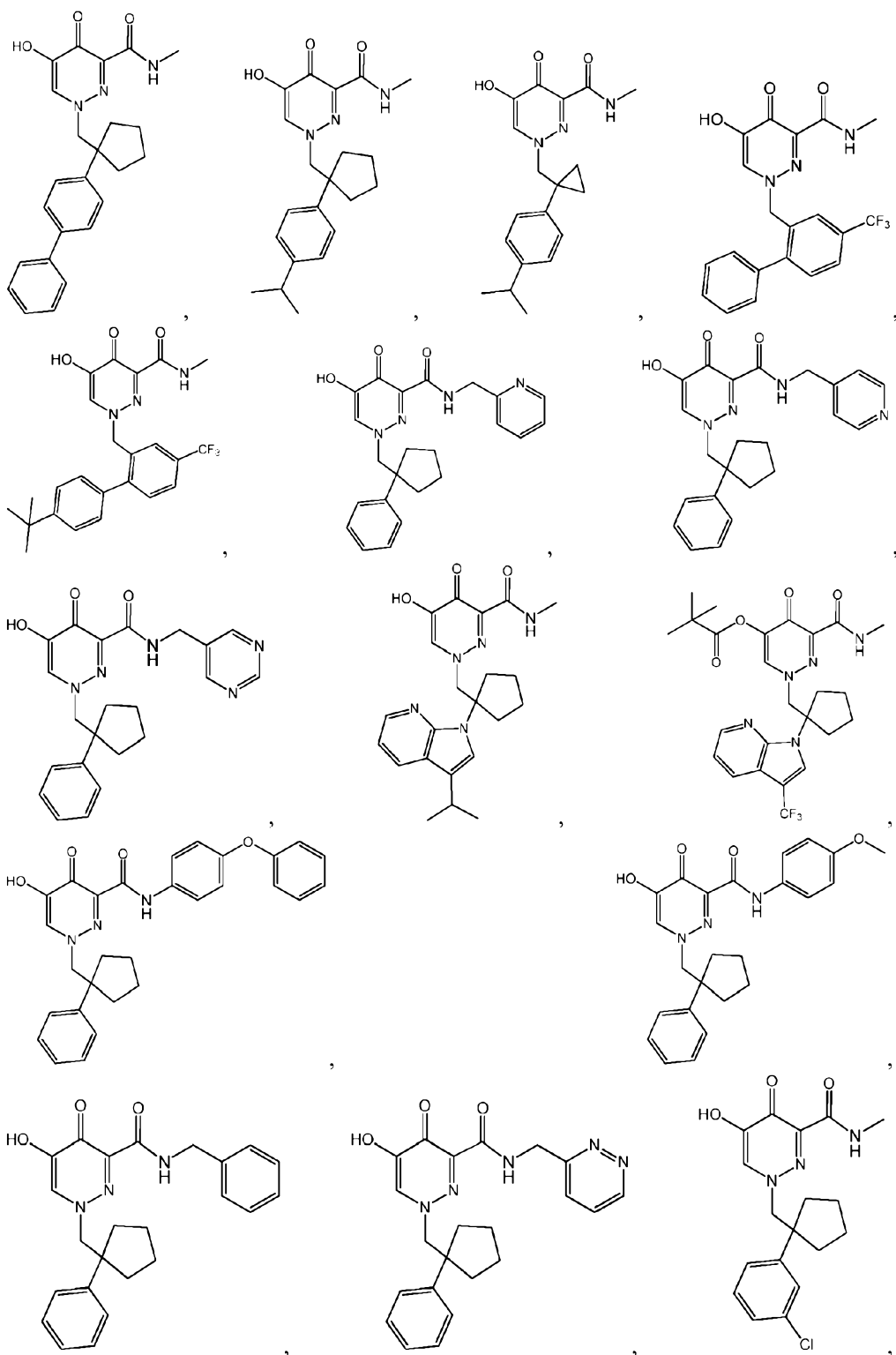


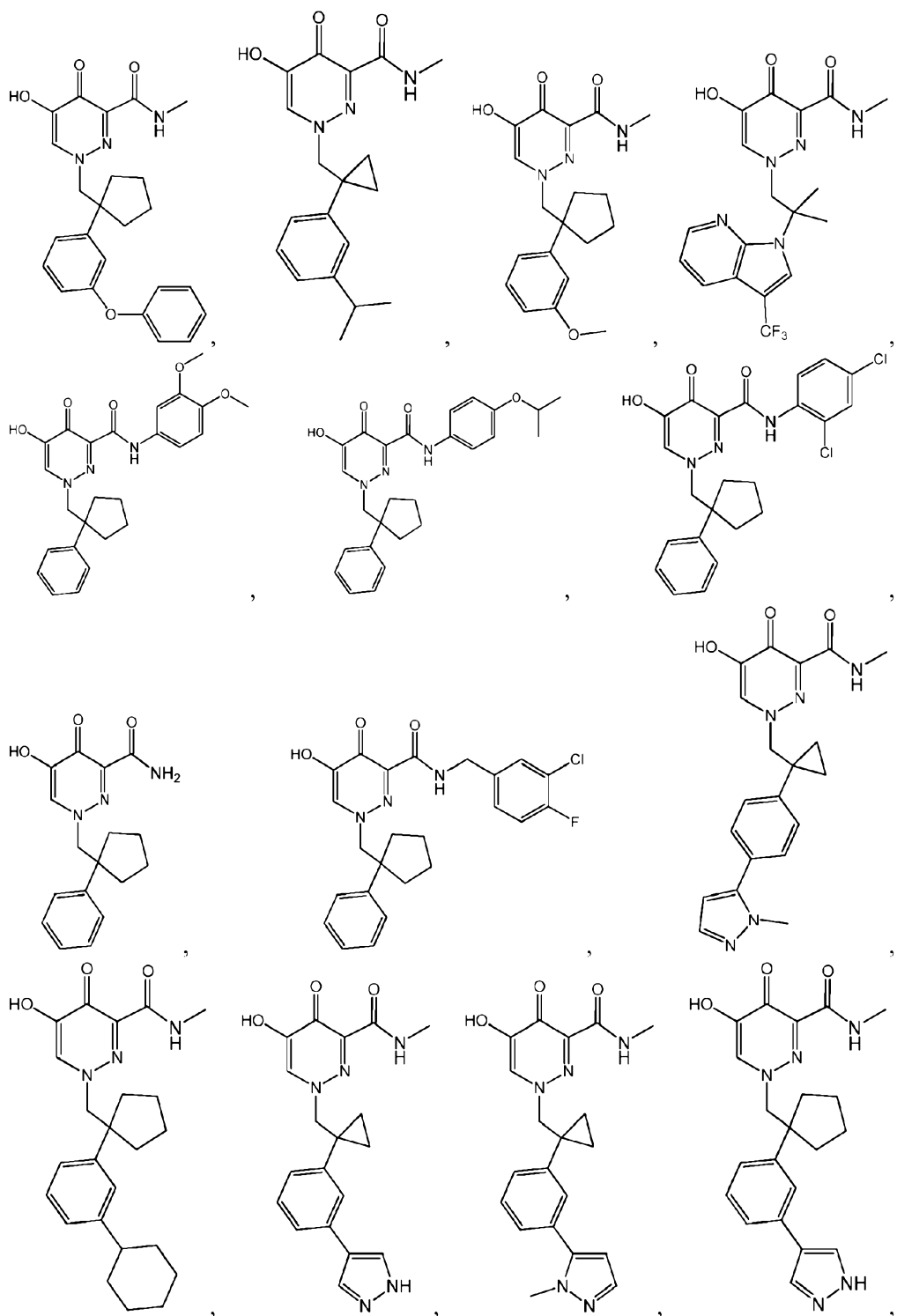
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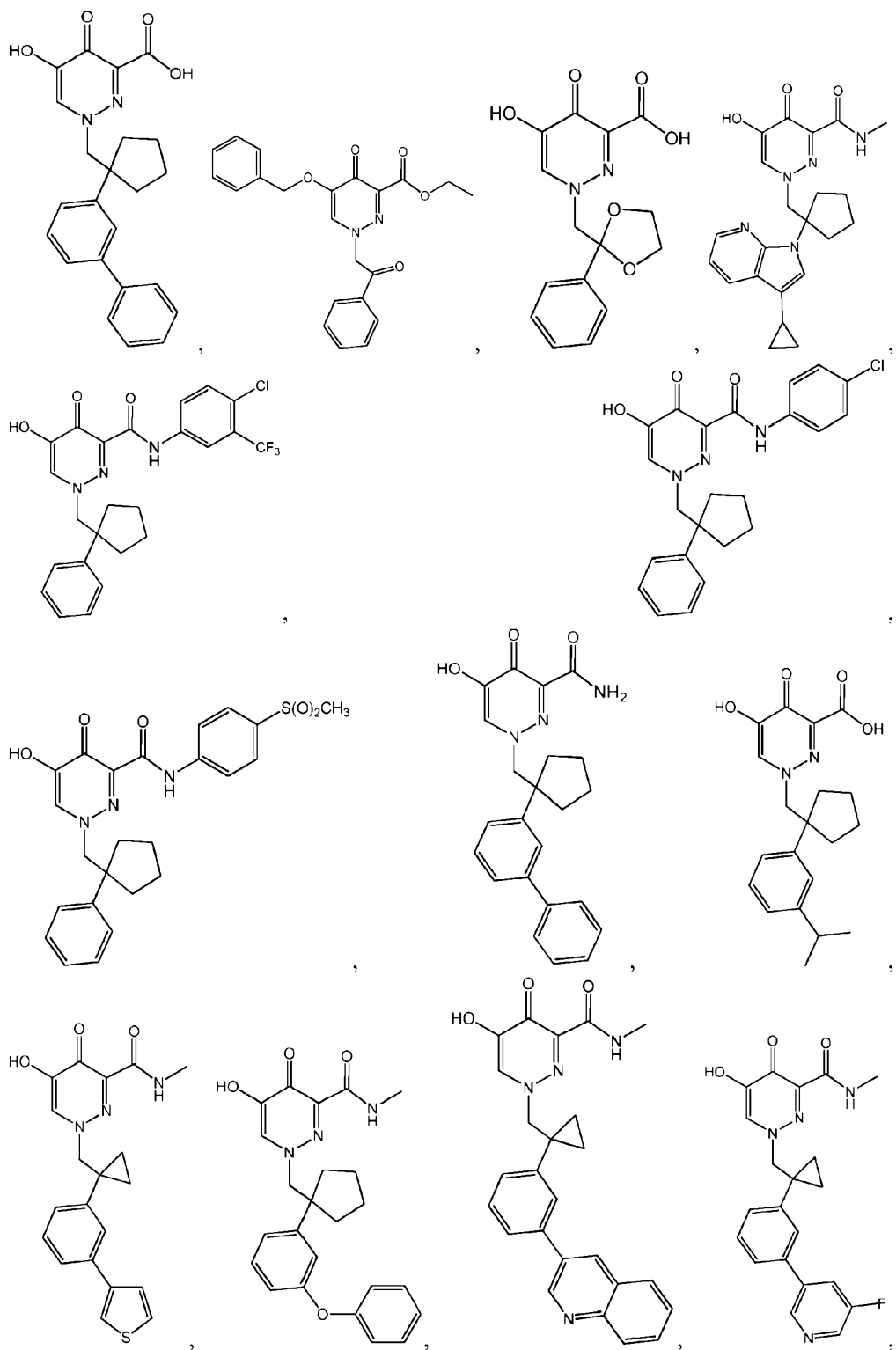




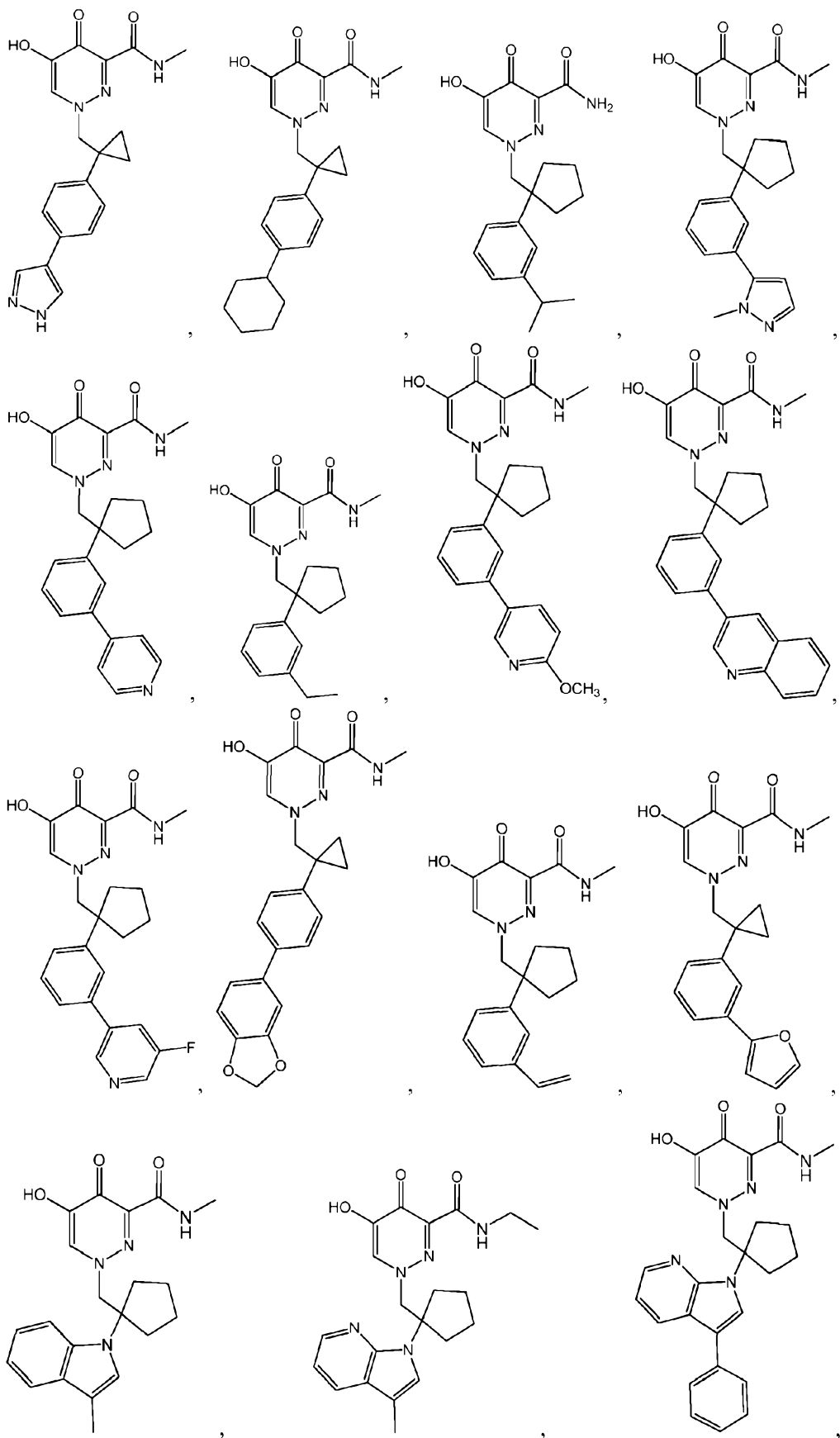


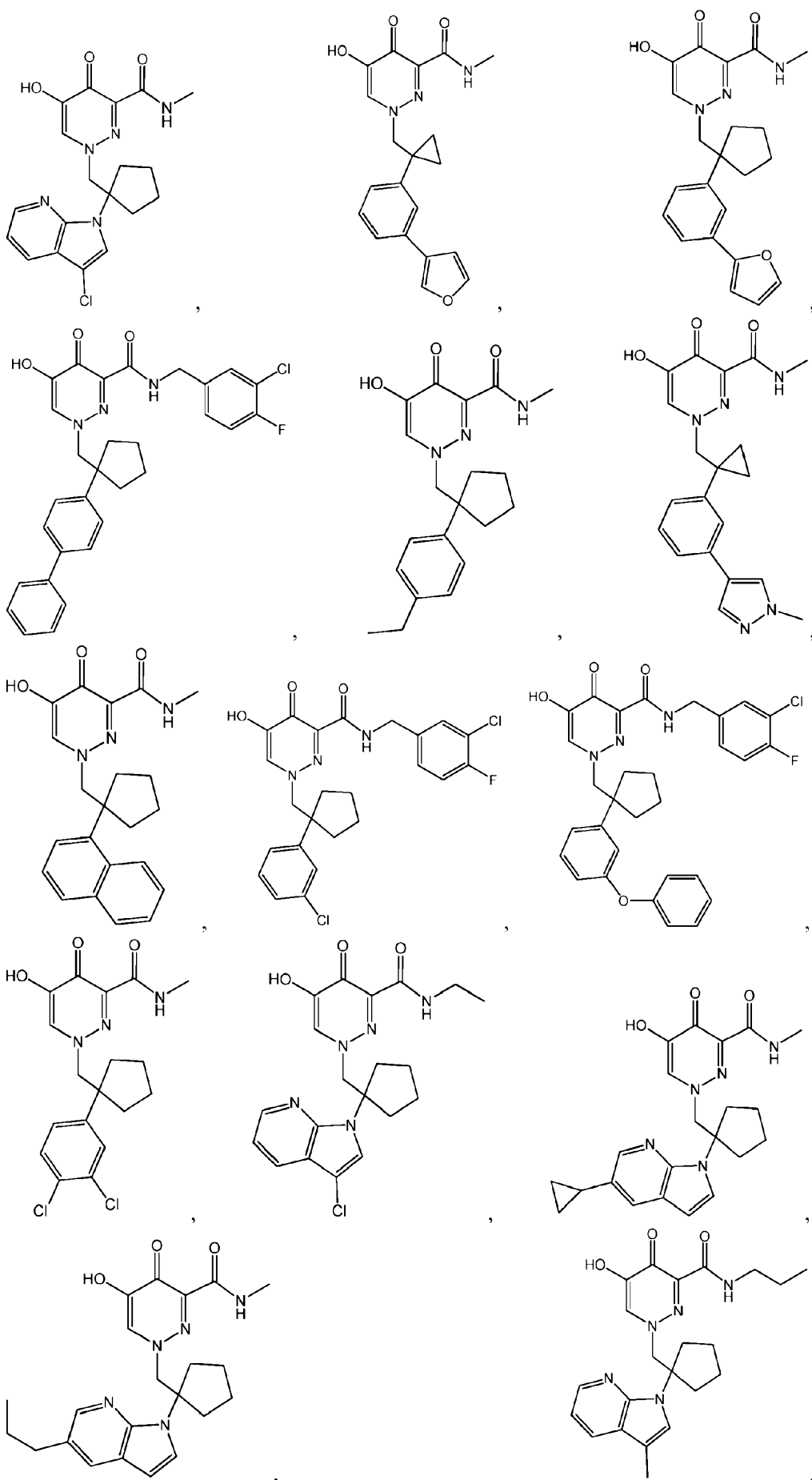


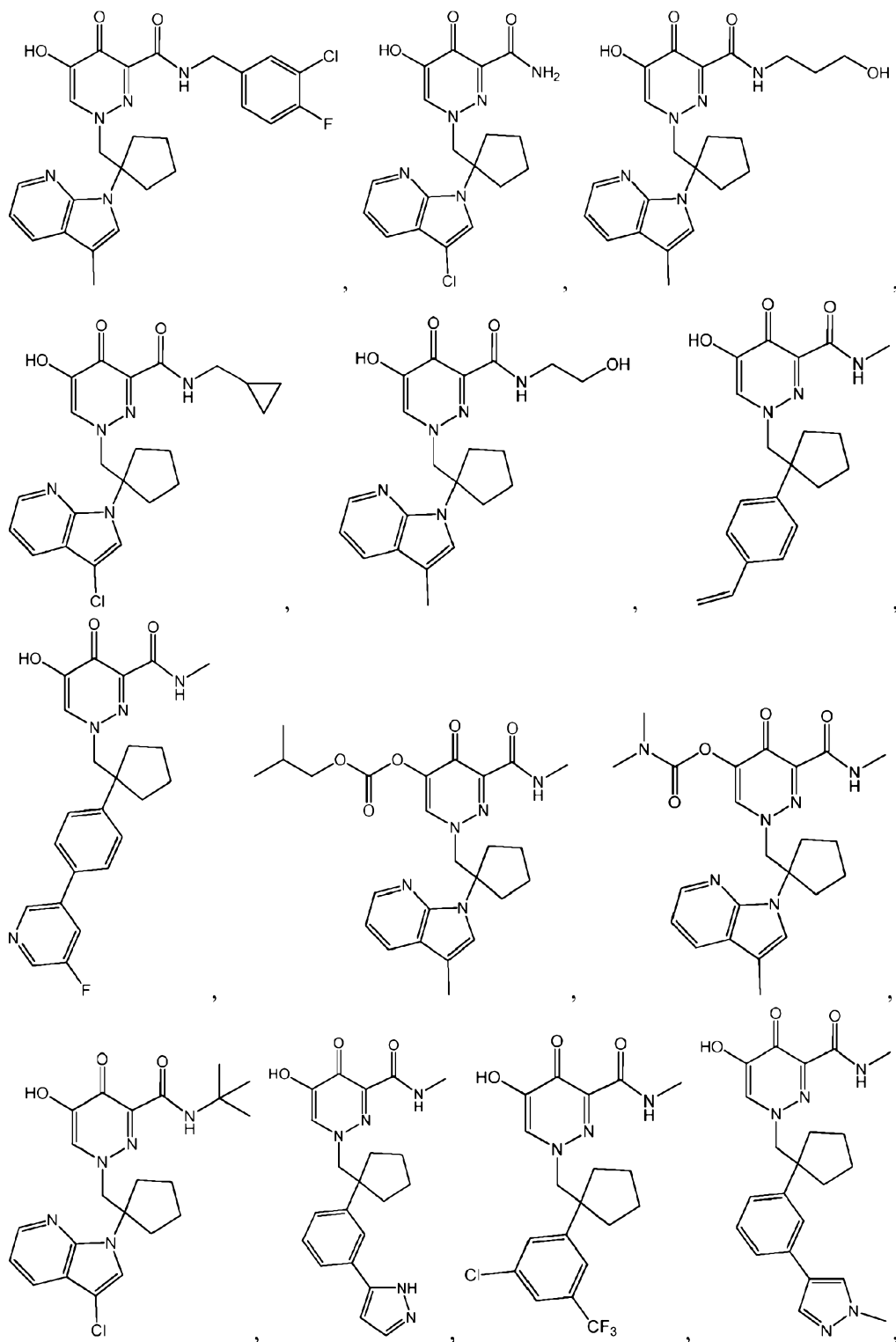


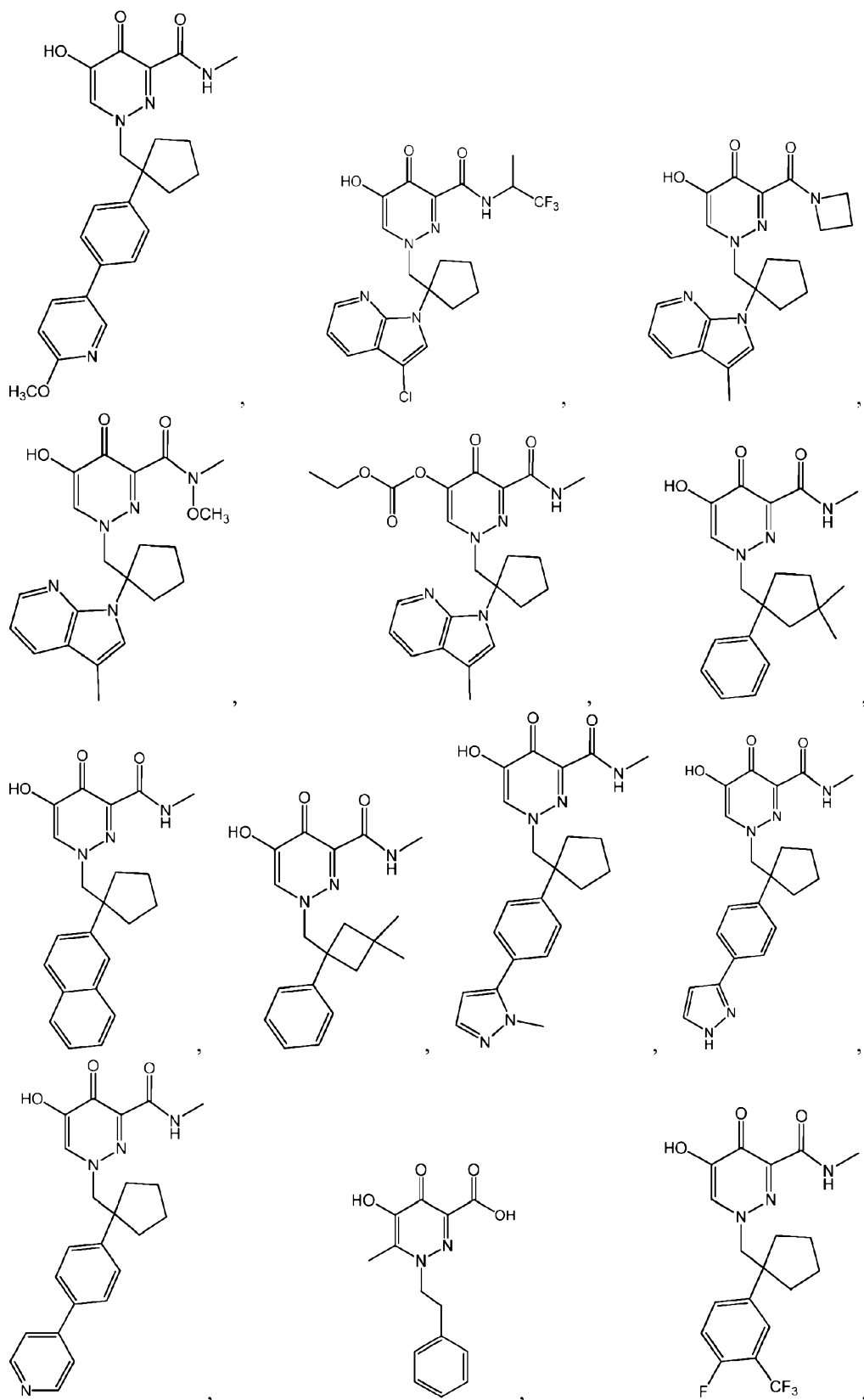


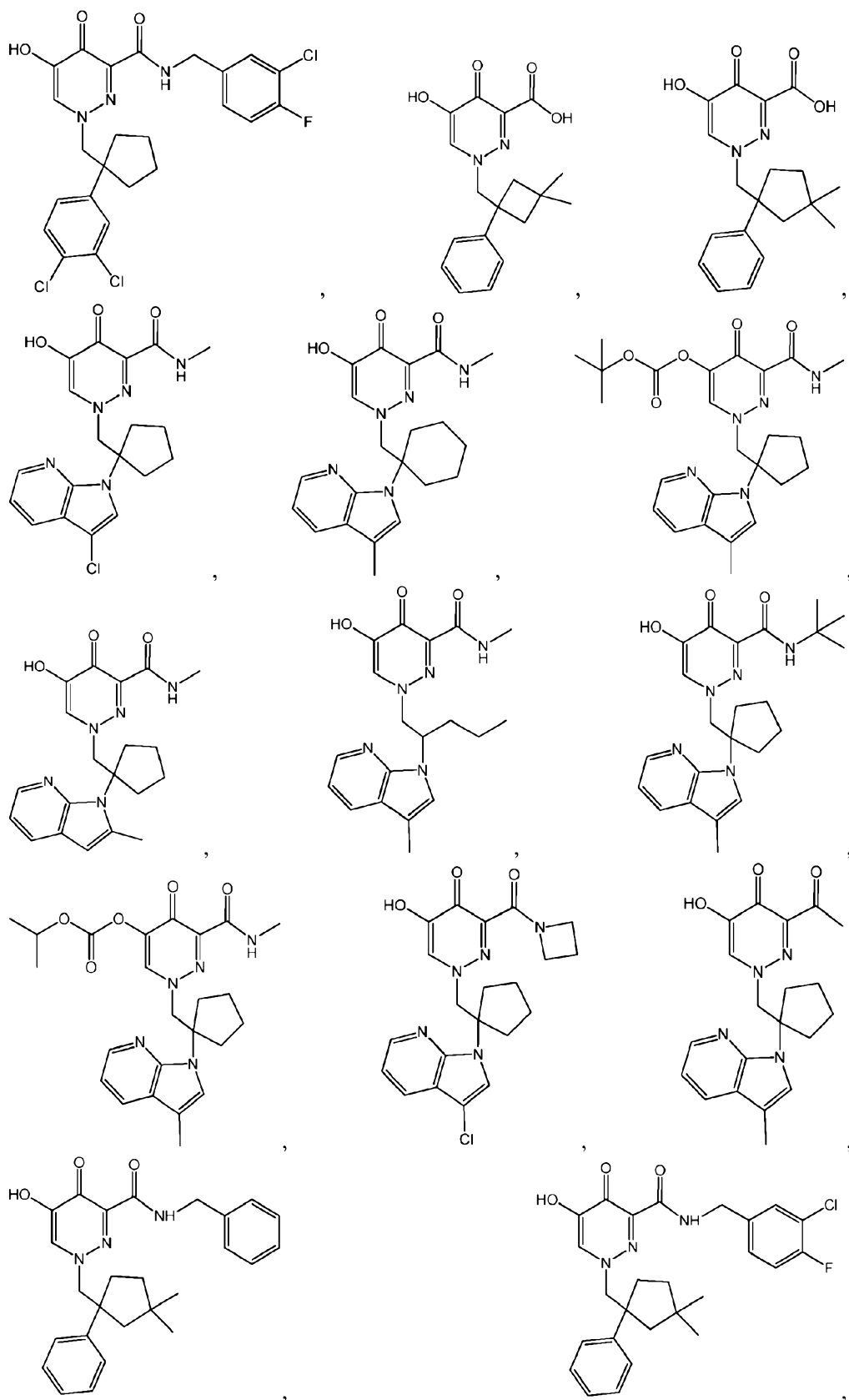


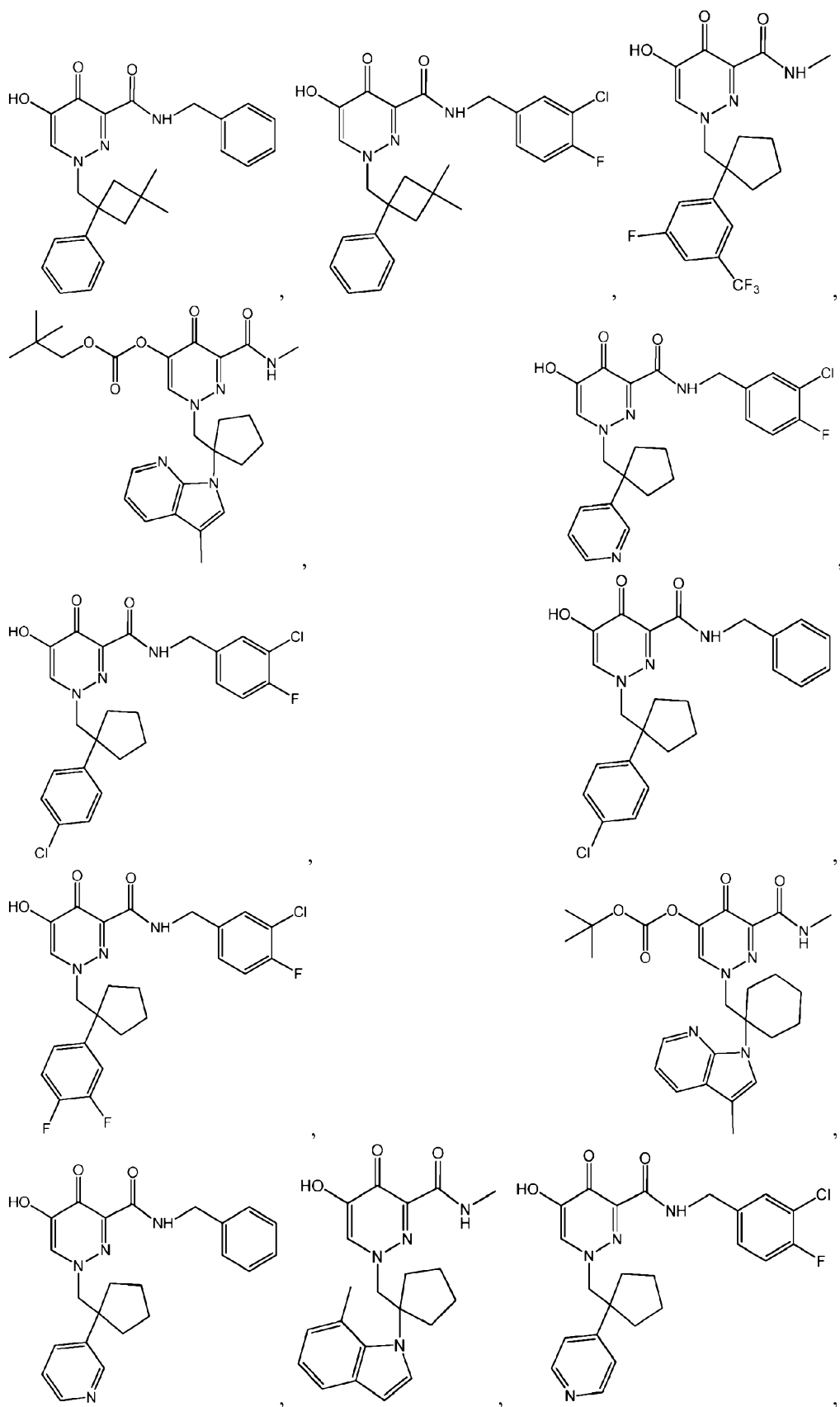


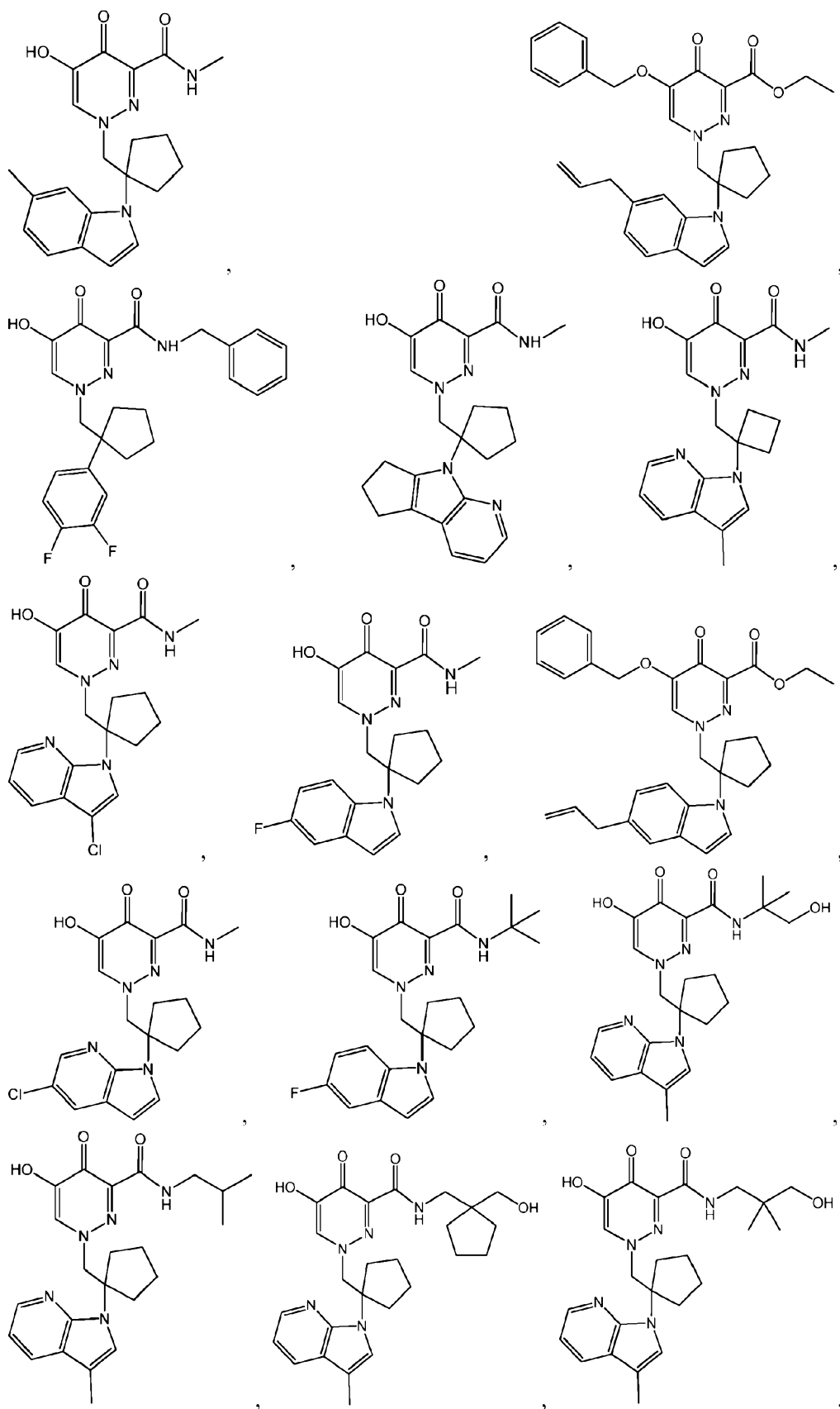






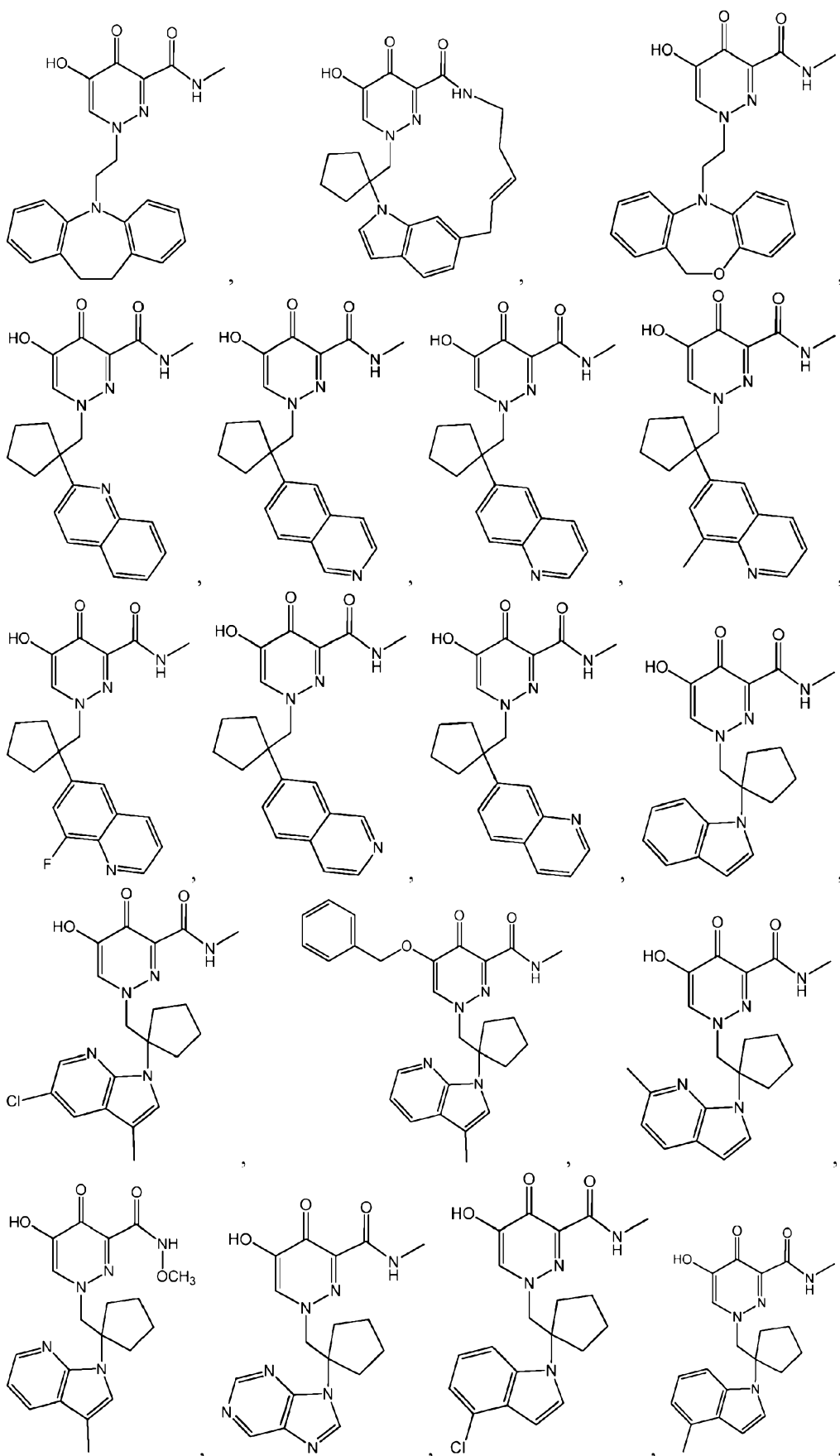


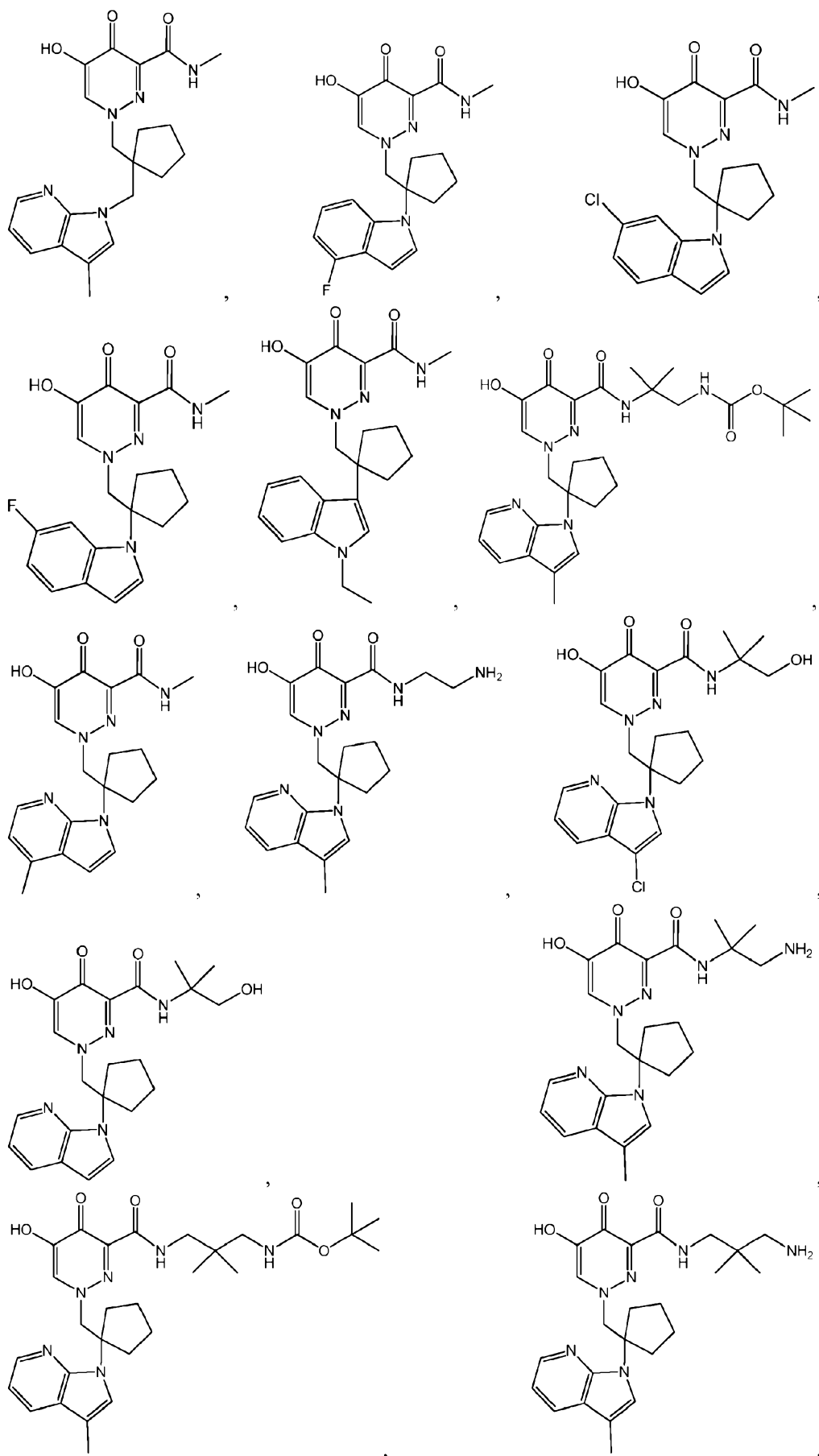


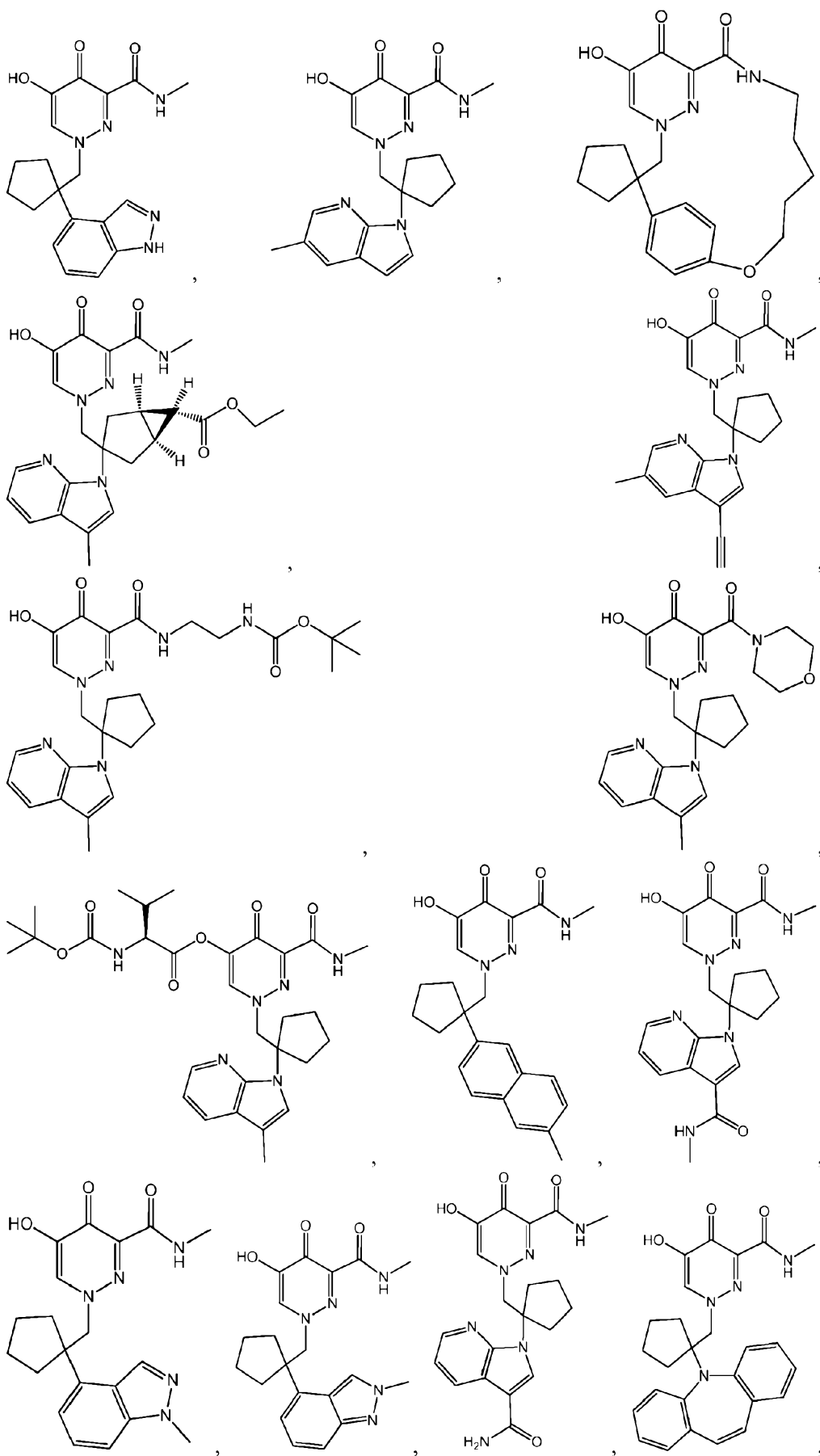


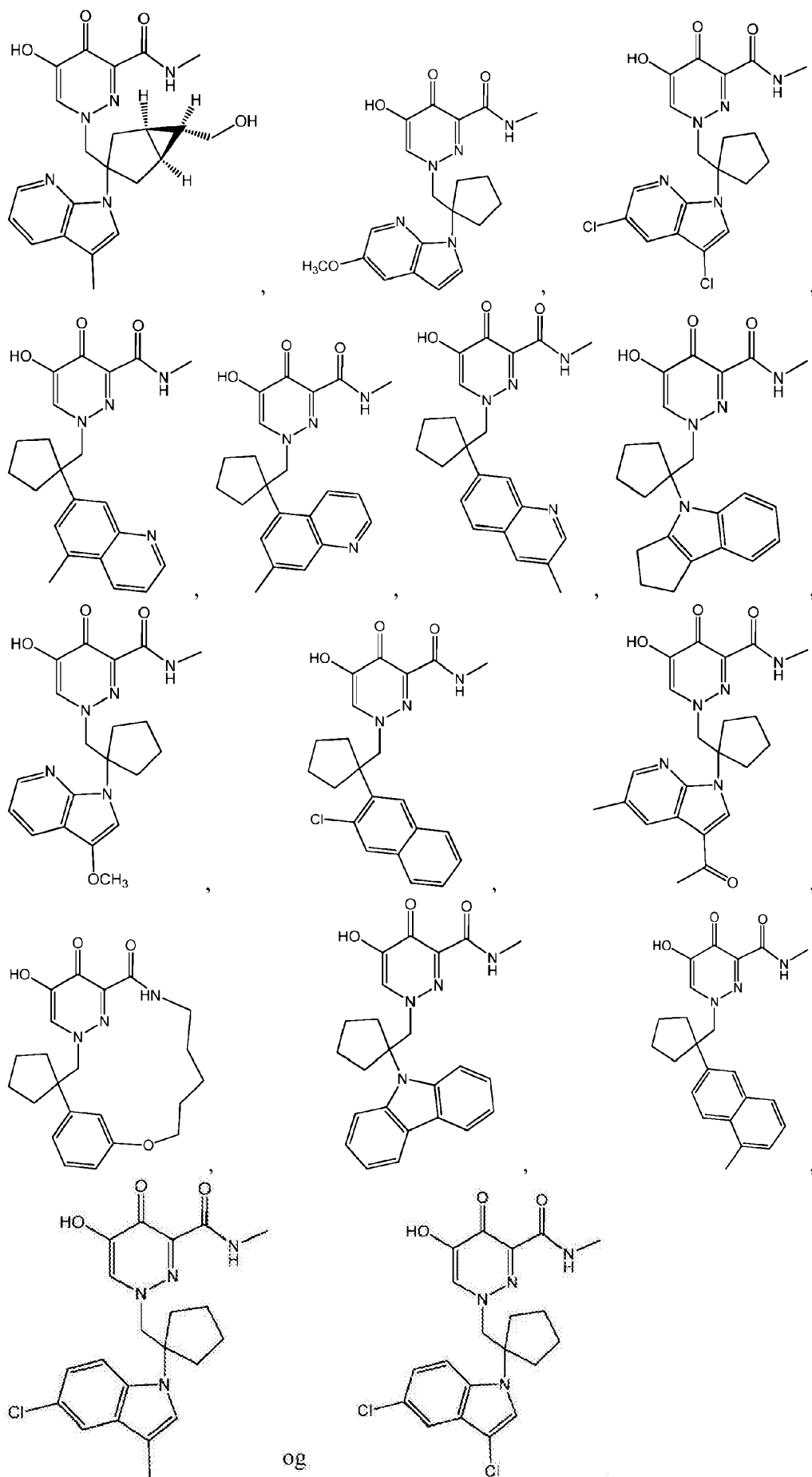






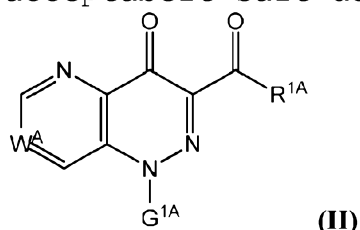




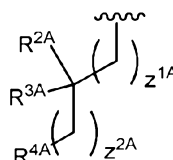


eller et farmaceutisk acceptabelt salt af en hvilken som helst af ovennævnte.

24. Forbindelse med formel (II) eller et farmaceutisk acceptabelt salt deraf:



hvor:



$G^{1A}$  er valgt fra gruppen, der består af  $R^{4A}$  og  $R^{5A}$ ;

$R^{1A}$  er valgt fra gruppen, der består af  $OR^{6A}$ ,  $NH_2$ , en eventuelt substitueret alkyl, en eventuelt substitueret aryl, en eventuelt substitueret monosubstitueret amin, en eventuelt substitueret disubstitueret amin, en eventuelt substitueret heterocyclyl og en eventuelt substitueret N-sulfonamido eller  $R^{10A}$ ;

$W^A$  er  $-CH-$  eller  $-N-$ ;

$R^{2A}$  er hydrogen eller  $C_{1-6}$ alkyl;

$R^{3A}$  er hydrogen eller  $C_{1-6}$ alkyl;

eller  $R^{2A}$  og  $R^{3A}$  sammen med carbonatomet, hvortil de er bundet, danner en eventuelt substitueret  $C_{3-6}$ cycloalkyl eller en eventuelt substitueret 5- til 6-leddet heterocyclyl;

$R^{4A}$  er valgt fra gruppen, der består af en eventuelt substitueret aryl, en eventuelt substitueret cycloalkyl, en eventuelt substitueret cycloalkenyl, en eventuelt substitueret heteroaryl og en eventuelt substitueret heterocyclyl;

$R^{5A}$  er valgt fra gruppen, der består af en eventuelt substitueret aryl, en eventuelt substitueret cycloalkyl, en eventuelt substitueret cycloalkenyl, en eventuelt substitueret heteroaryl og en eventuelt substitueret heterocyclyl;

$R^{6A}$  er valgt fra gruppen, der består af hydrogen,  $C_{1-6}$ alkyl,  $-C(O)R^{7A}$  og  $-C(O)NR^{8A}R^{9A}$ ;

$R^{7A}$  er valgt fra gruppen, der består af hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl( $C_{1-6}$ alkyl), heteroaryl( $C_{1-6}$ alkyl)

og heterocyclyl(C<sub>1-6</sub>alkyl);

R<sup>8A</sup> og R<sup>9A</sup> uafhængigt er valgt fra gruppen, der består af hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heterocyclyl, aryl(C<sub>1-6</sub>alkyl), heteroaryl(C<sub>1-6</sub>alkyl) og heterocyclyl(C<sub>1-6</sub>alkyl);

eller R<sup>8A</sup> og R<sup>9A</sup> sammen med nitrogenatomet, hvortil de er bundet, danner en eventuelt substitueret heterocyclyl;

hvor, når R<sup>1A</sup> er R<sup>10A</sup>, så er R<sup>10A</sup> og R<sup>4A</sup> samlet og indbefatter L<sup>1A</sup>, hvor L<sup>1A</sup> forbinder R<sup>10A</sup> og R<sup>4A</sup> til frembringelse af en 11- til 20-leddet ring, eller hvor, når R<sup>1A</sup> er R<sup>10A</sup>, så er R<sup>10A</sup> og R<sup>5A</sup> samlet og indbefatter L<sup>1A</sup>, hvor L<sup>1A</sup> forbinder R<sup>10A</sup> og R<sup>5A</sup> til frembringelse af en 11- til 20-leddet ring;

R<sup>10A</sup> er eventuelt substitueret -CH<sub>2</sub>-, eventuelt substitueret -CH=CH-, O (oxygen), S (svovl) eller NR<sup>11A</sup>;

R<sup>11A</sup> er hydrogen eller C<sub>1-6</sub>alkyl;

L<sup>1A</sup> er -L<sup>2A</sup>- eller -L<sup>3A</sup>-L<sup>4A</sup>-L<sup>5A</sup>-;

L<sup>2A</sup> er valgt fra gruppen, der består af en eventuelt substitueret alkylen, en eventuelt substitueret alkenylen, en eventuelt substitueret heteroalkylen og en eventuelt substitueret heteroalkenylen;

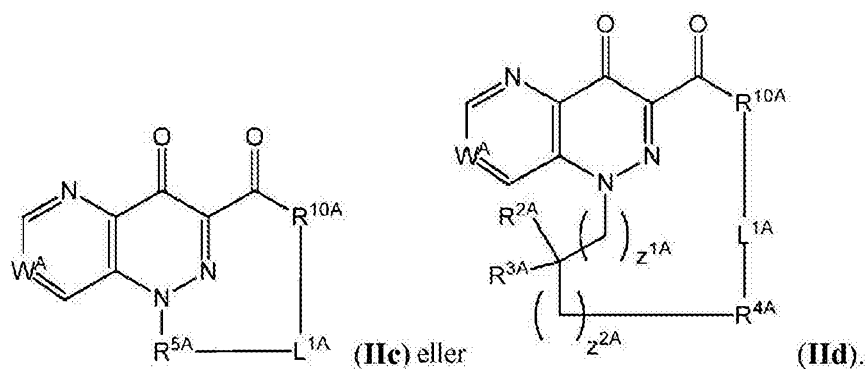
L<sup>3A</sup> er en eventuelt substitueret C<sub>1-6</sub>alkylen;

L<sup>4A</sup> er en eventuelt substitueret cycloalkyl, en eventuelt substitueret aryl, en eventuelt substitueret heteroaryl, en eventuelt substitueret heterocyclyl, O (oxygen), S (svovl) eller NR<sup>11A</sup>; og

L<sup>5A</sup> er en eventuelt substitueret C<sub>1-6</sub>alkylen eller en eventuelt substitueret heteroalkylen; og

Z<sup>1A</sup> og Z<sup>2A</sup> uafhængigt er 0, 1, 2, 3 eller 4.

25. Forbindelse ifølge krav 24 eller et farmaceutisk acceptabelt salt deraf, der har strukturen med formel (IIc) eller formel (IIId) eller et farmaceutisk acceptabelt salt deraf:



26. Forbindelse ifølge krav 25 eller et farmaceutisk acceptabelt salt deraf, hvor  $L^{2A}$  er en eventuelt substitueret alkylen eller en eventuelt substitueret alkenylen; fortrinsvis en eventuelt substitueret  $C_{4-7}$ alkylen eller en eventuelt substitueret  $C_{4-7}$ alkenylen; eller hvor  $L^{2A}$  er en eventuelt substitueret heteroalkylen eller en eventuelt substitueret heteroalkenylen; eller hvor  $L^{2A}$  er en eventuelt substitueret oxygenholdig  $C_3$ -heteroalkenylen, en eventuelt substitueret oxygenholdig  $C_4$ -heteroalkenylen eller en eventuelt substitueret oxygenholdig  $C_5$ -heteroalkenylen; eller hvor  $L^{2A}$  er en eventuelt substitueret  $-(CH_2)_3-O-$ , en eventuelt substitueret  $-(CH_2)_4-O-$ , en eventuelt substitueret  $-(CH_2)_5-O-$ , en eventuelt substitueret  $-(CH_2)_3-S-$ , en eventuelt substitueret  $-(CH_2)_4-S-$ , en eventuelt substitueret  $-(CH_2)_5-S-$ , en eventuelt substitueret  $-(CH_2)_3-NH-$ , en eventuelt substitueret  $-(CH_2)_4-NH-$  eller en eventuelt substitueret  $-(CH_2)_5-NH-$ ; eller  $L^{2A}$  er en eventuelt substitueret  $-(CH_2)(CH=CH)(CH_2)-O-$ , en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)-O-$ , en eventuelt substitueret  $-(CH_2)(CH=CH)(CH_2)_2-O-$ , en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)_2-O-$ , en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)-S-$ , en eventuelt substitueret  $-(CH_2)(CH=CH)(CH_2)_2-S-$ , en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)_2-S-$ , en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)-NH-$ , en eventuelt substitueret  $-(CH_2)(CH=CH)(CH_2)_2-NH-$  eller en eventuelt substitueret  $-(CH_2)_2(CH=CH)(CH_2)_2-NH-$ .

27. Forbindelse ifølge krav 25 eller et farmaceutisk acceptabelt salt deraf, hvor:

$L^{1A}$  er  $-L^{3A}-L^{4A}-L^{5A}-$ ;

$L^{3A}$  er en eventuelt substitueret  $C_{1-4}$ alkylen;

$L^{4A}$  er en eventuelt substitueret cycloalkyl, en eventuelt substitueret aryl eller en eventuelt substitueret heteroaryl; og

5  $L^{5A}$  er en eventuelt substitueret  $C_{1-4}$ alkylen; eller hvor:

$L^{1A}$  er  $-L^{3A}-L^{4A}-L^{5A}-$ ;

$L^{3A}$  er en eventuelt substitueret  $C_{1-4}$ alkylen;

$L^{4A}$  er O (oxygen), S (svovl) eller  $NR^{11A}$ ; og

10  $L^{5A}$  er en eventuelt substitueret  $C_{1-4}$ alkylen; eller hvor:

$L^{1A}$  er  $-L^{3A}-L^{4A}-L^{5A}-$ ;

$L^{3A}$  er en eventuelt substitueret  $C_{2-4}$ alkylen;

15  $L^{4A}$  er en eventuelt substitueret cycloalkyl, en eventuelt substitueret aryl, en eventuelt substitueret heteroaryl, en eventuelt substitueret heterocyclyl, O (oxygen), S (svovl) eller  $NR^{11}$ ; og

$L^{5A}$  er en eventuelt substitueret  $C_{2-4}$ alkylen.

20 28. Forbindelse ifølge et hvilket som helst af kravene 25-27 eller et farmaceutisk acceptabelt salt deraf, hvor:

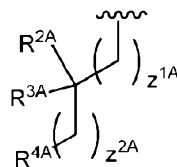
$R^{1A}$  er  $R^{10A}$ , hvor  $R^{10A}$  er  $NR^{11A}$ ; og

$R^{11A}$  er H (hydrogen); eller

25 hvor  $R^{1A}$  er  $NH_2$ , en eventuelt substitueret monosubstitueret amin eller en eventuelt substitueret disubstitueret amin.

29. Forbindelse ifølge krav 24 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^{1A}$  er en eventuelt substitueret alkyl.

30. Forbindelse ifølge krav 28 eller 29 eller et farmaceutisk



acceptabelt salt deraf, hvor  $G^{1A}$  er  $R^{4A}$ ; eller hvor  $G^{1A}$  er  $R^{5A}$ , hvor  $R^{5A}$  er en eventuelt substitueret aryl, fortrinsvis en eventuelt substitueret phenyl.

35

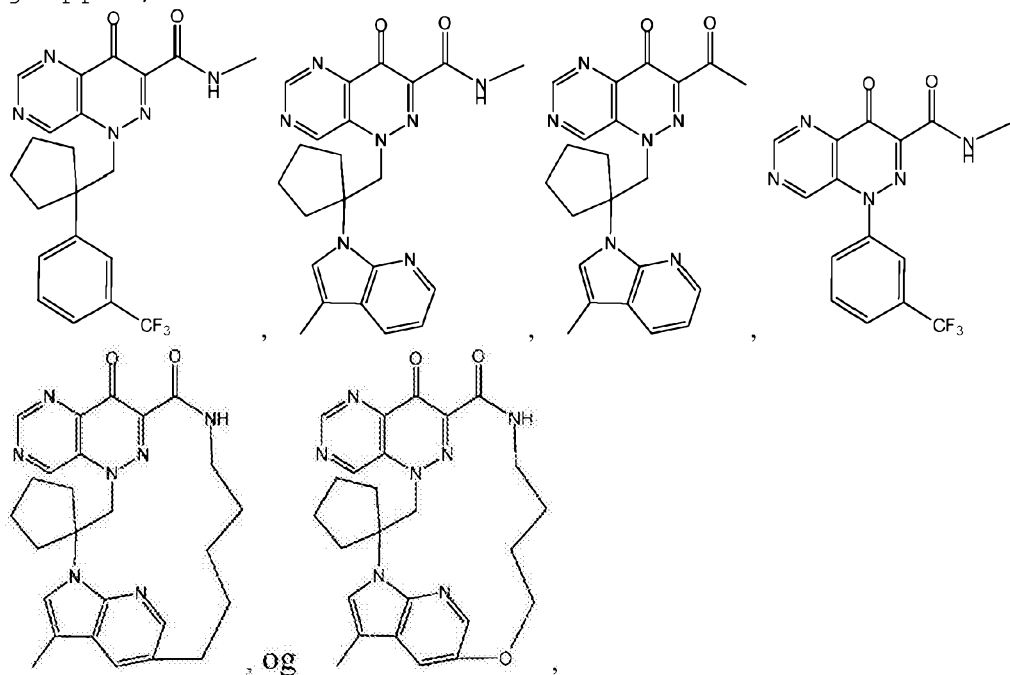


31. Forbindelse ifølge krav 30 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^{2A}$  og  $R^{3A}$  sammen med carbonatomet, hvortil de er bundet, danner en eventuelt substitueret  $C_{3-6}$ cycloalkyl; fortrinsvis en usubstitueret  $C_{3-6}$ cycloalkyl; mere  
5 fortrinsvis en  $C_5$ cycloalkyl.

32. Forbindelse ifølge krav 30 eller 31 eller et farmaceutisk acceptabelt salt deraf, hvor  $R^{4A}$  er en eventuelt substitueret aryl; fortrinsvis en eventuelt substitueret phenyl; mere  
10 fortrinsvis en substitueret aryl substitueret med en eller flere grupper valgt fra gruppen, der består af  $C_{1-6}$ alkyl, alkoxy, aryl, cyano, halogen, halogenalkyl og halogenalkoxy; eller hvor  $R^{4A}$  er en eventuelt substitueret heteroaryl.

15 33. Forbindelse ifølge et hvilket som helst af kravene 30-32 eller et farmaceutisk acceptabelt salt deraf, hvor  $Z^{1A}$  er 0; eller  $Z^{1A}$  er 1.

34. Forbindelse ifølge krav 24, hvor forbindelsen er valgt fra  
20 gruppen, der består af:



eller et farmaceutisk acceptabelt salt af en hvilken som helst af ovennævnte.

25 35. Farmaceutisk sammensætning, der omfatter en effektiv mængde

af en forbindelse ifølge et hvilket som helst af kravene 1-34 eller et farmaceutisk acceptabelt salt deraf og et farmaceutisk acceptabelt bæremateriale, fortyndingsmiddel, excipiens eller en kombination deraf.

5

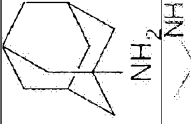
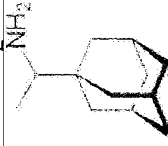
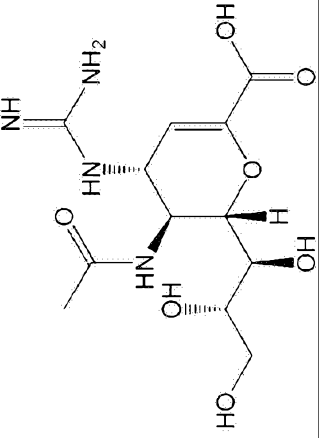
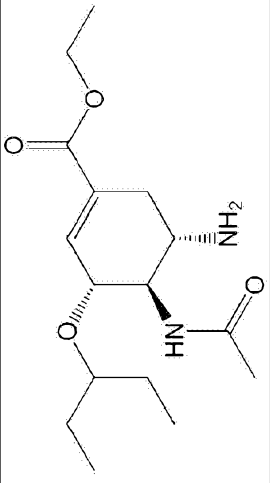
36. Forbindelse ifølge et hvilket som helst af kravene 1-34 eller et farmaceutisk acceptabelt salt deraf til anvendelse til bedring eller behandling af en orthomyxovirus; fortrinsvis en influenzavirus; mere fortrinsvis influenza A eller influenza B;  
10 mere fortrinsvis en influenzavirus valgt fra gruppen, der består af H1N1, H3N2, H5N1 og H7N9.

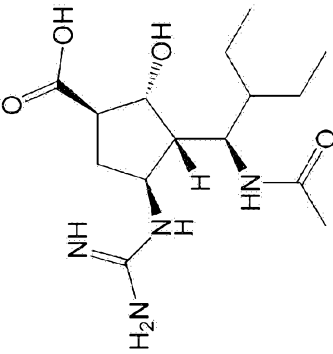
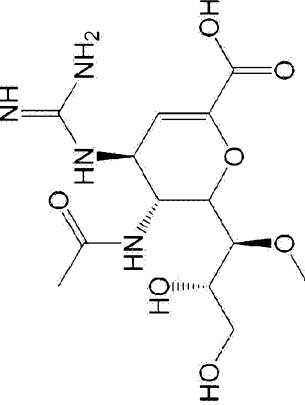
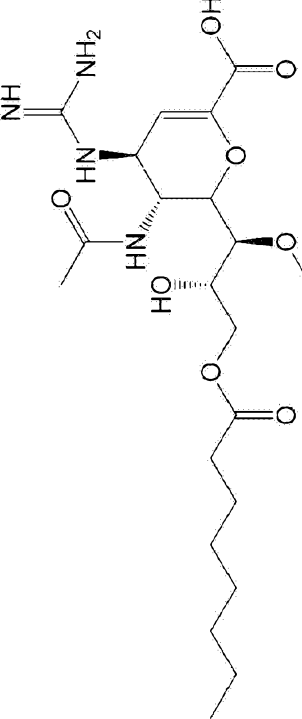
37. Forbindelse ifølge et hvilket som helst af kravene 1-34 eller et farmaceutisk acceptabelt salt deraf til anvendelse til  
15 inhibering af replikation af en orthomyxovirus; fortrinsvis en influenzavirus; mere fortrinsvis influenza A eller influenza B; mere fortrinsvis en influenzavirus valgt fra gruppen, der består af H1N1, H3N2, H5N1 og H7N9.

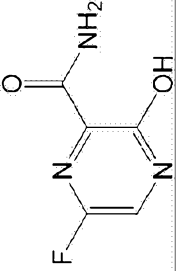
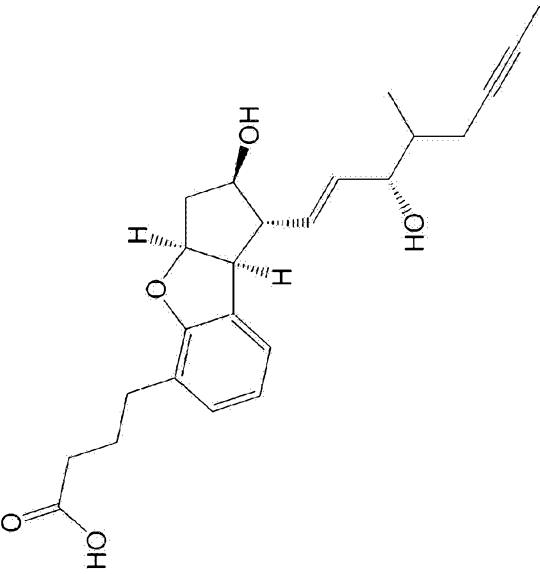
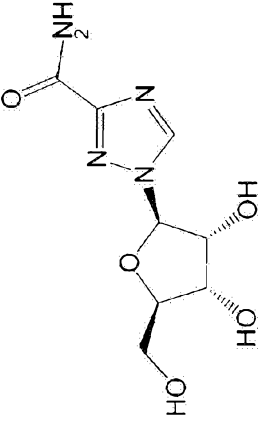
20 38. Forbindelse til anvendelse ifølge krav 36 eller 37, hvor forbindelsen anvendes i kombination med et eller flere yderligere midler; fortrinsvis orthomyxovirussen er en influenzavirus; og hvor det ene eller de flere yderligere midler er valgt fra gruppen, der består af en neuraminidaseinhibitor,  
25 en M2-proteininhibitor, en polymeraseinhibitor, en PB2-inhibitor, amantadin, rimantadin, zanamivir, oseltamivir, peramivir, laninamivir, laninamivir-octanoat, favipiravir, fludase, ADS-8902, en immunmodulator, beraprost, Neugene®, ribavirin, CAS-reg.nr. 1422050-75-6, CAS-reg.nr. 1259366-34-1  
30 (VX-787), FluMist Quadrivalent® (MedImmune), Fluarix® Quadrivalent (GlaxoSmithKline), Fluzone® Quadrivalent (Sanofi Pasteur), Flucelvax® (Novartis) og FluBlok® (Protein Sciences); fortrinsvis oseltamivir.

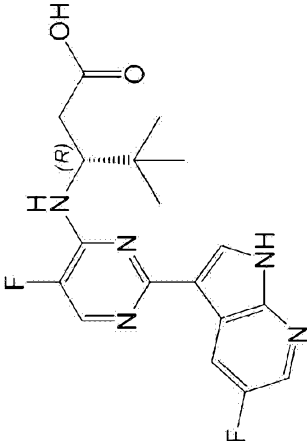
## DRAWINGS

Figure 1

Name or CAS No.	IUPAC Name	Structure
amantadine	adamantan-1-amine	
rimantadine	(1R,2R)-1-(1-adamantyl)ethanamine	
zanamivir	(2R,3R,4S)-4-guanidino-3-(prop-1-en-2-ylamino)-2-((1R,2R)-1,2,3-trihydroxypropyl)-3,4-dihydro-2H-pyran-6-carboxylic acid	
oseltamivir	ethyl (3R,4R,5S)-5-amino-4-acetamido-3-(pentan-3-yloxy)-cyclohex-1-ene-1-carboxylate	

Name or CAS No.	IUPAC Name	Structure
peramivir	(1S,2S,3S,4R)-3-[(1S)-1-acetamido-2-ethylbutyl]-4-(diaminomethylideneamino)-2-hydroxycyclopentane-1-carboxylic acid	
laninamivir	(4S,5R,6R)-5-acetamido-4-carbamimidamido-6-[(1R,2R)-3-hydroxy-2-methoxypropyl]-5,6-dihydro-4H-pyran-2-carboxylic acid	
laninamivir octanoate	(3R,4S)-3-acetamido-4-guanidino-2-((1S,2S)-2-hydroxy-1-methoxy-3-(octanoyloxy)propyl)-3,4-dihydro-2H-pyran-6-carboxylic acid	

Name or CAS No.	IUPAC Name	Structure
favipiravir	6-fluoro-3-hydroxy-2-pyrazinecarboxamide	
beraprost	4-[2-hydroxy-1-[(E)-3-hydroxy-4-methyloct-1-en-6-ynyl]-2,3,3a,8b-tetrahydro-1H-cyclopenta[b][1]benzofuran-5-yl]butanoic acid	
ribavirin	1-[(2R,3R,4S,5R)-3,4-dihydroxy-5-(hydroxymethyl)oxolan-2-yl]-1H-1,2,4-triazole-3-carboxamide	

Name or CAS No.	IUPAC Name	Structure
1422050-75-6	(R)-3-((5-fluoro-2-(5-fluoro-1H-pyrrolo[2,3-b]pyridin-3-yl)pyrimidin-4-yl)amino)-4,4-dimethylpentanoic acid	
VX-787	(2S,3S)-3-((5-fluoro-2-(5-fluoro-1H-pyrrolo[2,3-b]pyridin-3-yl)pyrimidin-4-yl)amino)bicyclo[2.2.2]octane-2-carboxylic acid	