INDAZOLE-3-CARBOXAMIDES AND THEIR USE AS WNT/B-CATENIN SIGNALING PATHWAY INHIBITORS

RELATED APPLICATIONS

Cross-Reference to Related Applications

[0001] This application claims the benefit of U.S. Provisional Application No. 61/534,601, filed September 14, 2011, and U.S. Provisional Application No. 61/624,646, filed April 16, 2012, which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] This invention relates to the field of therapeutic oncology. More particularly, it concerns the use of an indazole-3-carboxamide compound or salts or analogs thereof, in the treatment of cancer, particularly colon, ovarian, pancreatic, breast, liver, prostate and hematologic cancers.

Description of the Related Art

[0003] Pattern formation is the activity by which embryonic cells form ordered spatial arrangements of differentiated tissues. Speculation on the mechanisms underlying these patterning effects usually centers on the secretion of a signaling molecule that elicits an appropriate response from the tissues being patterned. More recent work aimed at the identification of such signaling molecules implicates secreted proteins encoded by individual members of a small number of gene families.

[0004] A longstanding idea in cancer biology is that cancers arise and grow due to the formation of cancer stem cells, which may constitute only a minority of the cells within a tumor but are nevertheless critical for its propagation. Stem cells are appealing as the cell of origin for cancer because of their pre-existing capacity for self-renewal and for unlimited replication. In addition, stem cells are relatively long-lived in comparison to other cells within tissues, providing a greater opportunity to accumulate the multiple additional mutations that may be required to increase the rate of cell

proliferation and produce clinically significant cancers. Of particular recent interest in the origin of cancer is the observation that the Wnt signaling pathway, which has been implicated in stem cell self-renewal in normal tissues, upon continuous activation has also been associated with the initiation and growth of many types of cancer. This pathway thus provides a potential link between the normal self-renewal of stem cells and the aberrantly regulated proliferation of cancer stem cells.

[0005] The Wnt growth factor family includes more than 10 genes identified in the mouse and at least 19 genes identified in the human. Members of the Wnt family of signaling molecules mediate many important short-and long-range patterning processes during invertebrate and vertebrate development. The Wnt signaling pathway is known for its important role in the inductive interactions that regulate growth and differentiation, and plays important roles in the homeostatic maintenance of post-embryonic tissue integrity. Wnt stabilizes cytoplasmic β-catenin, which stimulates the expression of genes including c-myc, c jun, fra-l, and cyclin Dl. In addition, misregulation of Wnt signaling can cause developmental defects and is implicated in the genesis of several human cancers. More recently, the Wnt pathway has been implicated in the maintenance of stem or progenitor cells in a growing list of adult tissues that now includes skin, blood, gut, prostate, muscle and the nervous system.

[0006] Pathological activation of the Wnt pathway is also believed to be the initial event leading to colorectal cancer in over 85% of all sporadic cases in the Western world. Activation of the Wnt pathway has also been extensively reported for hepatocellular carcinoma, breast cancer, ovarian cancer, pancreatic cancer, melanomas, mesotheliomas, lymphomas and leukemias. In addition to cancer, inhibitors of the Wnt pathway can be used for stem cell research or for the treatment of any diseases characterized by aberrant Wnt activation such as diabetic retinopathy, pulmonary fibrosis, rheumatoid arthritis, scleroderma as well as mycotic and viral infections and bone and cartilage diseases. As such, it is a therapeutic target that is of great interest to the field.

[0007] In addition to cancer, there are many cases of genetic diseases due to mutations in Wnt signaling components. Examples of some of the many diseases are Alzheimer's disease [*Proc. Natl. Acad. Sci. U S A* **(2007)**, *104(22)*, 9434-9], osteoarthritis, polyposis coli [*Science* **(1991)**, *253(5020)*, 665-669], bone density and

vascular defects in the eye (osteoporosis-pseudoglioma syndrome, OPPG) [*N. Engl. J. Med.* **(2002)**, *346(20)*, 1513-21], familial exudative vitreoretinopathy [*Hum. Mutat.* **(2005)**, *26(2)*, 104-12], retinal angiogenesis [*Nat. Genet.* **(2002)**, *32(2)*, 326-30], early coronary disease [*Science* **(2007)**, *315(5816)*, 1278-82], tetra-amelia syndrome [*Am. J. Hum. Genet.* **(2004)**, *74(3)*, 558-63], Müllerian-duct regression and virilization [*Engl. J. Med.* **(2004)**, *351(8)*, 792-8], SERKAL syndrome [*Am. J. Hum. Genet.* **(2008)**, *82(1)*, 39-47], diabetes mellitus type 2 [*Am. J. Hum. Genet.* **(2004)**, *75(5)*, 832-43; *N. Engl. J. Med.* **(2006)**, *355(3)*, 241-50], Fuhrmann syndrome [*Am. J. Hum. Genet.* **(2006)**, *79(2)*, 402-8], Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome [*Am. J. Hum. Genet.* **(2006)**, *79(2)*, 402-8], odonto-onycho-dermal dysplasia [*Am. J. Hum. Genet.* **(2007)**, *81(4)*, 821-8], obesity [*Diabetologia* **(2006)**, *49(4)*, 678-84], split-hand/foot malformation [*Hum. Mol. Genet.* **(2008)**, *17(17)*, 2644-53], caudal duplication syndrome [*Am. J. Hum. Genet.* **(2006)**, *79(1)*, 155-62], tooth agenesis [*Am. J. Hum. Genet.* **(2004)**, *74(5)*, 1043-50], Wilms tumor [*Science* **(2007)**, *315(5812)*, 642-5], skeletal dysplasia [*Nat. Genet.* **(2009)**, *41(1)*, 95-100], focal dermal hypoplasia [*Nat. Genet.* **(2007)**, *39(7)*, 836-8], autosomal recessive anonychia [*Nat. Genet.* **(2006)**, *38(11)*, 1245-7], neural tube defects [*N. Engl. J. Med.* **(2007)**, *356(14)*, 1432-7], alpha-thalassemia (ATRX) syndrome [*The Journal of Neuroscience* **(2008)**, *28(47)*, 12570 –12580], fragile X syndrome [*PLoS Genetics* **(2010)**, *6(4)*, e1000898], ICF syndrome, Angelman syndrome [*Brain Research Bulletin* **(2002)**, *57(1)*, 109-119], Prader-Willi syndrome [*Journal of Neuroscience* **(2006)**, *26(20)*, 5383-5392], Beckwith-Wiedemann Syndrome [*Pediatric and Developmental Pathology* **(2003)**, *6(4)*, 299-306] and Rett syndrome.

[0008] Regulation of cell signaling by the Wnt signaling pathway is critical for the formation of neuronal circuits. Wnt pathway modulates in neural tissue, among other things, axon pathfinding, dendritic development, and synaptic assembly. Through different receptors, Wnt pathway activates and/or regulates diverse signaling pathways and other processes that lead to local changes on the cytoskeleton or global cellular changes involving nuclear function. Recently, a link between neuronal activity, essential for the formation and refinement of neuronal connections, and Wnt signaling has been uncovered. Indeed, neuronal activity regulates the release of various Wnt proteins and the localization of their receptors. Wnt pathway mediates synaptic structural changes induced

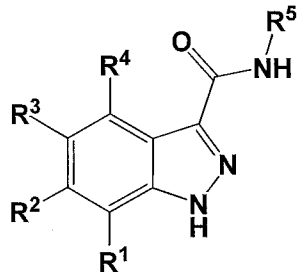
by neuronal activity or experience. Evidence suggests that dysfunction in Wnt signaling contributes to neurological disorders [*Brain Research Reviews* **(2000)**, *33(1)*, 1–12; *Oncogene* **(2006)** *25(57)*, 7545-7553; *Molecular Neurodegeneration* **(2008)**, *3*, 9; *Neurobiology of Disease* **(2010)**, *38(2)*, 148–153; *Journal of Neurodevelopmental Disorders* **(2011)**, *3(2)*, 162–174 and *Cold Spring Harbor Perspectives in Biology February* **(2012)**, *4(2)*].

SUMMARY OF THE INVENTION

[0009] The present invention makes available methods and reagents, involving contacting a cell with an agent, such as an aromatic compound, in a sufficient amount to antagonize Wnt activity, e. g., to reverse or control an aberrant growth state or correct a genetic disorder due to mutations in Wnt signaling components.

[0010] Some embodiments disclosed herein include Wnt inhibitors containing an indazole-3-carboxamide core. Other embodiments disclosed herein include pharmaceutical compositions and methods of treatment using these compounds.

[0011] One embodiment disclosed herein includes a compound having the structure of formula **I**:



I

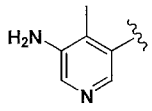
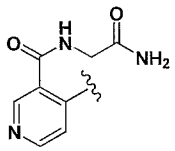
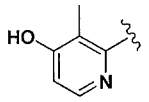
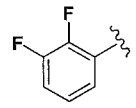
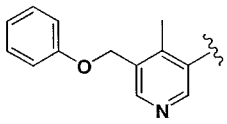
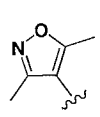
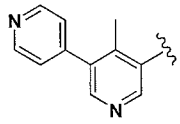
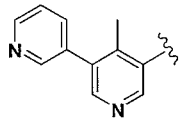
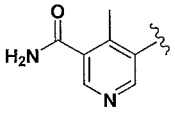
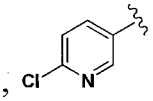
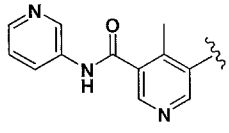
[0012] In some embodiments of formula **(I)**:

R^1, R^2 and R^4 are independently selected from the group consisting of H, C_{1-9} alkyl, halide, $-N(R^{10})_2$, $-XR^{10}$, CN, $-OCF_3$ and $-CF_3$;

R^3 is selected from the group consisting of carbocyclylR^6, heterocyclylR^6, arylR^6 and heteroarylR^6;

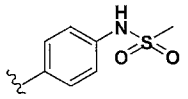
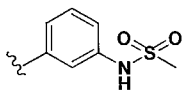
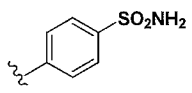
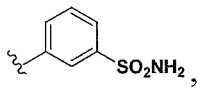
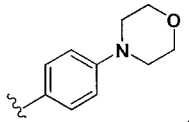
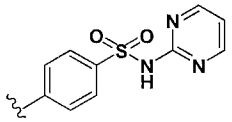
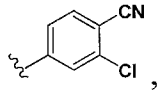
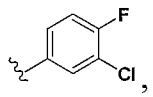
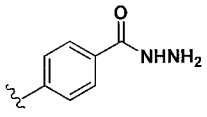
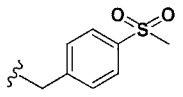
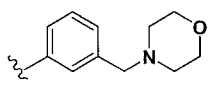
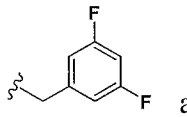
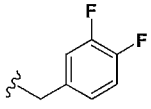
with the proviso that when R^3 is heteroaryl, the heteroaryl is not selected from the group consisting of isoquinoline, 1H-pyrrolo[2,3-*c*]pyridine and tetrazole;

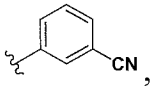
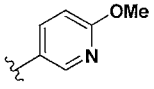
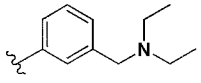
R^5 is selected from the group consisting of -(C_{1-9} alkyl)$_n$carbocyclylR^7, -(C_{1-9} alkyl)$_n$heterocyclylR^7, -(C_{1-9} alkyl)$_n$arylR^7 and -(C_{1-9} alkyl)$_n$heteroarylR^7;

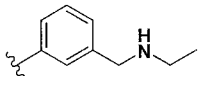
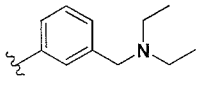
with the proviso that R^5 is not 4-pyridylR^7 when R^1, R^2 and R^4 are H, R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6, 2-pyridylR^6, phenylR^6, thiazoleR^6, imidazoleR^6, pyrimidineR^6, oxazoleR^6,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H.

with the proviso that R^5 is not –(CH_2)(3-pyridyl)R^7 when R^1, R^2 and R^4 are H, R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6 and thiazoleR^6, and R^6 and R^7 are both H;

with the proviso that R^5 is not phenylR^7 when R^1, R^2 and R^4 are H, R^3 is 4-pyridylR^6 and R^6 and R^7 are both H;

with the proviso that R^3 is not 3-pyridylR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of phenylR^7,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H;

with the proviso that R^3 is not oxazoleR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of  ,  and  , and R^6 is H;

with the proviso that R^3 is not thiazoleR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of  and  , and R^6 is H;

each R^6 is 1-5 substituents each selected from the group consisting of H, C_{1-9} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-XR^{10}$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^8$, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-(C_{1-9}\text{ alkyl})_nN(R^{10})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$;

each R^7 is 1-5 substituents each selected from the group consisting of H, C_{1-9} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-XR^{10}$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^9$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^9$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^9$, $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^9$, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-(C_{1-9}\text{ alkyl})_nN(R^{10})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$;

each R^8 is 1-5 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, OCF_3, $-CF_3$ -CN, $-XR^{12}$, $-C(=O)R^{13}$, $-N(R^{12})C(=O)R^{13}$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})SO_2R^{13}$ and $-SO_2R^{13}$;

each R^9 is 1-5 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$ -CN, $-XR^{12}$, $-C(=O)R^{13}$, $-N(R^{12})C(=O)R^{13}$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})SO_2R^{13}$ and $-SO_2R^{13}$;

each R^{10} is independently selected from the group consisting of H, C_{1-9} alkyl, $-(C_{1-9}\text{ alkyl})_nN(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^8$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^8$;

each R^{11} is independently selected from the group consisting of C_{1-9} alkyl, $-N(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^8$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^8$;

each R^{12} is independently selected from the group consisting of H, C_{1-9} alkyl, $-(C_{1-9}\text{ alkyl})_nN(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}$;

each R^{13} is independently selected from the group consisting of C_{1-9} alkyl, $-N(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}$;

each R^{14} is independently selected from the group consisting of H, C_{1-3} alkyl, carbocyclyl and aryl;

each X is selected from the group consisting of a bond, -O- and -S-; and

each n is 0 or 1.

[0013] Some embodiments include stereoisomers and pharmaceutically acceptable salts of a compound of general formula (**I**).

[0014] Some embodiments include pro-drugs of a compound of general formula (**I**).

[0015] Some embodiments of the present invention include pharmaceutical compositions comprising a compound of general formula (**I**) or in a pharmaceutically acceptable carrier, diluent, or excipient.

[0016] Other embodiments disclosed herein include methods of inhibiting one or more members of the Wnt pathway, including one or more Wnt proteins by administering to a subject affected by a disorder or disease in which aberrant Wnt signaling is implicated, such as cancer and other diseases associated with abnormal angiogenesis, cellular proliferation, cell cycling and mutations in Wnt signaling components, a compound according to formula (**I**). Accordingly, the compounds and compositions provided herein can be used to treat cancer, to reduce or inhibit angiogenesis, to reduce or inhibit cellular proliferation and correct a genetic disorder due to mutations in Wnt signaling components. Non-limiting examples of diseases which can be treated with the compounds and compositions provided herein include a variety of cancers, diabetic retinopathy, pulmonary fibrosis, rheumatoid arthritis, scleroderma, mycotic and viral infections, osteochondrodysplasia, Alzheimer's disease, lung disease, osteoarthritis, polyposis coli, osteoporosis-pseudoglioma syndrome, familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-ameliasyndrome, Müllerian-duct regression and virilization, SERKAL syndrome, diabetes mellitus type 2, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication syndrome, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome.

[0017] Some embodiments of the present invention include methods to prepare a compound of general formula (**I**).

[0018] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention, as claimed.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Compositions and methods for inhibiting one or more members of the Wnt pathway, including one or more Wnt proteins would be of tremendous benefit. Certain embodiments provide such compositions and methods.

[0020] Some embodiments relate to a method for treating a disease including, but not limited to, cancers, diabetic retinopathy, pulmonary fibrosis, rheumatoid arthritis, scleroderma, mycotic and viral infections, bone and cartilage diseases, Alzheimer's disease, lung disease, osteoarthritis, polyposis coli, bone density and vascular defects in the eye (Osteoporosis-pseudoglioma Syndrome, OPPG), familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-amelia, Müllerian-duct regression and virilization, SERKAL syndrome, type II diabetes, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman's syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome.

[0021] In some embodiments, pharmaceutical compositions are provided that are effective for treatment of a disease of an animal, *e.g.*, a mammal, caused by the pathological activation or mutations of the Wnt pathway. The composition includes a pharmaceutically acceptable carrier and a Wnt pathway inhibitor as described herein.

Definitions

[0022] 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 to which this disclosure belongs. All patents, applications, published applications, and other publications are incorporated by reference in their entirety. In the event that there is a plurality of definitions for a term herein, those in this section prevail unless stated otherwise.

[0023] In this specification and in the claims, the following terms have the meanings as defined. As used herein, "alkyl" means a branched, or straight chain chemical group containing only carbon and hydrogen, such as methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl and pentyl. Alkyl groups can either be unsubstituted or substituted with one or more substituents, e.g., halide, alkoxy, acyloxy, amino, amido, cyano, nitro, hydroxyl, mercapto, carboxy, carbonyl, benzyloxy, aryl, heteroaryl, or other functionality that may be suitably blocked, if necessary for purposes of the invention, with a protecting group. Alkyl groups can be saturated or unsaturated (e.g., containing -C=C- or -C≡C- subunits), at one or several positions. Typically, alkyl groups will comprise 1 to 9 carbon atoms, preferably 1 to 6, more preferably 1 to 4, and most preferably 1 to 2 carbon atoms.

[0024] As used herein, "carbocyclyl" means a cyclic ring system containing only carbon atoms in the ring system backbone, such as cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, and cyclohexenyl. Carbocyclyls may include multiple fused rings. Carbocyclyls may have any degree of saturation provided that at least one ring in the ring system is not aromatic. Carbocyclyl groups can either be unsubstituted or substituted with one or more substituents, e.g., alkyl, halide, alkoxy, acyloxy, amino, amido, cyano, nitro, hydroxyl, mercapto, carboxy, carbonyl, benzyloxy, aryl, heteroaryl, or other functionality that may be suitably blocked, if necessary for purposes of the invention, with a protecting group. Typically, carbocyclyl groups will comprise 3 to 10 carbon atoms, preferably 3 to 6.

[0025] As used herein, "lower alkyl" means a subset of alkyl having 1 to 3 carbon atoms, and thus is a hydrocarbon substituent, which is linear, or branched. Examples of lower alkyl include methyl, ethyl, n-propyl and isopropyl. Likewise, radicals

using the terminology "lower" refer to radicals preferably with 1 to about 3 carbons in the alkyl portion of the radical.

[0026] As used herein, "amido" means a H-CON- or alkyl-CON-, carbocyclyl-CON-, aryl-CON-, heteroaryl-CON- or heterocyclyl-CON group wherein the alkyl, carbocyclyl, aryl or heterocyclyl group is as herein described.

[0027] As used herein, "aryl" means an aromatic radical having a single-ring (e.g., phenyl) or multiple condensed rings (e.g., naphthyl or anthryl) with only carbon atoms present in the ring backbone. Aryl groups can either be unsubstituted or substituted with one or more substituents, e.g., alkyl, amino, cyano, hydroxyl, lower alkyl, haloalkyl, alkoxy, nitro, halo, mercapto, and other substituents. A preferred carbocyclic aryl is phenyl.

[0028] As used herein, the term "heteroaryl" means an aromatic radical having one or more heteroatom(s) (e.g., N, O, or S) in the ring backbone and may include a single ring (e.g., pyridine) or multiple condensed rings (e.g., quinoline). Heteroaryl groups can either be unsubstituted or substituted with one or more substituents, e.g., amino, cyano, hydroxyl, lower alkyl, haloalkyl, alkoxy, nitro, halo, mercapto, and other substituents. Examples of heteroaryl include thienyl, pyridinyl, furyl, oxazolyl, oxadiazolyl, pyrrolyl, imidazolyl, triazolyl, thiodiazolyl, pyrazolyl, isoxazolyl, thiadiazolyl, pyranyl, pyrazinyl, pyrimidinyl, pyridazinyl, triazinyl, thiazolyl benzothienyl, benzoxadiazolyl, benzofuranyl, benzimidazolyl, benzotriazolyl, cinnolinyl, indazolyl, indolyl, isoquinolinyl, isothiazolyl, naphthyridinyl, purinyl, thienopyridinyl, pyrido[2,3-*d*]pyrimidinyl, pyrrolo[2,3-*b*]pyridinyl, quinazolinyl, quinolinyl, thieno[2,3-*c*]pyridinyl, pyrazolo[3,4-*b*]pyridinyl, pyrazolo[3,4-*c*]pyridinyl, pyrazolo[4,3-*c*]pyridine, pyrazolo[4,3-*b*]pyridinyl, tetrazolyl, and others.

[0029] In these definitions it is clearly contemplated that substitution on the aryl and heteroaryl rings is within the scope of certain embodiments. Where substitution occurs, the radical is called substituted aryl or substituted heteroaryl. Preferably one to three and more preferably one or two substituents occur on the aryl ring. Though many substituents will be useful, preferred substituents include those commonly found in aryl compounds, such as alkyl, cycloalkyl, hydroxy, alkoxy, cyano, halo, haloalkyl, mercapto and the like.

[0030] As used herein, “amide” includes both RNR’CO- (in the case of R = alkyl, alkaminocarbonyl-) and RCONR’- (in the case of R = alkyl, alkyl carbonylamino-).

[0031] As used herein, the term “ester” includes both ROCO- (in the case of R = alkyl, alkoxycarbonyl-) and RCOO- (in the case of R = alkyl, alkylcarbonyloxy-).

[0032] As used herein, "acyl" means an H-CO- or alkyl-CO-, carbocyclyl-CO-, aryl-CO-, heteroaryl-CO- or heterocyclyl-CO- group wherein the alkyl, carbocyclyl, aryl or heterocyclyl group is as herein described. Preferred acyls contain a lower alkyl. Exemplary alkyl acyl groups include formyl, acetyl, propanoyl, 2-methylpropanoyl, t-butylacetyl, butanoyl and palmitoyl.

[0033] As used herein, "halo”, “halide” or “halogen” is a chloro, bromo, fluoro or iodo atom radical. Chloro, bromo and fluoro are preferred halides. Most preferred halide is fluorine.

[0034] As used herein, "haloalkyl" means a hydrocarbon substituent, which is linear or branched or cyclic alkyl, alkenyl or alkynyl substituted with chloro, bromo, fluoro or iodo atom(s). Most preferred of these are fluoroalkyls, wherein one or more of the hydrogen atoms have been substituted by fluoro. Preferred haloalkyls are of 1 to about 3 carbons in length, more preferred haloalkyls are 1 to about 2 carbons, and most preferred are 1 carbon in length. The skilled artisan will recognize then that as used herein, "haloalkylene" means a diradical variant of haloalkyl, such diradicals may act as spacers between radicals, other atoms, or between the parent ring and another functional group.

[0035] As used herein, “heterocyclyl” means a cyclic ring system comprising at least one heteroatom in the ring system backbone. Heterocyclyls may include multiple fused rings. Heterocyclyls may have any degree of saturation provided that at least one ring in the ring system is not aromatic. Heterocyclyls may be substituted or unsubstituted with one or more substituents, e.g., alkyl, halide, alkoxy, acyloxy, amino, amido, cyano, nitro, hydroxyl, mercapto, carboxy, carbonyl, benzyloxy, aryl, heteroaryl, and other substituents, and are attached to other groups via any available valence, preferably any available carbon or nitrogen. More preferred heterocycles are of 5-7 members. In six membered monocyclic heterocycles, the heteroatom(s) are selected from one up to three of O, N or S, and wherein when the heterocycle is five membered, preferably it has one

or two heteroatoms selected from O, N, or S. Examples of heterocyclyl include azirinyl, aziridinyl, azetidinyl, oxetanyl, thietanyl, 1,4,2-dithiazolyl, 1,3-benzodioxolyl, dihydroisoindolyl, dihydroisoquinolinyl, dihydrocinnolinyl, dihydrobenzodioxinyl, dihydro[1,3]oxazolo[4,5-b]pyridinyl, benzothiazolyl, dihydroindolyl, dihydropyridinyl, 1,3-dioxanyl, 1,4-dioxanyl, 1,3-dioxolanyl, isoindolinyl, morpholinyl, thiomorpholinyl, piperazinyl, pyranyl, pyrrolidinyl, tetrahydrofuryl, tetrahydropyridinyl, oxazinyl, thiazinyl, thiinyl, thiazolidinyl, isothiazolidinyl, oxazolidinyl, isoxazolidinyl, piperidinyl, pyrazolidinyl imidazolidinyl, thiomorpholinyl, and others.

[0036] As used herein, "substituted amino" means an amino radical which is substituted by one or two alkyl, cycloalkyl, aryl, heteroaryl or heterocyclyl groups, wherein the alkyl, aryl, heteroaryl or heterocyclyl are defined as above.

[0037] As used herein, "substituted thiol" means RS- group wherein R is an alkyl, an aryl, heteroaryl or a heterocyclyl group, wherein the alkyl, cycloalkyl, aryl, heteroaryl or heterocyclyl are defined as above.

[0038] As used herein, "sulfonyl" means an alkylSO_2, arylSO_2, heteroarylSO_2, carbocyclylSO_2, or heterocyclyl-SO_2 group wherein the alkyl, carbocyclyl, aryl, heteroaryl or heterocyclyl are defined as above.

[0039] As used herein, "sulfamido" means an alkyl-N-$S(O)_2N$-, aryl-$NS(O)_2N$-, heteroaryl-$NS(O)_2N$-, carbocyclyl-$NS(O)_2N$ or heterocyclyl-$NS(O)_2N$- group wherein the alkyl, carbocyclyl, aryl, heteroaryl or heterocyclyl group is as herein described.

[0040] As used herein, "sulfonamido" means an alkyl-$S(O)_2N$-, aryl-$S(O)_2N$-, heteroaryl-$S(O)_2N$-, carbocyclyl-$S(O)_2N$- or heterocyclyl-$S(O)_2N$- group wherein the alkyl, carbocyclyl, aryl, heteroaryl or heterocyclyl group is as herein described.

[0041] As used herein, "ureido" means an alkyl-NCON-, aryl-NCON-, heteroaryl-NCON- , carbocyclyl-NCON- or heterocyclyl-NCON- group wherein the alkyl, carbocyclyl, aryl, heteroaryl or heterocyclyl group is as herein described.

[0042] As used herein, when two groups are indicated to be "linked" or "bonded" to form a "ring," it is to be understood that a bond is formed between the two groups and may involve replacement of a hydrogen atom on one or both groups with the bond, thereby forming a carbocyclyl, heterocyclyl, aryl, or heteroaryl ring. The skilled

artisan will recognize that such rings can and are readily formed by routine chemical reactions, and it is within the purview of the skilled artisan to both envision such rings and the methods of their formations. Preferred are rings having from 3-7 members, more preferably 5 or 6 members. As used herein the term "ring" or "rings" when formed by the combination of two radicals refers to heterocyclic, carbocyclic, aryl, or heteroaryl rings.

[0043] The skilled artisan will recognize that some structures described herein may be resonance forms or tautomers of compounds that may be fairly represented by other chemical structures, even when kinetically; the artisan recognizes that such structures are only a very small portion of a sample of such compound(s). Such compounds are clearly contemplated within the scope of this invention, though such resonance forms or tautomers may not be explicitly represented herein.

[0044] The compounds provided herein may encompass various stereochemical forms. The compounds also encompasses diastereomers as well as optical isomers, e.g. mixtures of enantiomers including racemic mixtures, as well as individual enantiomers and diastereomers, which arise as a consequence of structural asymmetry in certain compounds. Separation of the individual isomers or selective synthesis of the individual isomers is accomplished by application of various methods which are well known to practitioners in the art. Unless otherwise indicated, when a disclosed compound is named or depicted by a structure without specifying the stereochemistry and has one or more chiral centers, it is understood to represent all possible stereoisomers of the compound.

[0045] The term "administration" or "administering" refers to a method of giving a dosage of a compound or pharmaceutical composition to a vertebrate or invertebrate, including a mammal, a bird, a fish, or an amphibian, where the method is, *e.g.*, orally, subcutaneously, intravenously, intranasally, topically, transdermally, intraperitoneally, intramuscularly, intrapulmonarilly, vaginally, rectally, ontologically, neuro-otologically, intraocularly, subconjuctivally, via anterior eye chamber injection, intravitreally, intraperitoneally, intrathecally, intracystically, intrapleurally, via wound irrigation, intrabuccally, intra-abdominally, intra-articularly, intra-aurally, intrabronchially, intracapsularly, intrameningeally, via inhalation, via endotracheal or endobronchial instillation, via direct instillation into pulmonary cavities, intraspinally,

intrasynovially, intrathoracically, via thoracostomy irrigation, epidurally, intratympanically, intracisternally, intravascularly, intraventricularly, intraosseously, via irrigation of infected bone, or via application as part of any admixture with a prosthetic devices. The preferred method of administration can vary depending on various factors, *e.g.*, the components of the pharmaceutical composition, the site of the disease, the disease involved, and the severity of the disease.

[0046] A "diagnostic" as used herein is a compound, method, system, or device that assists in the identification and characterization of a health or disease state. The diagnostic can be used in standard assays as is known in the art.

[0047] The term "mammal" is used in its usual biological sense. Thus, it specifically includes humans, cattle, horses, dogs, and cats, but also includes many other species.

[0048] The term "pharmaceutically acceptable carrier" or "pharmaceutically acceptable excipient" includes any and all solvents, co-solvents, complexing agents, dispersion media, coatings, antibacterial and antifungal agents, isotonic and absorption delaying agents and the like which are not biologically or otherwise undesirable. The use of such media and agents for pharmaceutically active substances is well known in the art. Except insofar as any conventional media or agent is incompatible with the active ingredient, its use in the therapeutic compositions is contemplated. Supplementary active ingredients can also be incorporated into the compositions. In addition, various adjuvants such as are commonly used in the art may be included. These and other such compounds are described in the literature, *e.g.*, in the Merck Index, Merck & Company, Rahway, NJ. Considerations for the inclusion of various components in pharmaceutical compositions are described, *e.g.*, in Gilman *et al.* (Eds.) (2010); Goodman and Gilman's: The Pharmacological Basis of Therapeutics, 12th Ed., The McGraw-Hill Companies.

[0049] The term "pharmaceutically acceptable salt" refers to salts that retain the biological effectiveness and properties of the compounds of the preferred embodiments and, which are not biologically or otherwise undesirable. In many cases, the compounds of the preferred embodiments are capable of forming acid and/or base salts by virtue of the presence of amino and/or carboxyl groups or groups similar thereto. Pharmaceutically acceptable acid addition salts can be formed with inorganic acids and

organic acids. Inorganic acids from which salts can be derived include, for example, hydrochloric acid, hydrobromic acid, sulfuric acid, nitric acid, phosphoric acid, and the like. Organic acids from which salts can be derived include, for example, acetic acid, propionic acid, glycolic acid, pyruvic acid, oxalic acid, maleic acid, malonic acid, succinic acid, fumaric acid, tartaric acid, citric acid, benzoic acid, cinnamic acid, mandelic acid, methanesulfonic acid, ethanesulfonic acid, p-toluenesulfonic acid, salicylic acid, and the like. Pharmaceutically acceptable base addition salts can be formed with inorganic and organic bases. Inorganic bases from which salts can be derived include, for example, sodium, potassium, lithium, ammonium, calcium, magnesium, iron, zinc, copper, manganese, aluminum, and the like; particularly preferred are the ammonium, potassium, sodium, calcium and magnesium salts. Organic bases from which salts can be derived include, for example, primary, secondary, and tertiary amines, substituted amines including naturally occurring substituted amines, cyclic amines, basic ion exchange resins, and the like, specifically such as isopropylamine, trimethylamine, diethylamine, triethylamine, tripropylamine, and ethanolamine. Many such salts are known in the art, as described in World Patent Publication 87/05297, Johnston et al., published September 11, 1987 (incorporated by reference herein).

[0050] "Solvate" refers to the compound formed by the interaction of a solvent and a Wnt pathway inhibitor, a metabolite, or salt thereof. Suitable solvates are pharmaceutically acceptable solvates including hydrates.

[0051] "Subject" as used herein, means a human or a non-human mammal, *e.g.*, a dog, a cat, a mouse, a rat, a cow, a sheep, a pig, a goat, a non-human primate or a bird, *e.g.*, a chicken, as well as any other vertebrate or invertebrate.

[0052] By "therapeutically effective amount" or "pharmaceutically effective amount" is one which is sufficient to achieve the desired effect and may vary according to the nature and severity of the disease condition, and the potency of the compound. "Therapeutically effective amount" is also intended to include one or more of the compounds of formula (**I**) in combination with one or more other agents that are effective to inhibit Wnt related diseases and/or conditions. The combination of compounds is preferably a synergistic combination. Synergy, as described, for example, by Chou and Talalay, *Advances in Enzyme Regulation* **(1984)**, *22*, 27-55, occurs when the effect of the

compounds when administered in combination is greater than the additive effect of the compounds when administered alone as a single agent. In general, a synergistic effect is most clearly demonstrated at sub-optimal concentrations of the compounds. It will be appreciated that different concentrations may be employed for prophylaxis than for treatment of an active disease. This amount can further depend upon the patient's height, weight, sex, age and medical history.

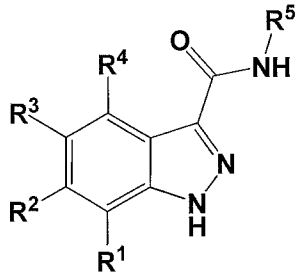
[0053] A therapeutic effect relieves, to some extent, one or more of the symptoms of the disease, and includes curing a disease. "Curing" means that the symptoms of active disease are eliminated. However, certain long-term or permanent effects of the disease may exist even after a cure is obtained (such as extensive tissue damage).

[0054] "Treat," "treatment," or "treating," as used herein refers to administering a pharmaceutical composition for therapeutic purposes. The term "therapeutic treatment" refers to administering treatment to a patient already suffering from a disease thus causing a therapeutically beneficial effect, such as ameliorating existing symptoms, preventing additional symptoms, ameliorating or preventing the underlying metabolic causes of symptoms, postponing or preventing the further development of a disorder and/or reducing the severity of symptoms that will or are expected to develop.

Compounds

[0055] The compounds and compositions described herein can be used as anti-proliferative agents, e.g., anti-cancer and anti-angiogenesis agents, and as inhibitors of the Wnt signaling pathway, e.g., for treating diseases or disorders associated with aberrant Wnt signaling. In addition, the compounds can be used as inhibitors of one or more kinases, kinase receptors, or kinase complexes. Such compounds and compositions are also useful for controlling cellular proliferation, differentiation, and/or apoptosis.

[0056] Some embodiments of the present invention include compounds, salts, pharmaceutically acceptable salts or pro-drug thereof of formula (**I**):



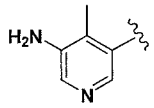
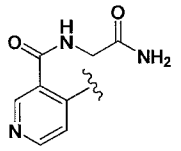
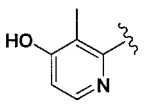
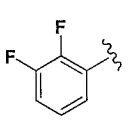
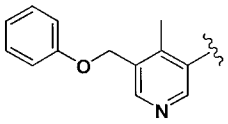
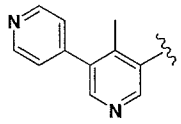
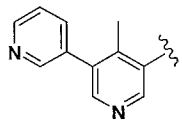
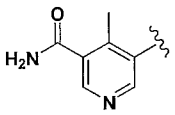
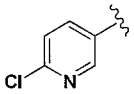
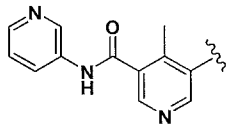
I

[0057] In some embodiments of formula **I**, R^1, R^2 and R^4 are independently selected from the group consisting of H, C_{1-9} alkyl, halide, $-N(R^{10})_2$, $-XR^{10}$, CN, $-OCF_3$ and $-CF_3$.

[0058] In some embodiments of formula **I**, R^3 is selected from the group consisting of carbocyclylR^6, heterocyclylR^6, arylR^6 and heteroarylR^6.

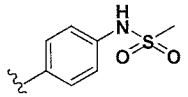
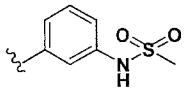
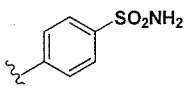
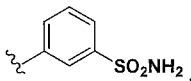
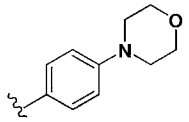
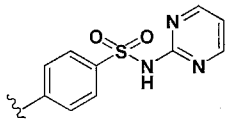
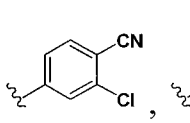
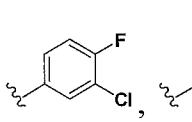
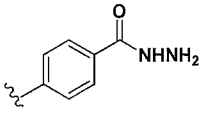
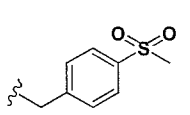
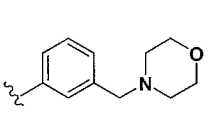
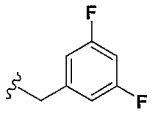
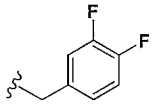
[0059] In some embodiments of formula **I**, when R^3 is heteroaryl, the heteroaryl is not selected from the group consisting of isoquinoline, 1H-pyrrolo[2,3-*c*]pyridine and tetrazole.

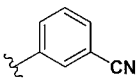
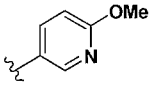
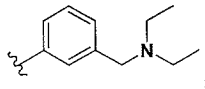
[0060] In some embodiments of formula **I**, R^5 is selected from the group consisting of $-(C_{1-9}\text{ alkyl})_n$carbocyclyl$R^7$, $-(C_{1-9}\text{ alkyl})_n$heterocyclyl$R^7$, $-(C_{1-9}\text{ alkyl})_n$aryl$R^7$ and $-(C_{1-9}\text{ alkyl})_n$heteroaryl$R^7$.

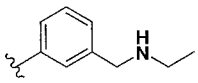
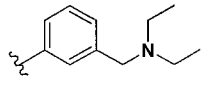
[0061] In some embodiments of formula **I**, R^5 is not 4-pyridylR^7 when R^1, R^2 and R^4 are H, R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6, 2-pyridylR^6, phenylR^6, thiazoleR^6, imidazoleR^6, pyrimidineR^6, oxazoleR^6,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H.

[0062] In some embodiments of formula **I**, R^5 is not $-(CH_2)(3\text{-pyridyl})R^7$ when R^1, R^2 and R^4 are H, R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6 and thiazoleR^6, and R^6 and R^7 are both H.

[0063] In some embodiments of formula **I**, R^5 is not phenylR^7 when R^1, R^2 and R^4 are H, R^3 is 4-pyridylR^6 and R^6 and R^7 are both H.

[0064] In some embodiments of formula **I**, R^3 is not 3-pyridylR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of phenylR^7,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  , and  , and R^6 and R^7 are both H.

[0065] In some embodiments of formula **I**, R^3 is not oxazoleR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of  ,  and  , and R^6 is H.

[0066] In some embodiments of formula **I**, R^3 is not thiazoleR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of  and  , and R^6 is H.

[0067] In some embodiments of formula **I**, each R^6 is 1-5 substituents each selected from the group consisting of H, $C_{1\text{-}9}$ alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-XR^{10}$, $-(C_{1\text{-}9}\text{ alkyl})_n\text{carbocyclyl}R^8$, $-(C_{1\text{-}9}\text{ alkyl})_n\text{heterocyclyl}R^8$, $-(C_{1\text{-}9}\text{ alkyl})_n\text{aryl}R^8$, $-(C_{1\text{-}9}\text{ alkyl})_n\text{heteroaryl}R^8$, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-(C_{1\text{-}9}\text{ alkyl})_nN(R^{10})_2$, $-(C_{1\text{-}9}\text{ alkyl})_nN(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$.

[0068] In some embodiments of formula **I**, each R^7 is 1-5 substituents each selected from the group consisting of H, C_{1-9} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-XR^{10}$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^9$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^9$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^9$, $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^9$, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-(C_{1-9}\text{ alkyl})_nN(R^{10})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$.

[0069] In some embodiments of formula **I**, each R^8 is 1-5 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, OCF_3, $-CF_3$ -CN, $-XR^{12}$, $-C(=O)R^{13}$, $-N(R^{12})C(=O)R^{13}$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})SO_2R^{13}$ and $-SO_2R^{13}$.

[0070] In some embodiments of formula **I**, each R^9 is 1-5 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$ -CN, $-XR^{12}$, $-C(=O)R^{13}$, $-N(R^{12})C(=O)R^{13}$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})_2$, $-(C_{1-9}\text{ alkyl})_nN(R^{12})SO_2R^{13}$ and $-SO_2R^{13}$.

[0071] In some embodiments of formula **I**, each R^{10} is independently selected from the group consisting of H, C_{1-9} alkyl, $-(C_{1-9}\text{ alkyl})_nN(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^8$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^8$.

[0072] In some embodiments of formula **I**, each R^{11} is independently selected from the group consisting of C_{1-9} alkyl, $-N(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}R^8$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}R^8$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}R^8$.

[0073] In some embodiments of formula **I**, each R^{12} is independently selected from the group consisting of H, C_{1-9} alkyl, $-(C_{1-9}\text{ alkyl})_nN(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}$.

[0074] In some embodiments of formula **I**, each R^{13} is independently selected from the group consisting of C_{1-9} alkyl, $-N(R^{14})_2$, $-(C_{1-9}\text{ alkyl})_n\text{carbocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{heterocyclyl}$, $-(C_{1-9}\text{ alkyl})_n\text{aryl}$ and $-(C_{1-9}\text{ alkyl})_n\text{heteroaryl}$.

[0075] In some embodiments of formula **I**, each R^{14} is independently selected from the group consisting of H, C_{1-3} alkyl, carbocyclyl and aryl.

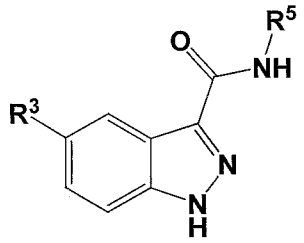
[0076] In some embodiments of formula **I**, each X is selected from the group consisting of a bond, -O- and -S-.

[0077] In some embodiments of formula **I**, each n is 0 or 1.

[0078] In some embodiments of formula **I**, X is O.

[0079] In some embodiments of formula **I**, R^1, R^2 and R^4 are H.

[0080] Some embodiments of the present invention include compounds, salts, pharmaceutically acceptable salts or pro-drug thereof of formula (**Ia**):

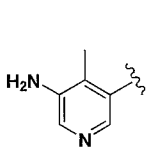
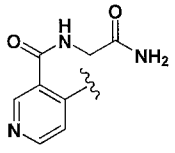
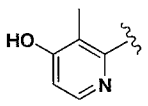
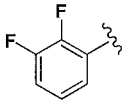
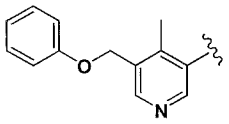
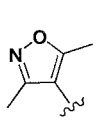
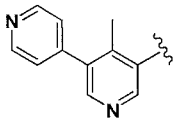
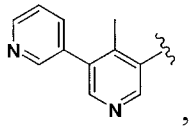
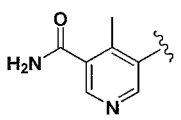
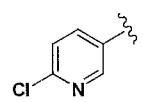
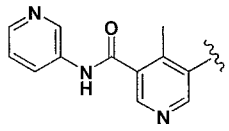


Ia

[0081] In some embodiments of formula **Ia**, R^3 is selected from the group consisting of arylR^6 and heteroarylR^6.

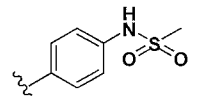
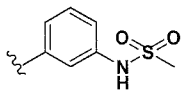
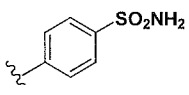
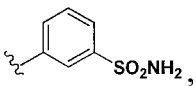
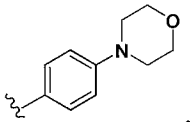
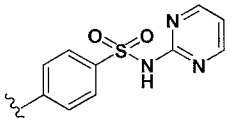
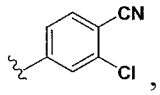
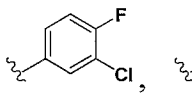
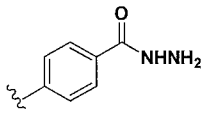
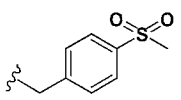
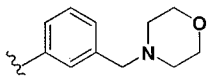
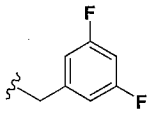
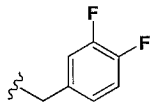
[0082] In some embodiments of formula **Ia**, when R^3 is heteroaryl, the heteroaryl is not selected from the group consisting of isoquinoline, 1H-pyrrolo[2,3-*c*]pyridine and tetrazole.

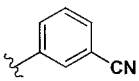
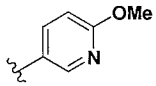
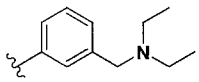
[0083] In some embodiments of formula **Ia**, R^5 is selected from the group consisting of -carbocyclylR^7, -heterocyclylR^7, -arylR^7, -heteroarylR^7, and -(C_{1-2} alkyl)heteroarylR^7.

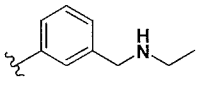
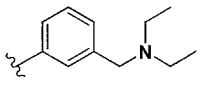
[0084] In some embodiments of formula **Ia**, R^5 is not 4-pyridylR^7 when R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6, 2-pyridylR^6, phenylR^6, thiazoleR^6, imidazoleR^6, pyrimidineR^6, oxazoleR^6,  ,  ,  ,  ,  ,  ,  ,  ,  ,  , and  , and R^6 and R^7 are both H.

[0085] In some embodiments of formula **Ia**, R^5 is not $-(CH_2)$(3-pyridyl)R^7 when R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6 and thiazoleR^6, and R^6 and R^7 are both H.

[0086] In some embodiments of formula **Ia**, R^5 is not phenylR^7 when R^3 is 4-pyridylR^6 and R^6 and R^7 are both H.

[0087] In some embodiments of formula **Ia**, R^3 is not 3-pyridylR^6 when R^5 is selected from the group consisting of phenylR^7,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H.

[0088] In some embodiments of formula **Ia**, R^3 is not oxazoleR^6 when R^5 is selected from the group consisting of  ,  and  , and R^6 is H.

[0089] In some embodiments of formula **Ia**, R^3 is not thiazoleR^6 when R^5 is selected from the group consisting of  and  , and R^6 is H.

[0090] In some embodiments of formula **Ia**, each R^6 is 1-2 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-OR^{10}$, $-(C_{1-2}$ alkyl)heterocyclylR^8, -heterocyclylR^8, $-(C_{1-2}$ alkyl)arylR^8, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$ and $-(C_{1-2}$ alkyl)$N(R^{10})_2$.

[0091] In some embodiments of formula **Ia**, each R^7 is 1-2 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-OR^{10}$, $-(C_{1-2}$ alkyl)heterocyclylR^9, -heterocyclylR^9, -arylR^9, $-(C_{1-2}$ alkyl)arylR^9, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-N(R^{10})_2$, $-(C_{1-2}$ alkyl)$N(R^{10})_2$, $-N(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$.

[0092] In some embodiments of formula **Ia**, each R^8 is 1-2 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, OCF_3, $-CF_3$ –CN and $-OR^{12}$.

[0093] In some embodiments of formula **Ia**, each R^9 is 1-2 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$ –CN and $-OR^{12}$.

[0094] In some embodiments of formula **Ia**, each R^{10} is independently selected from the group consisting of H, C_{1-3} alkyl, $-(C_{1-3}\text{ alkyl})N(R^{14})_2$ and -arylR^8.

[0095] In some embodiments of formula **Ia**, each R^{11} is independently selected from the group consisting of C_{1-3} alkyl, $-N(R^{14})_2$, -carbocyclylR^8 and -heterocyclylR^8.

[0096] In some embodiments of formula **Ia**, each R^{12} is independently selected from the group consisting of H and C_{1-3} alkyl.

[0097] In some embodiments of formula **Ia**, each R^{14} is independently selected from the group consisting of H, C_{1-3} alkyl and carbocyclyl.

[0098] In some embodiments of formula **I** or formula **Ia**, halide is fluorine.

[0099] In some embodiments of formula **I** or formula **Ia**, R^3 is –arylR^6.

[00100] In some embodiments of formula **I** or formula **Ia**, R^3 is –heteroarylR^6.

[00101] In some embodiments of formula **I** or formula **Ia**, R^5 is –arylR^7.

[00102] In some embodiments of formula **I** or formula **Ia**, R^5 is –heteroarylR^7.

[00103] In some embodiments of formula **I** or formula **Ia**, R^5 is –heterocyclylR^7.

[00104] In some embodiments of formula **I** or formula **Ia**, R^3 is –heteroarylR^6 and R^5 is –heteroarylR^7.

[00105] In some embodiments of formula **I** or formula **Ia**, R^3 is –phenylR^6 and R^5 is –heteroarylR^7.

[00106] In some embodiments of formula **I** or formula **Ia**, R^3 is –heteroarylR^6 and R^5 is –phenylR^7.

[00107] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7.

[00108] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is $-CH_2$-3-pyridylR^7.

[00109] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –pyridazinylR^7.

[00110] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –pyrazinylR^7.

[00111] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is – pyrimidinylR^7.

[00112] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is benzo[*d*][1,3]dioxolyl.

[00113] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is 2,3-dihydrobenzo[*b*][1,4]dioxinyl.

[00114] In some embodiments of formula **I** or formula **Ia**, the aryl is phenyl.

[00115] In some embodiments of formula **I** or formula **Ia**, when R^3 is heteroaryl, the heteroaryl is 3-pyridyl.

[00116] In some embodiments of formula **I** or formula **Ia**, when R^5 is heteroaryl, the heteroaryl is 3-pyridyl.

[00117] In some embodiments of formula **I** or formula **Ia**, when R^5 is heteroaryl, the heteroaryl is 5-pyrimidinyl.

[00118] In some embodiments of formula **I** or formula **Ia**, when R^5 is heteroaryl, the heteroaryl is 4-pyridazinyl.

[00119] In some embodiments of formula **I** or formula **Ia**, when R^5 is heteroaryl, the heteroaryl is pyrazolyl.

[00120] In some embodiments of formula **I** or formula **Ia**, when R^5 is heteroaryl, the heteroaryl is benzo[*d*][1,3]dioxolyl.

[00121] In some embodiments of formula **I** or formula **Ia**, when R^5 is heteroaryl, the heteroaryl is 2,3-dihydrobenzo[*b*][1,4]dioxinyl.

[00122] In some embodiments of formula **I** or formula **Ia**, R^6 is a heterocyclyl. For example, the heterocyclyl can be selected from the group consisting of morpholinyl, piperazinyl, piperidinyl, tetrahydropyranyl, azetidinyl and pyrrolidinyl. In certain embodiments, R^6 is morpholinyl. In another embodiment, R^6 is piperazinyl. In another embodiment, R^6 is piperidinyl. In another embodiment, R^6 is pyrrolidinyl.

[00123] In some embodiments of formula **I** or formula **Ia**, R^7 is a heterocyclyl. For example, the heterocyclyl can be selected from the group consisting of morpholinyl, piperazinyl, piperidinyl, tetrahydropyranyl, azetidinyl and pyrrolidinyl. In certain

embodiments, R^7 is morpholinyl. In another embodiment, R^7 is piperazinyl. In another embodiment, R^7 is piperidinyl. In another embodiment, R^7 is pyrrolidinyl. In another embodiment, R^7 is azetidinyl.

[00124] In some embodiments of formula **I** or formula **Ia**, R^{10} is a carbocyclyl. For example, the carbocyclyl can be selected from the group consisting of cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. In certain embodiments, R^{10} is cyclopropyl. In another embodiment, R^{10} is cyclobutyl. In another embodiment, R^{10} is cyclopentyl. In another embodiment, R^{10} is cyclohexyl.

[00125] In some embodiments of formula **I** or formula **Ia**, R^{11} is a heterocyclyl. For example, the heterocyclyl can be selected from the group consisting of morpholinyl, piperazinyl, piperidinyl, tetrahydropyranyl, azetidinyl and pyrrolidinyl. In certain embodiments, R^{11} is morpholinyl. In another embodiment, R^{11} is piperazinyl. In another embodiment, R^{11} is piperidinyl. In another embodiment, R^{11} is pyrrolidinyl. In another embodiment, R^{11} is azetidinyl.

[00126] In some embodiments of formula **I** or formula **Ia**, R^{11} is a carbocyclyl. For example, the carbocyclyl can be selected from the group consisting of cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. In certain embodiments, R^{11} is cyclopropyl. In another embodiment, R^{11} is cyclobutyl. In another embodiment, R^{11} is cyclopentyl. In another embodiment, R^{11} is cyclohexyl.

[00127] In some embodiments of formula **I** or formula **Ia**, R^{12} is a carbocyclyl. For example, the carbocyclyl can be selected from the group consisting of cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. In certain embodiments, R^{12} is cyclopropyl. In another embodiment, R^{12} is cyclobutyl. In another embodiment, R^{12} is cyclopentyl. In another embodiment, R^{12} is cyclohexyl.

[00128] In some embodiments of formula **I** or formula **Ia**, R^{13} is a heterocyclyl. For example, the heterocyclyl can be selected from the group consisting of morpholinyl, piperazinyl, piperidinyl, tetrahydropyranyl, azetidinyl and pyrrolidinyl. In certain embodiments, R^{13} is morpholinyl. In another embodiment, R^{13} is piperazinyl. In another embodiment, R^{13} is piperidinyl. In another embodiment, R^{13} is pyrrolidinyl. In another embodiment, R^{13} is azetidinyl.

[00129] In some embodiments of formula **I** or formula **Ia**, R^{13} is a carbocyclyl. For example, the carbocyclyl can be selected from the group consisting of cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. In certain embodiments, R^{13} is cyclopropyl. In another embodiment, R^{13} is cyclobutyl. In another embodiment, R^{13} is cyclopentyl. In another embodiment, R^{13} is cyclohexyl.

[00130] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent.

[00131] In some embodiments of formula **I** or formula **Ia**, R^6 is 1-2 substituents.

[00132] In some embodiments of formula **I**, R^6 is 1-3 substituents.

[00133] In some embodiments of formula **I**, R^6 is 1-4 substituents.

[00134] In some embodiments of formula **I** or formula **Ia**, R^6 is H.

[00135] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is a halide.

[00136] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-NH_2$.

[00137] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-OCF_3$.

[00138] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-OCH_3$.

[00139] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-CF_3$.

[00140] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is –heterocyclylR^8.

[00141] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)$heterocyclylR^8.

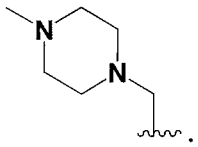
[00142] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)$pyrrolidinylR^8.

[00143] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)$pyrrolidinylR^8 where R^8 is two substituents and both substituents are halides.

[00144] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)$piperidinylR^8.

[00145] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)$phenylR^8.

[00146] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is – phenoxyR^8.

[00147] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is  .

[00148] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-N(R^{10})_2$.

[00149] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-N(R^{10})_2$ where each R^{10} is independently selected from C_{1-3} alkyl.

[00150] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)N(R^{10})_2$.

[00151] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-(CH_2)N(R^{10})_2$ where each R^{10} is independently selected from C_{1-3} alkyl.

[00152] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-N(R^{10})SO_2R^{11}$.

[00153] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-N(R^{10})C(=O)R^{11}$.

[00154] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-N(R^{10})C(=O)R^{11}$ where R^{11} is a heterocyclyl.

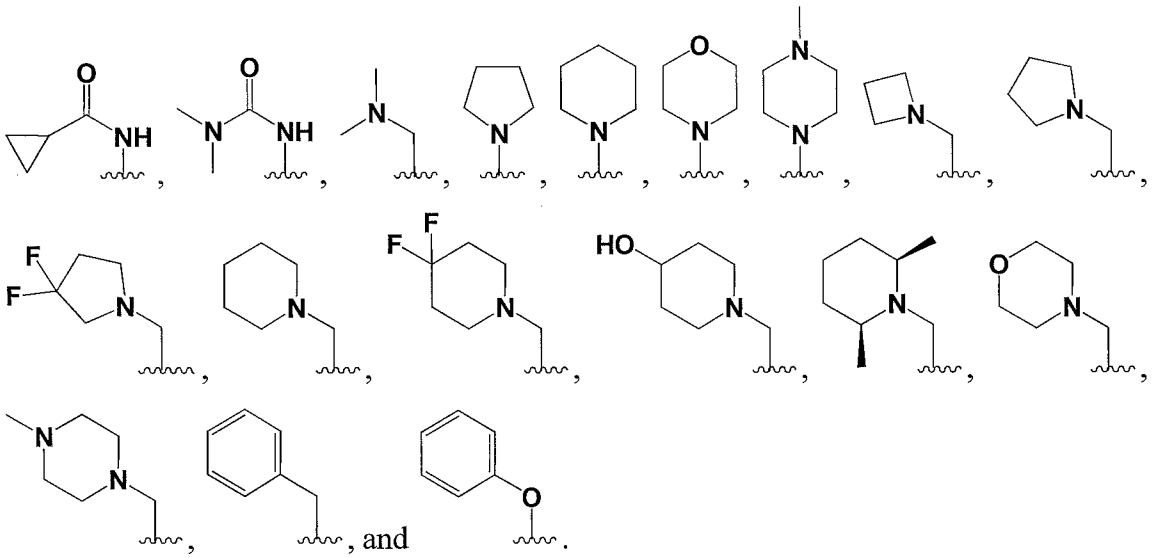
[00155] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is $-N(R^{10})C(=O)R^{11}$ where R^{11} is a carbocyclyl.

[00156] In some embodiments of formula **I**, R^6 is two substituents and the substituents are fluorine and $-(C_{1-9}$ alkyl$)_n$heterocyclylR^8.

[00157] In some embodiments of formula **Ia**, R^6 is two substituents and the substituents are fluorine and -heterocyclylR^8.

[00158] In some embodiments of formula **Ia**, R^6 is two substituents and the substituents are fluorine and -(C_{1-2} alkyl)heterocyclylR^8.

[00159] In some embodiments of formula **I** or formula **Ia**, R^6 is one substituent and the substituent is select from the group consisting of



[00160] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent.

[00161] In some embodiments of formula **I** or formula **Ia**, R^7 is 1-2 substituents.

[00162] In some embodiments of formula **I**, R^7 is 1-3 substituents.

[00163] In some embodiments of formula **I**, R^7 is 1-4 substituents.

[00164] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is a halide.

[00165] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-NH_2$.

[00166] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –OH.

[00167] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-CF_3$.

[00168] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is -CN.

[00169] In some embodiments of formula **I**, R^7 is one substituent and the substituent is $-XR^{10}$ where X is O and R^{10} is C_{1-3} alkyl.

[00170] In some embodiments of formula **Ia**, R^7 is one substituent and the substituent is $-OR^{10}$ and R^{10} is C_{1-3} alkyl.

[00171] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –phenylR^9.

[00172] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-(CH_2)N(R^{10})_2$.

[00173] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-(CH_2)N(R^{10})_2$ where each R^{10} is independently selected from C_{1-3} alkyl.

[00174] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –(CH_2)heterocyclylR^9.

[00175] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –(CH_2)pyrrolidinylR^9.

[00176] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –heterocyclylR^9.

[00177] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is – phenoxyR^9.

[00178] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –(CH_2)phenylR^9.

[00179] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is –phenylR^9.

[00180] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-N(R^{10})C(=O)R^{11}$.

[00181] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-N(R^{10})C(=O)R^{11}$ where R^{11} is a carbocyclyl.

[00182] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-N(R^{10})_2$.

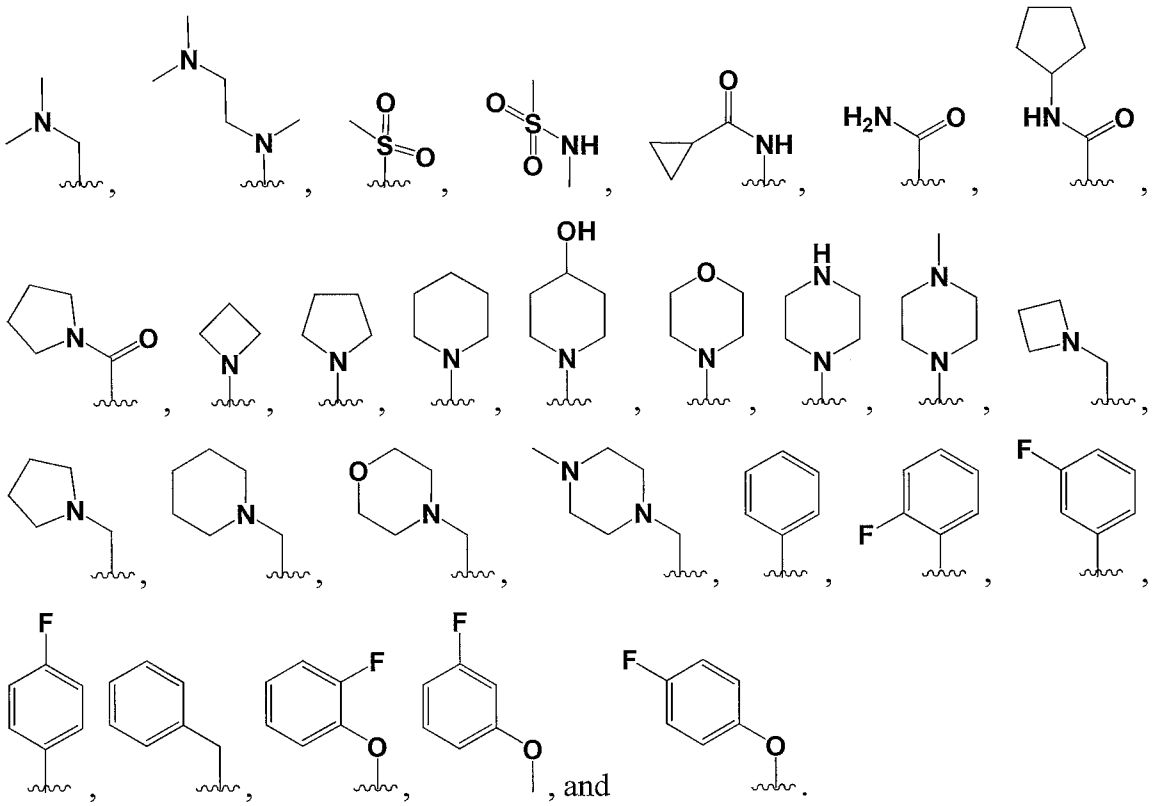
[00183] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-C(=O)R^{11}$ where R^{11} is select from the group consisting of –heterocyclylR^8 and $-N(R^{10})_2$.

[00184] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-SO_2R^{11}$.

[00185] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is $-SO_2R^{11}$; and R^{11} is C_{1-3} alkyl.

[00186] In some embodiments of formula **I** or formula **Ia**, R^7 is two substituents and the substituents are C_{1-3} alkyl and –heterocyclylR^9.

[00187] In some embodiments of formula **I** or formula **Ia**, R^7 is one substituent and the substituent is select from the group consisting of



[00188] In some embodiments of formula **I** or formula **Ia**, R^8 is one substituent.

[00189] In some embodiments of formula **I** or formula **Ia**, R^8 is 1-2 substituents.

[00190] In some embodiments of formula **I**, R^8 is 1-3 substituents.

[00191] In some embodiments of formula **I**, R^8 is 1-4 substituents.

[00192] In some embodiments of formula **I** or formula **Ia**, R^8 is H.

[00193] In some embodiments of formula **I** or formula **Ia**, R^8 is one substituent and the substituent is C_{1-3} alkyl.

[00194] In some embodiments of formula **I** or formula **Ia**, R^8 is one substituent and the substituent is –OH.

[00195] In some embodiments of formula **I** or formula **Ia**, R^8 is one substituent and the substituent is a halide.

[00196] In some embodiments of formula **I** or formula **Ia**, R^8 is two substituents and the substituents are halides.

[00197] In some embodiments of formula **I**, R^8 is three substituents and the substituents are halides.

[00198] In some embodiments of formula **I** or formula **Ia**, R^9 is one substituent.

[00199] In some embodiments of formula **I** or formula **Ia**, R^9 is 1-2 substituents.

[00200] In some embodiments of formula **I**, R^9 is 1-3 substituents.

[00201] In some embodiments of formula **I**, R^9 is 1-4 substituents.

[00202] In some embodiments of formula **I** or formula **Ia**, R^9 is H.

[00203] In some embodiments of formula **I** or formula **Ia**, R^9 is one substituent and the substituent is C_{1-3} alkyl.

[00204] In some embodiments of formula **I** or formula **Ia**, R^9 is one substituent and the substituent is –OH.

[00205] In some embodiments of formula **I** or formula **Ia**, R^9 is one substituent and the substituent is a halide.

[00206] In some embodiments of formula **I** or formula **Ia**, R^9 is two substituents and the substituents are halides.

[00207] In some embodiments of formula **I** or formula **Ia**, R^8 is a -C_{1-3} alkyl. For example, the -C_{1-3} alkyl can be selected from the group consisting of methyl, ethyl, n-propyl and isopropyl. In certain embodiments, R^8 is methyl. In another embodiment, R^8 is ethyl.

[00208] In some embodiments of formula **I** or formula **Ia**, R^{10} is a -C_{1-3} alkyl. For example, the -C_{1-3} alkyl can be selected from the group consisting of methyl, ethyl, n-propyl and iso-propyl. In certain embodiments, R^{10} is methyl. In another embodiment, R^{10} is ethyl. In another embodiment, R^{10} is n-propyl. In another embodiment, R^{10} is iso-propyl.

[00209] In some embodiments of formula **I** or formula **Ia**, R^{11} is a -C_{1-3} alkyl. For example, the -C_{1-3} alkyl can be selected from the group consisting of methyl, ethyl, n-propyl and iso-propyl. In certain embodiments, R^{11} is methyl. In another embodiment, R^{11} is ethyl. In another embodiment, R^{11} is n-propyl. In another embodiment, R^{11} is iso-propyl.

[00210] In some embodiments of formula **I** or formula **Ia**, R^{14} is a -C_{1-3} alkyl. For example, the -C_{1-3} alkyl can be selected from the group consisting of methyl, ethyl, n-propyl and iso-propyl. In certain embodiments, R^{14} is methyl. In another embodiment, R^{14} is ethyl. In another embodiment, R^{14} is n-propyl. In another embodiment, R^{14} is iso-propyl.

[00211] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)$N(R^{10})_2$; and R^7 is one substituent consisting of -CF_3; and each R^{10} is -C_{1-3} alkyl.

[00212] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 and R^8 are both H; and the heterocycle is a 5-member ring.

[00213] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 and R^8 are both H; and the heterocycle is a 6-member ring.

[00214] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of CN; R^8 is H; and the heterocycle is a 5-member ring.

[00215] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of CN; R^8 is H; and the heterocycle is a 6-member ring.

[00216] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of CF_3; R^8 is H; and the heterocycle is a 6-member ring.

[00217] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of -heterocyclylR^8; each R^8 is H; and the heterocycles are independently selected from a 5 or 6-member ring.

[00218] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)$N(R^{10})_2$; and R^7 is one substituent consisting of -CN; and each R^{10} is -C_{1-3} alkyl.

[00219] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)$N(R^{10})_2$; and R^7 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^8 is H; each R^{10} is -C_{1-3} alkyl; and the heterocycle is a 6-member ring.

[00220] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of -heterocyclylR^8; each R^8 is one substituent independently selected from H and -OH; and the heterocycles are independently selected from a 5 or 6-member ring.

[00221] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of -C(=O)R^{11}; R^{11} is -heterocyclylR^8; each R^8 is H; and the heterocycles are independently selected from a 5 or 6-member ring.

[00222] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of -heterocyclylR^8; each R^8 is 1-3 substituents independently selected from H and F with the proviso that at least one substituent on one heterocycle is fluorine; and each heterocycle is a 5-member ring.

[00223] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7

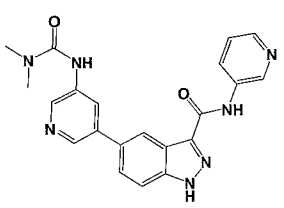
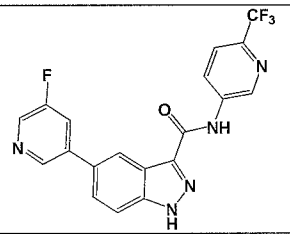
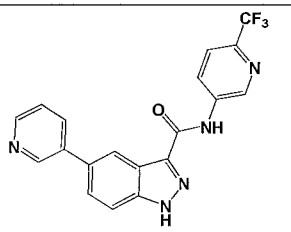
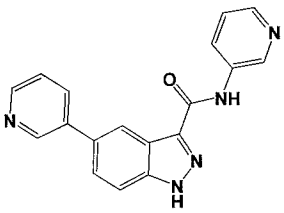
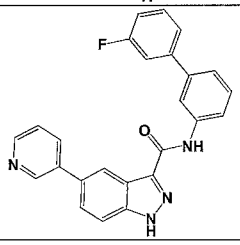
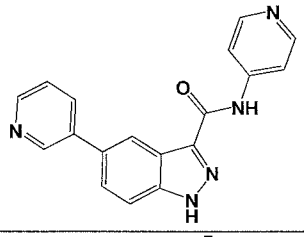
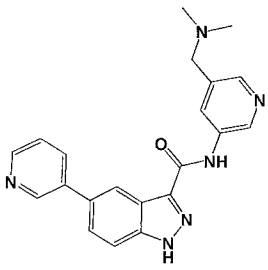
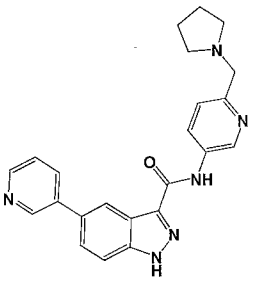
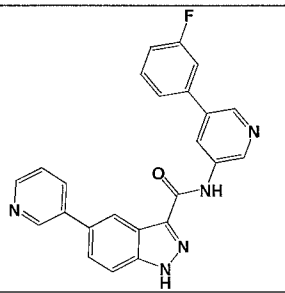
is one substituent consisting of -C(=O)R^{11}; R^{11} is -NHR^{10}; R^{10} is heterocyclylR^8; each R^8 is H; and the heterocycles are independently selected from a 5 or 6-member ring.

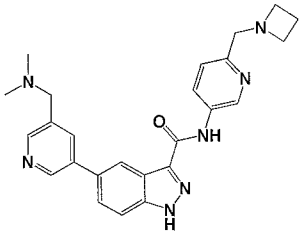
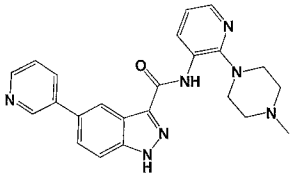
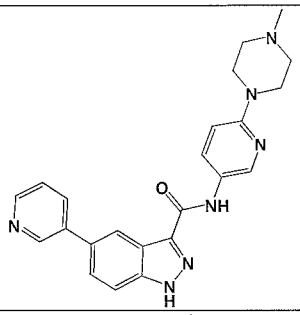
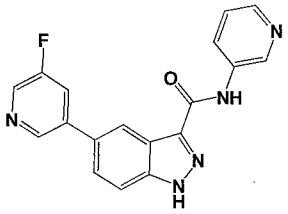
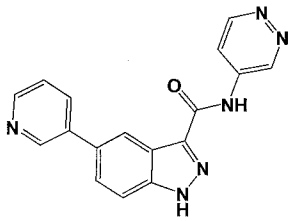
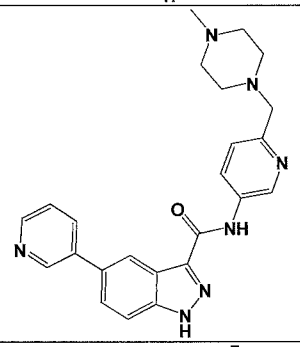
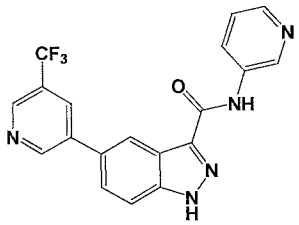
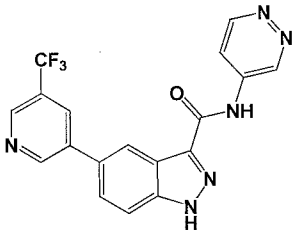
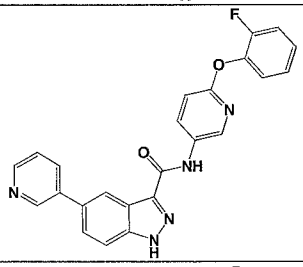
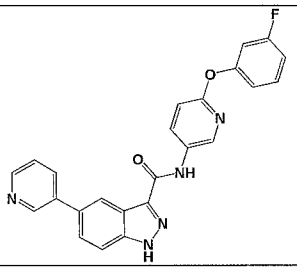
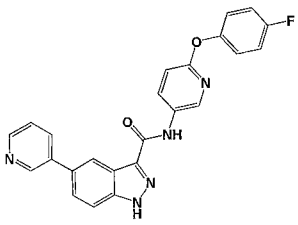
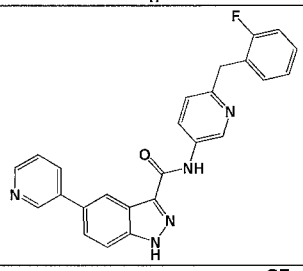
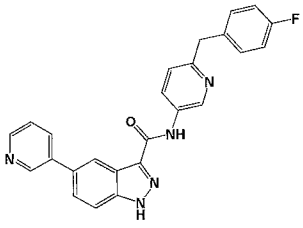
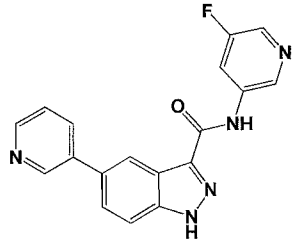
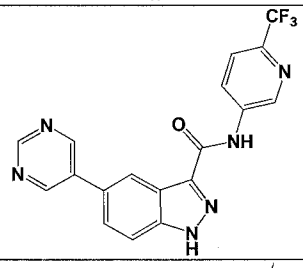
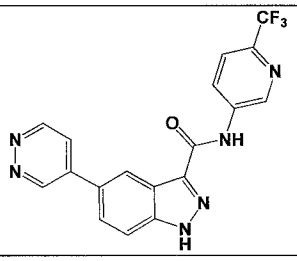
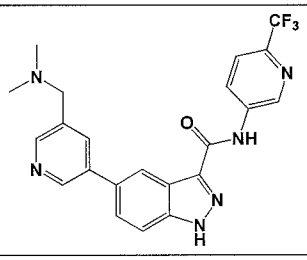
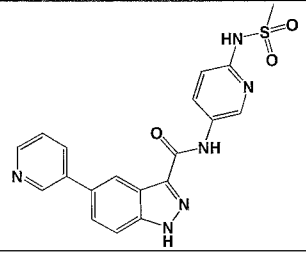
[00224] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is one substituent consisting of -SO_2R^{11}; R^8 is H; R^{11} is -C_{1-3} alkyl; and the heterocycle is a 6-member ring.

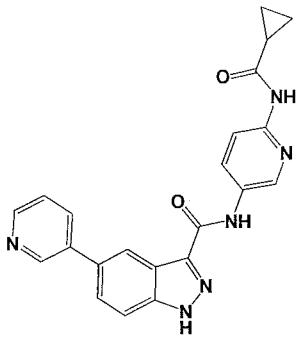
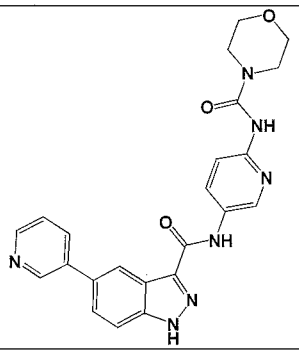
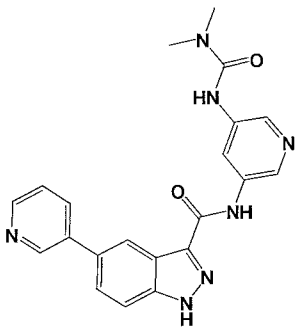
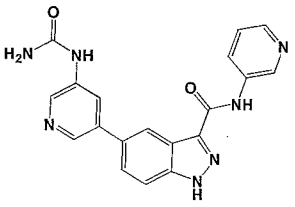
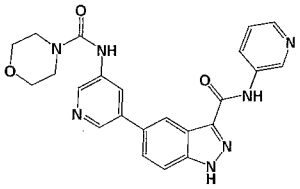
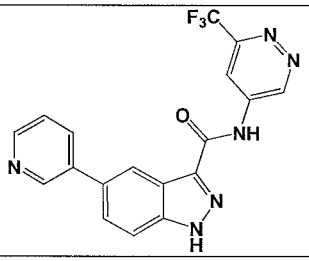
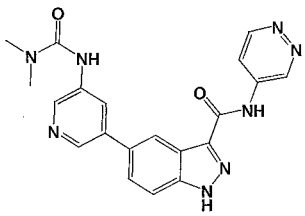
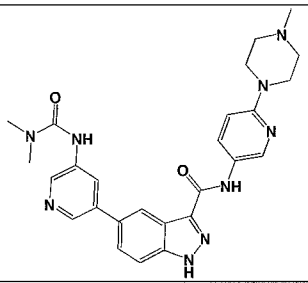
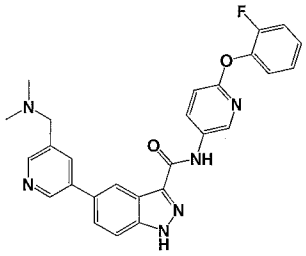
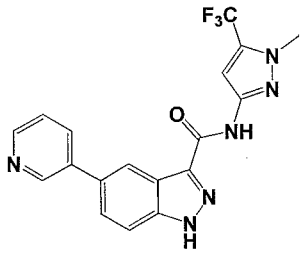
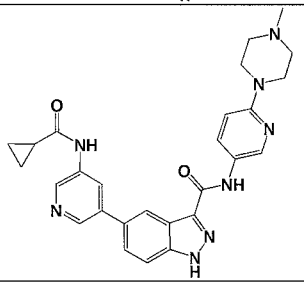
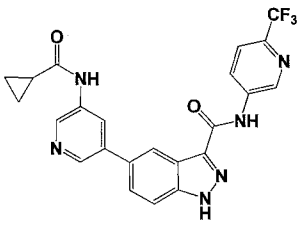
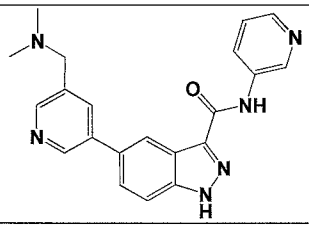
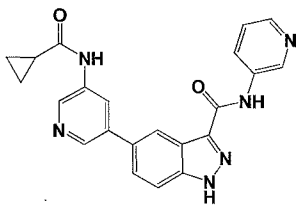
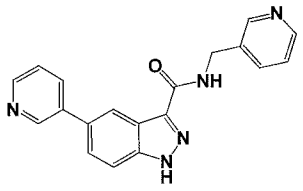
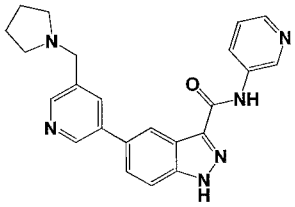
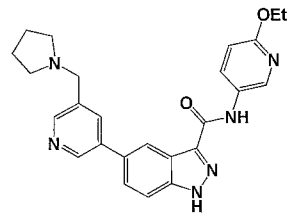
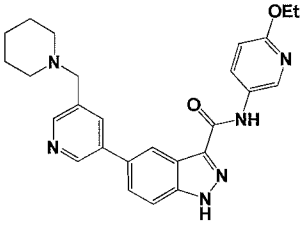
[00225] In some embodiments of formula **I** or formula **Ia**, R^3 is –3-pyridylR^6 and R^5 is –3-pyridylR^7; R^6 is one substituent consisting of -(C_{1-2} alkyl)heterocyclylR^8; R^7 is H; R^8 is 1-4 substituents independently selected from H and F with the proviso that at least one substituent is fluorine; and the heterocycle is a 5-member ring.

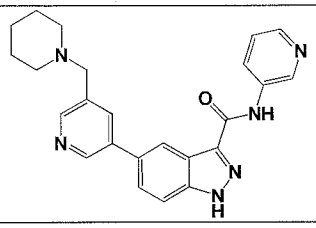
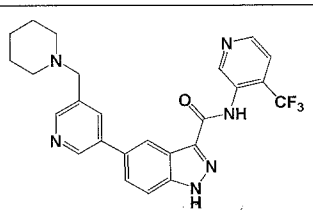
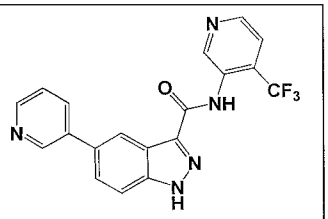
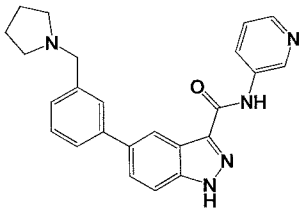
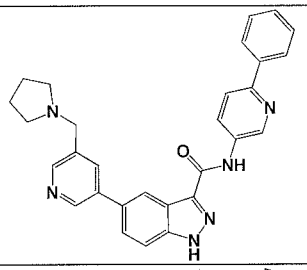
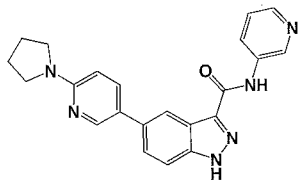
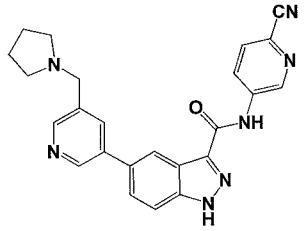
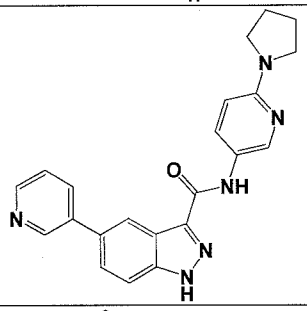
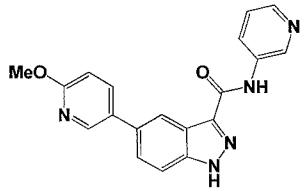
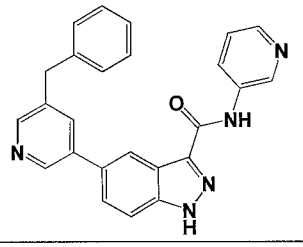
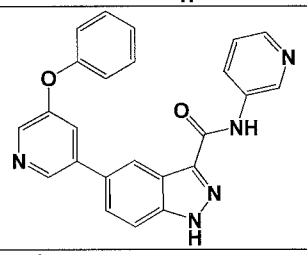
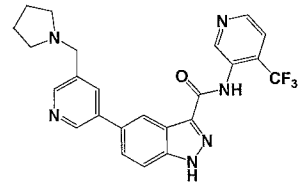
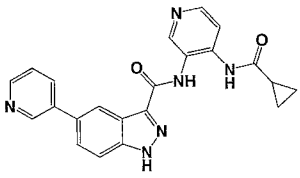
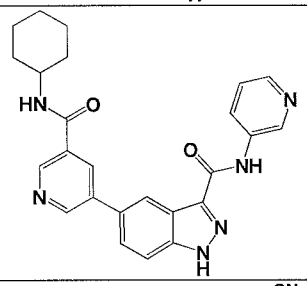
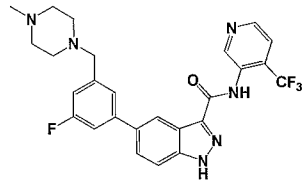
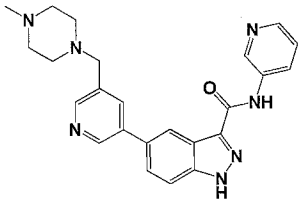
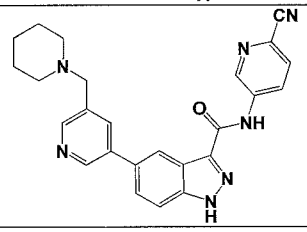
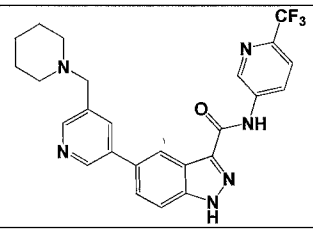
[00226] Illustrative compounds of Formula (**I**) are shown in Table 1.

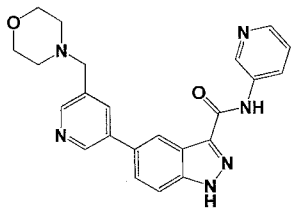
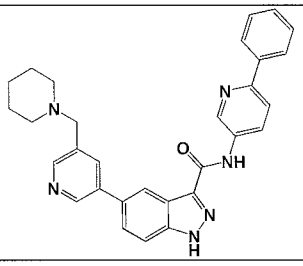
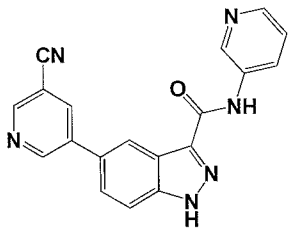
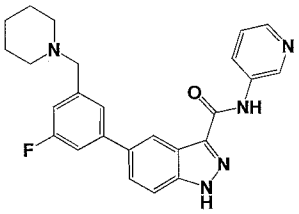
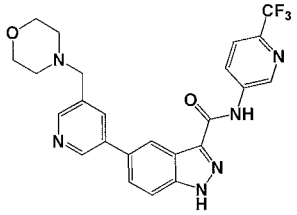
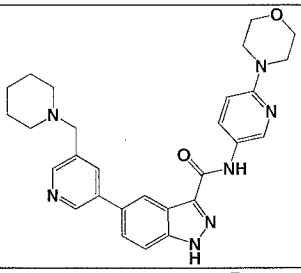
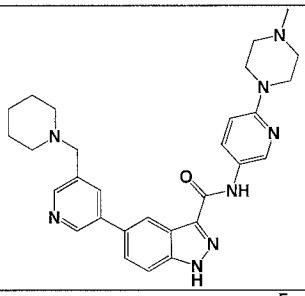
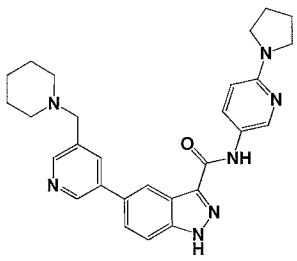
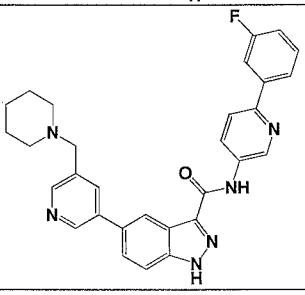
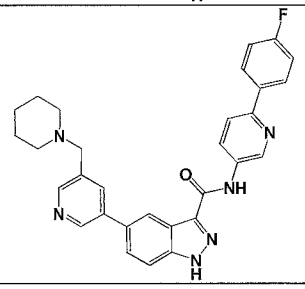
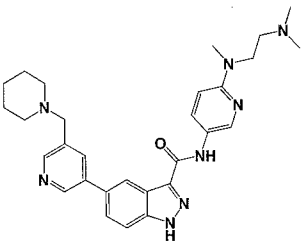
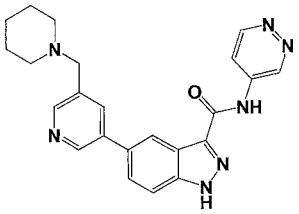
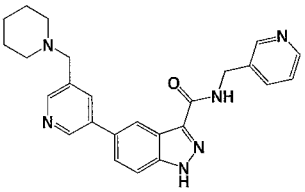
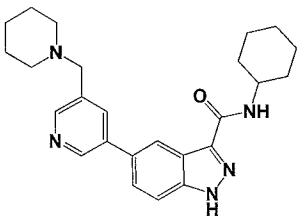
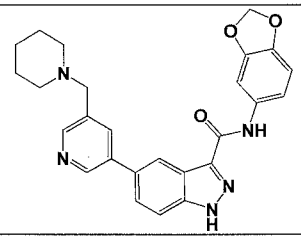
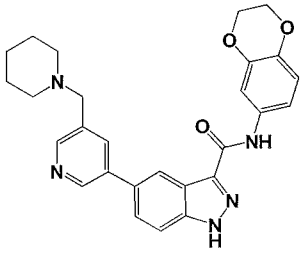
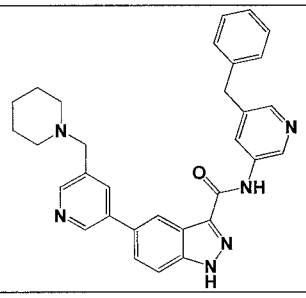
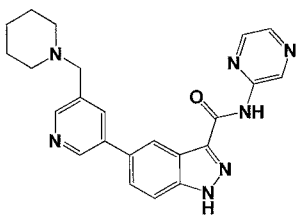
Table 1.

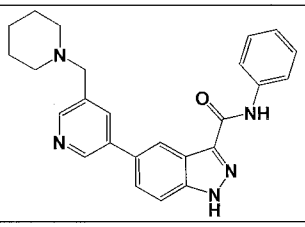
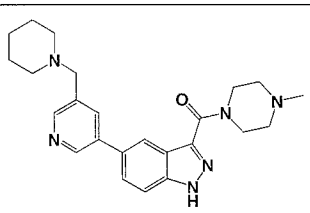
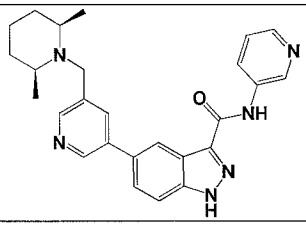
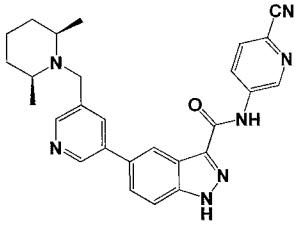
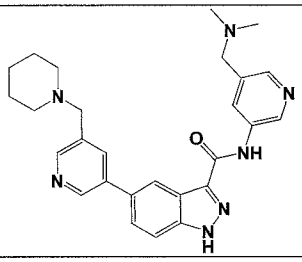
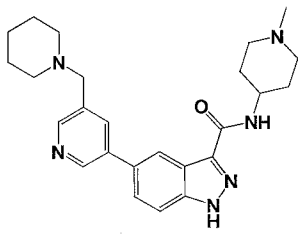
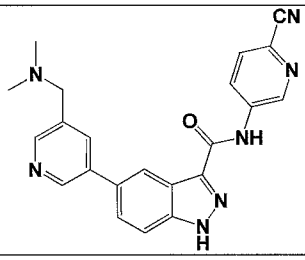
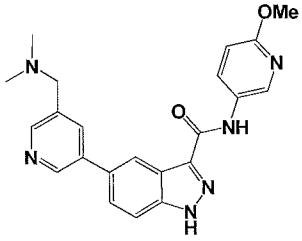
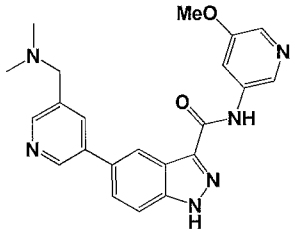
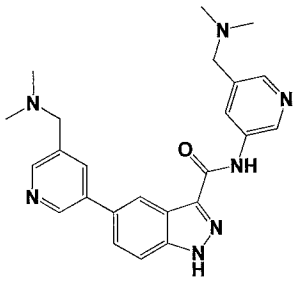
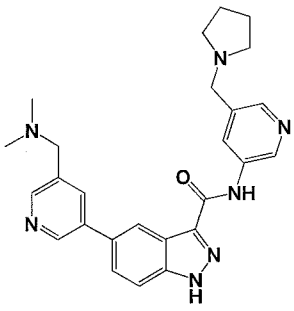
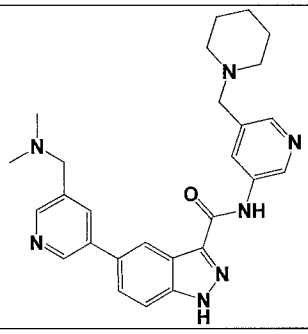
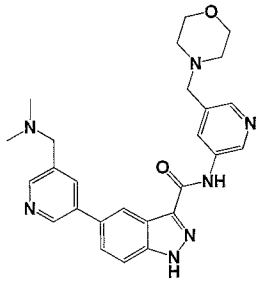
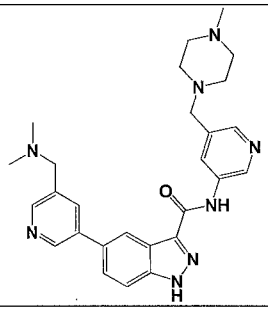
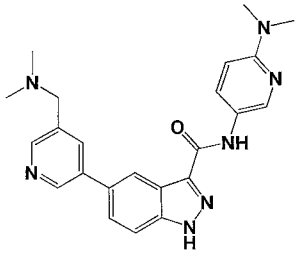
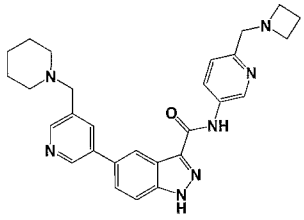
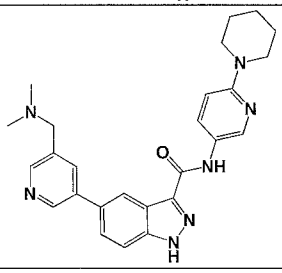
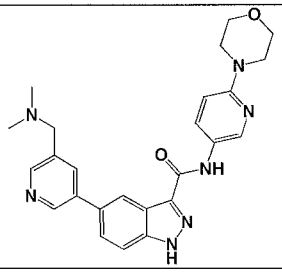
1		**2**		**3**	
4		**5**		**6**	
7		**8**		**9**	

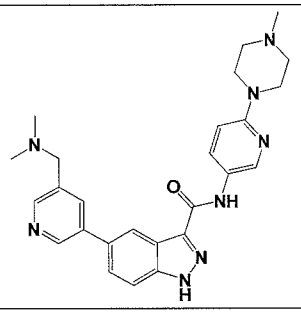
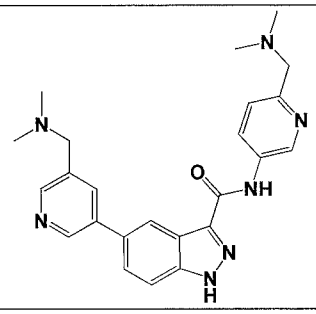
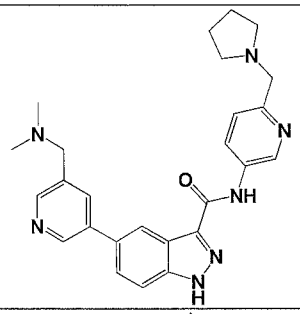
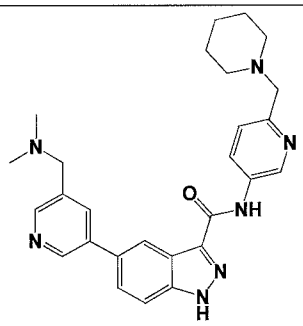
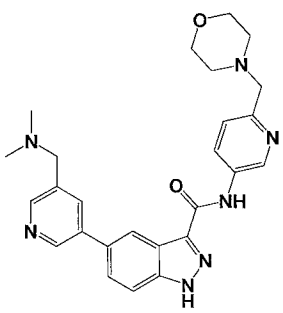
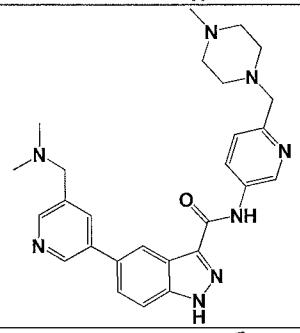
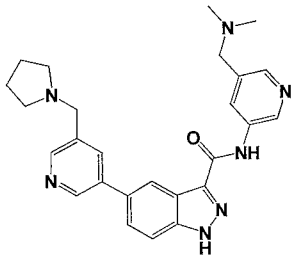
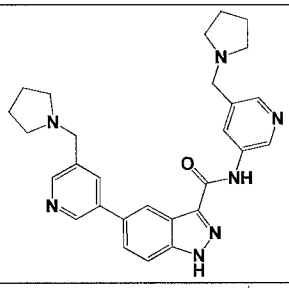
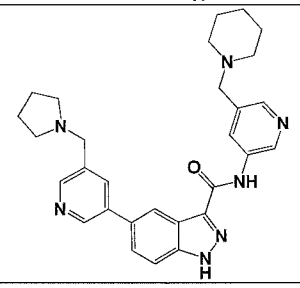
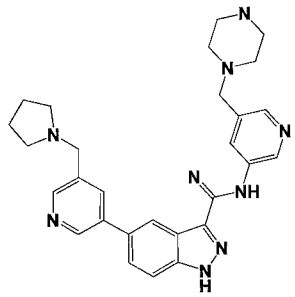
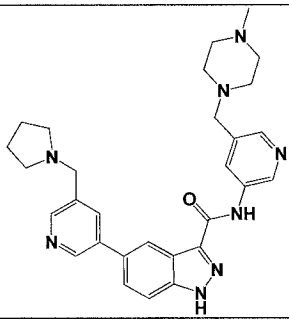
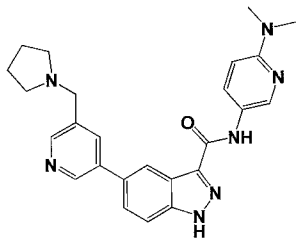
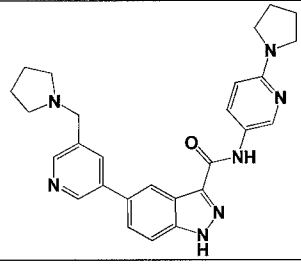
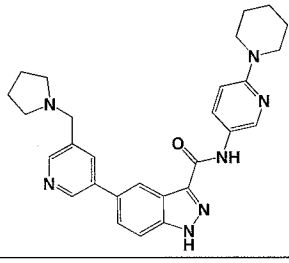
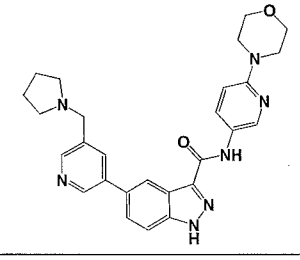
10		11		12	
13		14		15	
16		17		18	
19		20		21	
22		23		24	
25		26		27	

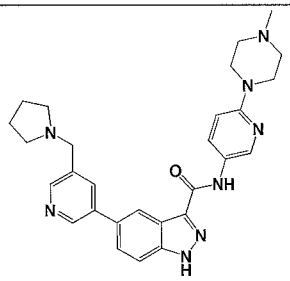
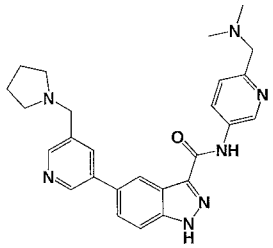
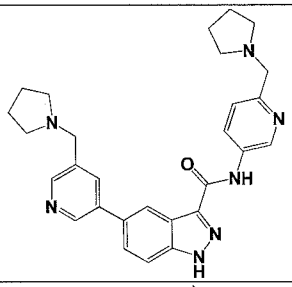
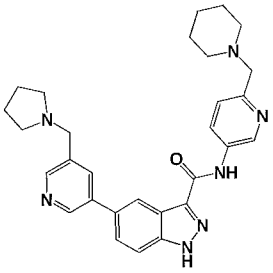
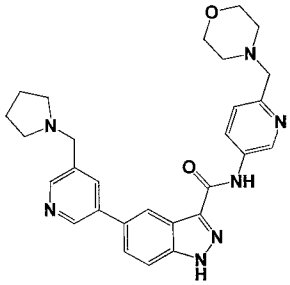
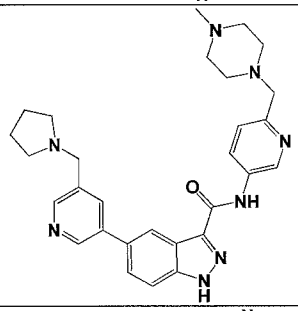
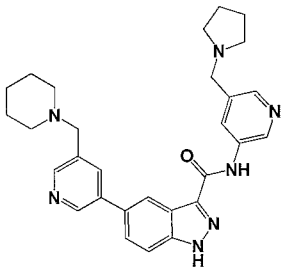
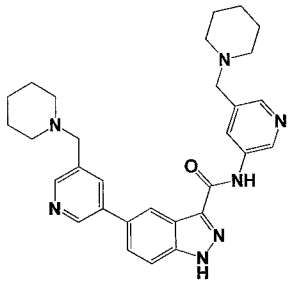
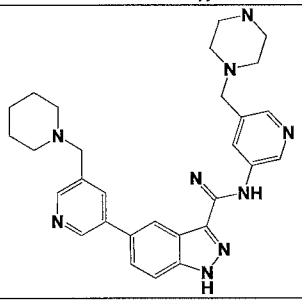
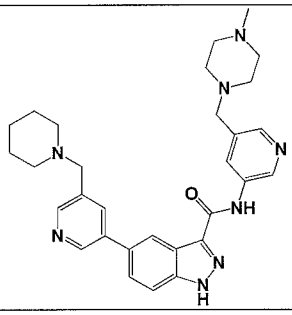
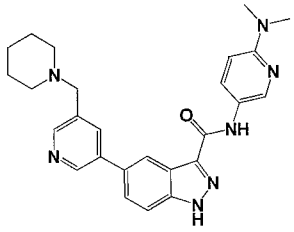
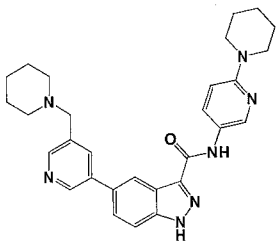
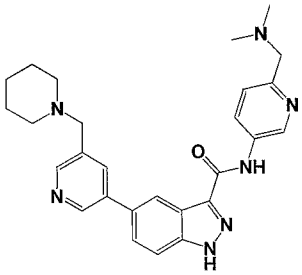
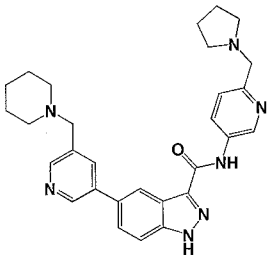
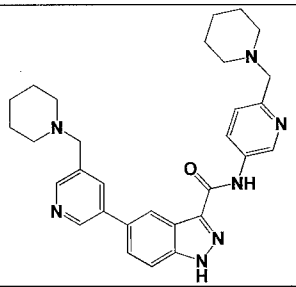
28		29		30	
31		32		33	
34		35		36	
37		38		39	
40		41		42	
43		44		45	

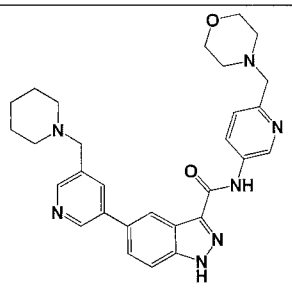
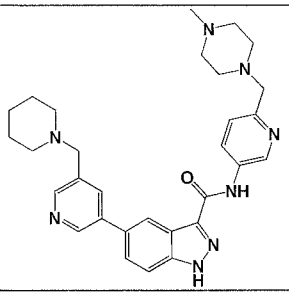
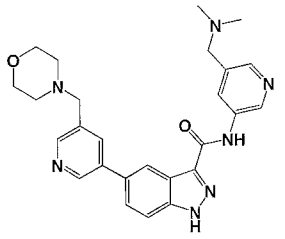
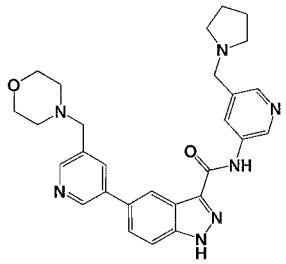
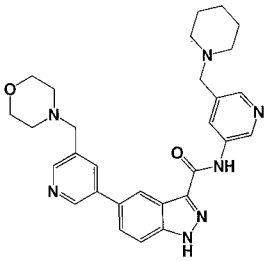
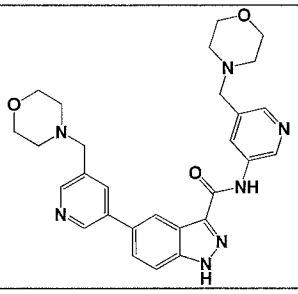
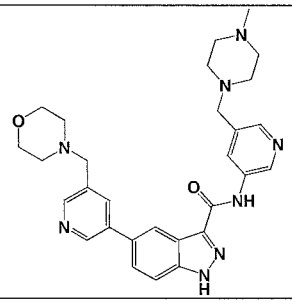
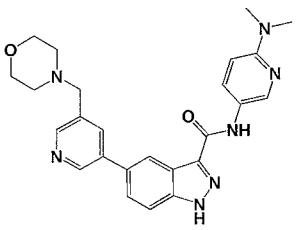
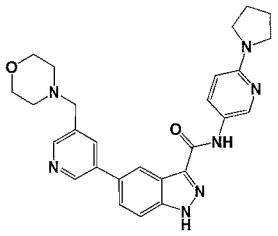
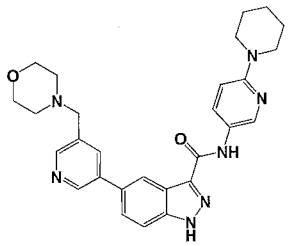
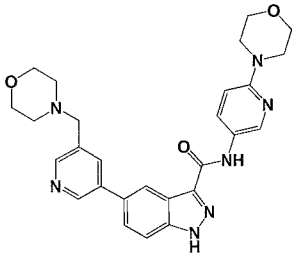
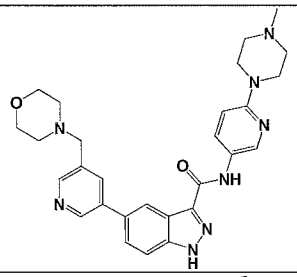
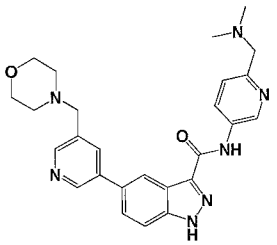
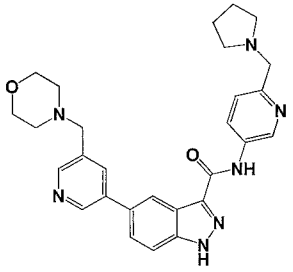
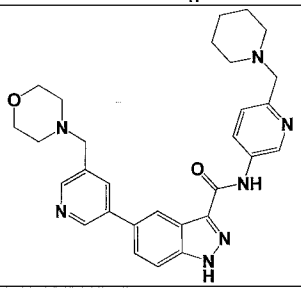
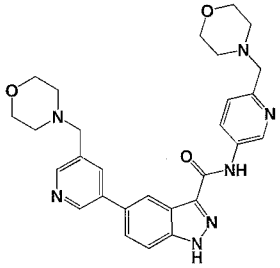
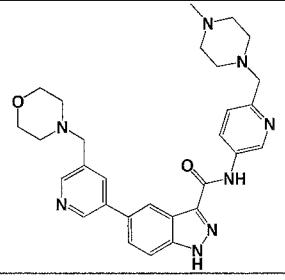
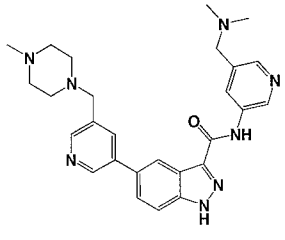
46		47		48	
49		50		51	
52		53		54	
55		56		57	
58		59		60	
61		62		63	

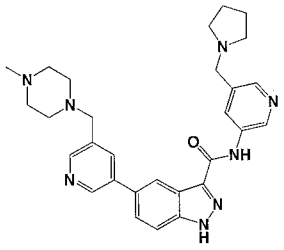
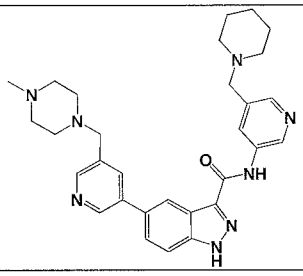
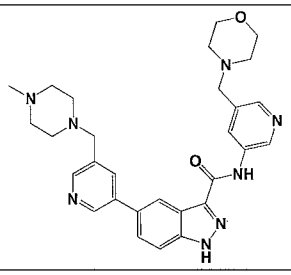
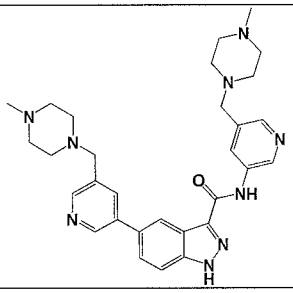
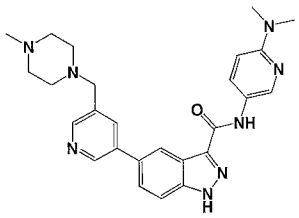
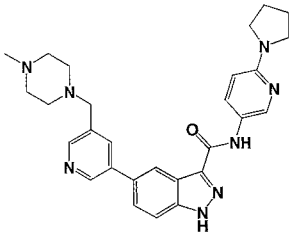
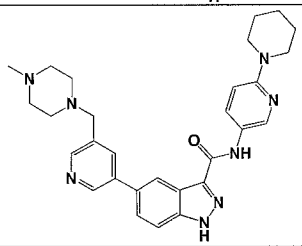
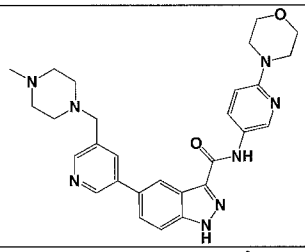
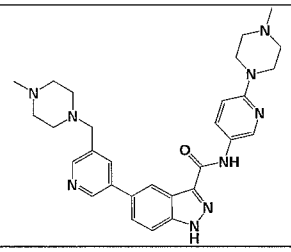
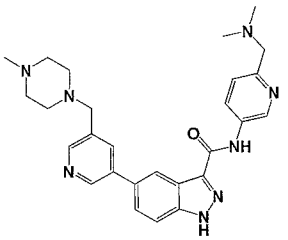
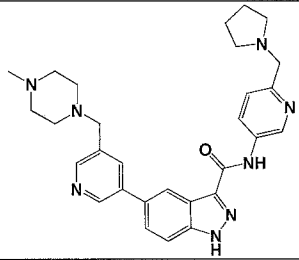
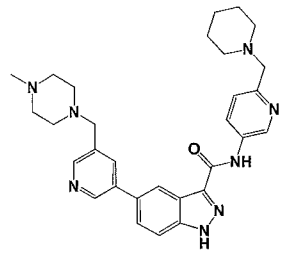
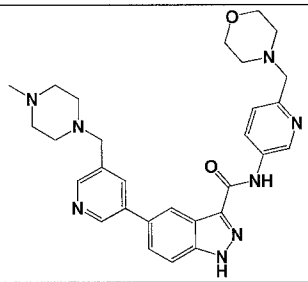
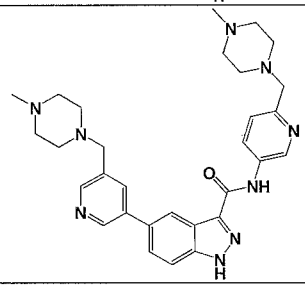
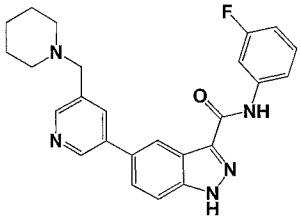
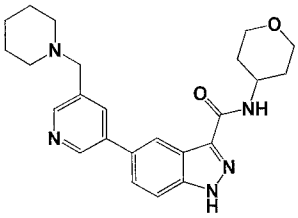
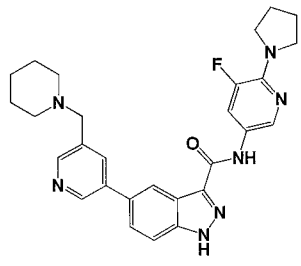
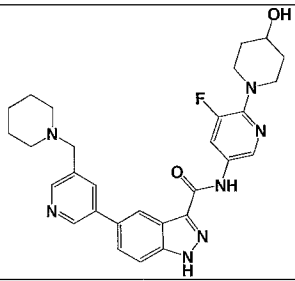
64		65		66	
67		68		69	
70		71		72	
73		74		75	
76		77		78	
79		80		81	

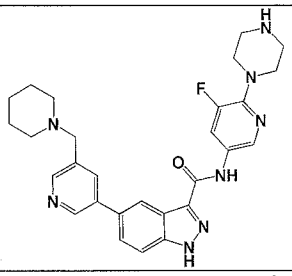
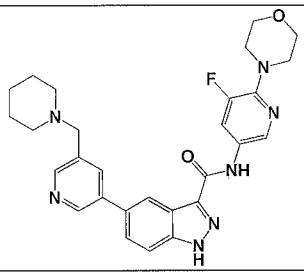
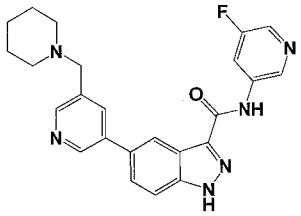
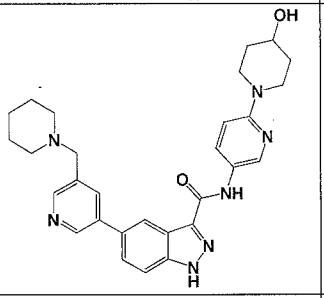
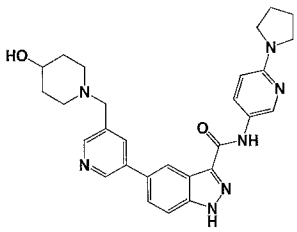
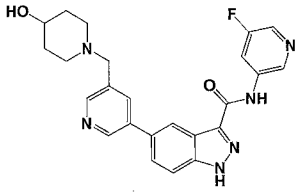
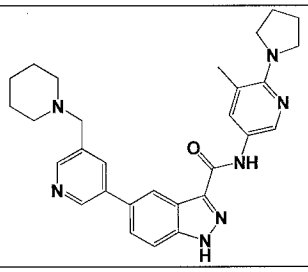
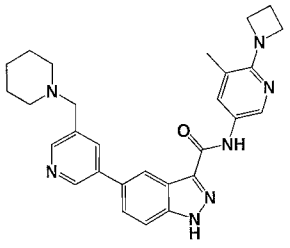
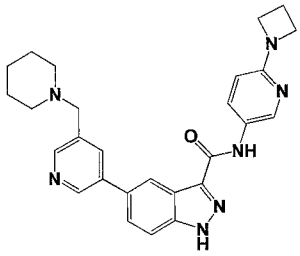
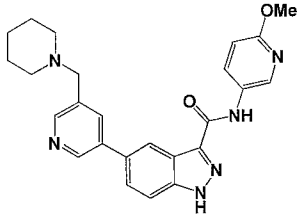
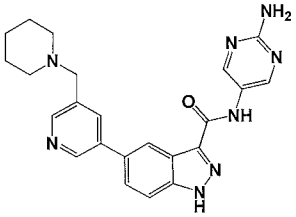
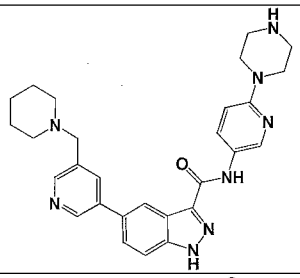
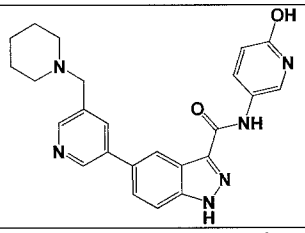
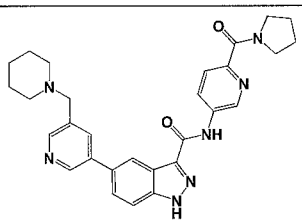
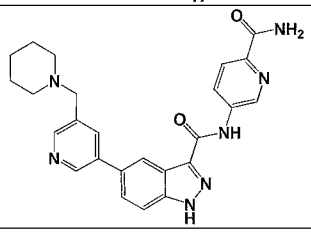
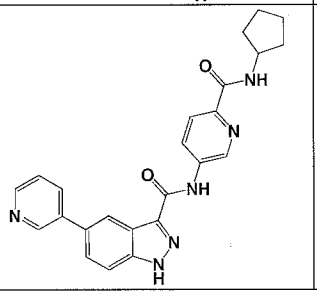
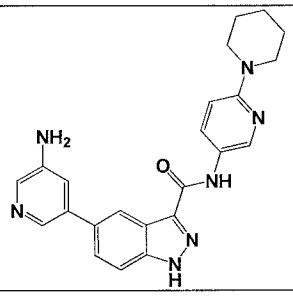
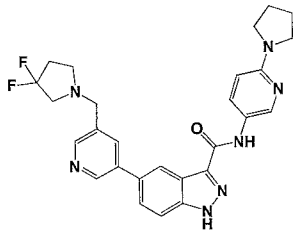
82		83		84	
85		86		87	
88		89		90	
91		92		93	
94		95		96	
97		98		99	

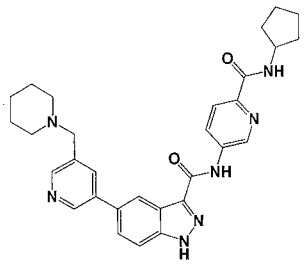
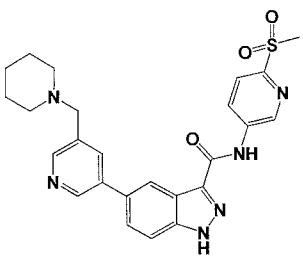
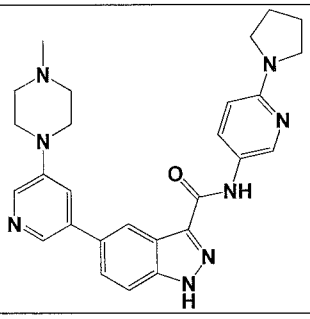
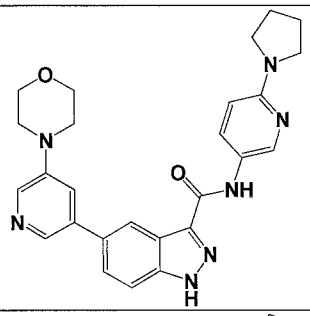
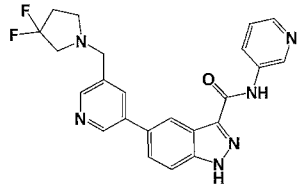
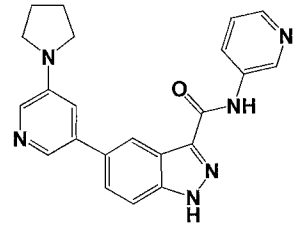
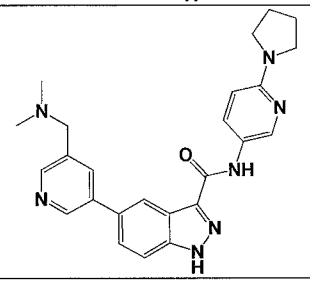
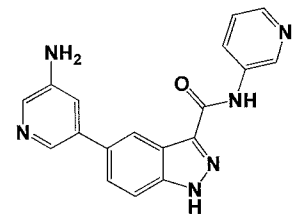
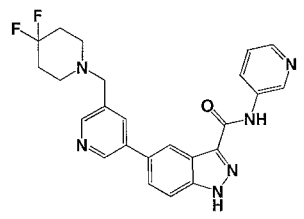
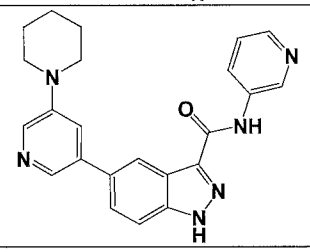
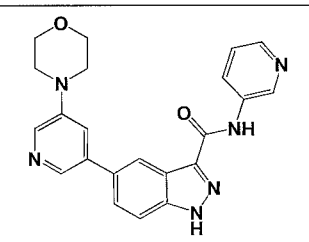
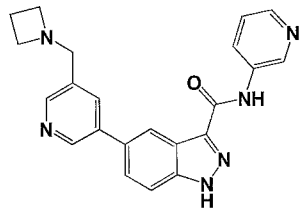
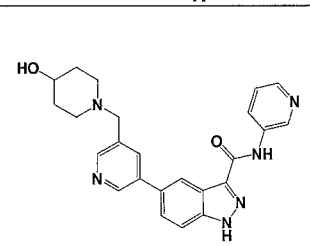
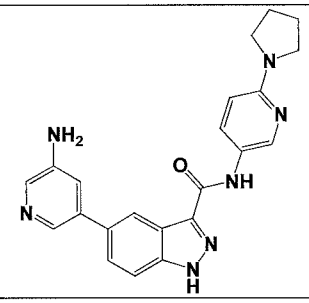
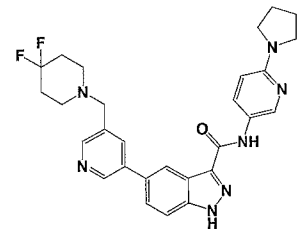
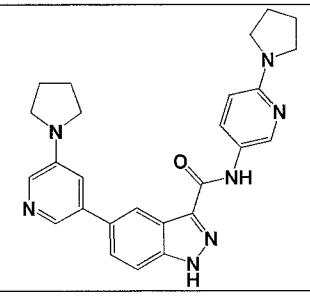
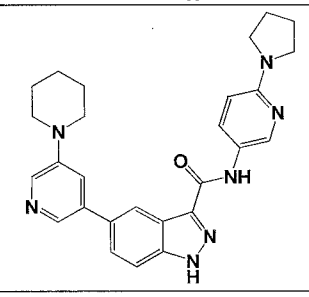
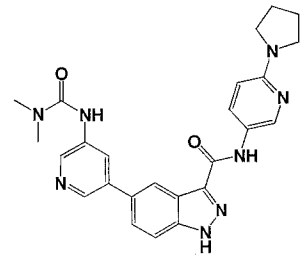
100		101		102	
103		104		105	
106		107		108	
109		110		111	
112		113		114	

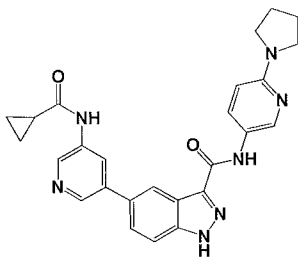
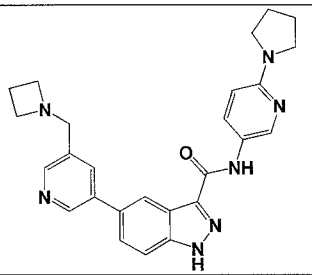
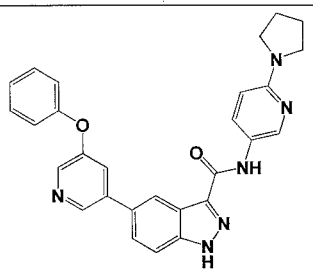
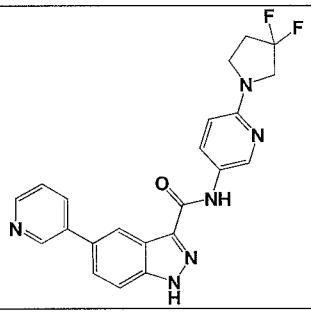
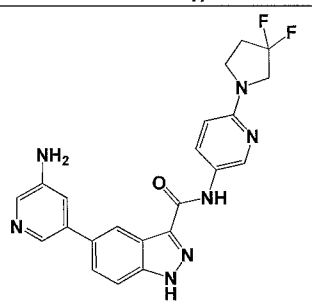
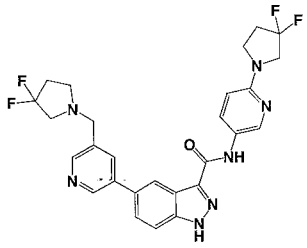
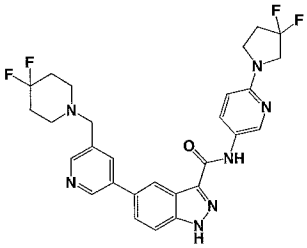
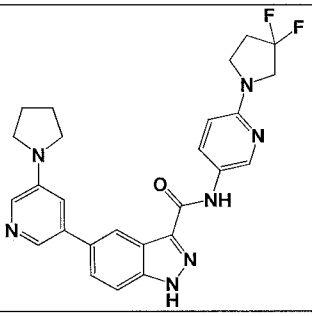
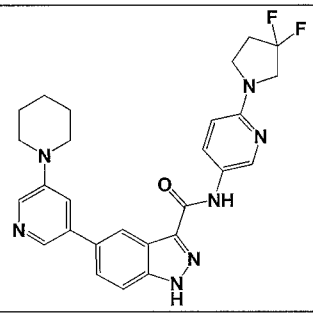
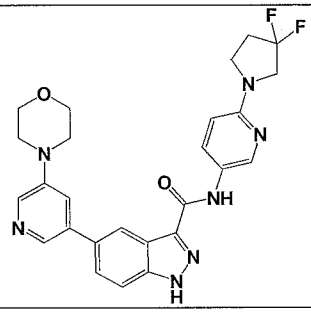
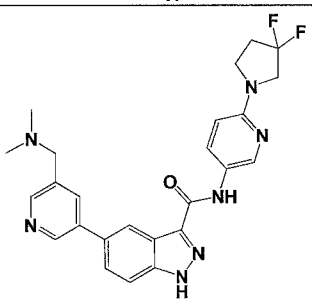
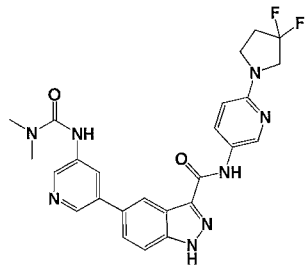
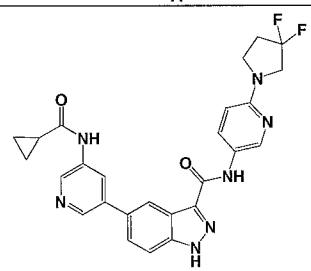
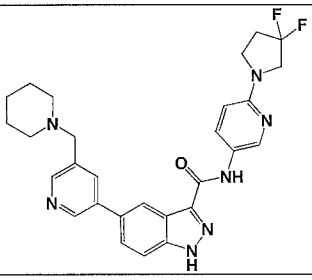
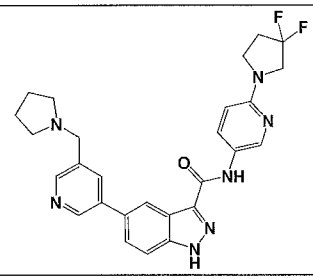
115		116		117	
118		119		120	
121		122		123	
124		125		126	
127		128		129	

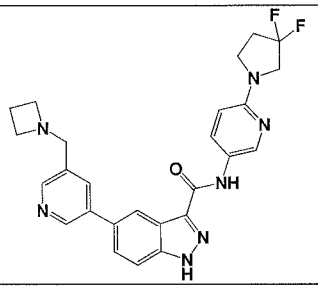
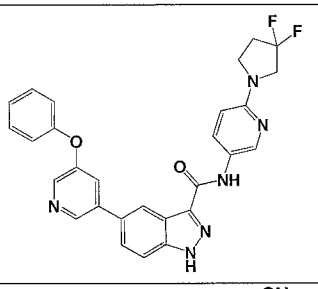
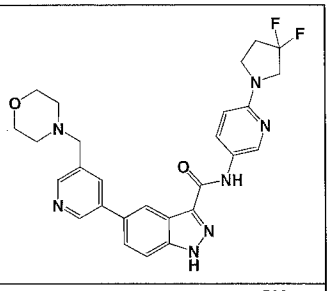
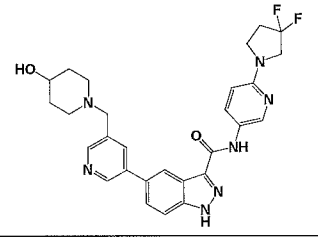
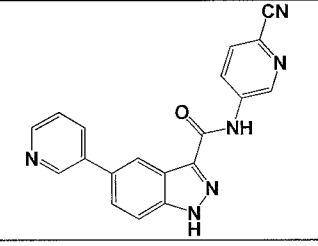
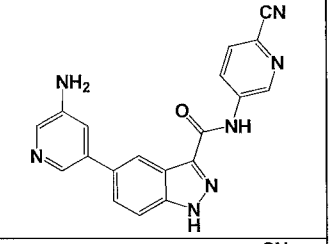
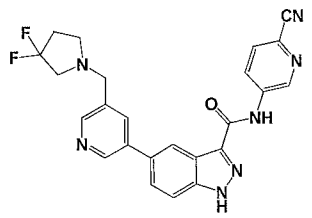
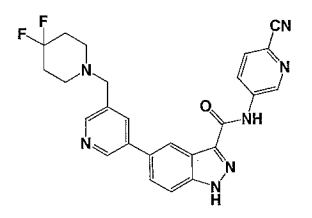
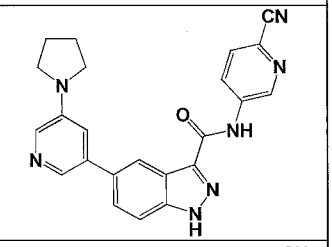
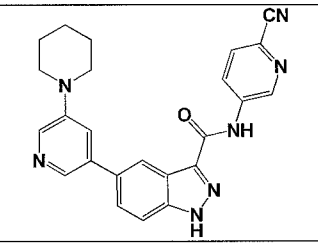
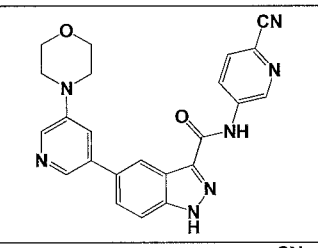
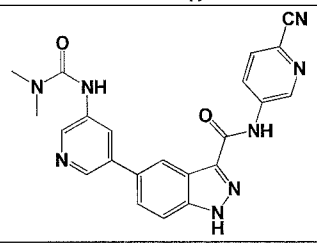
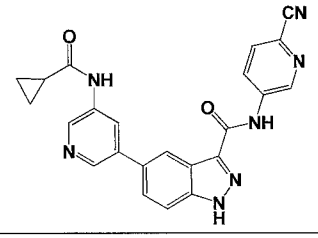
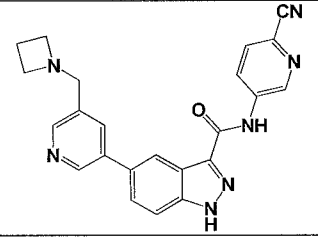
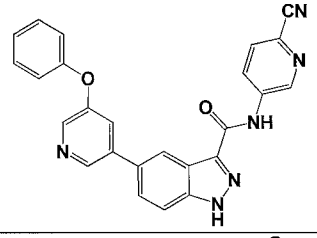
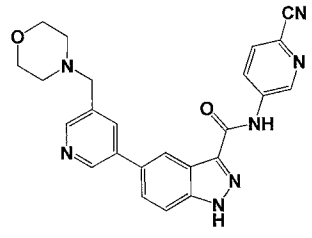
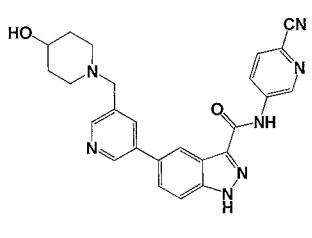
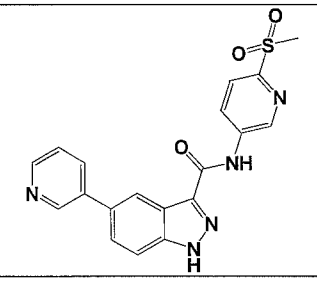
130		131		132	
133		134		135	
136		137		138	
139		140		141	
142		143		144	
145		146		147	

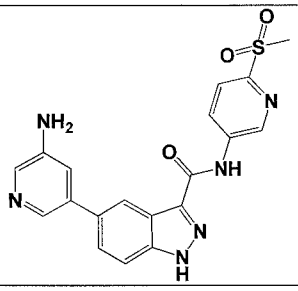
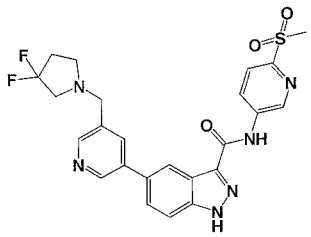
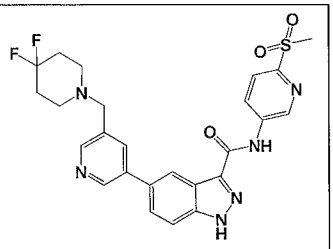
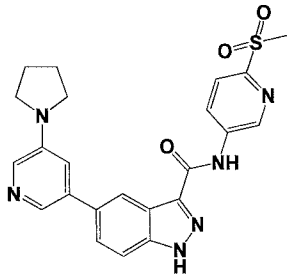
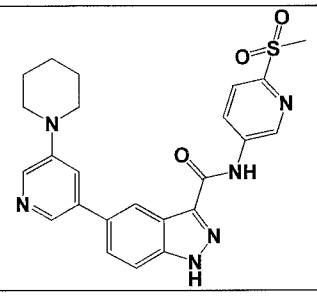
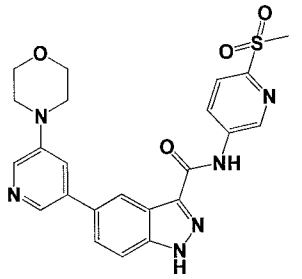
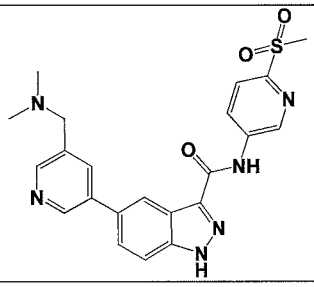
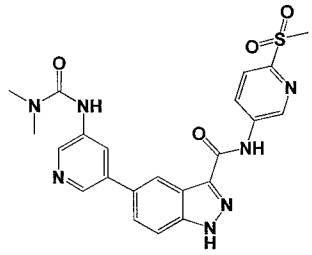
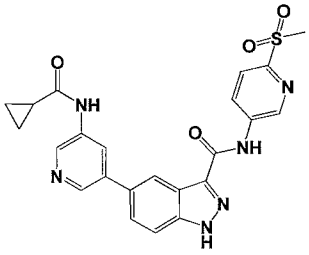
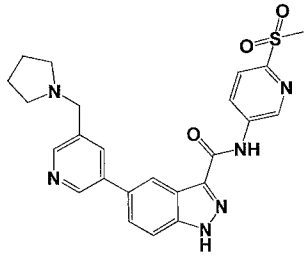
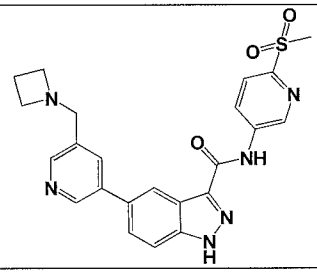
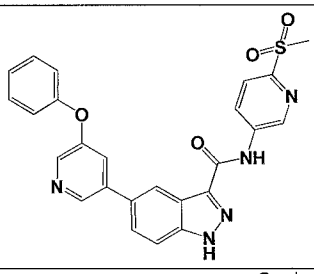
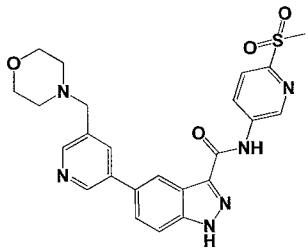
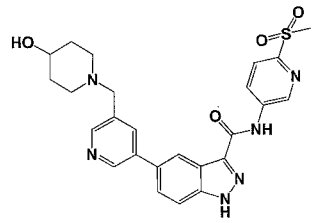
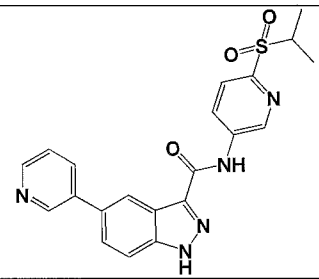
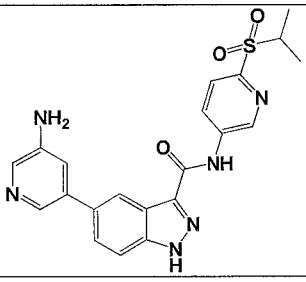
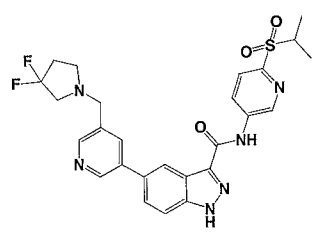
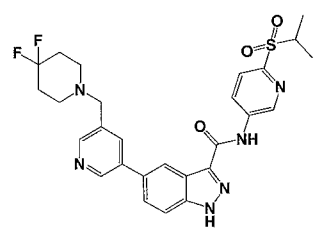
148		149		150	
151		152		153	
154		155		156	
157		158		159	
160		161		162	
163		164		165	

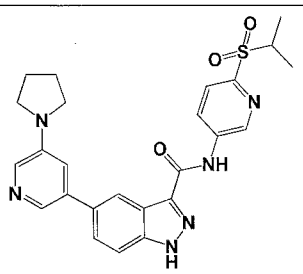
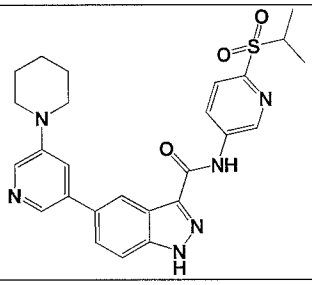
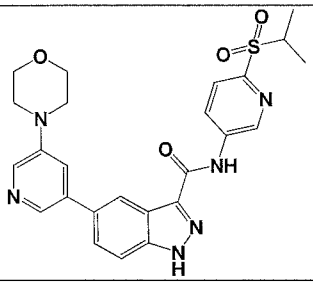
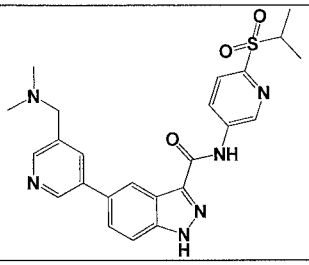
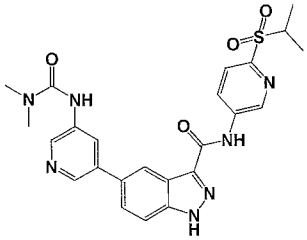
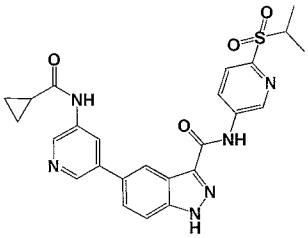
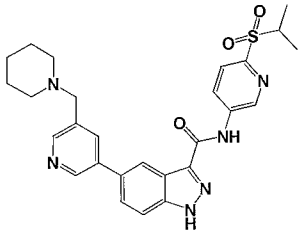
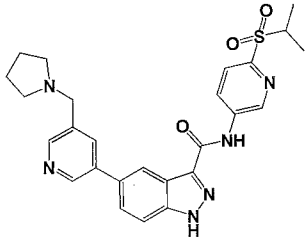
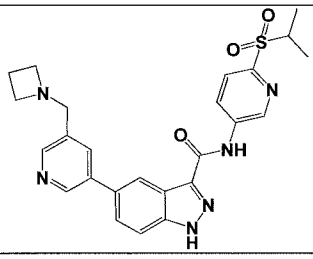
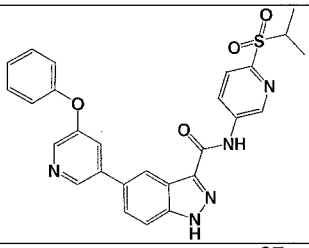
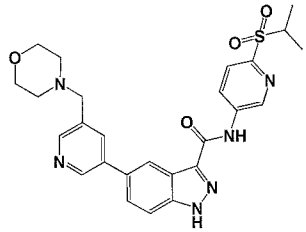
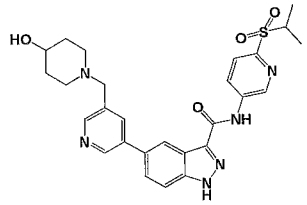
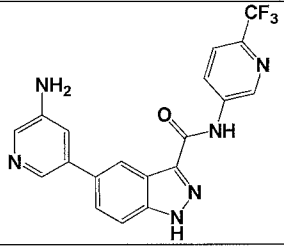
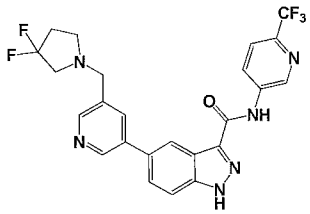
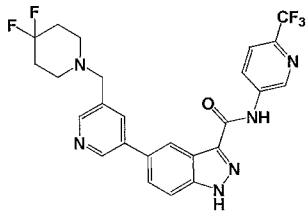
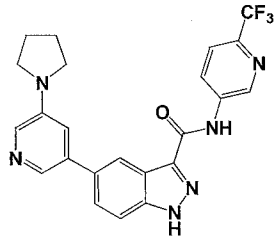
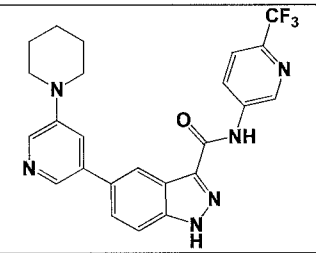
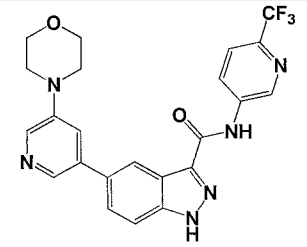
166		167		168	
169		170		171	
172		173		174	
175		176		177	
178		179		180	
181		182		183	

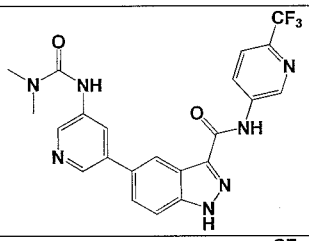
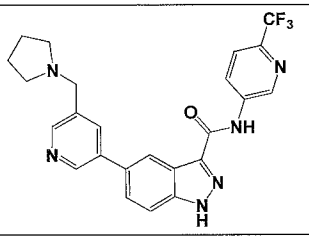
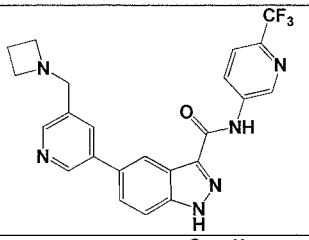
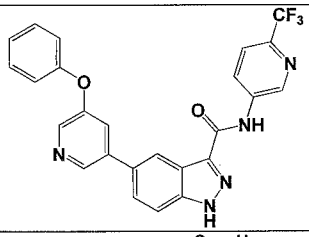
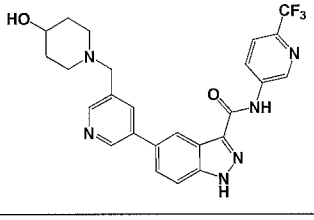
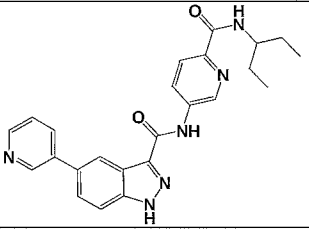
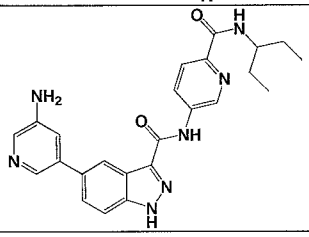
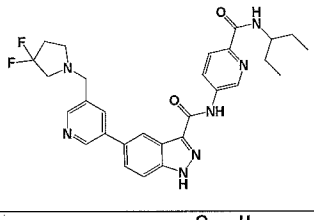
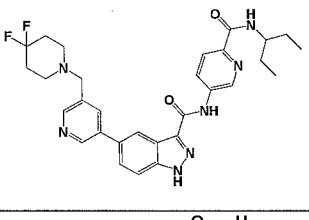
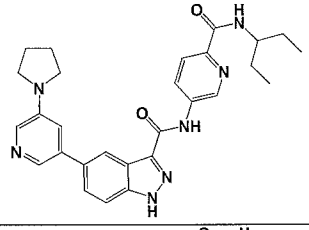
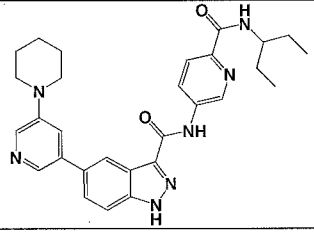
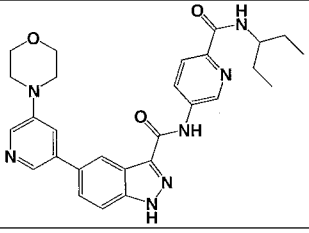
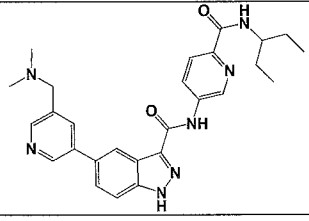
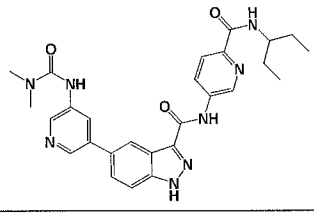
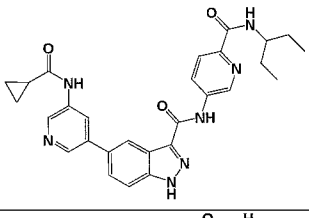
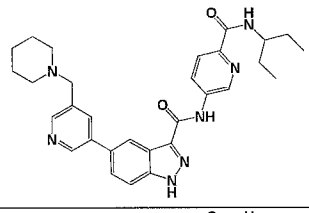
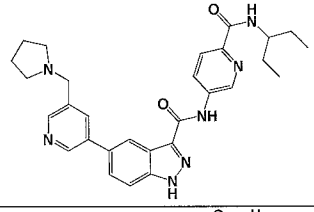
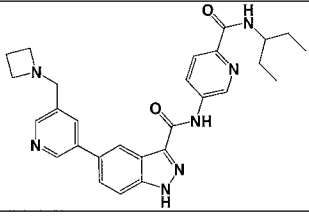
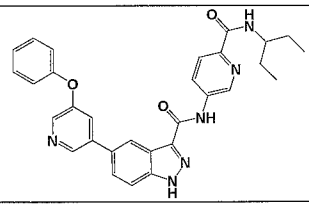
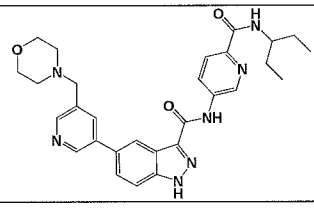
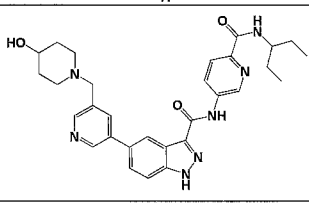
184		185		186	
187		188		189	
190		191		192	
193		194		195	
196		197		198	
199		200		201	

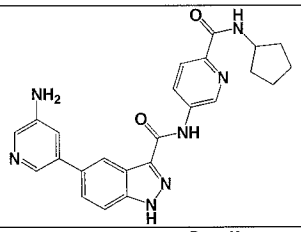
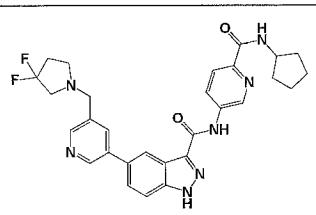
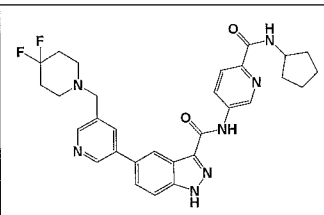
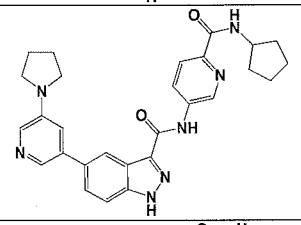
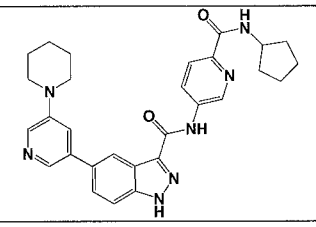
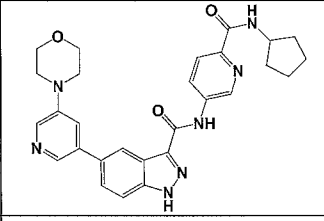
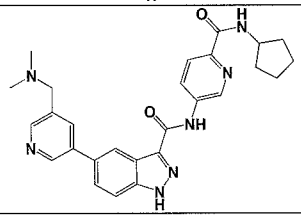
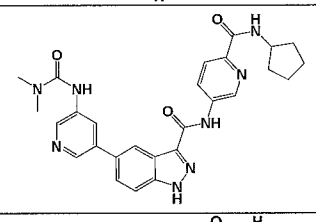
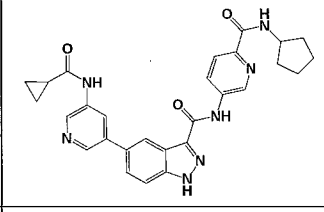
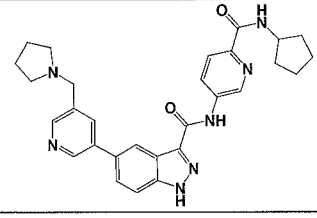
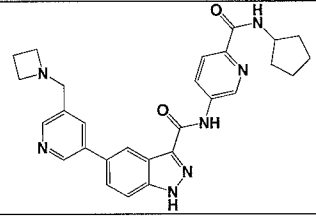
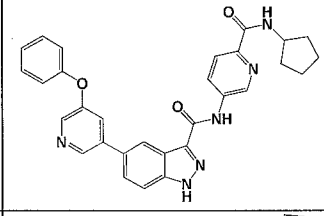
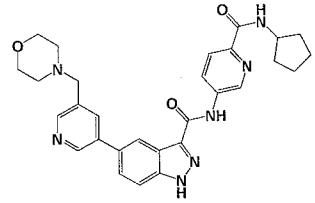
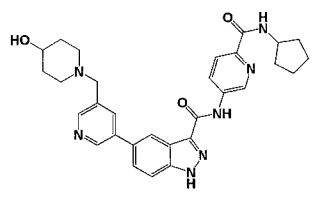
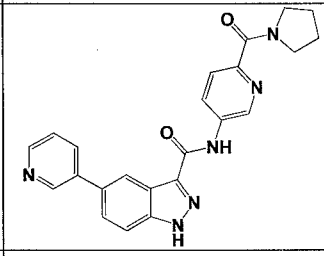
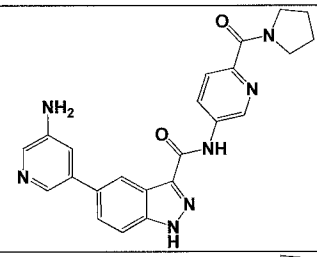
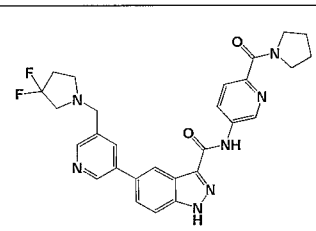
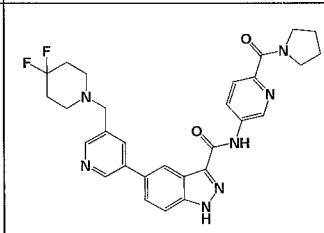
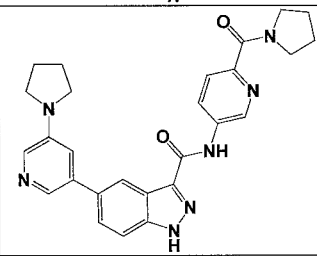
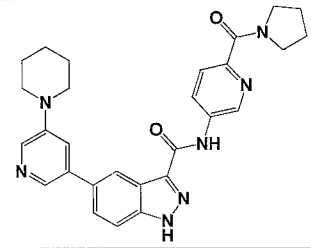
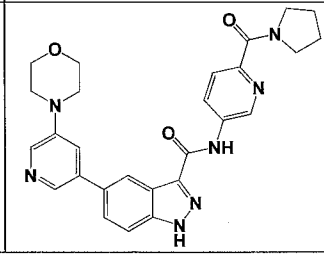
202		203		204	
205		206		207	
208		209		210	
211		212		213	
214		215		216	

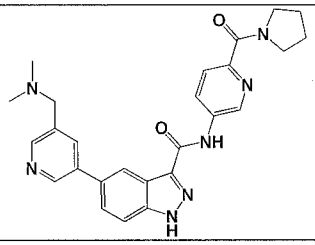
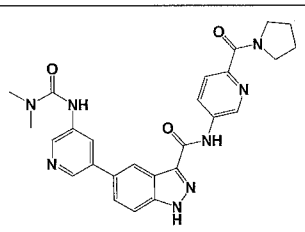
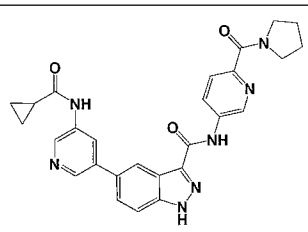
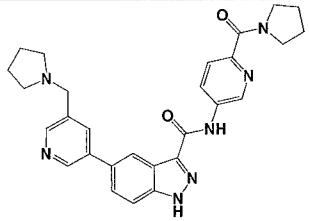
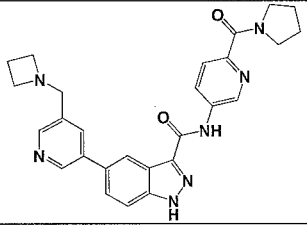
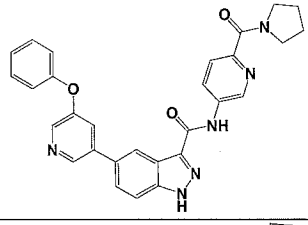
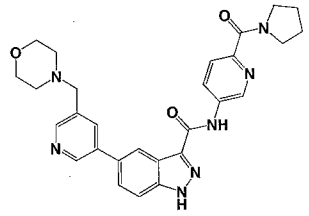
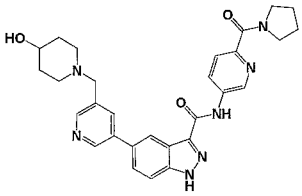
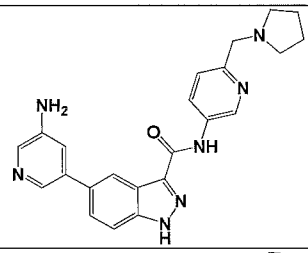
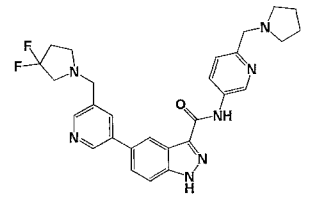
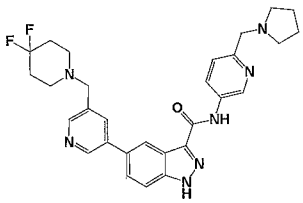
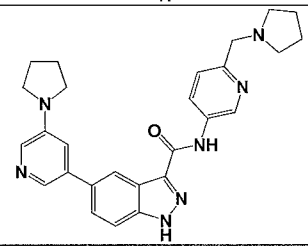
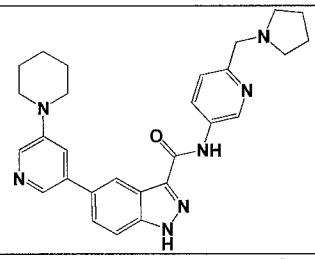
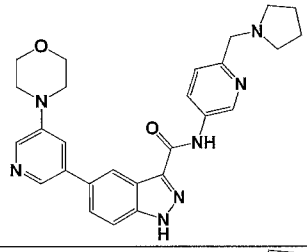
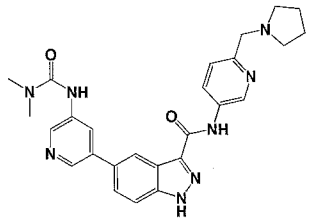
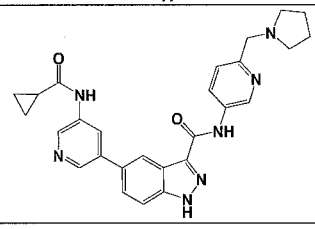
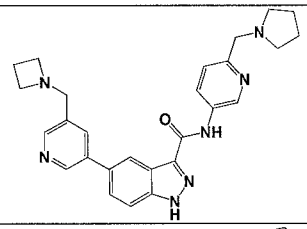
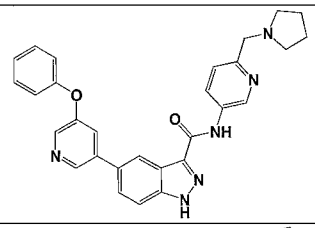
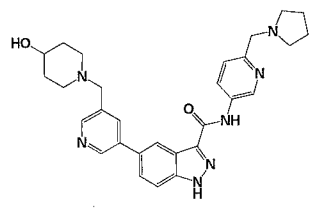
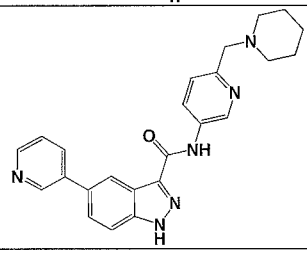
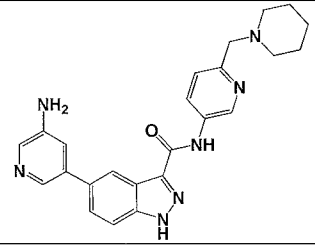
217		218		219	
220		221		222	
223		224		225	
226		227		228	
229		230		231	
232		233		234	

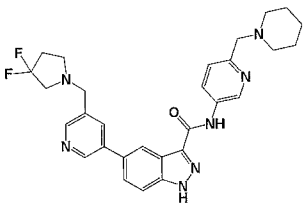
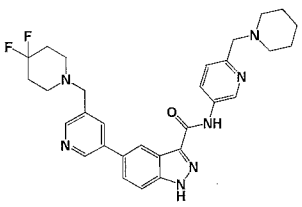
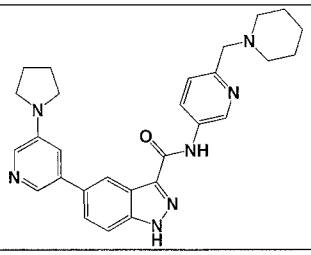
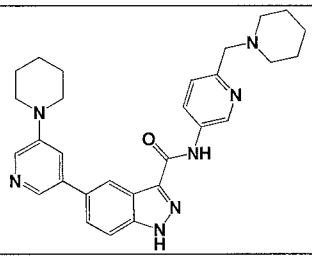
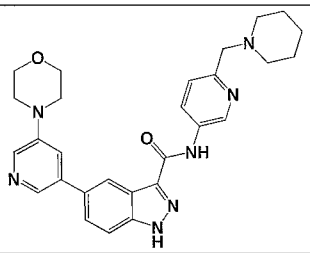
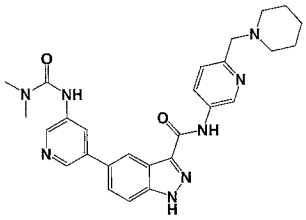
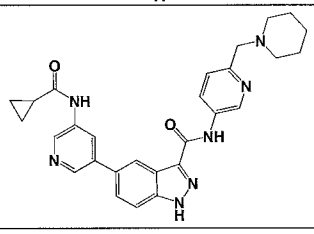
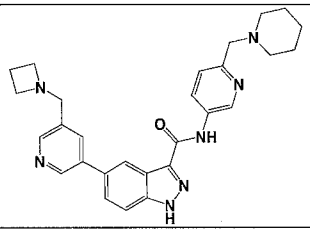
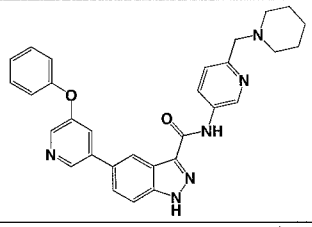
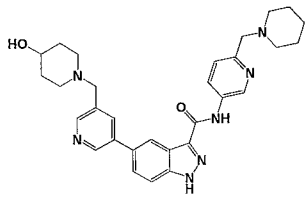
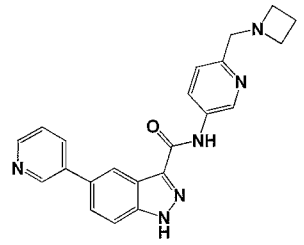
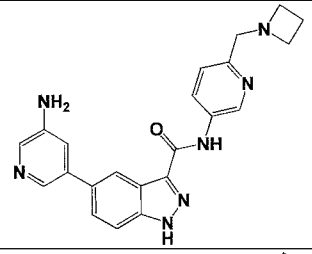
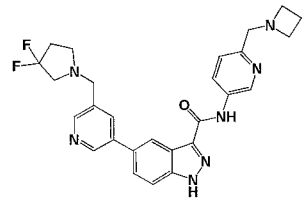
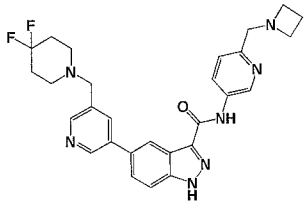
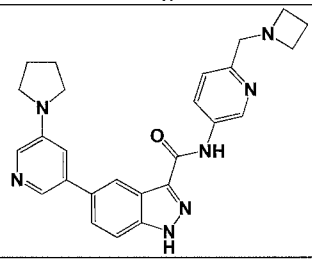
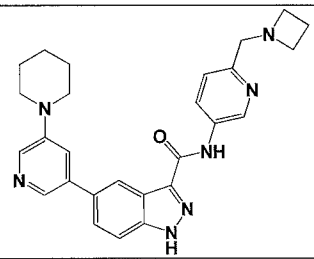
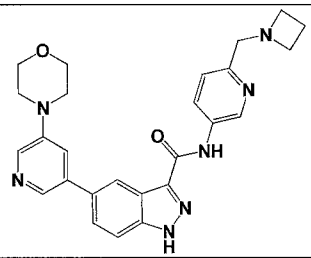
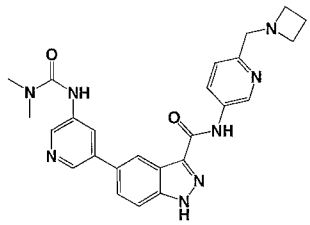
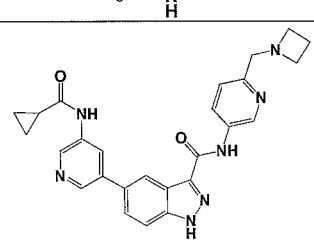
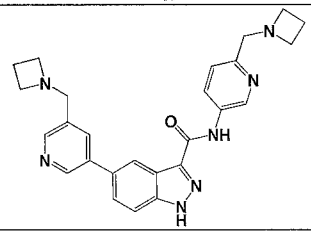
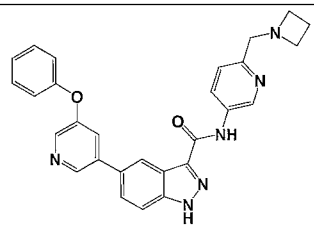
235		236		237	
238		239		240	
241		242		243	
244		245		246	
247		248		249	
250		251		252	

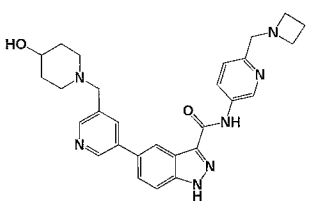
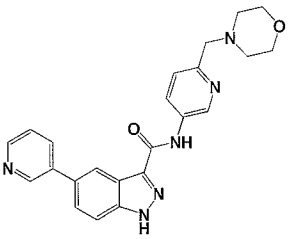
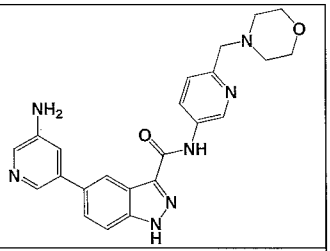
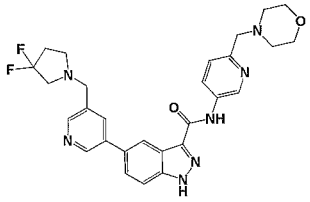
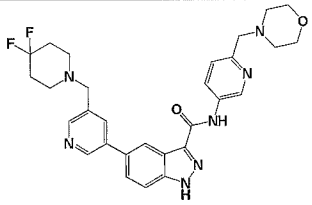
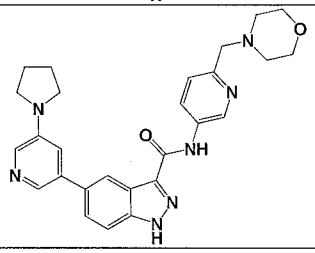
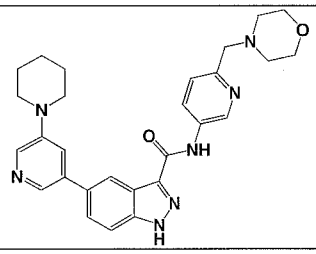
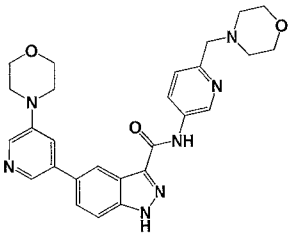
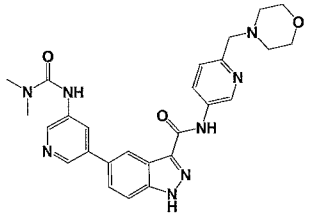
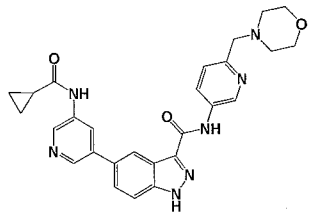
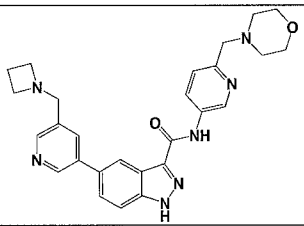
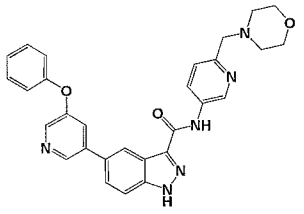
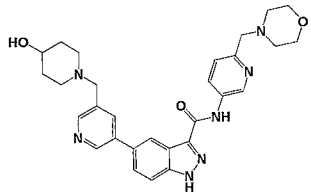
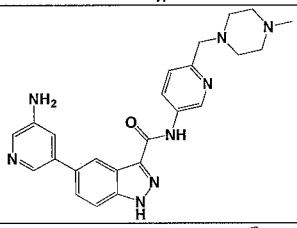
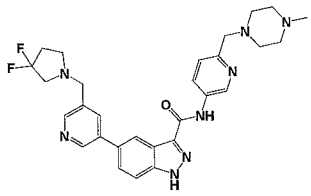
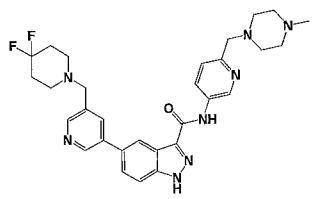
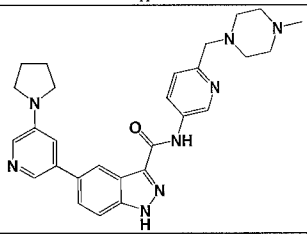
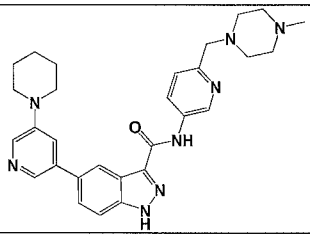
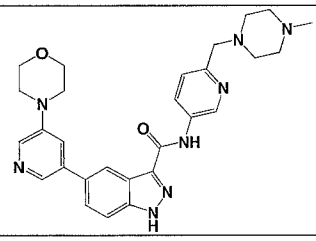
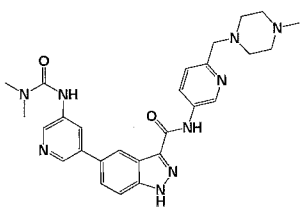
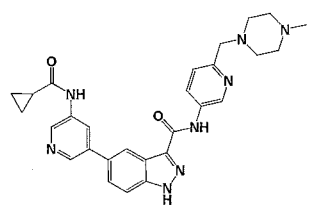
253		254		255	
256		257		258	
259		260		261	
262		263		264	
265		266		267	
268		269		270	

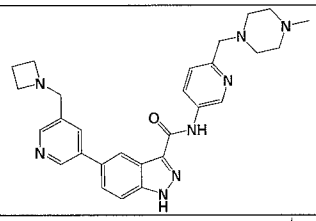
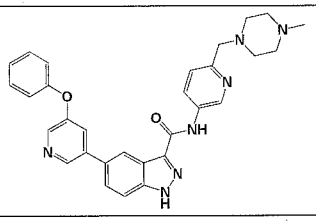
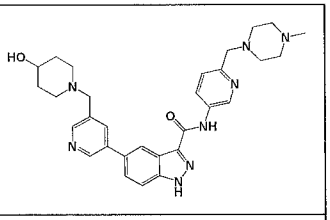
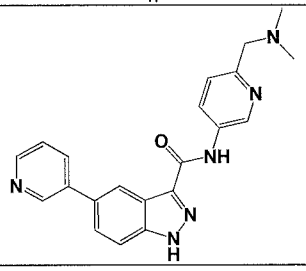
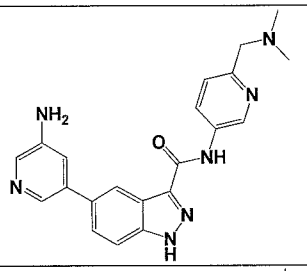
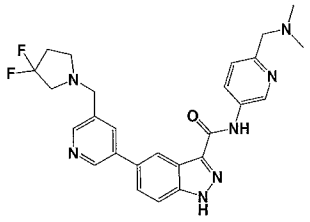
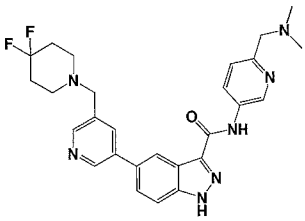
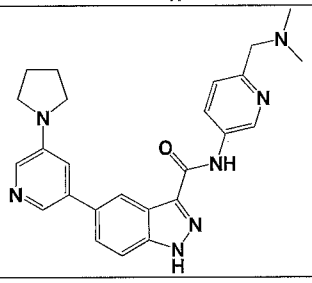
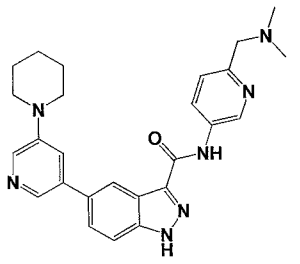
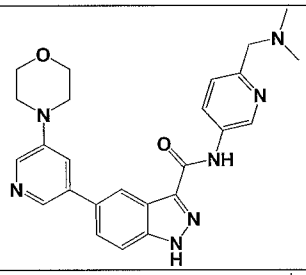
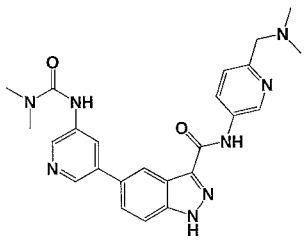
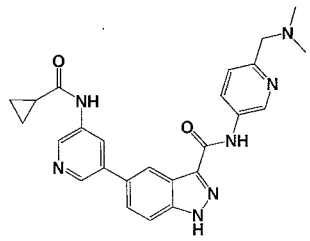
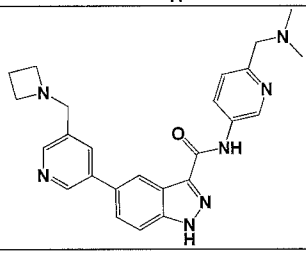
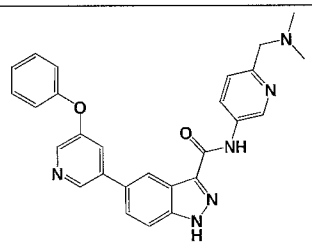
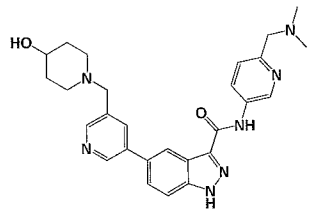
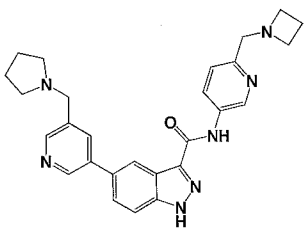
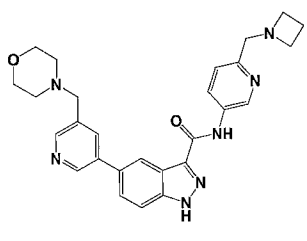
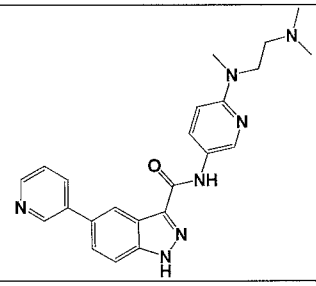
271		272		273	
274		275		276	
277		278		279	
280		281		282	
283		284		285	
286		287		288	
289		290		291	

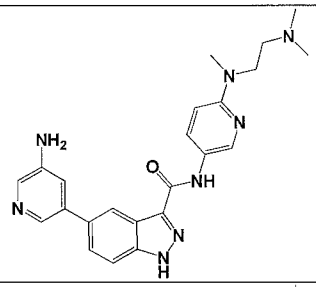
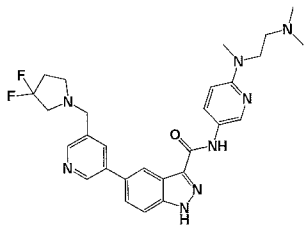
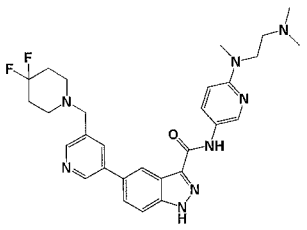
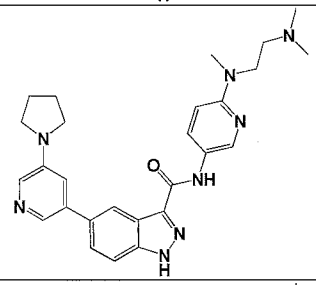
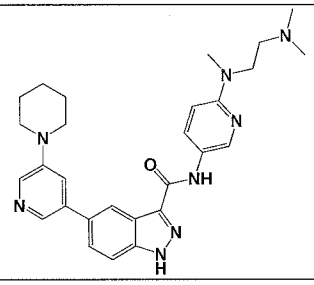
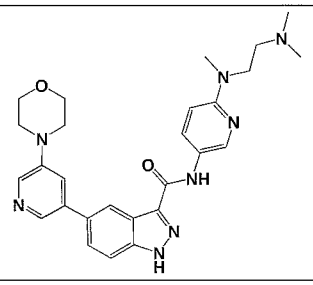
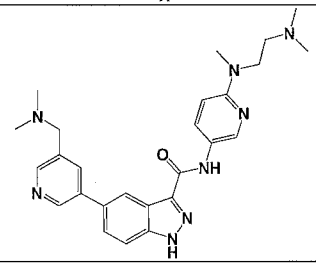
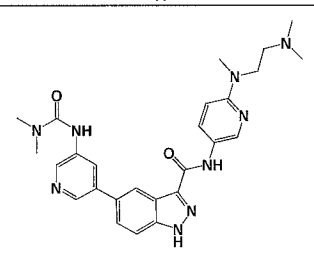
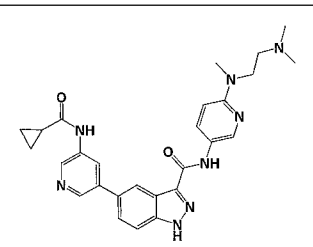
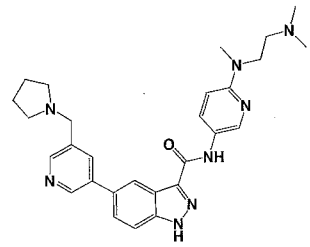
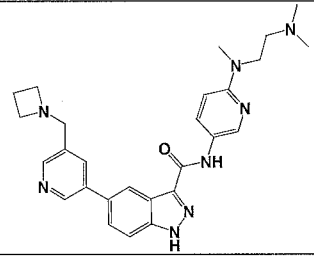
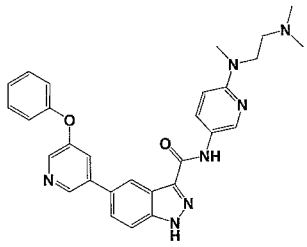
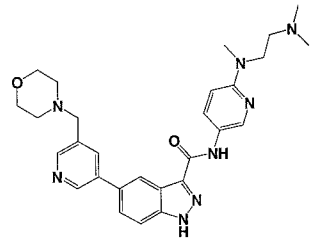
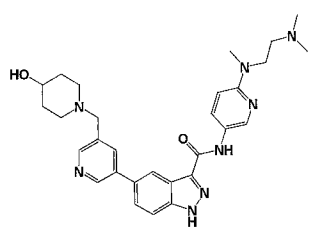
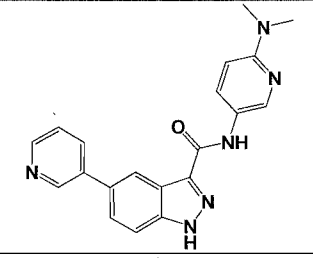
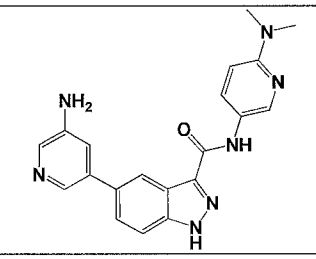
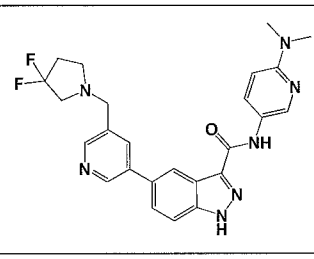
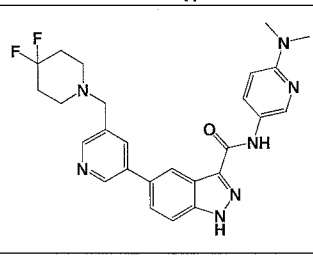
292		293		294	
295		296		297	
298		299		300	
301		302		303	
304		305		306	
307		308		309	
310		311		312	

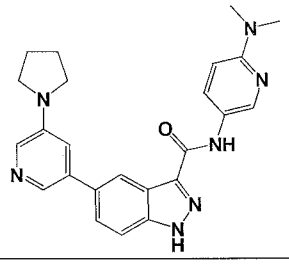
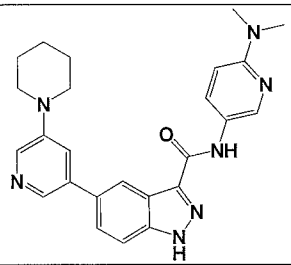
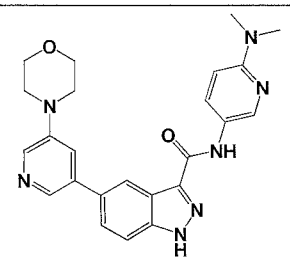
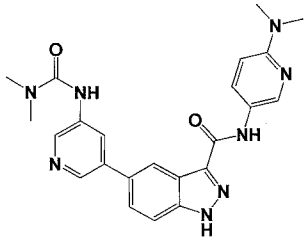
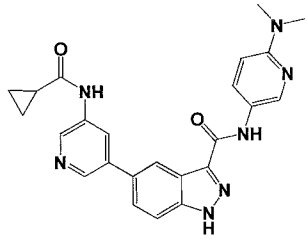
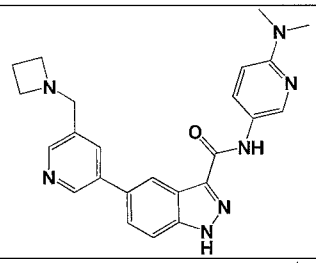
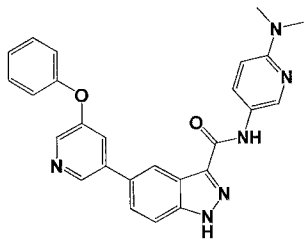
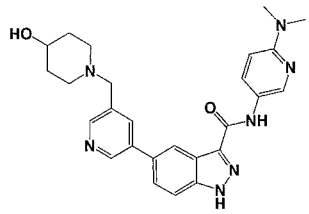
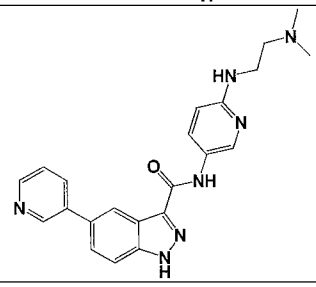
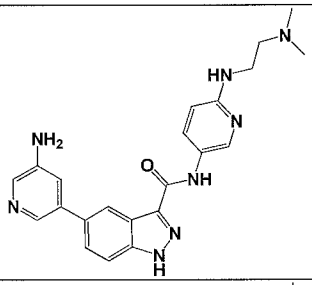
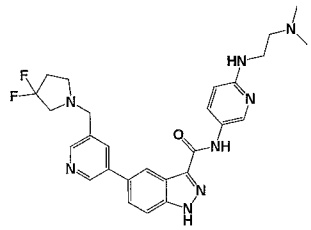
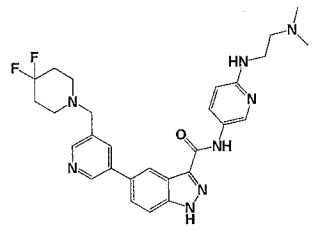
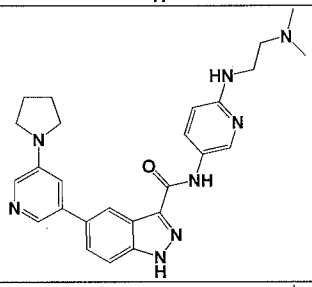
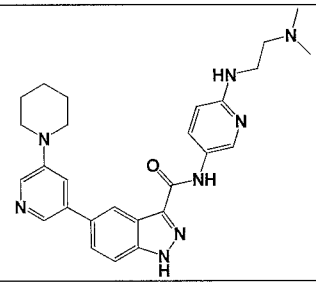
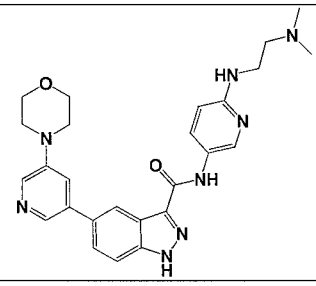
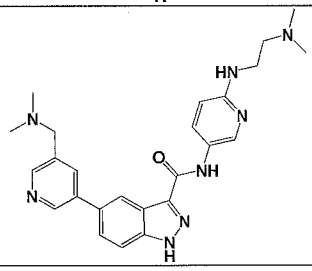
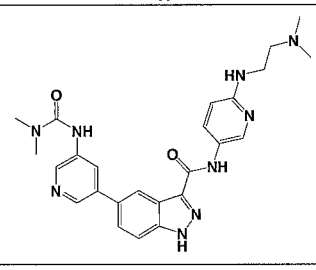
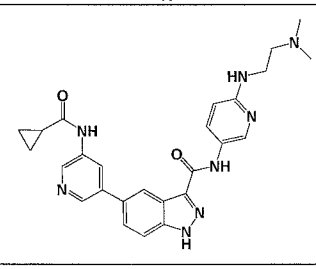
313		314		315	
316		317		318	
319		320		321	
322		323		324	
325		326		327	
328		329		330	
331		332		333	

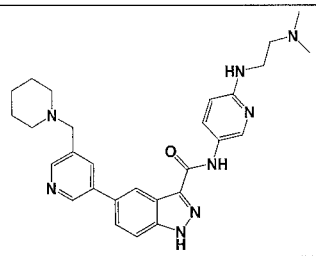
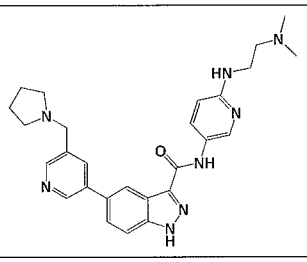
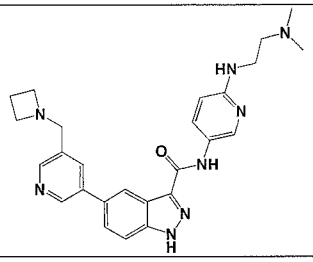
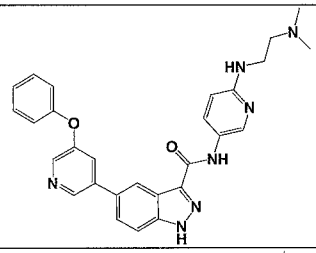
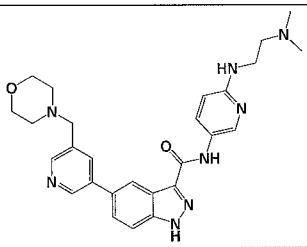
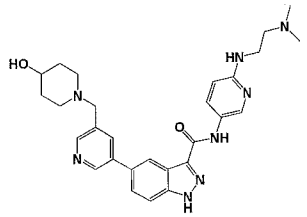
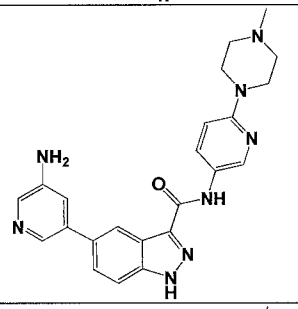
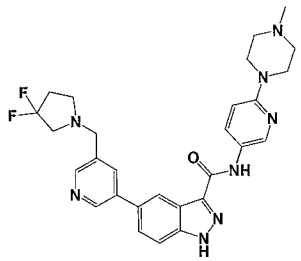
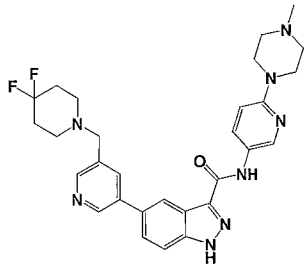
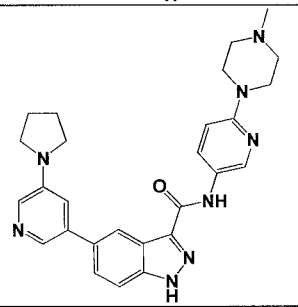
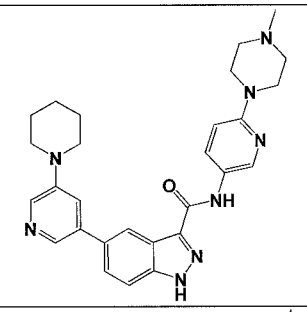
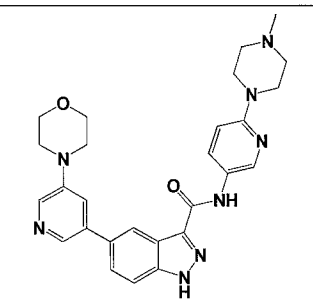
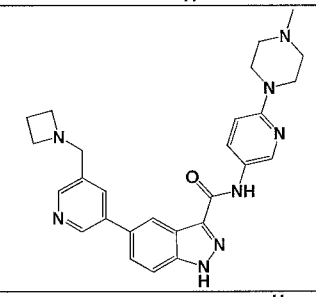
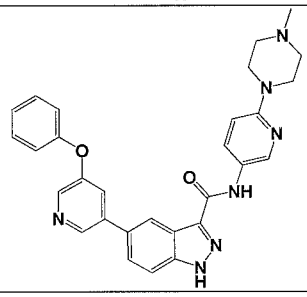
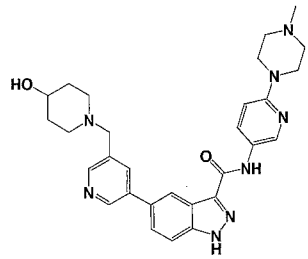
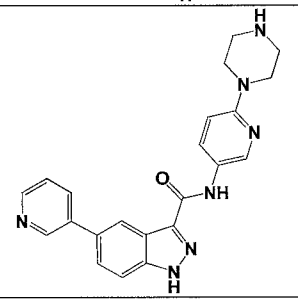
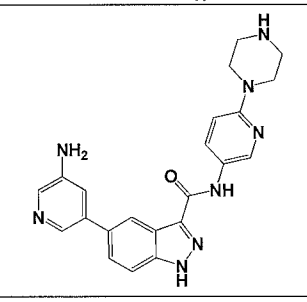
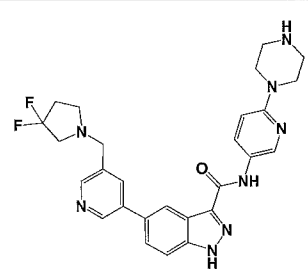
334		335		336	
337		338		339	
340		341		342	
343		344		345	
346		347		348	
349		350		351	
352		353		354	

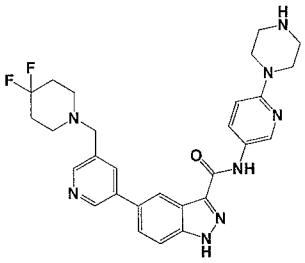
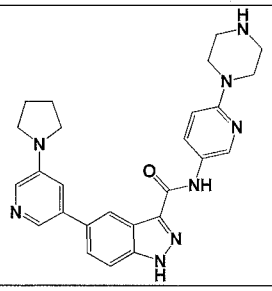
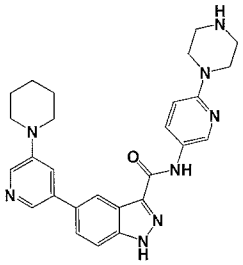
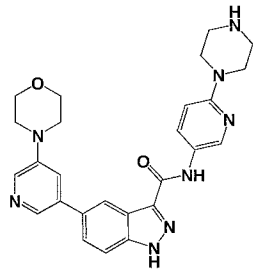
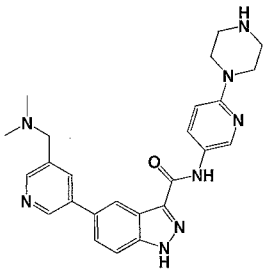
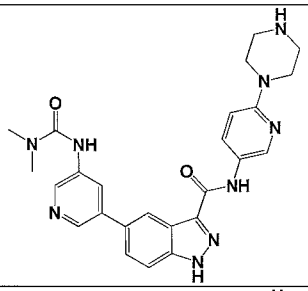
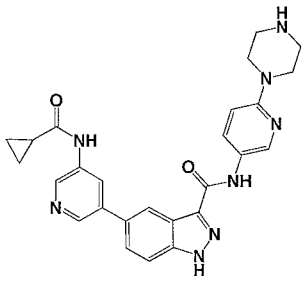
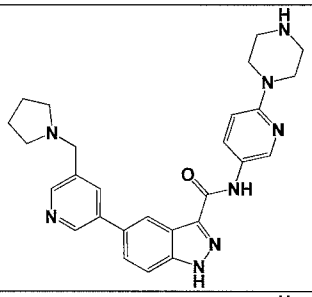
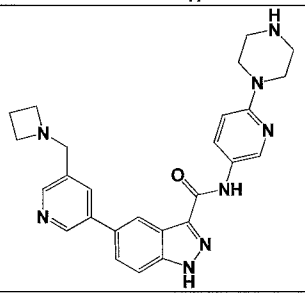
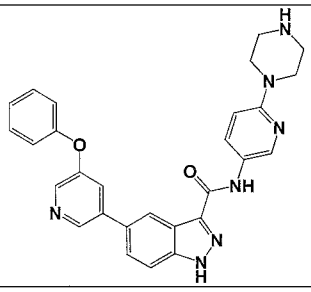
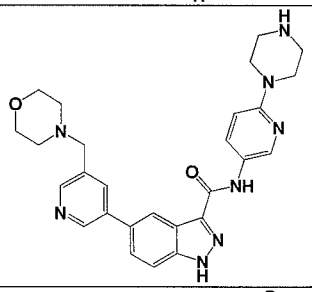
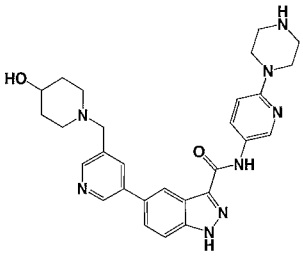
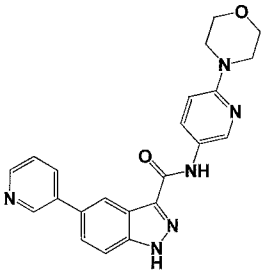
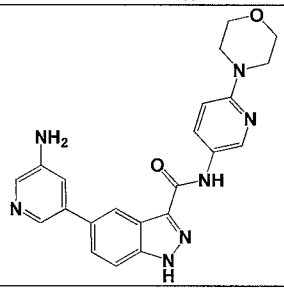
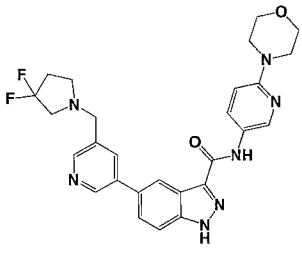
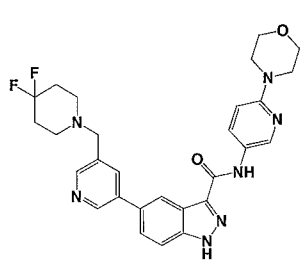
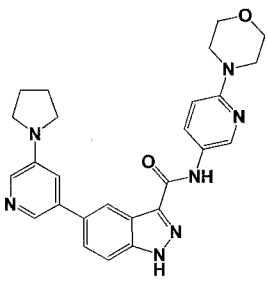
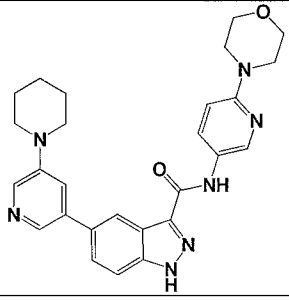
355		356		357	
358		359		360	
361		362		363	
364		365		366	
367		368		369	
370		371		372	
373		374		375	

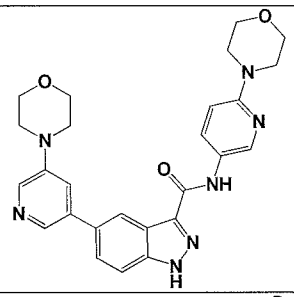
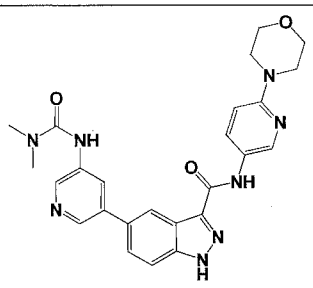
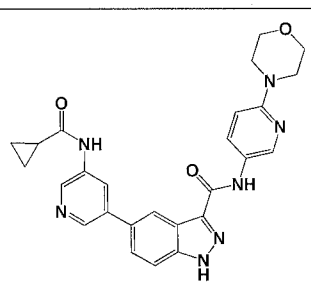
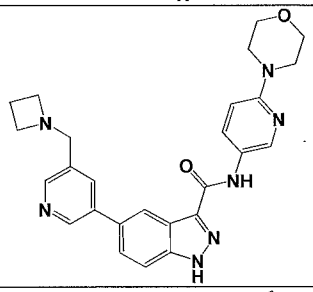
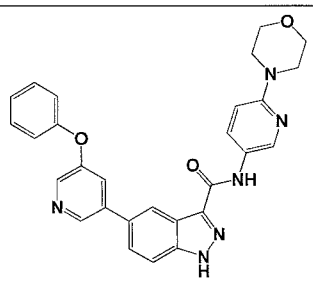
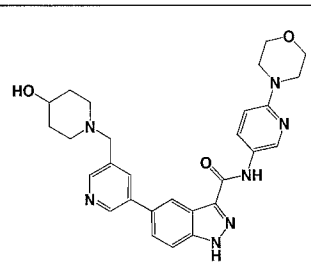
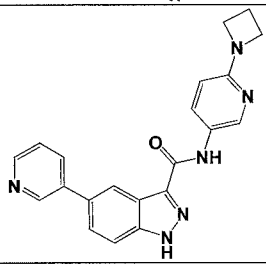
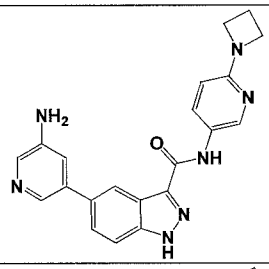
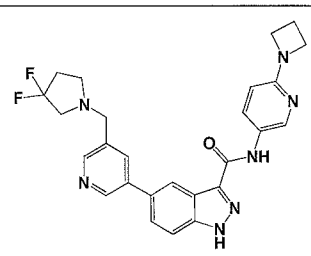
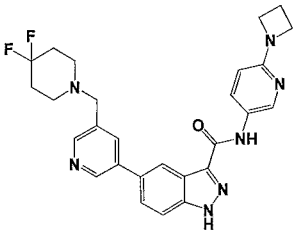
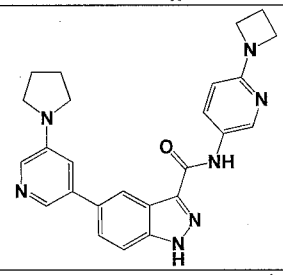
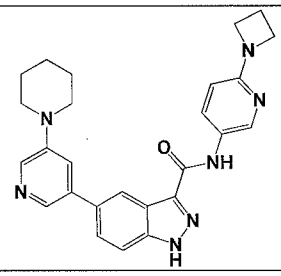
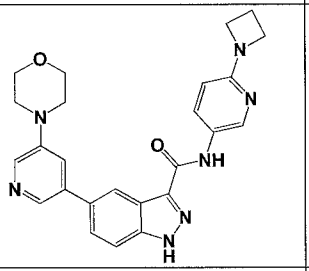
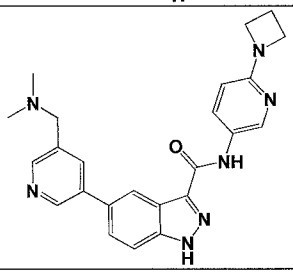
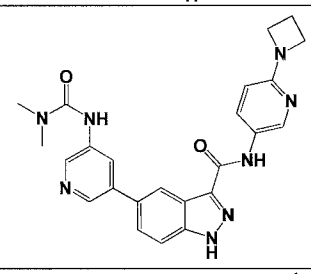
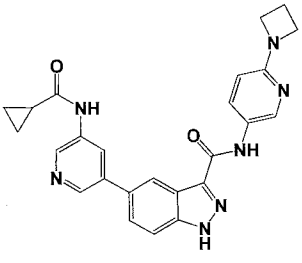
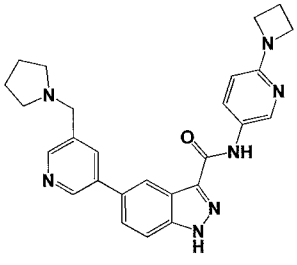
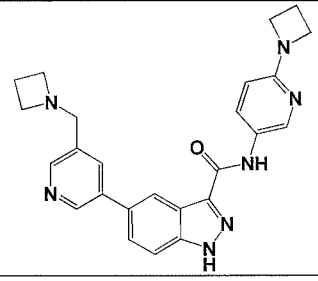
376		377		378	
379		380		381	
382		383		384	
385		386		387	
388		389		390	
391		392		393	

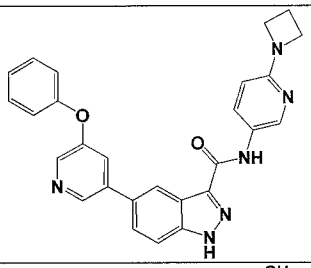
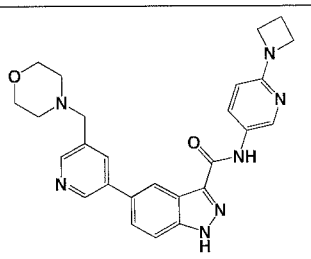
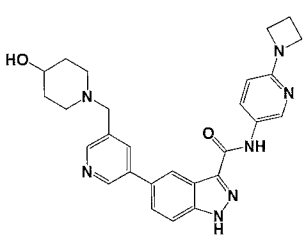
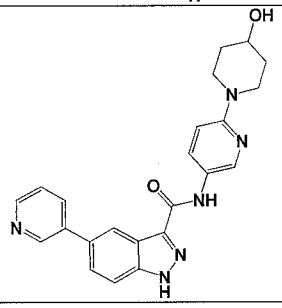
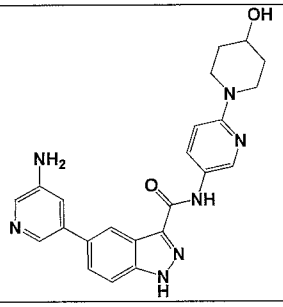
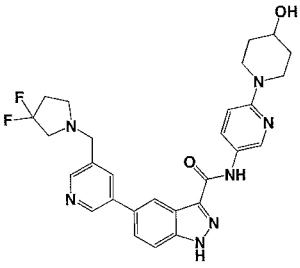
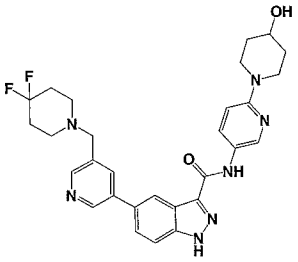
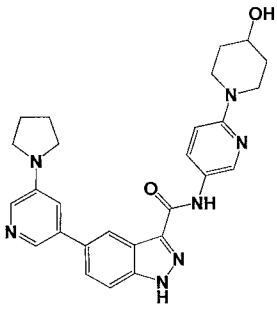
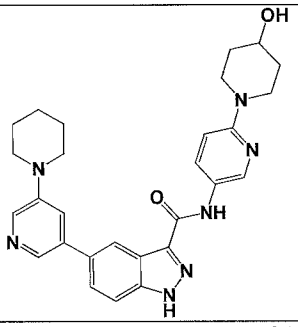
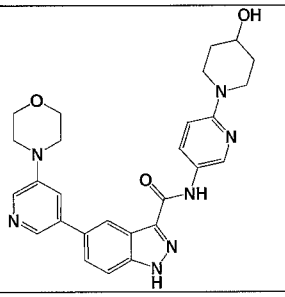
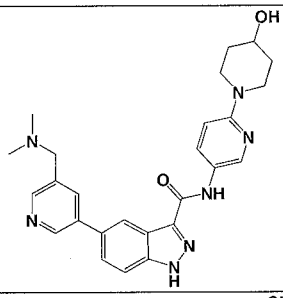
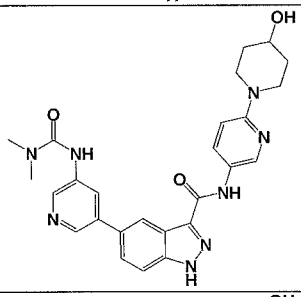
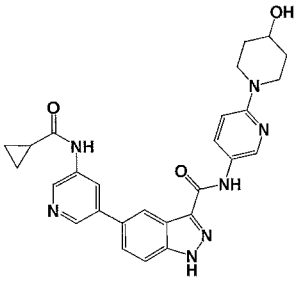
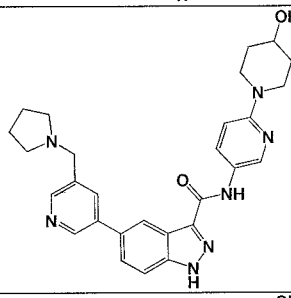
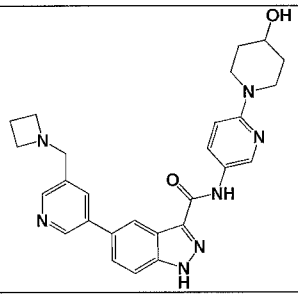
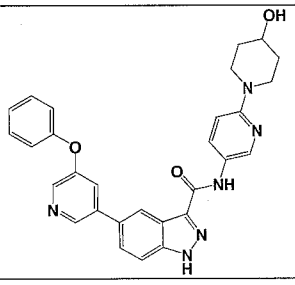
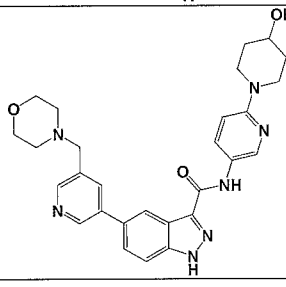
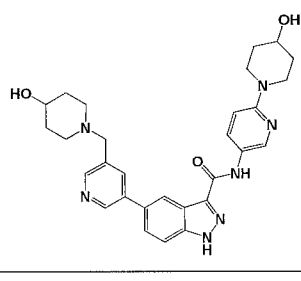
394		395		396	
397		398		399	
400		401		402	
403		404		405	
406		407		408	
409		410		411	

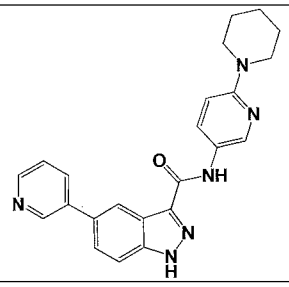
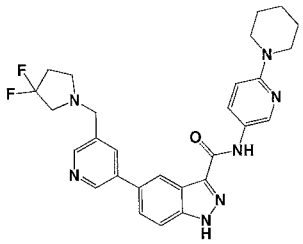
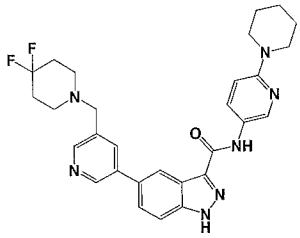
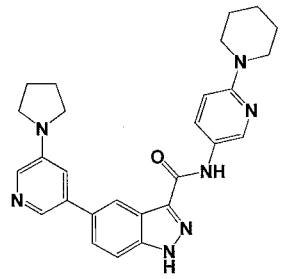
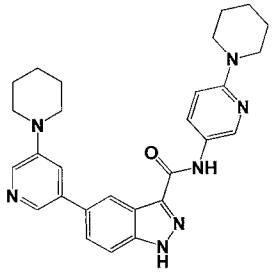
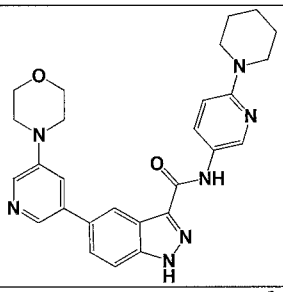
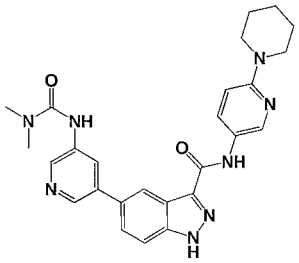
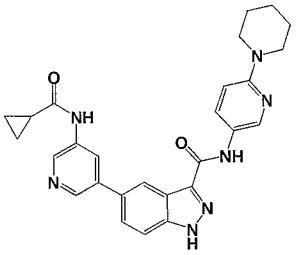
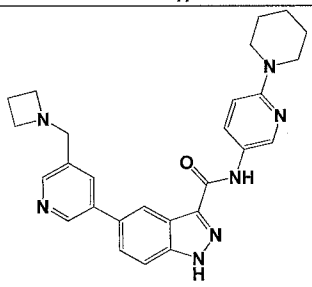
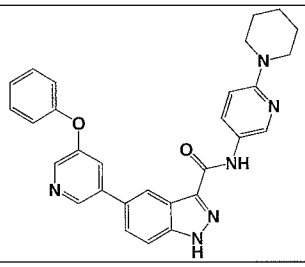
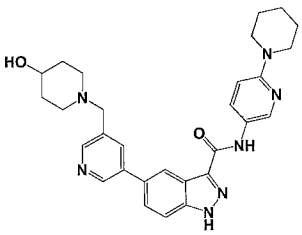
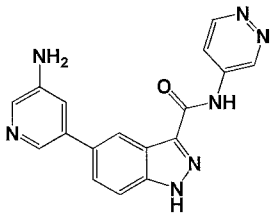
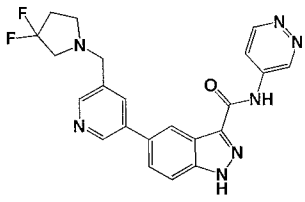
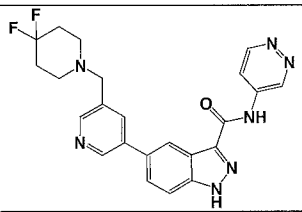
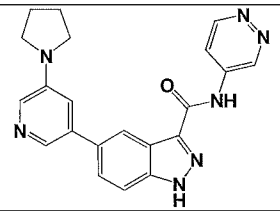
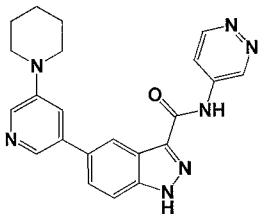
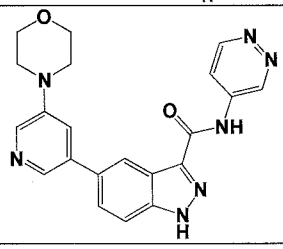
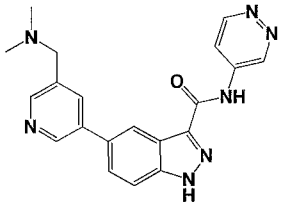
412		413		414	
415		416		417	
418		419		420	
421		422		423	
424		425		426	
427		428		429	

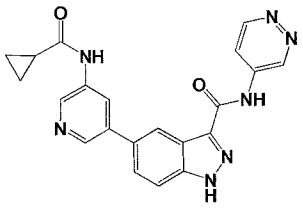
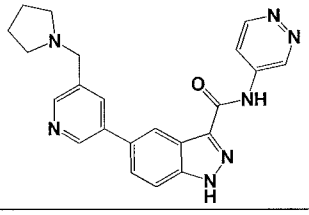
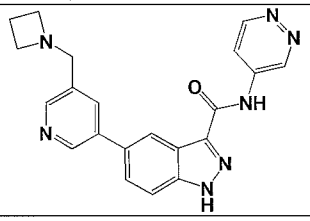
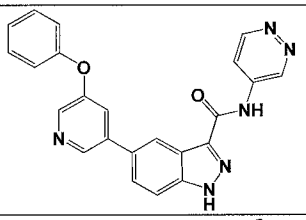
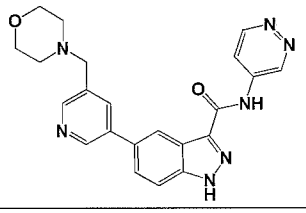
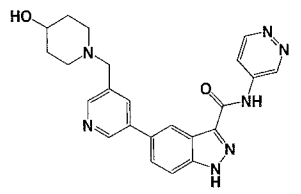
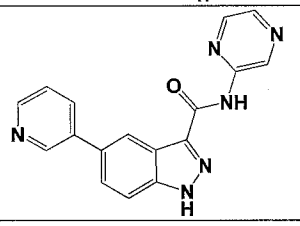
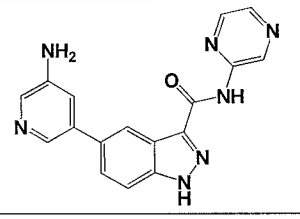
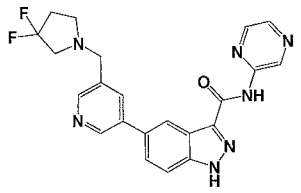
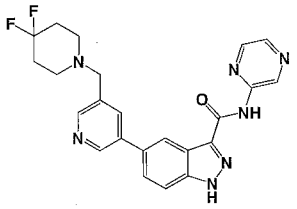
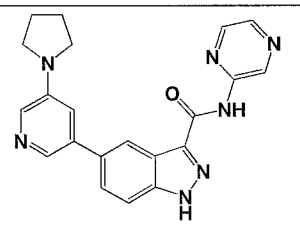
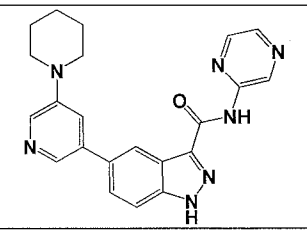
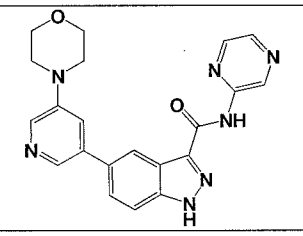
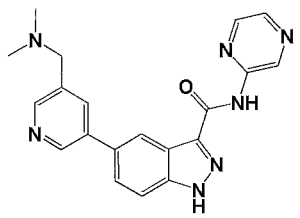
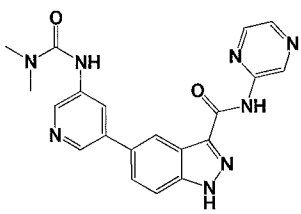
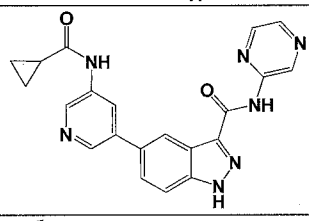
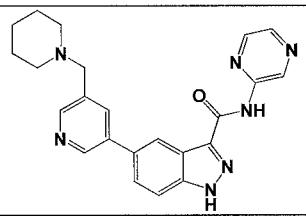
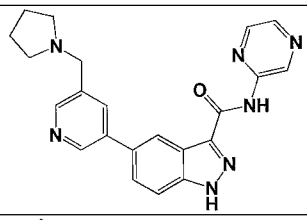
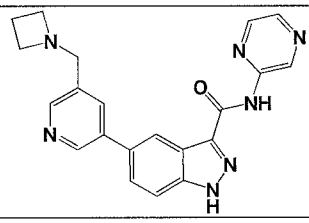
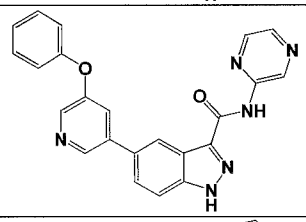
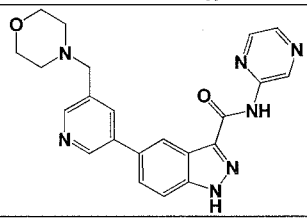
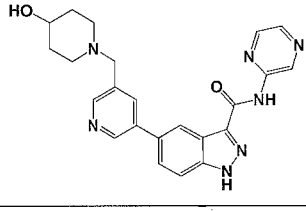
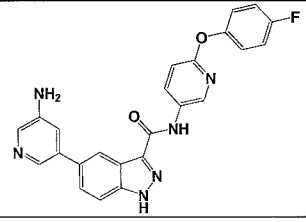
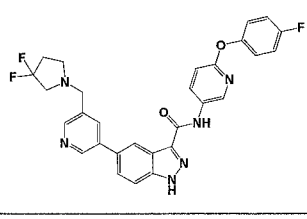
430		431		432	
433		434		435	
436		437		438	
439		440		441	
442		443		444	
445		446		447	

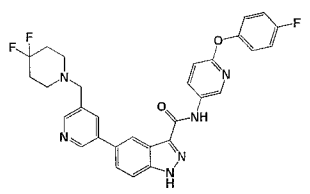
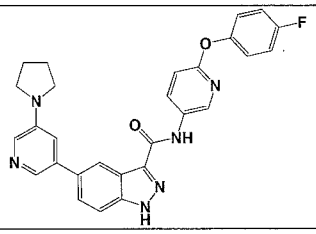
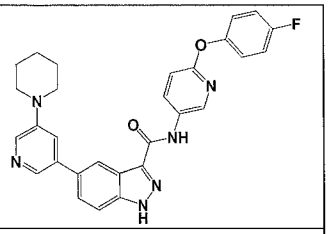
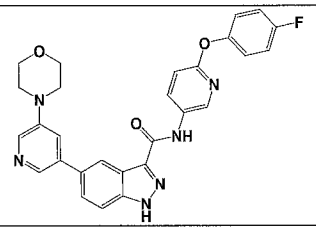
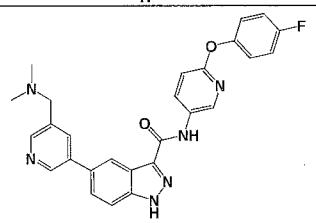
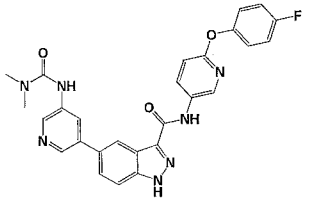
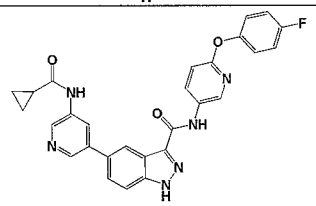
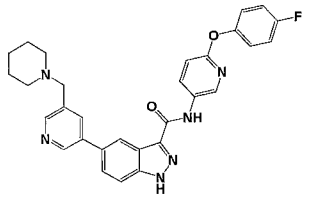
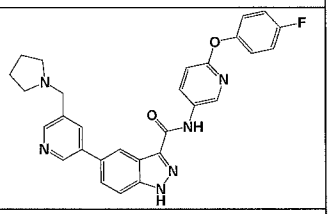
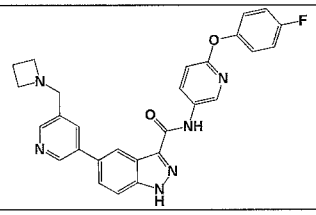
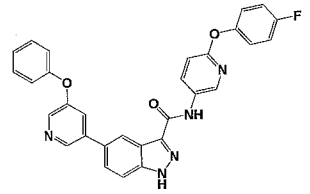
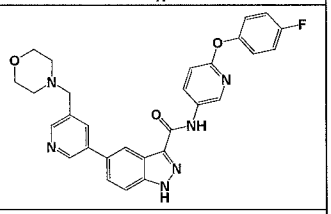
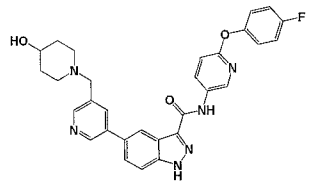
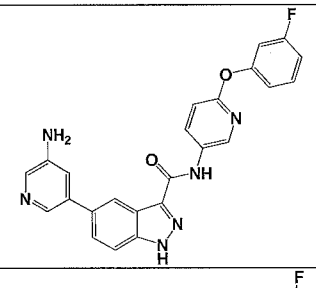
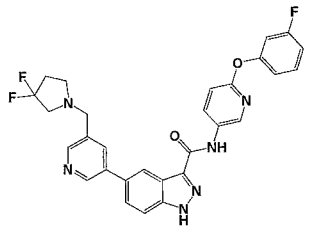
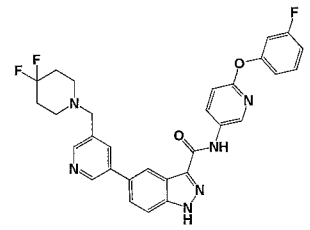
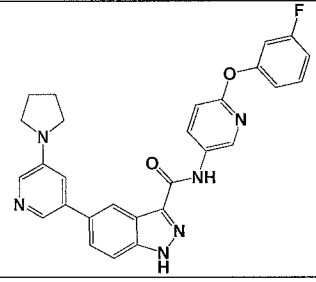
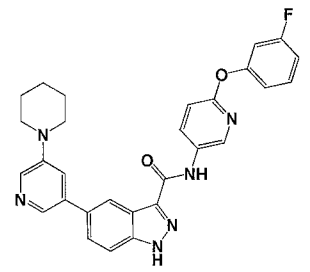
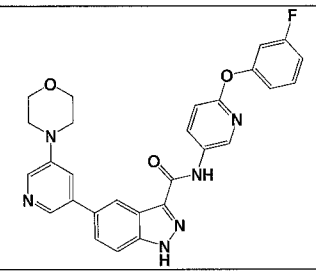
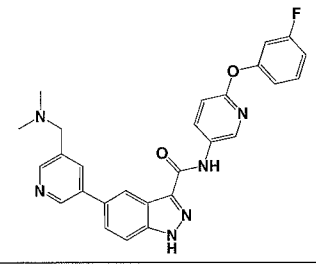
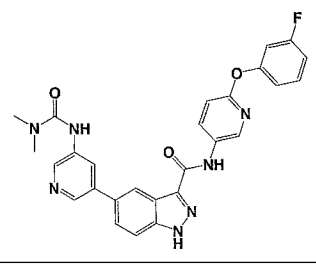
448		449		450	
451		452		453	
454		455		456	
457		458		459	
460		461		462	
463		464		465	

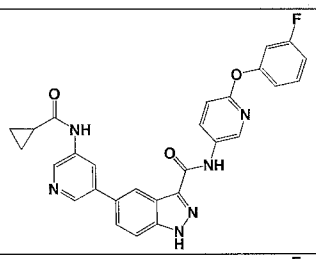
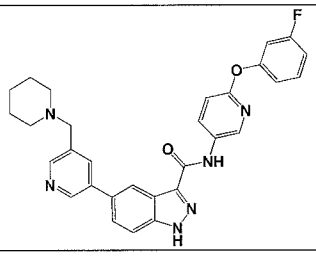
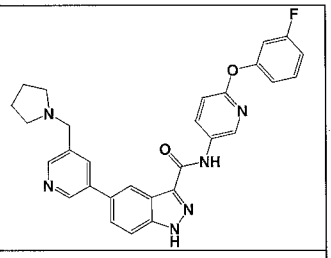
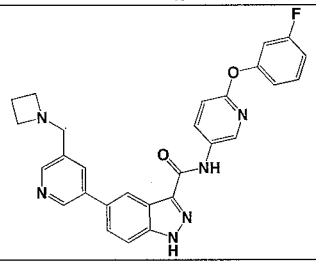
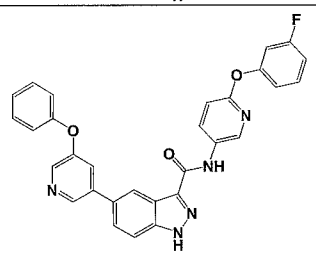
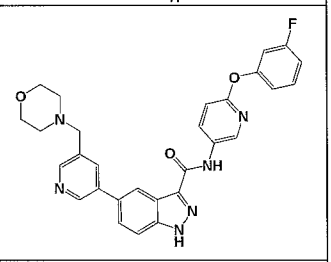
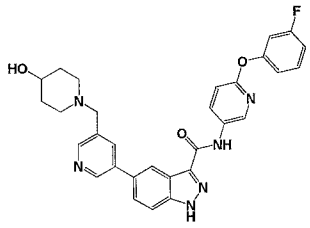
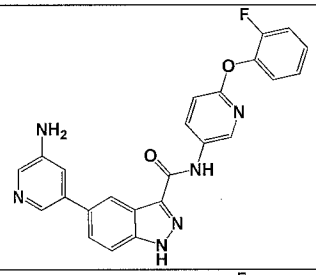
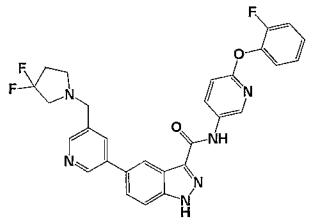
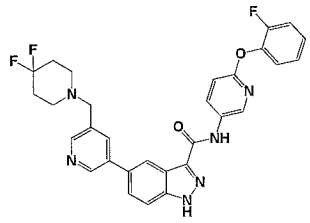
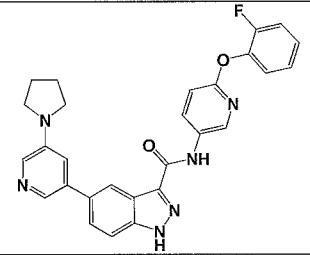
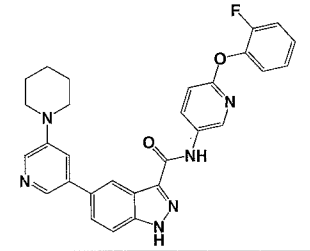
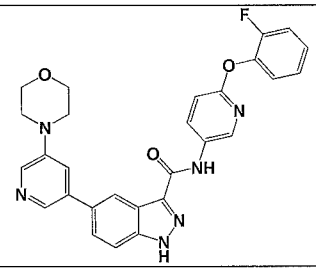
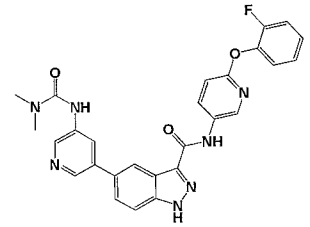
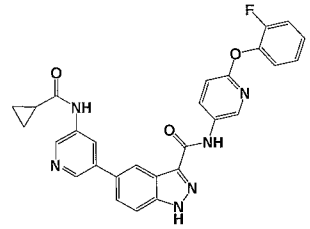
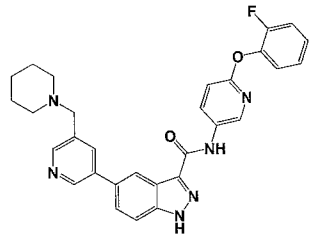
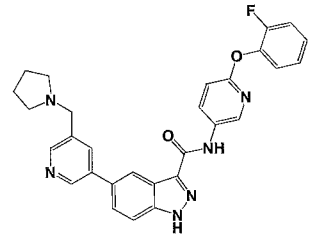
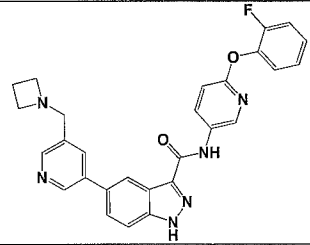
466		467		468	
469		470		471	
472		473		474	
475		476		477	
478		479		480	
481		482		483	

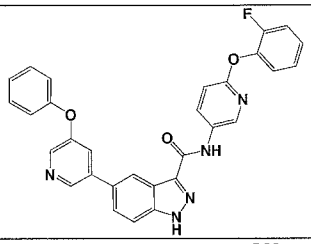
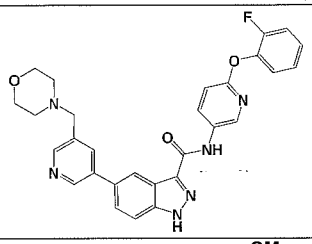
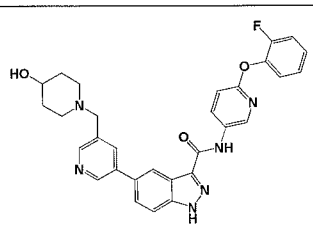
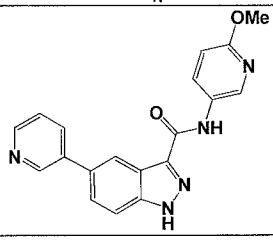
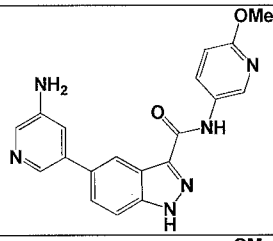
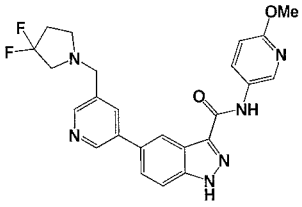
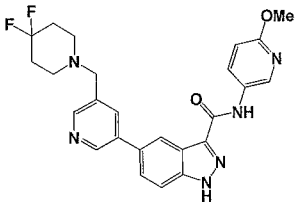
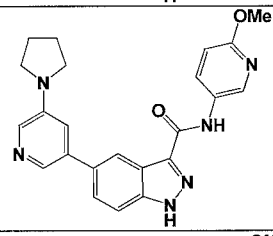
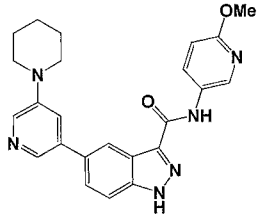
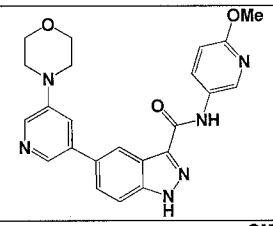
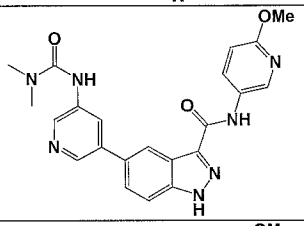
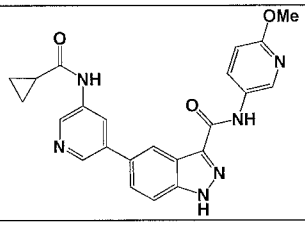
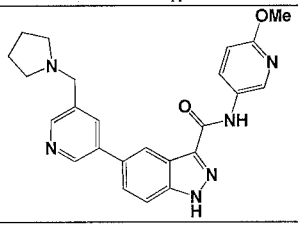
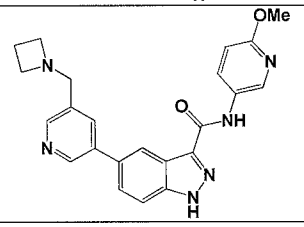
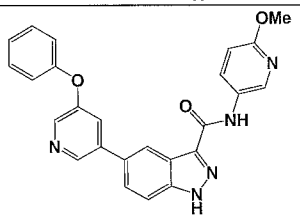
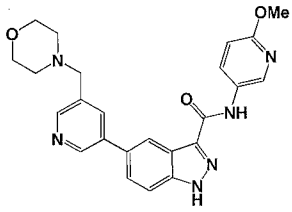
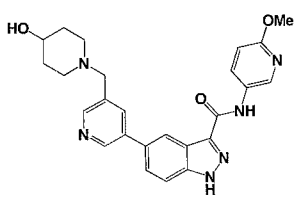
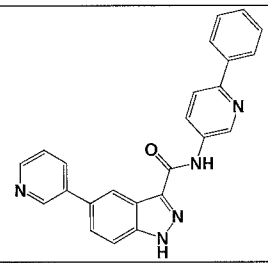
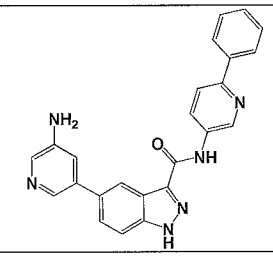
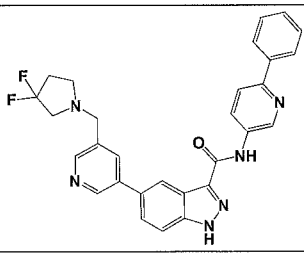
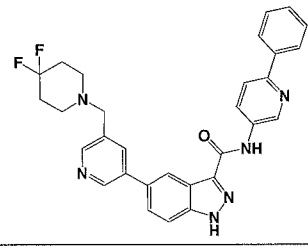
484		485		486	
487		488		489	
490		491		492	
493		494		495	
496		497		498	
499		500		501	

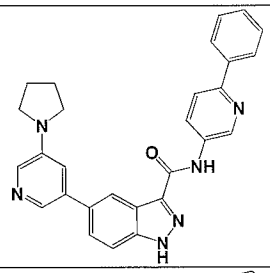
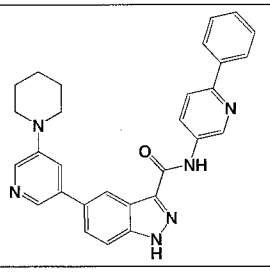
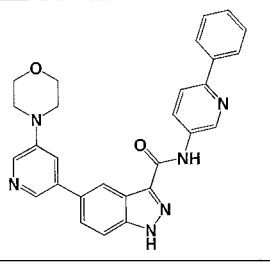
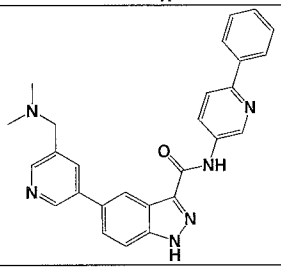
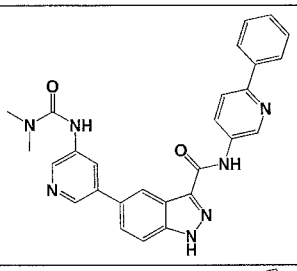
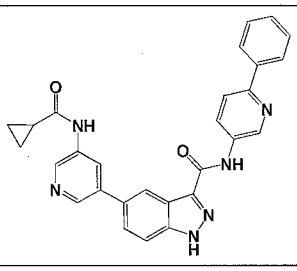
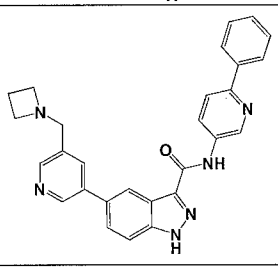
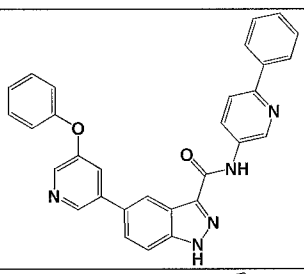
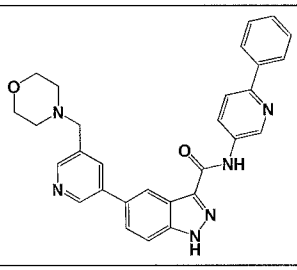
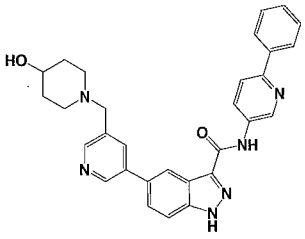
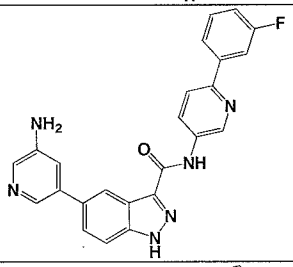
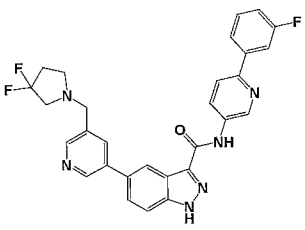
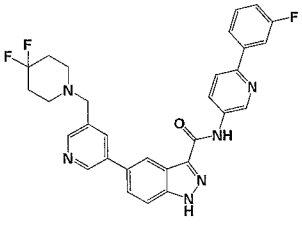
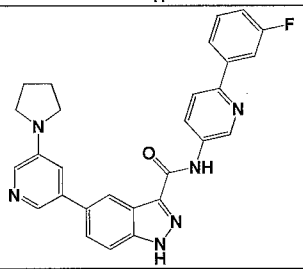
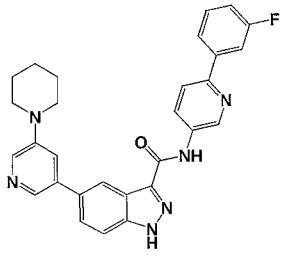
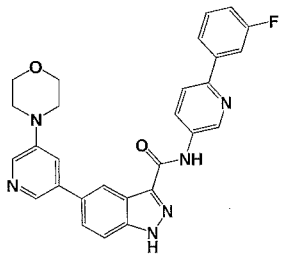
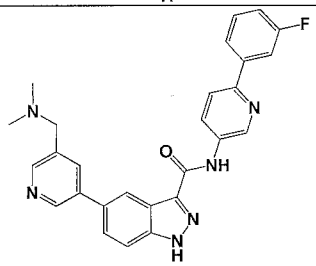
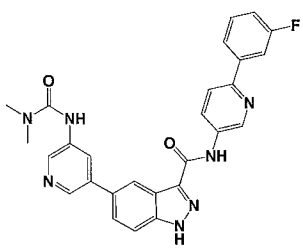
502		503		504	
505		506		507	
508		509		510	
511		512		513	
514		515		516	
517		518		519	

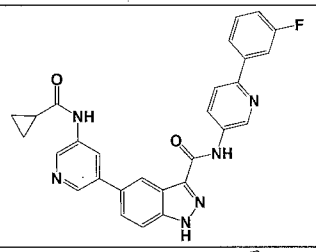
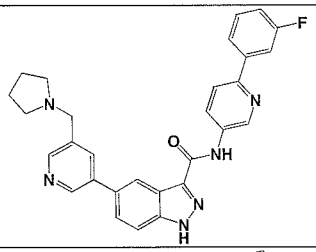
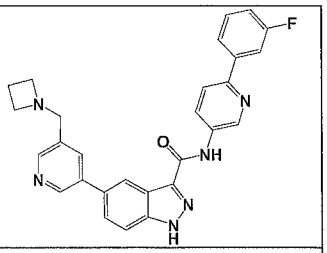
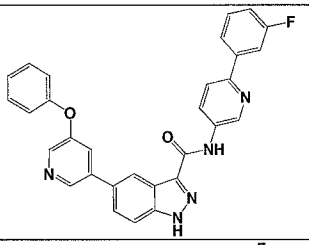
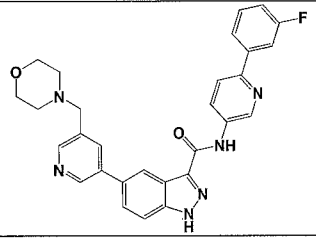
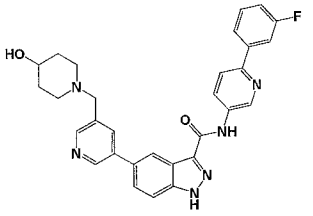
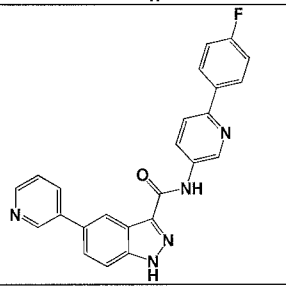
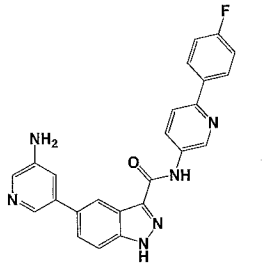
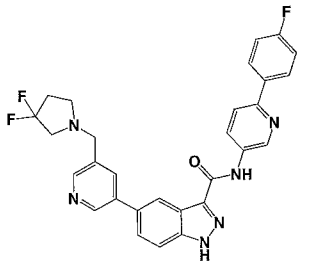
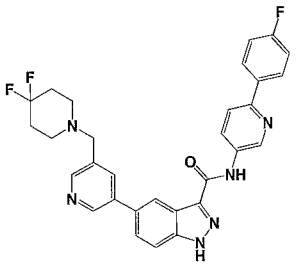
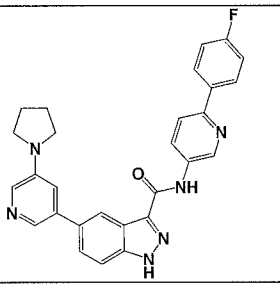
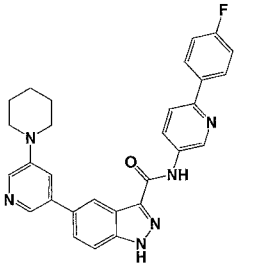
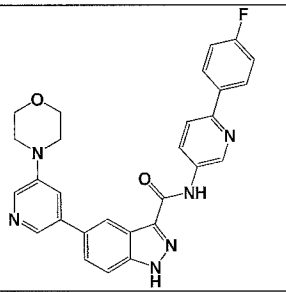
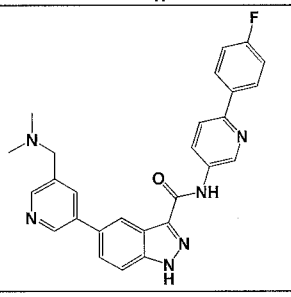
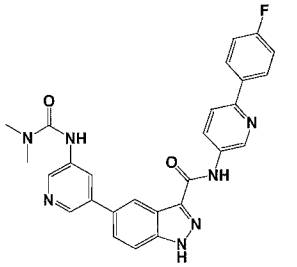
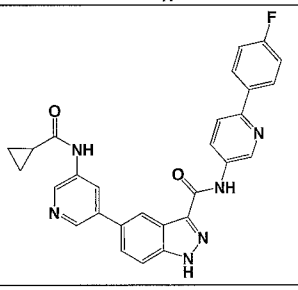
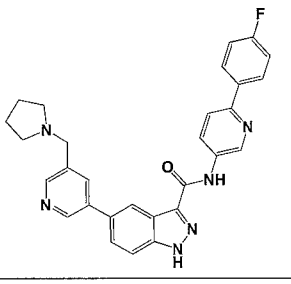
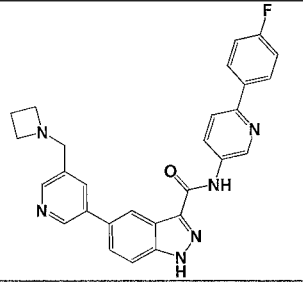
520		521		522	
523		524		525	
526		527		528	
529		530		531	
532		533		534	
535		536		537	
538		539		540	
541		542		543	

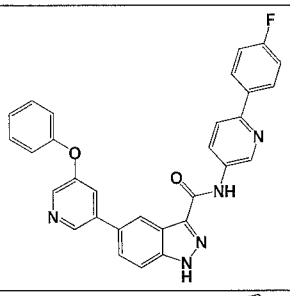
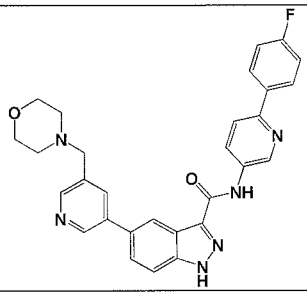
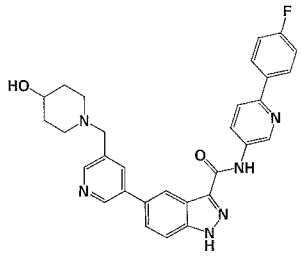
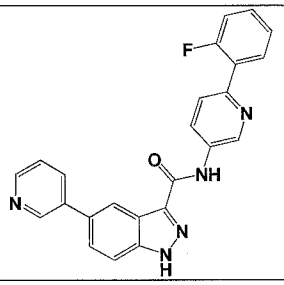
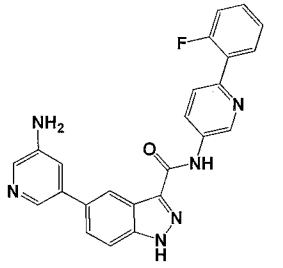
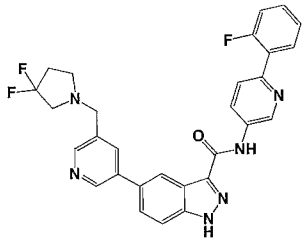
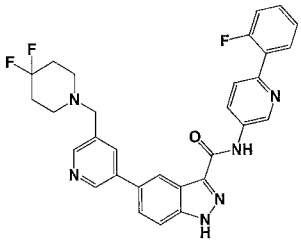
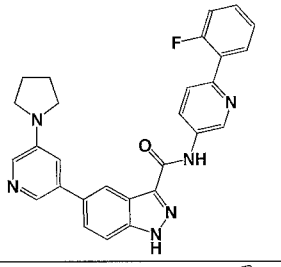
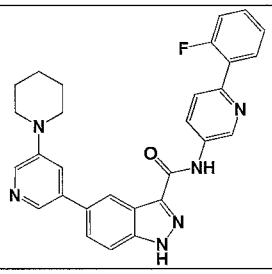
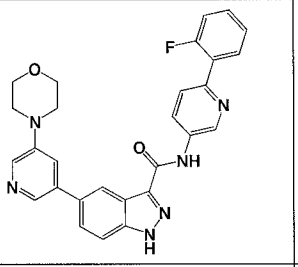
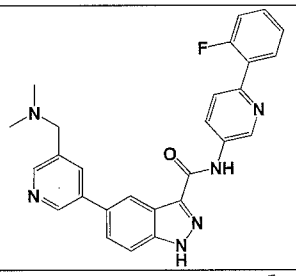
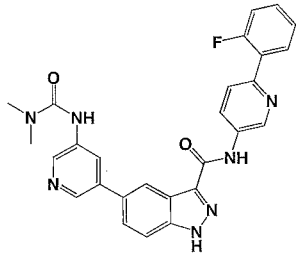
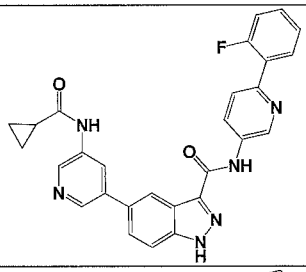
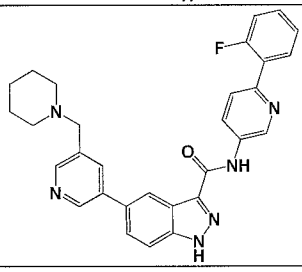
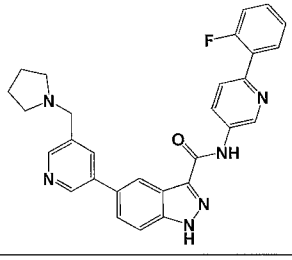
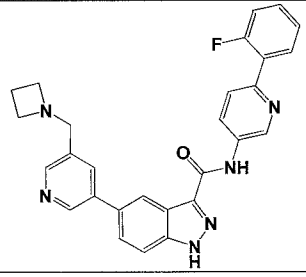
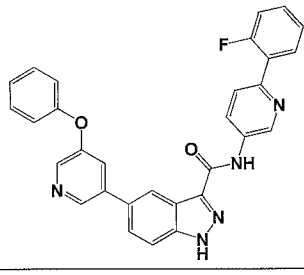
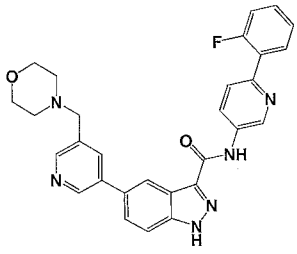
544		545		546	
547		548		549	
550		551		552	
553		554		555	
556		557		558	
559		560		561	
562		563		564	

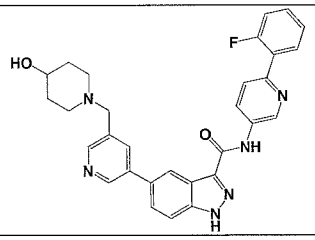
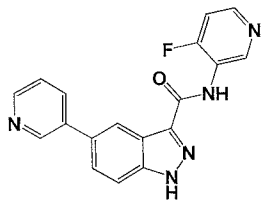
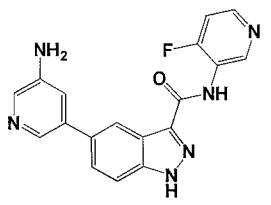
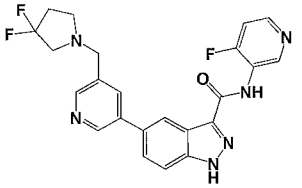
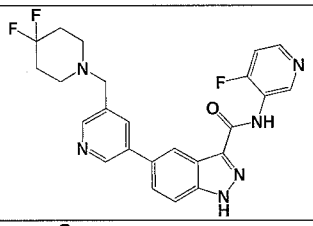
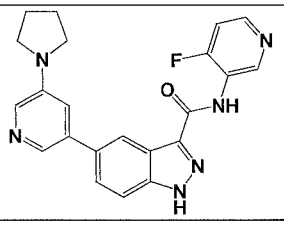
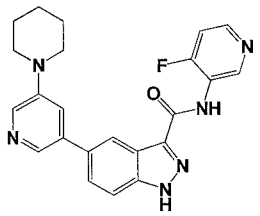
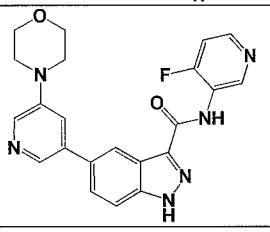
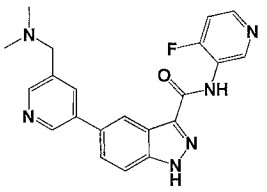
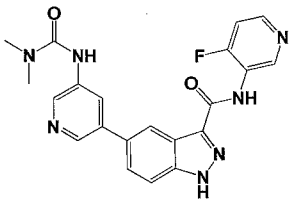
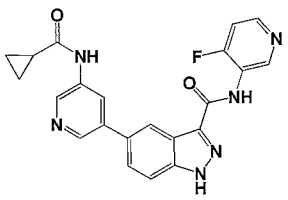
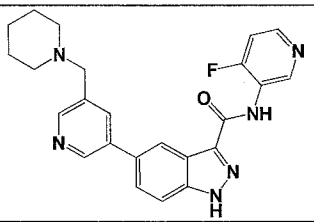
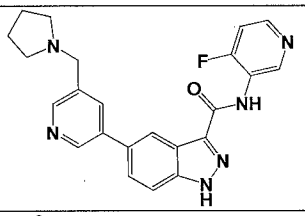
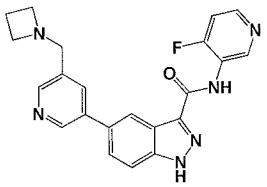
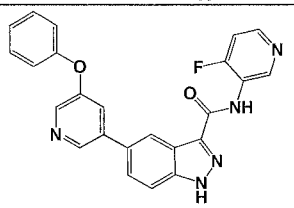
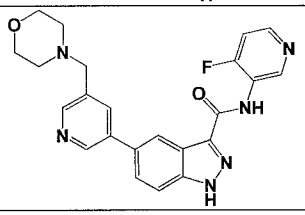
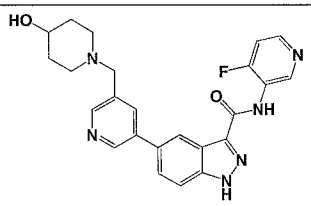
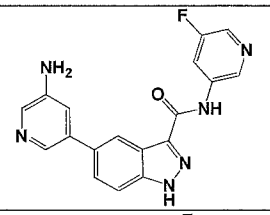
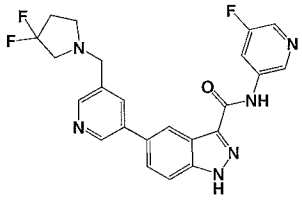
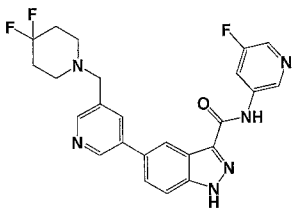
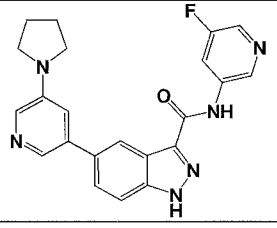
565		566		567	
568		569		570	
571		572		573	
574		575		576	
577		578		579	
580		581		582	

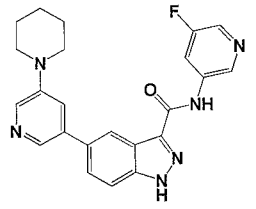
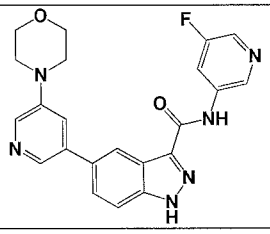
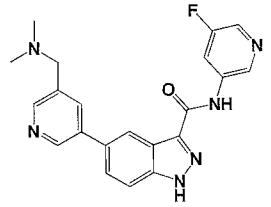
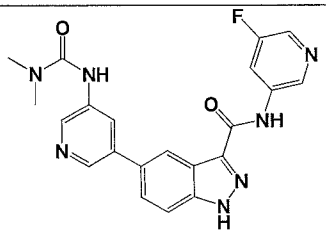
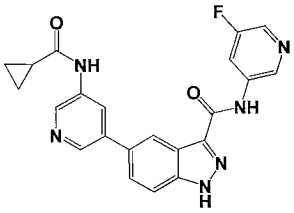
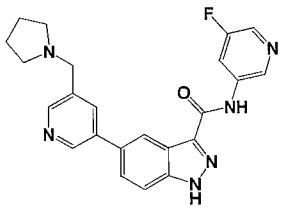
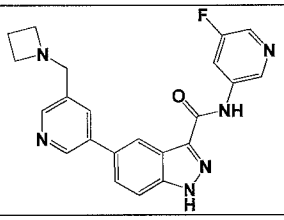
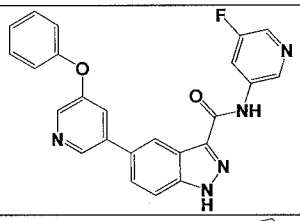
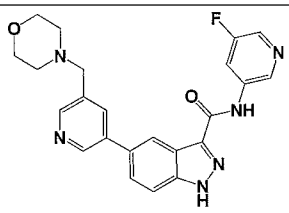
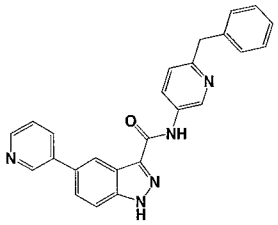
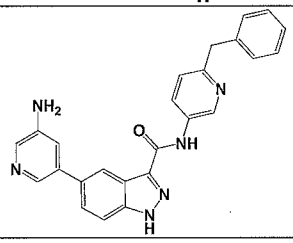
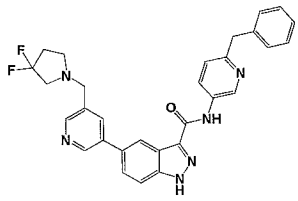
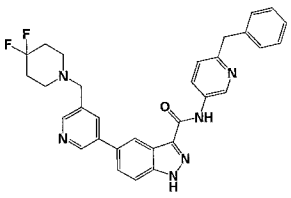
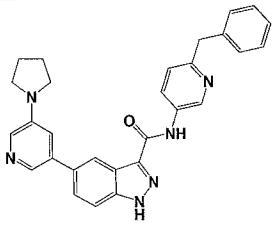
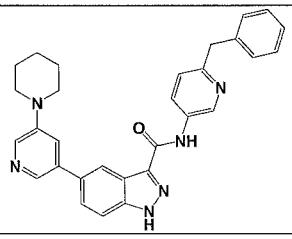
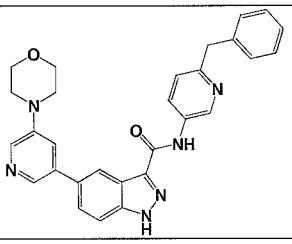
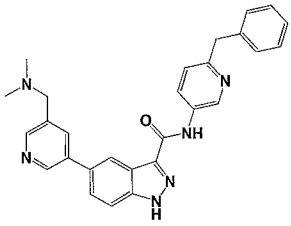
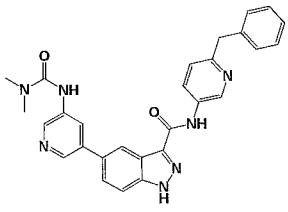
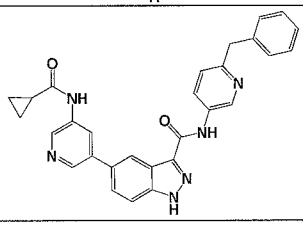
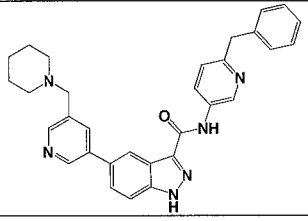
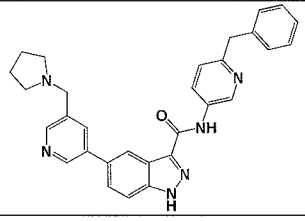
583		584		585	
586		587		588	
589		590		591	
592		593		594	
595		596		597	
598		599		600	
601		602		603	

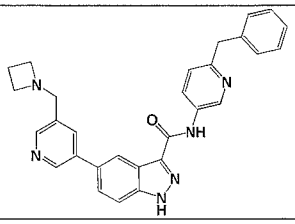
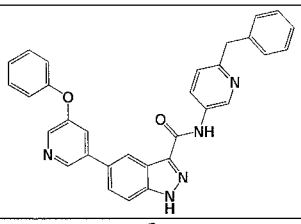
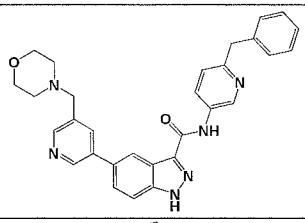
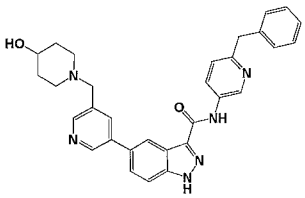
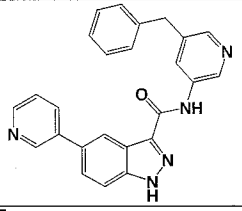
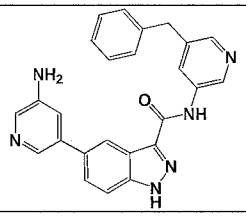
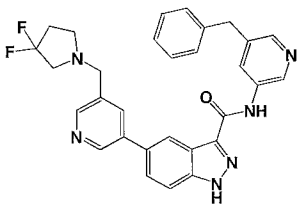
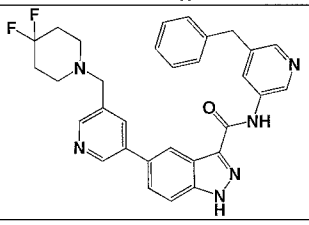
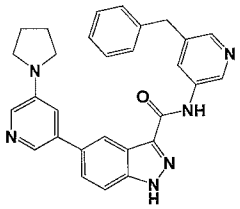
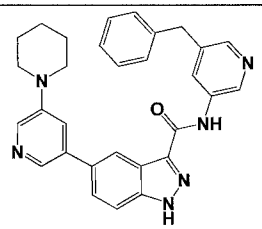
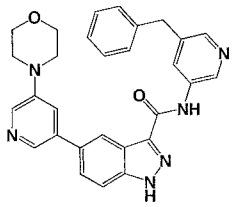
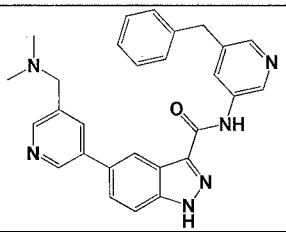
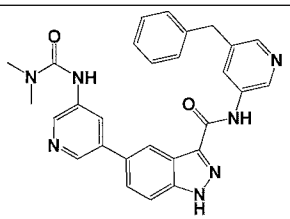
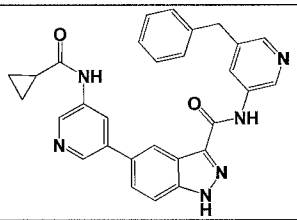
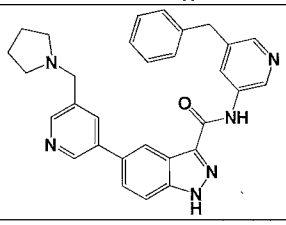
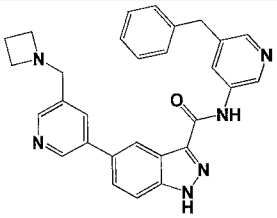
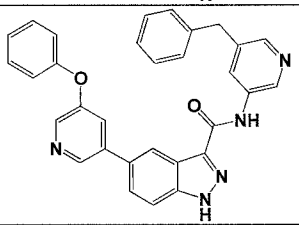
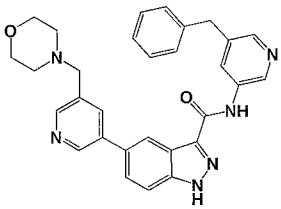
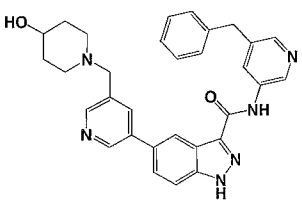
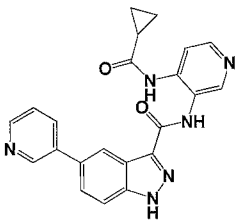
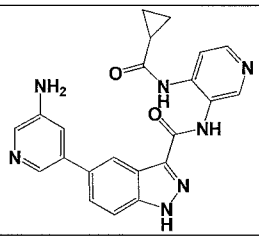
604		605		606	
607		608		609	
610		611		612	
613		614		615	
616		617		618	
619		620		621	

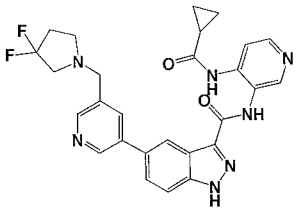
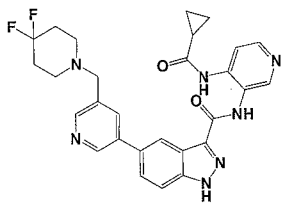
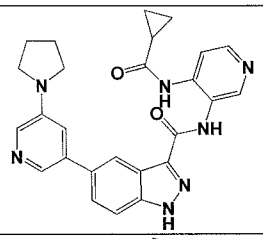
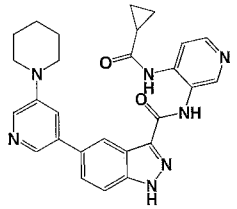
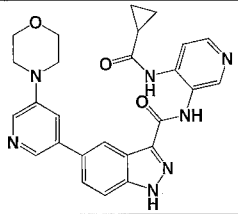
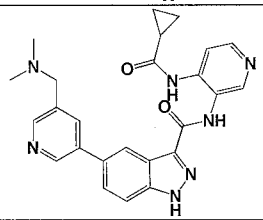
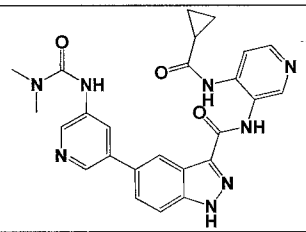
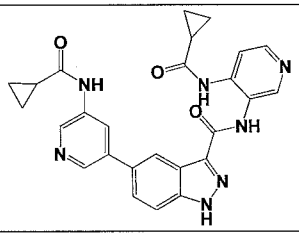
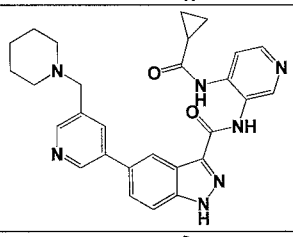
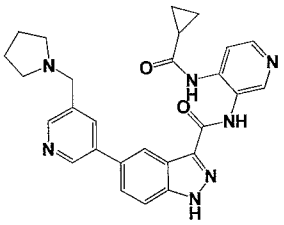
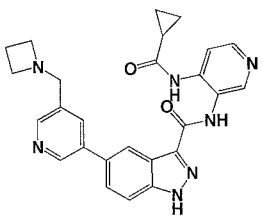
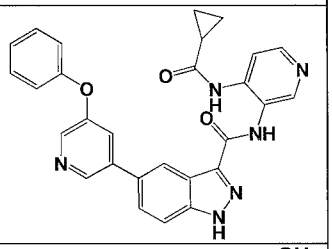
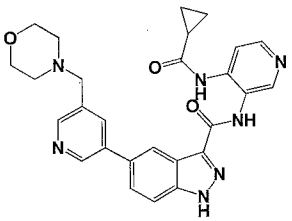
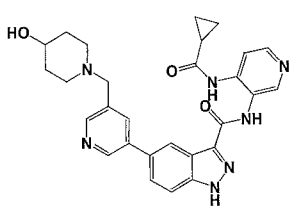
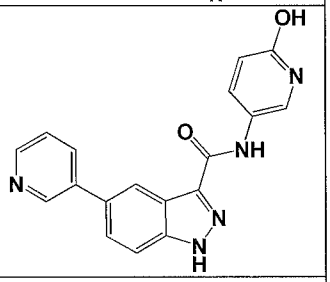
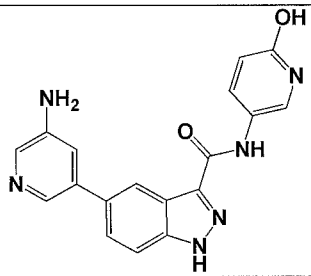
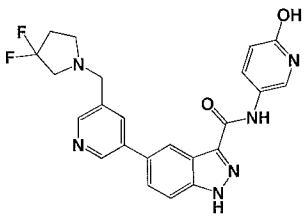
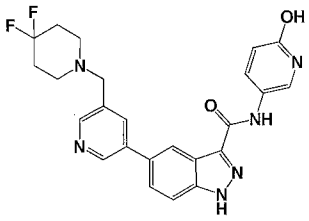
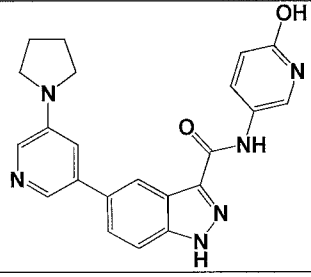
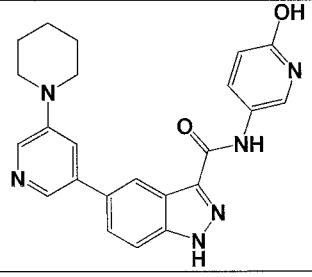
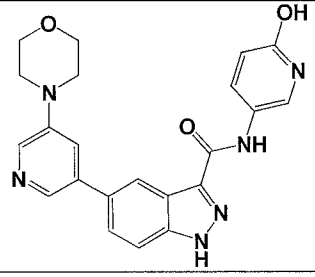
622		623		624	
625		626		627	
628		629		630	
631		632		633	
634		635		636	
637		638		639	

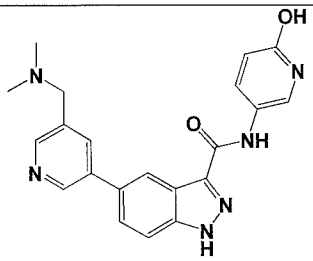
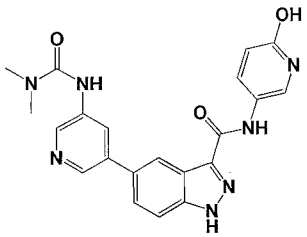
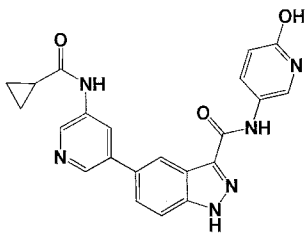
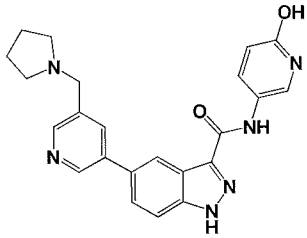
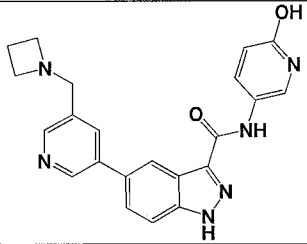
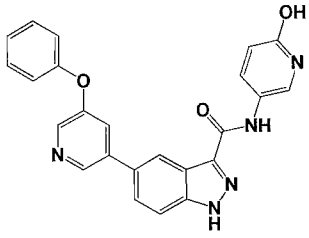
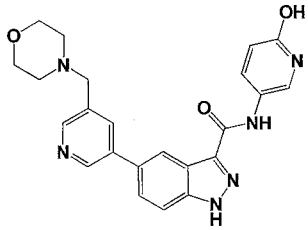
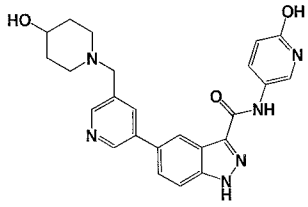
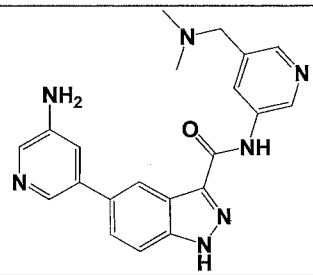
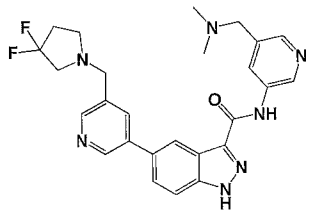
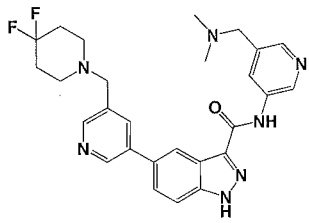
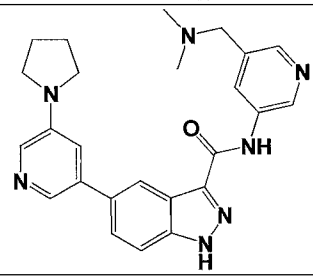
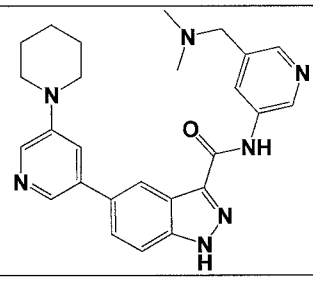
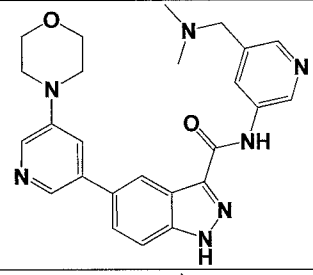
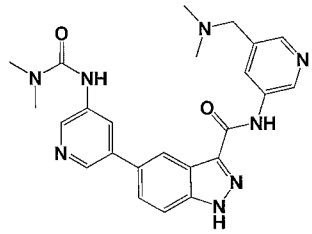
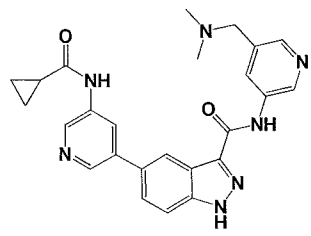
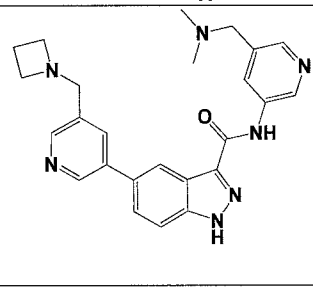
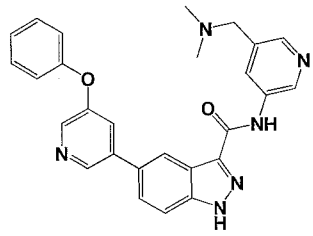
640		641		642	
643		644		645	
646		647		648	
649		650		651	
652		653		654	
655		656		657	

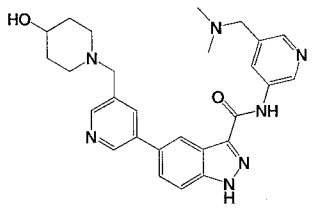
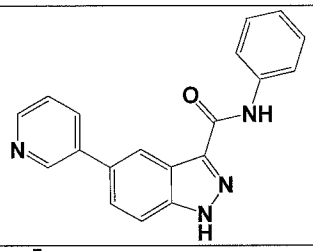
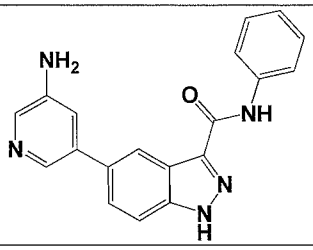
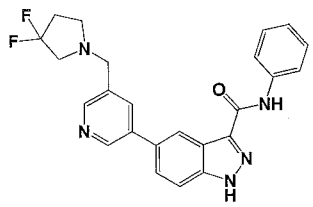
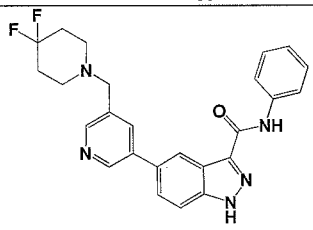
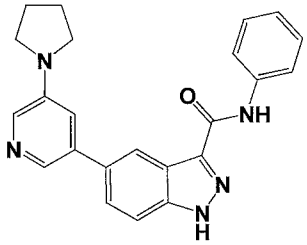
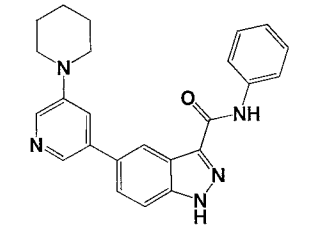
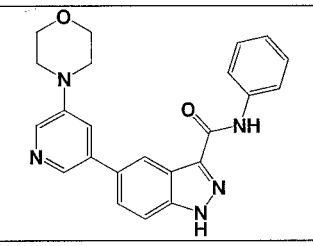
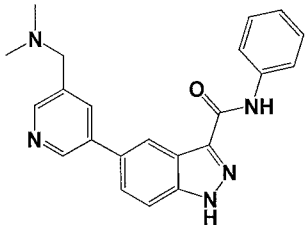
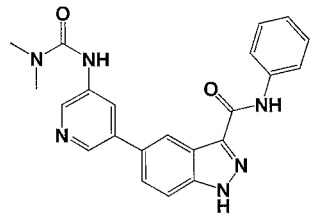
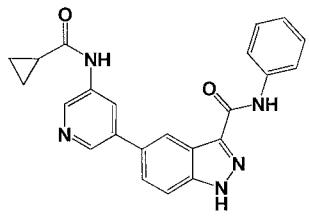
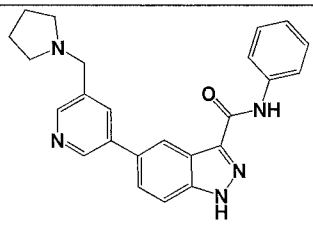
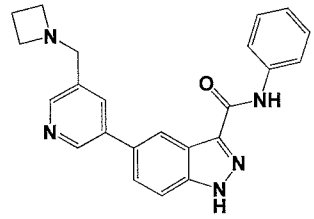
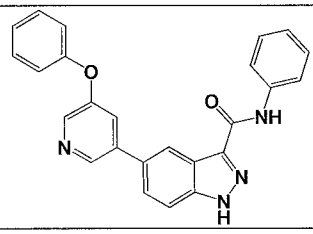
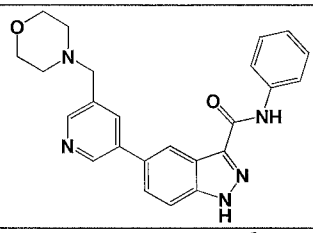
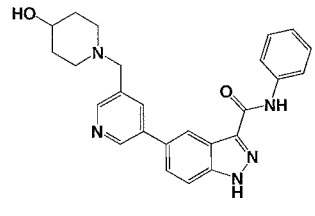
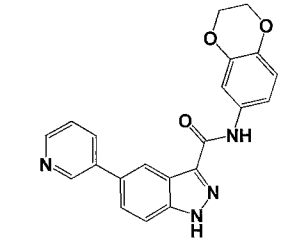
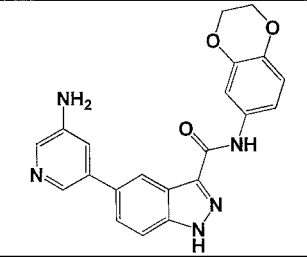
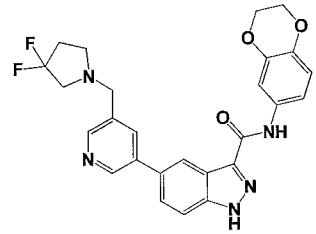
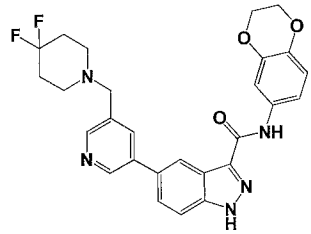
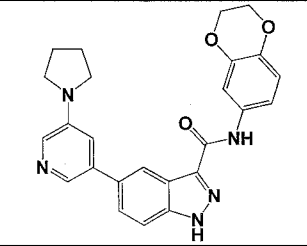
658		659		660	
661		662		663	
664		665		666	
667		668		669	
670		671		672	
673		674		675	
676		677		678	

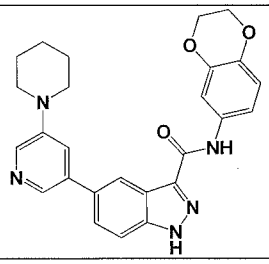
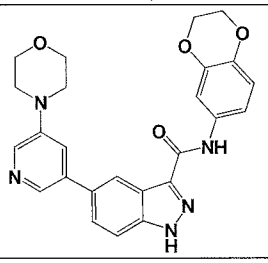
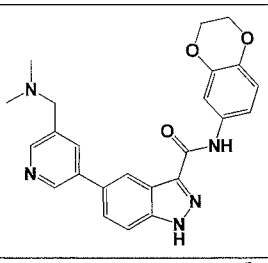
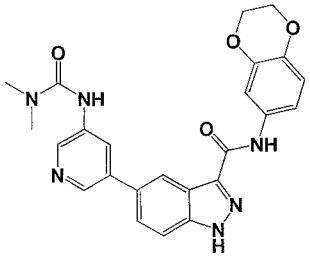
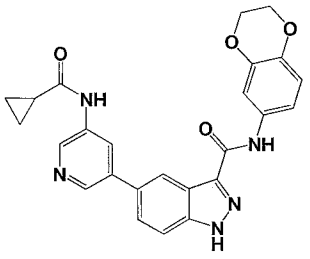
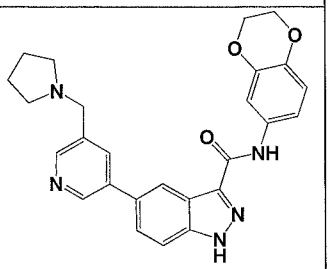
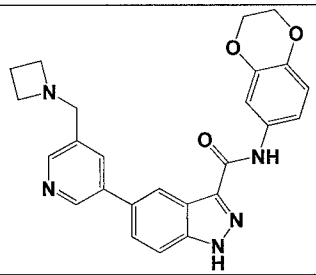
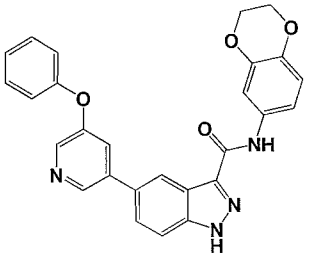
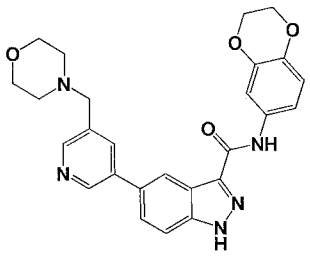
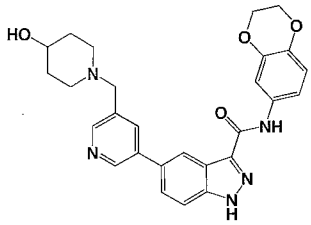
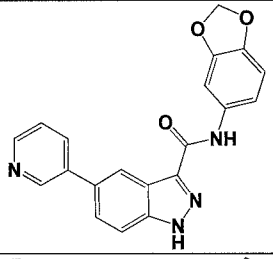
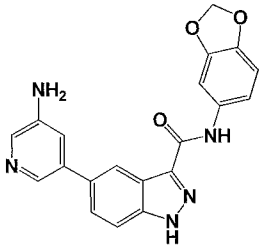
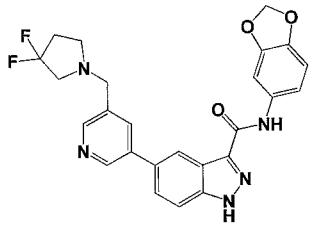
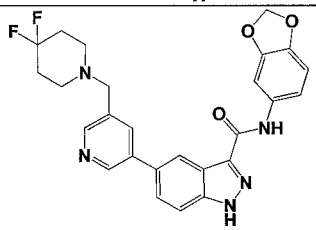
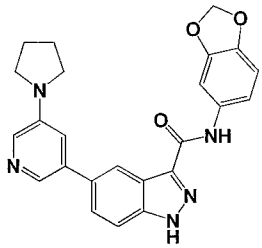
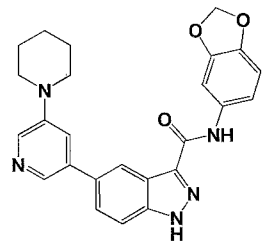
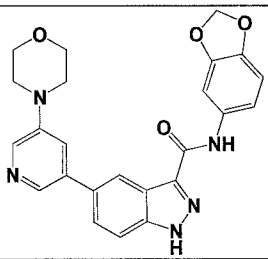
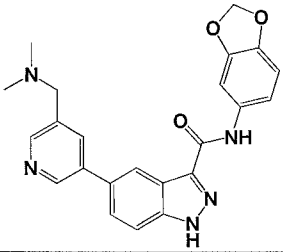
679		680		681	
682		683		684	
685		686		687	
688		689		690	
691		692		693	
694		695		696	
697		698		699	

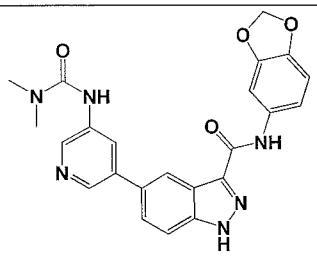
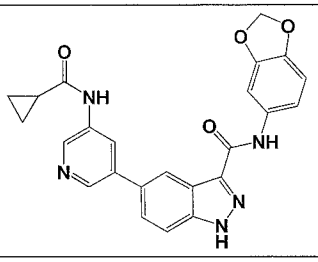
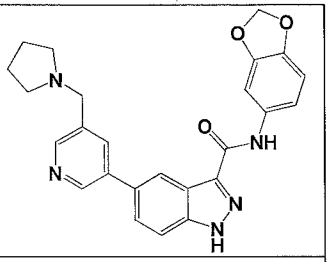
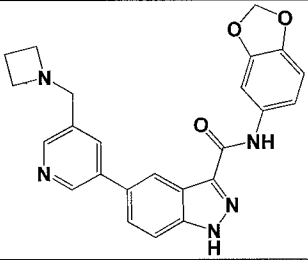
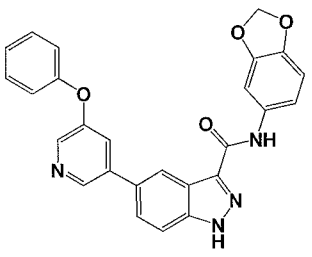
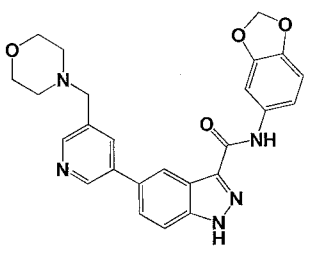
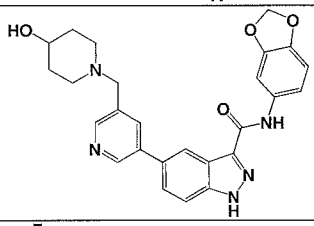
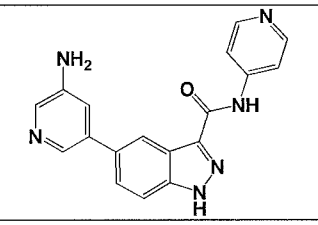
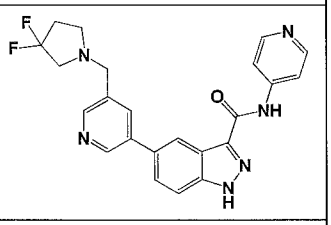
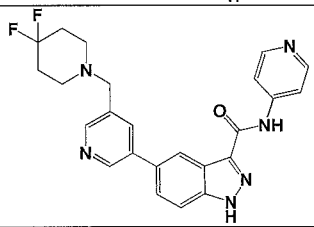
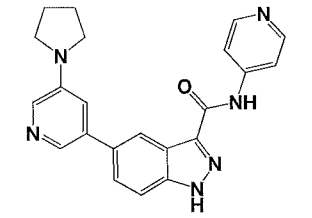
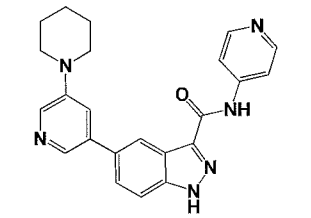
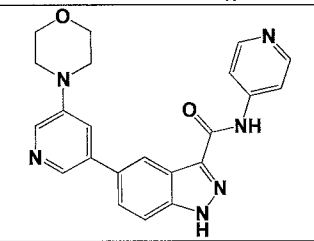
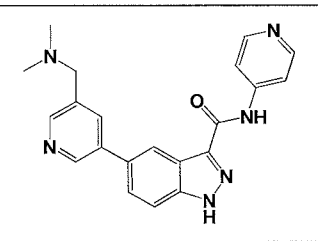
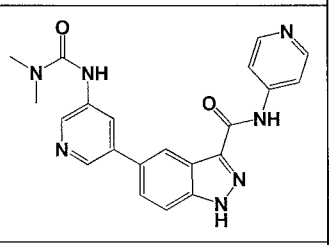
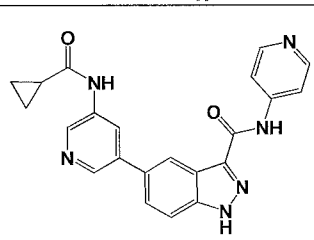
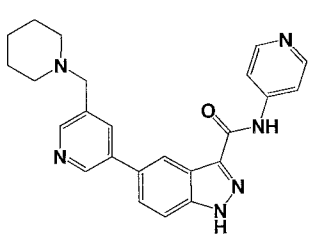
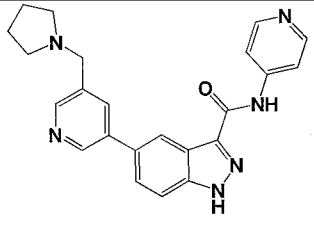
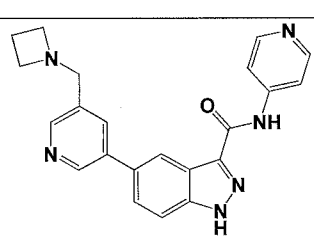
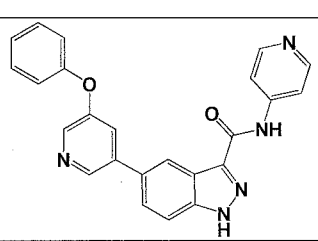
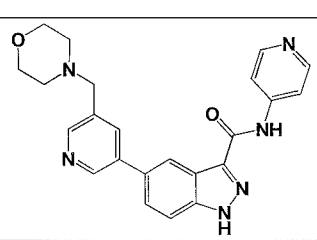
700		701		702	
703		704		705	
706		707		708	
709		710		711	
712		713		714	
715		716		717	
718		719		720	

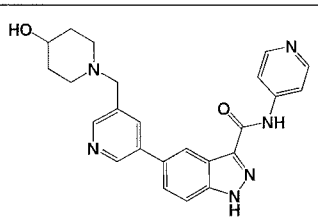
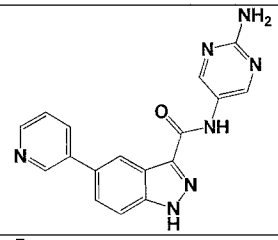
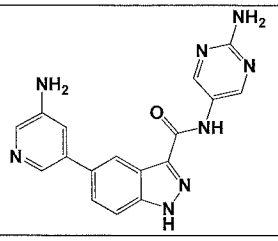
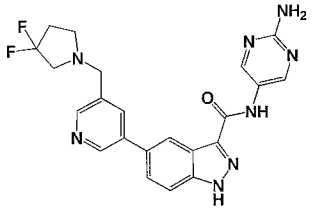
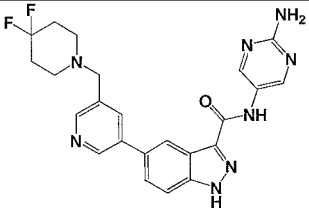
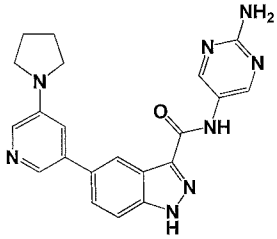
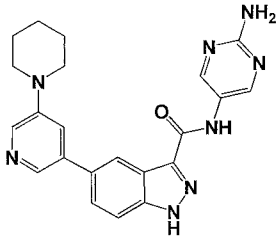
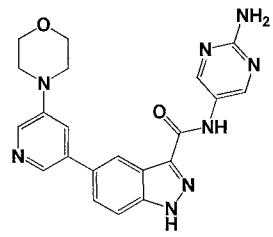
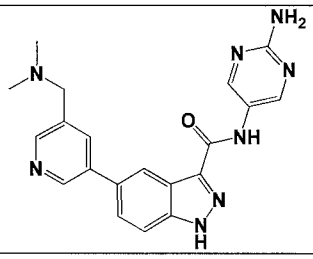
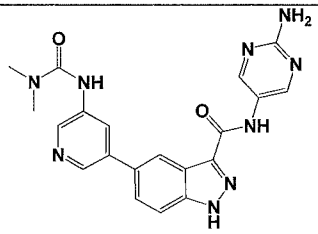
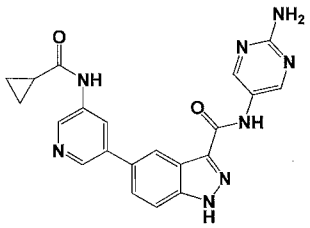
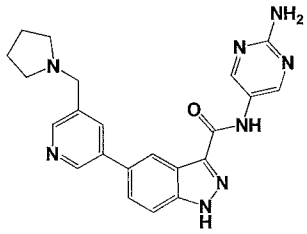
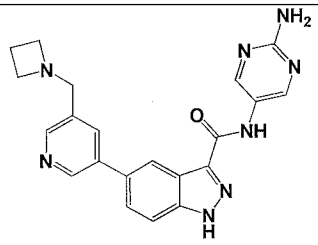
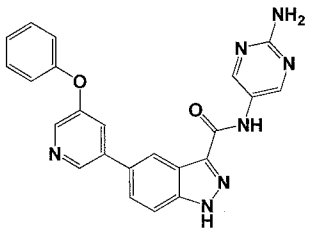
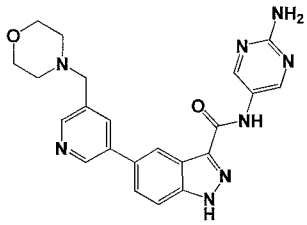
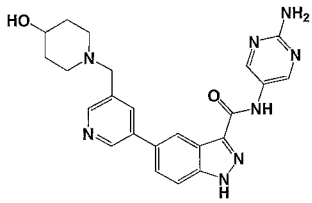
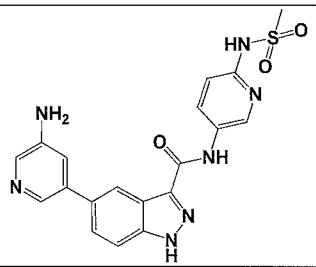
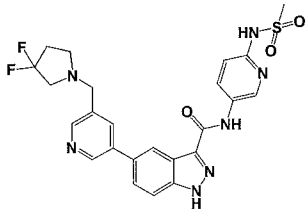
721		722		723	
724		725		726	
727		728		729	
730		731		732	
733		734		735	
736		737		738	
739		740		741	

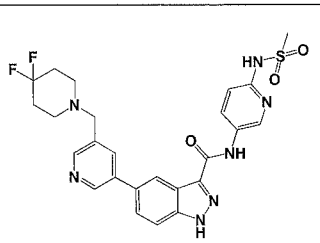
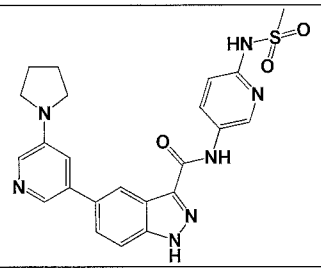
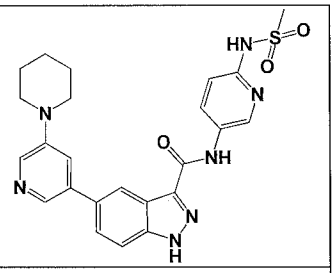
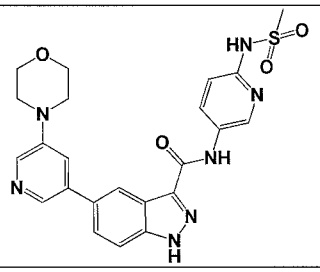
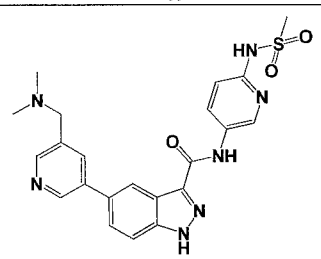
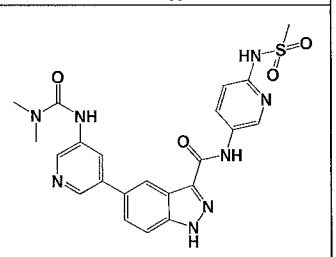
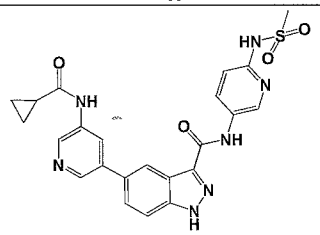
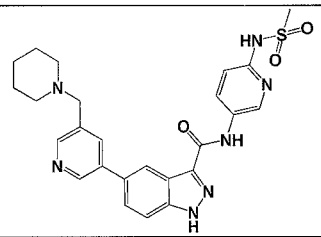
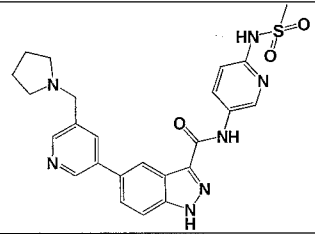
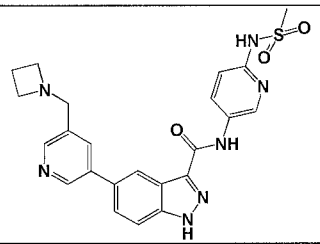
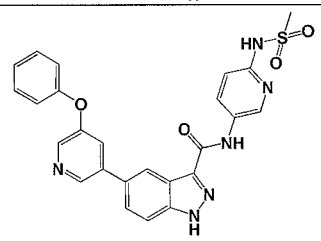
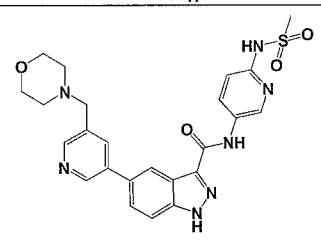
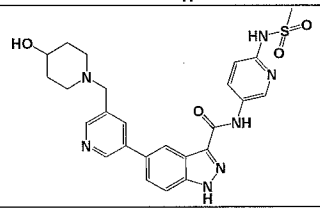
742		743		744	
745		746		747	
748		749		750	
751		752		753	
754		755		756	
757		758		759	

760		761		762	
763		764		765	
766		767		768	
769		770		771	
772		773		774	
775		776		777	
778		779		780	

781		782		783	
784		785		786	
787		788		789	
790		791		792	
793		794		795	
796		797		798	

799		800		801	
802		803		804	
805		806		807	
808		809		810	
811		812		813	
814		815		816	
817		818		819	

820		821		822	
823		824		825	
826		827		828	
829		830		831	
832		833		834	
835		836		837	

838		839		840	
841		842		843	
844		845		846	
847		848		849	
850					

Compound preparation

[00227] The starting materials used in preparing the compounds of the invention are known, made by known methods, or are commercially available. It will be apparent to the skilled artisan that methods for preparing precursors and functionality related to the compounds claimed herein are generally described in the literature. The skilled artisan given the literature and this disclosure is well equipped to prepare any of the compounds.

[00228] It is recognized that the skilled artisan in the art of organic chemistry can readily carry out manipulations without further direction, that is, it is well within the scope and practice of the skilled artisan to carry out these manipulations. These include reduction of carbonyl compounds to their corresponding alcohols, oxidations, acylations, aromatic substitutions, both electrophilic and nucleophilic, etherifications, esterification and saponification and the like. These manipulations are discussed in standard texts such as *March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure* 6th Ed., John Wiley & Sons (2007), Carey and Sundberg, *Advanced Organic Chemistry* 5th Ed., Springer (2007), *Comprehensive Organic Transformations: A Guide to Functional Group Transformations*, 2nd Ed., John Wiley & Sons (1999) (incorporated herein by reference in its entirety) and the like.

[00229] The skilled artisan will readily appreciate that certain reactions are best carried out when other functionality is masked or protected in the molecule, thus avoiding any undesirable side reactions and/or increasing the yield of the reaction. Often the skilled artisan utilizes protecting groups to accomplish such increased yields or to avoid the undesired reactions. These reactions are found in the literature and are also well within the scope of the skilled artisan. Examples of many of these manipulations can be found for example in T. Greene and P. Wuts *Protecting Groups in Organic Synthesis,* 4th Ed., John Wiley & Sons (2007), incorporated herein by reference in its entirety.

[00230] To further illustrate this invention, the following examples are included. The examples should not, of course, be construed as specifically limiting the invention. Variations of these examples within the scope of the claims are within the purview of one skilled in the art and are considered to fall within the scope of the invention as described, and claimed herein. The reader will recognize that the skilled artisan, armed with the present disclosure, and skill in the art is able to prepare and use the invention without exhaustive examples.

[00231] Trademarks used herein are examples only and reflect illustrative materials used at the time of the invention. The skilled artisan will recognize that variations in lot, manufacturing processes, and the like, are expected. Hence the examples, and the trademarks used in them are non-limiting, and they are not intended to

be limiting, but are merely an illustration of how a skilled artisan may choose to perform one or more of the embodiments of the invention.

[00232] (^{1}H) nuclear magnetic resonance spectra (NMR) were measured in the indicated solvents on a Bruker NMR spectrometer (Avance TM DRX300, 300 MHz for ^{1}H or Avance TM DRX500, 500 MHz for ^{1}H) or Varian NMR spectrometer (Mercury 400BB, 400 MHz for ^{1}H). Peak positions are expressed in parts per million (ppm) downfield from tetramethylsilane. The peak multiplicities are denoted as follows, s, singlet; d, doublet; t, triplet; q, quartet; ABq, AB quartet; quin, quintet; sex, sextet; sep, septet; non, nonet; dd, doublet of doublets; d/ABq, doublet of AB quartet; dt, doublet of triplets; td, triplet of doublets; m, multiplet.

[00233] The following abbreviations have the indicated meanings:

brine = saturated aqueous sodium chloride

$CDCl_3$ = deuterated chloroform

DCE = dichloroethane

DCM = dichloromethane

DHP = dihydropyran

DIPEA = diisopropylethylamine

DMF = N,N-dimethylformamide

DMSO-d_6 = deuterated dimethylsulfoxide

ESIMS = electron spray mass spectrometry

EtOAc = ethyl acetate

EtOH = ethanol

h = hour

HATU = 2-(1H-7-azabenzotriazol-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate

HCl = hydrochloric acid

HOAc = acetic acid

H_2SO_4 = sulfuric acid

iPrOH = iso-propyl alcohol

KOAc = potassium acetate

K_3PO_4 = potassium phosphate

LAH = lithium aluminum hydride

mCPBA = meta-Chloroperoxybenzoic acid

MeOH = methanol

$MgSO_4$ = magnesium sulfate

min. = minute

MW = microwave

$NaBH(OAc)_3$ = sodium triacetoxyborohydride

$NaHCO_3$ = sodium bicarbonate

$NaHSO_3$ = sodium bisulfite

$NaHSO_4$ = sodium bisulfate

NaOH = sodium hydroxide

NH_4OH = ammonium hydroxide

NMR = nuclear magnetic resonance

Pd/C = palladium(0) on carbon

$PdCl_2(dppf)_2$ = 1,1'-bis(diphenylphosphino)ferrocene]palladium(II) chloride

$Pd_2(dba)_3$ = tris(dibenzylideneacetone)dipalladium(0)

$Pd(PPh_3)_4$ = tetrakis(triphenylphosphine)palladium(0)

PPTS = pyridinium p-toluenesulfonate

r.t. = room temperature

sat^d. = saturated

sol^n. = solution

Reflx. = heated to reflux

TEA = triethylamine

TFA = trifluoroacetic acid

THF = tetrahydrofuran

TLC = thin layer chromatography

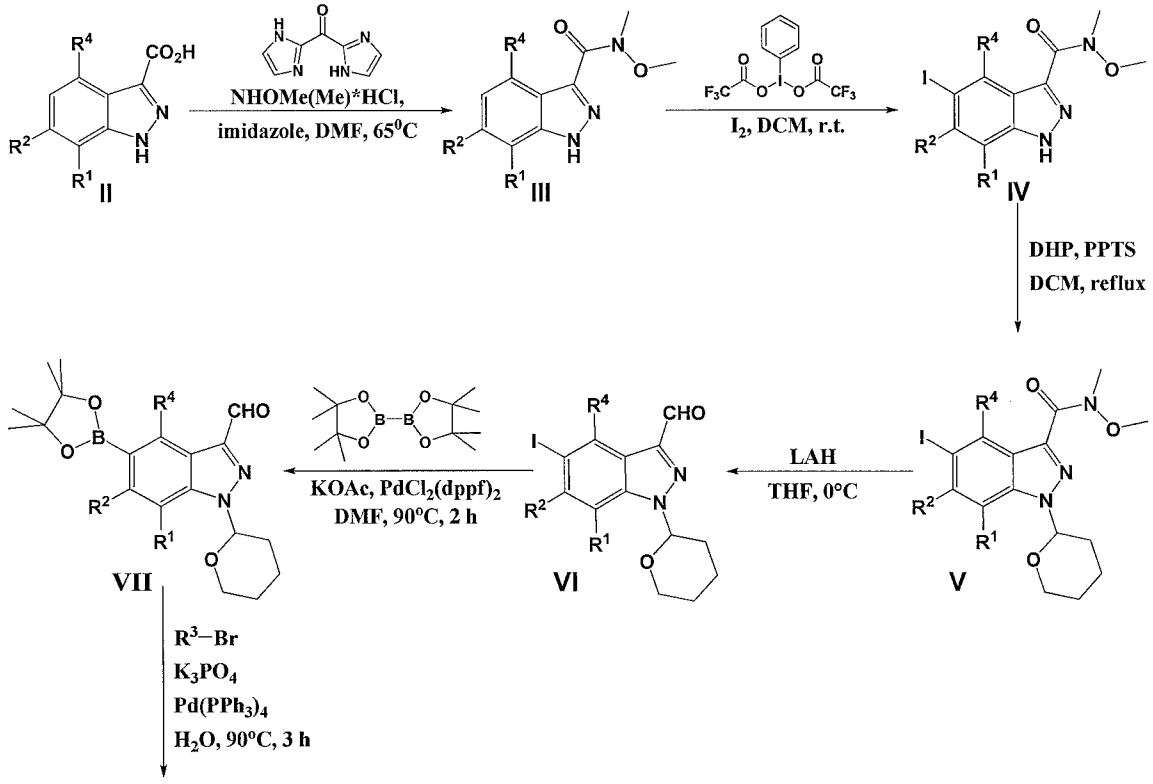
Tr-Cl = trityl chloride or triphenylmethyl chloride

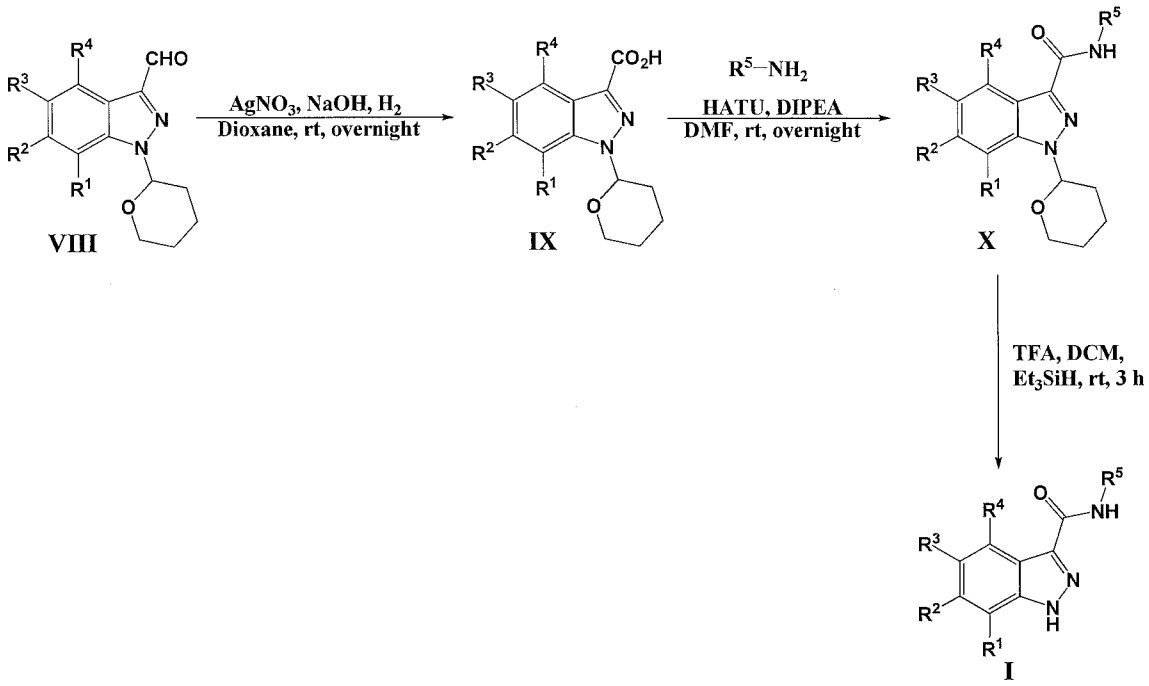
[00234] The following example schemes are provided for the guidance of the reader, and collectively represent an example method for making the compounds provided herein. Furthermore, other methods for preparing compounds of the invention

will be readily apparent to the person of ordinary skill in the art in light of the following reaction schemes and examples. The skilled artisan is thoroughly equipped to prepare these compounds by those methods given the literature and this disclosure. The compound numberings used in the synthetic schemes depicted below are meant for those specific schemes only, and should not be construed as or confused with same numberings in other sections of the application. Unless otherwise indicated, all variables are as defined above.

General procedures

[00235] Compounds of Formula **I** of the present invention can be prepared as depicted in Scheme **1**.

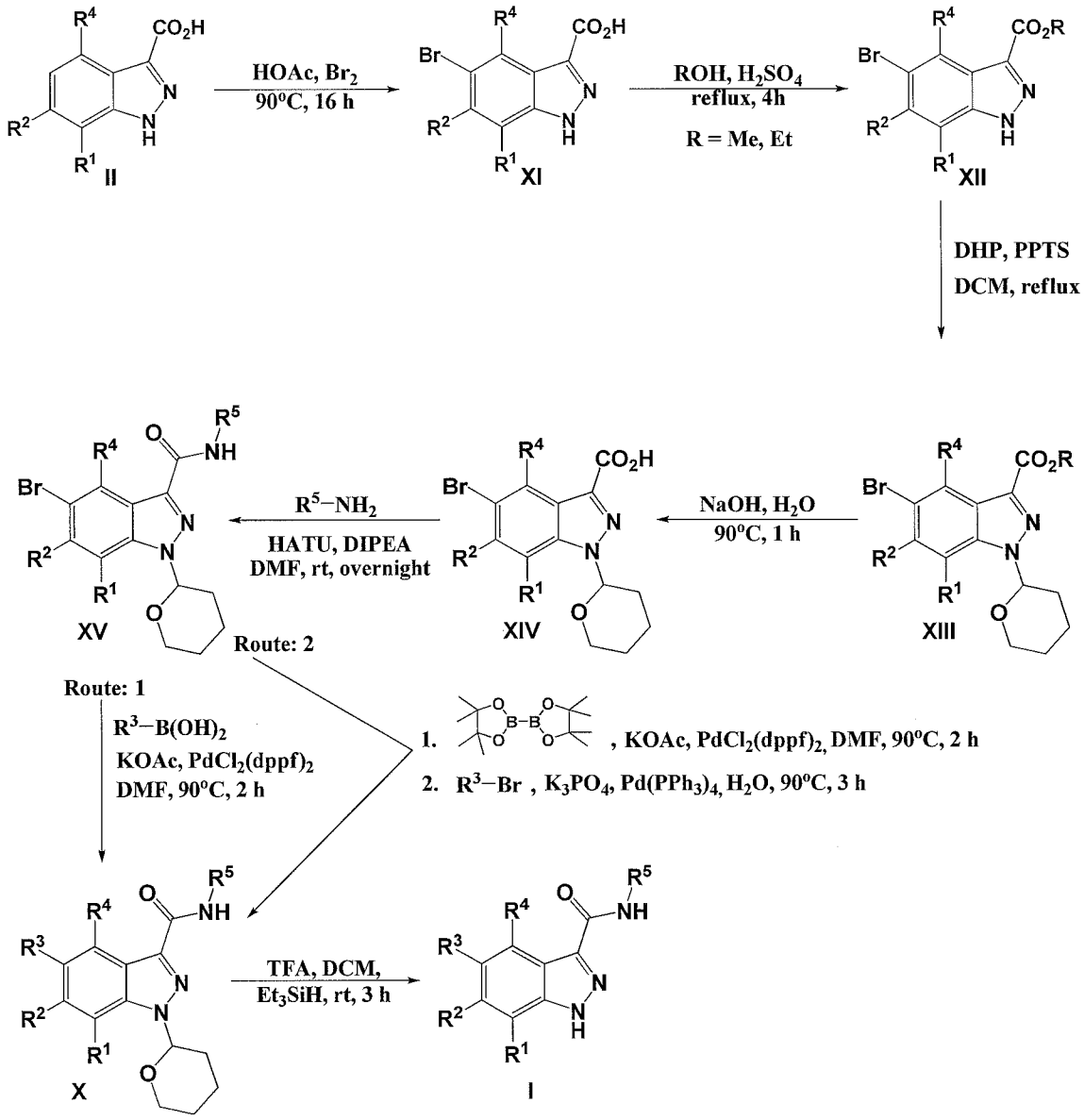




Scheme 1

[00236] Scheme **1** describes a method for preparation of indazole-3-carboxamide derivatives (**I**) by first forming the Weinreb amide (**III**) of a 1*H*-indazole-3-carboxylic acid (**II**). The Weinreb amide (**III**) is reacted with (bis(trifluoroacetoxy)iodo)benzene to produce the 5-iodo-1*H*-indazole-3-carboxylic acid (**IV**) followed by THP protection of the indazole nitrogen. The Weinreb amide of protected indazole **V** is reduced to aldehyde **VI** followed by reaction with bis(pinacolato)diboron to give the pinacol ester (**VII**). Suzuki coupling with a variety of aromatic and nonaromatic bromides yields the R^3 substituted indazole **VIII**. Oxidation of the aldehyde to the acid (**IX**) followed by HATU mediated coupling of a variety of amines and sequent deprotection produces the desired indazole-3-carboxamide derivatives (**I**).

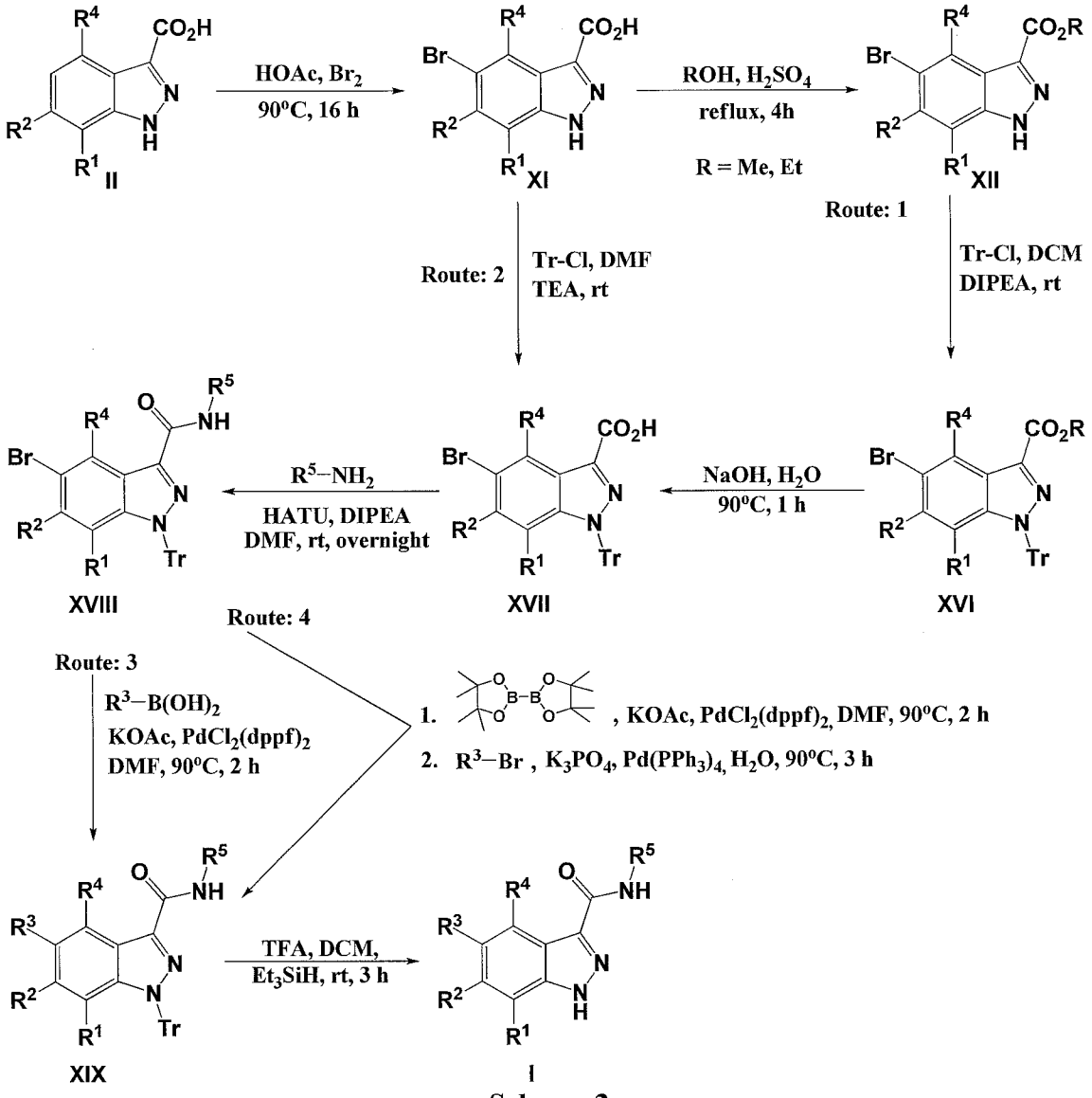
[00237] Compounds of Formula **I** of the present invention can also be prepared as depicted in Scheme **2**.



Scheme 2

[00238] Scheme **2** describes an alternative method for preparation of indazole-3-carboxamide derivatives (**I**) by bromination of the indazole 5-position followed by esterification to form ester **XII**. The indazole nitrogen is THP protected and the ester is hydrolyzed to acid **XIV**. The acid is coupled with a variety of amines to produce amide **XV** which is then coupled with a variety of boronic acids (Route 1) to give **X**. Alternatively, **XV** can be converted to the boronate ester and then couple to a variety of bromides (Route 2) to yield **X**. Final deprotection of the indazole nitrogen yields the desired indazole-3-carboxamide derivatives (**I**).

[00239] Compounds of Formula **I** of the present invention can also be prepared as depicted in Scheme **3**.



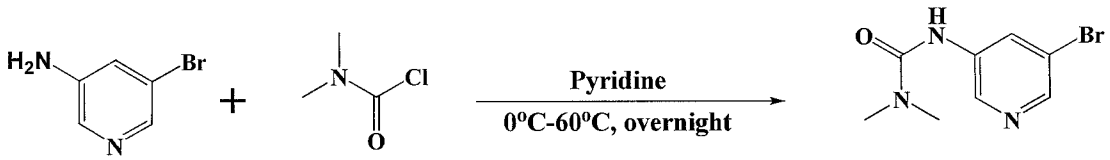
Scheme 3

[00240] Scheme **3** describes another alternative method for preparation of indazole-3-carboxamide derivatives (**I**) by bromination of the indazole 5-position followed by either Route 1: esterification to form ester **XII**, then trityl protection of the indazole nitrogen and then finally hydrolyzed of the ester to acid **XVII**; or Route 2: trityl protection of the indazole nitrogen directly to acid **XVII**. The acid is coupled with a variety of amines to produce amide **XVIII** which is then coupled with a variety of

boronic acids (Route 3) to give **XIX**. Alternatively, **XVIII** can be converted to the boronate ester and then couple to a variety of bromides (Route 4) to yield **XIX**. Final deprotection of the indazole nitrogen yields the desired indazole-3-carboxamide derivatives (**I**).

Illustrative Compound Examples

[00241] Preparation of intermediate 3-(5-bromopyridin-3-yl)-1,1-dimethylurea (**XXII**) is depicted below in Scheme **4**.



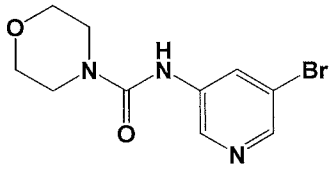
XX **XXI** **XXII**

Scheme 4

Step **1**

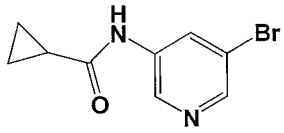
[00242] 3-Amino-5-bromo pyridine (**XX**) (1.0 g, 5.78 mmol) was dissolved in pyridine and cooled to 0°C before adding dimethyl carbamyl chloride (**XXI**) (0.683 g, 6.35 mmol). The reaction mixture was stirred at room temperature for 2 h and then heated overnight at 60°C under argon. The solution was cooled to room temperature, poured into ice water and extracted with EtOAc. The organic extract was dried over $MgSO_4$, filtered and concentrated to a residue to afford 3-(5-bromopyridin-3-yl)-1,1-dimethylurea (**XXII**) as a brown solid, (1.24 g, 5.09 mmol, 88% yield). ^{1}H NMR (DMSO-d_6) δ ppm 8.67-8.64 (m, 2H), 8.23 (d, J = 7.8 Hz, 1H), 2.93 (s, 6H); ESIMS found for $C_8H_{10}BrN_3O$ *m/z* 245.05(M+H).

[00243] The following intermediates were prepared in accordance with the procedure described in the above Scheme **4**.



XXIII

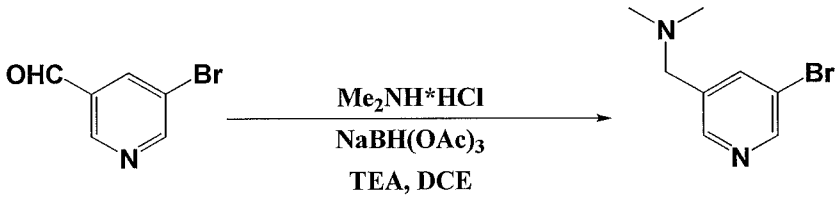
[00244] N-(5-bromopyridin-3-yl)morpholine-4-carboxamide (**XXIII**): Tan solid (0.82 g, 48%). ^{1}H NMR (DMSO-d_6) 3.43-3.45 (m, 4H), 3.60-3.62 (m, 4H), 8.21 (t, J = 2.0 Hz, 1H), 8.26 (d, J = 2.0 Hz, 1H), 8.62 (d, J = 2.2 Hz, 1H), 8.91 (s, 1H); ESIMS found for $C_{10}H_{12}BrN_3O_2$ *m/z* 286 (M+H).



XXIV

[00245] N-(5-bromopyridin-3-yl)cyclopropanecarboxamide **(XXIV):** Off white solid, (83% yield), ^{1}H NMR ($CDCl_3$, 400 MHz) δ ppm 8.46-8.39 (m, 3H), 7.54 (bs, 1H), 1.56-1.50 (m, 1H), 1.13-1.07 (m, 2H), 0.96-0.90 (m, 2H); ESIMS found for $C_9H_9BrN_2O$ *m/z* 240.85 (M+H).

[00246] Preparation of intermediate (**XXVI**) is depicted below in Scheme **5**.



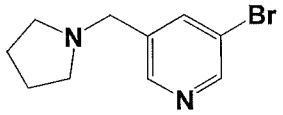
XXV **XXVI**

Scheme 5

Step **1**

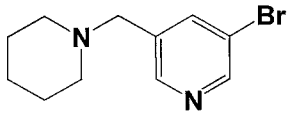
[00247] To a solution of 5-bromonicotinaldehyde (**XXV**) (5.0 g, 26.9 mmol) in DCE (108 mL) was added dimethylamine-HCl (4.39 g, 53.8 mmol) and TEA (7.5 g, 53.8 mmol). The reaction was stirred at room temperature for 1 h. $NaBH(OAc)_3$ was added and the reaction was stirred overnight at room temperature. The reaction was diluted with DCM and sat. aq. $NaHCO_3$. The organic layer was separated, washed with water, brine, dried and concentrated under vacuum to produce 1-(5-bromopyridin-3-yl)-N,N-dimethylmethanamine (**XXVI**) as a brown liquid (92.6% yield). ^{1}H NMR ($CDCl_3$) δ ppm 2.15 (s, 6H), 3.43 (s, 2H), 7.94 (s, 1H), 8.47 (d, J=2Hz, 1H), 8.59 (d, J=3Hz, 1H); ESIMS found for $C_8H_{11}BrN_2$ *m/z* 215 (M^{Br79}+H) and 217 (M^{Br81}+H).

[00248] The following intermediates were prepared in accordance with the procedure described in the above Scheme **5**.



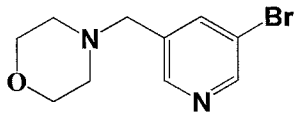
XXVII

[00249] 3-Bromo-5-(pyrrolidin-1-ylmethyl)pyridine (**XXVII**): Golden liquid (1.35 g, 97% yield). ^{1}H NMR (DMSO-d_6) 1.68-1.71 (m, 4H), 2.42-2.44 (m, 4H), 3.60 (s, 2H), 7.96 (s, 1H), 8.48 (d, *J*=2Hz, 1H), 8.58 (d, *J*=3Hz, 1H); ESIMS found for $C_{10}H_{13}BrN_2$ *m/z* 242 (M+H).



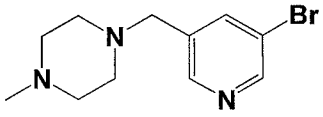
XXVIII

[00250] 3-Bromo-5-(piperidin-1-ylmethyl)pyridine (**XXVIII**): Brown liquid (13.1 g, 94% yield). ^{1}H NMR (DMSO-d_6) 1.36-1.39 (m, 2H), 1.46-1.51 (m, 4H), 2.31-2.32 (m, 4H), 3.46 (s, 2H), 7.94 (s, 1H), 8.47 (d, *J*=2Hz, 1H), 8.58 (d, *J*=3Hz, 1H); ESIMS found for $C_{11}H_{15}BrN_2$ *m/z* 257 (M+H).



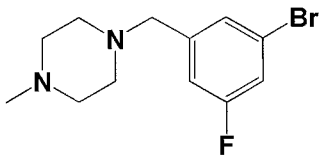
XXIX

[00251] 4-((5-Bromopyridin-3-yl)methyl)morpholine (**XXIX**): Brown oil (1.02 g, 35.6% yield). ESIMS found for $C_{10}H_{13}BrN_2O$ *m/z* 258 (M+H).



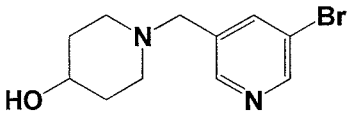
XXX

[00252] 1-((5-Bromopyridin-3-yl)methyl)-4-methylpiperazine (**XXX**): Brown oil (0.93 g, 64% yield). ^{1}H NMR (DMSO-d_6) 2.14 (s, 3H), 2.27-2.37 (m, 8H), 3.49 (s, 2H), 7.95 (s, 1H), 8.47 (d, *J*=1.7Hz, 1H), 8.59 (d, *J*=2.2Hz, 1H); ESIMS found for $C_{11}H_{16}BrN_3$ *m/z* 272 (M+H).



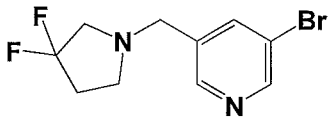
XXXI

[00253] 1-(3-Bromo-5-fluorobenzyl)-4-methylpiperazine (**XXXI**): Light yellow oil (2.07 g, 68% yield). ^{1}H NMR (DMSO-d_6) 2.14 (s, 3H), 2.28-2.40 (m, 8H), 3.46 (s, 2H), 7.15-7.17 (m, 1H), 7.35 (s, 1H), 7.40-7.42 (m, 1H); ESIMS found for $C_{12}H_{16}BrFN_2$ *m/z* 288 (M+H).



XXXII

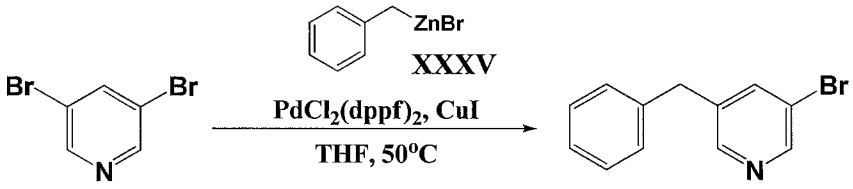
[00254] 1-(5-Bromopyridin-3-yl)piperidin-4-ol (**XXXII**): Brown oil (2.15 g, 7.93mmol, 72.7% yield). ^{1}H NMR (DMSO-d_6) 1.34-1.41 (m, 2H), 1.67-1.71 (m, 2H), 2.03-2.07 (m, 2H), 2.62-2.64 (m, 2H), 3.42-3.46 (m, 1H), 3.47 (s, 2H), 4.55 (d, *J*=4.2Hz, 1H), 7.93-7.94 (m, 1H), 8.46 (d, *J*=1.6Hz, 1H), 8.58 (d, *J*=2.2Hz, 1H); ESIMS found for $C_{11}H_{15}BrN_2O$ *m/z* 272 (M+H).



XXXIII

[00255] 3-Bromo-5-((3,3-difluoropyrrolidin-1-yl)methyl)pyridine (**XXXIII**): Brown liquid (7.38 g, 26.64 mmol, 94.9% yield). ^{1}H NMR (DMSO-d_6) 2.21-2.30 (m, 2H), 2.70 (t, *J*=7Hz, 2H), 2.89 (t, *J*=13Hz, 2H), 3.66 (s, 2H), 7.95-7.98 (m, 1H), 8.57 (d, *J*=1.7Hz, 1H), 8.61 (d, *J*=2.2Hz, 1H); ESIMS found for $C_{10}H_{11}BrF_2N_2$ *m/z* 276 (M+H).

[00256] Preparation of 3-benzyl-5-bromopyridine (**XXXVI**) is depicted below in Scheme **6**.

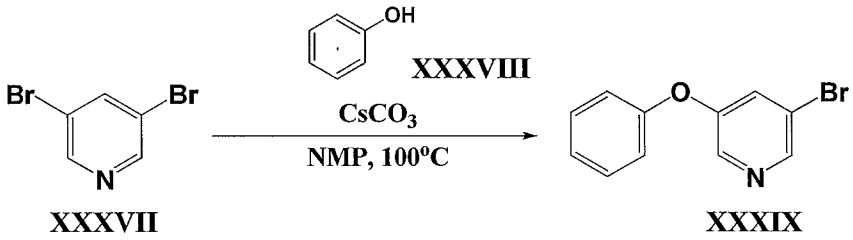


Scheme 6

Step 1

[00257] To a solution of 3,5-dibromopyridine (**XXXIV**) (1.03 g, 4.36 mmol) in THF (7 mL) under argon was added CuI (50 mg, 0.26 mmol) and $PdCl_2(dppf)_2$ (178 mg, 0.22 mmol). Benzylzinc(II) bromide (**XXXV**) (0.5M in THF) (13.09 mL, 6.55 mmol) was slowly added by syringe. The reaction was heated at 50°C over the weekend. The reaction was quenched with water and extracted with EtOAc. The EtOAc was separated, washed with water, brine, dried over $MgSO_4$ and concentrated under vacuum. The residue was purified on a silica gel column (100% hexanes → 5:95 EtOAc:hexanes) to afford 3-benzyl-5-bromopyridine (**XXXVI**) (0.614 g, 2.47 mmol, 57% yield) as a light brown oil. ^{1}H NMR (DMSO-d_6) δ ppm 3.98 (s, 2H), 7.19-7.23 (m, 1H), 7.27-7.32 (m, 4H), 7.92-7.93 (m, 1H), 8.51 (d, *J*=2Hz, 1H), 8.54 (d, *J*=3Hz, 1H); ESIMS found for $C_{12}H_{10}BrN$ *m/z* 248 (M+H).

[00258] Preparation of 3-bromo-5-phenoxypyridine (**XXXIX**) is depicted below in Scheme 7.



XXXVII **XXXIX**

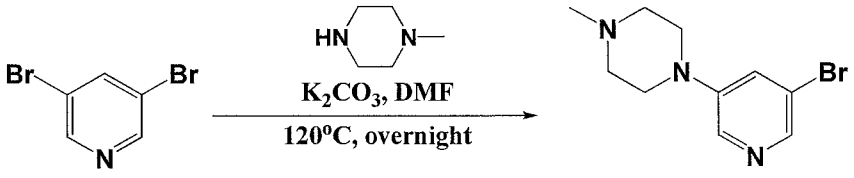
Scheme 7

Step 1

[00259] To a solution of 3,5-dibromopyridine (**XXXVII**) (1.00 g, 4.24 mmol) in NMP (11 mL) was added phenol (**XXXVIII**) (398 mg, 4.24 mmol) and $CsCO_3$ (1.38 g, 4.24 mmol). The reaction was heated at 100°C over the weekend. The reaction was then partitioned between Et_2O/water. The Et_2O was separated, washed with 2x water, brine, dried over $MgSO_4$ and concentrated under vacuum. The residue was purified on a silica gel column (100% hexanes → 2:98 EtOAc:hexanes) to afford 3-bromo-5-phenoxypyridine (**XXXIX**) (535 mg, 2.14 mmol, 50% yield) as a clear oil. ^{1}H NMR (DMSO-d_6) δ ppm 7.13-7.15 (m, 2H), 7.23-7.26 (m, 1H), 7.43-7.46 (m, 2H), 7.69-7.70

(m, 1H), 8.37 (d, *J*=3Hz, 1H), 8.49 (d, *J*=2Hz, 1H); ESIMS found for $C_{11}H_8BrNO$ *m/z* 250 (M+H).

[00260] Preparation of 1-(5-bromopyridin-3-yl)-4-methylpiperazine (**XL**) is depicted below in Scheme **8**.



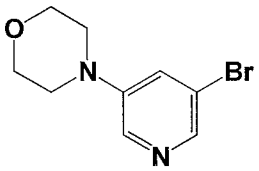
XXXVIII **XL**

Scheme 8

Step **1**

[00261] To a solution of 3,5-dibromopyridine (**XXXVIII**) (2.90 g, 12.24 mmol) in dry DMF (20 mL) was added 1-methylpiperazine (2.987 mL, 26.93 mmol) and K_2CO_3 (5.58 g, 40.39 mmol). The reaction was heated at 120°C overnight. An additional portion of 1-methylpiperazine (6 mL) was added and heating was continued for another 24 h. The reaction was poured into ice water and filtered. The filtrate was extracted with 66% MeOH/$CHCl_3$. The organic layer was dried over MgSO4, filtered and concentrated under vacuum to yield 1-(5-bromopyridin-3-yl)-4-methylpiperazine (**XL**) as a brown viscous oil (2.49 g, 9.76 mmol, 79.8% yield). ESIMS found for $C_{10}H_{14}BrN_3$ *m/z* 256 (M+H).

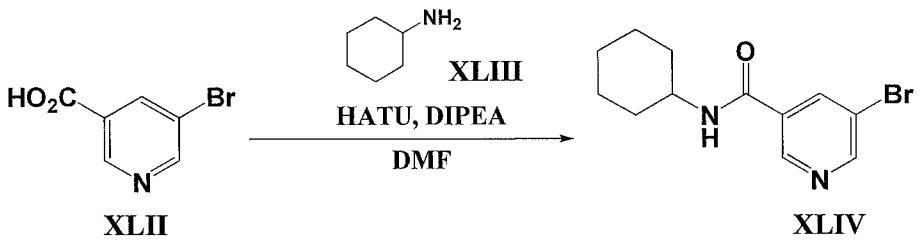
[00262] The following intermediate was prepared in accordance with the procedure described in the above Scheme **8**.



XLI

[00263] 4-(5-Bromopyridin-3-yl)morpholine (**XLI**): Yellow solid (1.12 g, 4.61 mmol, 64.9% yield). ESIMS found for $C_9H_{11}BrN_2O$ *m/z* 244.1 (M+H).

[00264] Preparation of 5-bromo-N-cyclohexylnicotinamide (**XLIV**) is depicted below in Scheme **9**.

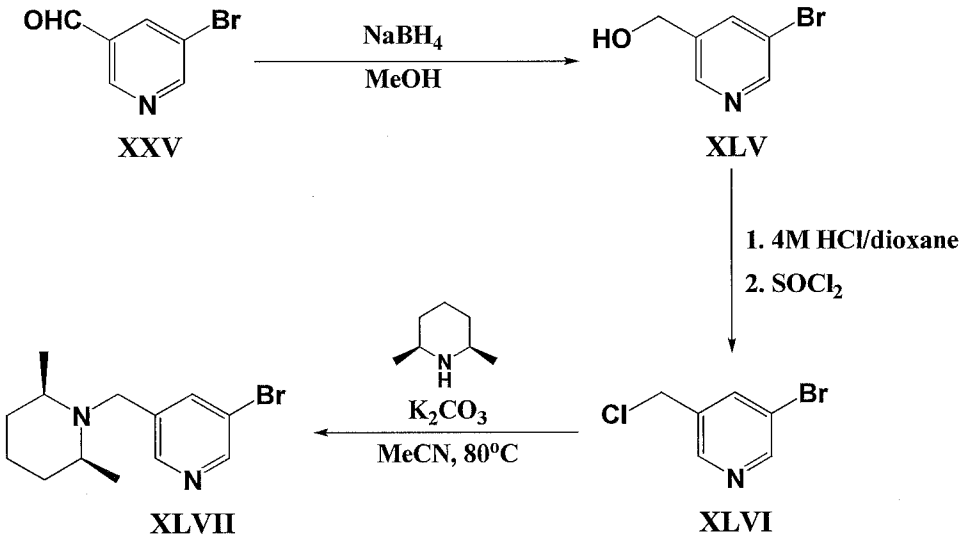


Scheme 9

Step **1**

[00265] To a solution of 5-bromonicotinic acid (**XLII**) (500 mg, 2.49 mmol) in DMF (8 mL) was added cyclohexanamine (**XLIII**) (247 mg, 2.49 mmol) and DIPEA (643 mg, 4.98 mmol). The reaction was cooled at 0°C before adding HATU (947 mg, 2.49 mmol). The reaction was warmed to room temperature and stirred for 4 hrs. The reaction was diluted with EtOAc, washed with 2x water, brine, dried over $MgSO_4$ and concentrated under vacuum to yield crude 5-bromo-N-cyclohexylnicotinamide (**XLIV**). The product was used without further purification. ESIMS found for $C_{12}H_{15}BrN_2O$ *m/z* 283 (M+H).

[00266] Preparation of 3-bromo-5-(((2R,6S)-2,6-dimethylpiperidin-1-yl)methyl)pyridine (**XLVII**) is depicted below in Scheme **10**.



Scheme 10

Step **1**

[00267] To a solution of 5-bromonicotinaldehyde (**XXV**) (2.05 g, 11.0 mmol) in MeOH (85 mL) was added $NaBH_4$ (832 mg, 21.99 mmol). The reaction was stirred at room temperature for 1 h. The reaction was quenched with saturated aqueous NH_4Cl (5 mL). The reaction was concentrated under vacuum and the residue was partitioned between saturated aqueous NH_4Cl/EtOAc. The organic layer was separated, washed with water, brine, dried over $MgSO_4$ and concentrated under vacuum to yield crude (5-bromopyridin-3-yl)methanol (**XLV**) as a golden oil (1.54 g, 8.2 mmol, 74% yield). The product was used without further purification. ESIMS found for C_6H_6BrNO *m/z* 188 (M+H).

Step **2**

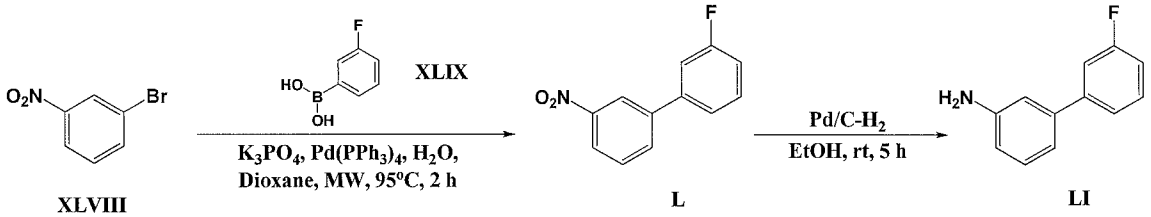
[00268] (5-Bromopyridin-3-yl)methanol (**XLV**) (1.54 g, 8.2 mmol) was treated with 4M HCl in dioxane (10 mL) at 0°C and then evaporated. The residue was dissolved in $SOCl_2$ (4 mL) and refluxed for 2 hrs. The $SOCl_2$ was removed and the residue was triturated with hexane to produce HCl salt of 3-bromo-5-(chloromethyl)pyridine (**XLVI**) as a brown solid (1.30 g, 5.4 mmol, 66% yield). The product was used without further purification. ESIMS found for C_6H_5BrClN *m/z* 206 (M+H).

Step **3**

[00269] To a solution of 3-bromo-5-(chloromethyl)pyridine (**XLVI**) (1.17 g, 4.8 mmol) in MeCN (0.2 mL) and (2S,6R)-2,6-dimethylpiperidine (2.6 mL, 19.3 mmol) was added K_2CO_3 (667 mg, 4.8 mmol). The reaction was refluxed for 5 hrs. TLC showed the presence of starting material so additional (2S,6R)-2,6-dimethylpiperidine (2.0 mL, 14.8 mmol) was added and the reaction was refluxed for an additional 5 hrs. The solvent was removed and the residue was partitioned between EtOAc/water. The EtOAc was separated and washed with brine, dried over $MgSO_4$ and concentrated under vacuum. The residue was purified on a silica gel column (100% hexanes → 6:94 EtOAc:hexanes) to afford 3-bromo-5-(((2R,6S)-2,6-dimethylpiperidin-1-yl)methyl)pyridine (**XLVII**) as a clear oil (728 mg, 2.57 mmol, 53% yield). ^1H NMR (DMSO-d_6) δ ppm 0.92 (d, *J*=8Hz, 6H), 1.21-1.32 (m, 3H), 1.52-1.55 (m, 2H), 1.59-1.63 (m, 1H), 2.42-2.46 (m, 2H), 3.73

(s, 2H), 7.97-7.98 (m, 1H), 8.50 (d, *J*=3Hz, 1H), 8.55-8.56 (m, 1H); ESIMS found for $C_{13}H_{19}BrN_2$ *m/z* 283 (M+H).

[00270] Preparation of intermediate 3'-fluorobiphenyl-3-amine (**LI**) is depicted below in Scheme **11**.



Scheme 11

Step **1**

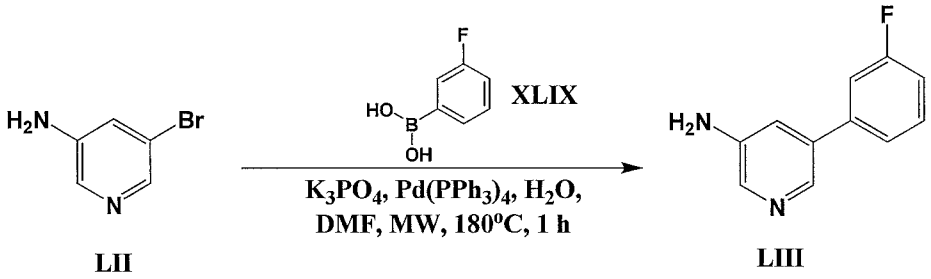
[00271] A 25 mL microwave vessel was charged with 1-bromo-3-nitrobenzene (**XLVIII**) (0.61 g, 3.0 mmol), 3-fluorophenylboronic acid (**XLIX**) (0.46 g, 3.3 mmol), potassium phosphate tribasic (0.95 g, 4.5 mmol), 1,4-dioxane (15.0 mL), and water (3.0 mL). Tetrakis(triphenylphosphine)palladium(0) (0.17 g, 0.15 mmol) was added, and the reaction was placed in a microwave reactor for 1 h at 95°C. An additional 3-fluorophenylboronic acid (0.20 g) and tetrakis(triphenylphosphine)palladium(0) (0.05 g) were added, and the reaction was heated for another 1 h at 95°C in a microwave reactor. The organic solvent was separated from the water and concentrated to a residue. The residue was then purified by flash chromatography using a 25 g Thomson normal phase silica gel cartridge (100% hexanes → 1:99 EtOAc:hexanes) to afford 3'-fluoro-3-nitrobiphenyl (**L**) (0.63 g, 2.91 mmol, 97% yield) as a white solid. ^{1}H NMR (DMSO-d_6) δ ppm 8.48 (t, *J* = 2.0 Hz, 1H), 8.26-8.24 (m, 1H), 8.20-8.18 (m, 1H), 7.78 (t, *J*=8Hz, 1H), 7.70-7.68 (m, 1H), 7.67-7.65 (m, 1H), 7.59-7.56 (m, 1H), 7.32-7.28 (m, 1H).

Step **2**

[00272] 10% Palladium on carbon (0.095g) was added to a solution of 3'-fluoro-3-nitrobiphenyl (**L**) (0.63 g, 2.88 mmol) in EtOH (20.0 mL). The flask was evacuated and replaced with a hydrogen atmosphere. The solution was stirred at room temperature for 5 h under hydrogen. The catalyst was filtered through a pad of Celite,

and the solvent was removed under reduced pressure. The residue was purified by flash chromatography using a 40 g Thomson normal phase silica gel cartridge (100% hexanes → 15:85 EtOAc:hexanes) to afford 3'-fluorobiphenyl-3-amine (**LI**) (0.34 g, 1.81 mmol, 63% yield) as a light yellow oil. ^{1}H NMR (DMSO-d_6) δ ppm 7.47-7.44 (m, 1H), 7.40-7.39 (m, 1H), 7.36-7.33 (m, 1H), 7.15-7.14 (m, 1H), 7.10 (t, *J*=7.7Hz, 1H), 6.85-6.84 (m, 1H), 6.80-6.79 (m, 1H), 6.60-6.58 (m, 1H), 5.18 (s, 2H); ESIMS found for $C_{12}H_{10}FN$ *m/z* 188 (M+H).

[00273] Preparation of intermediate 5-(3-fluorophenyl)pyridin-3-amine (**LIII**) is depicted below in Scheme **12**.

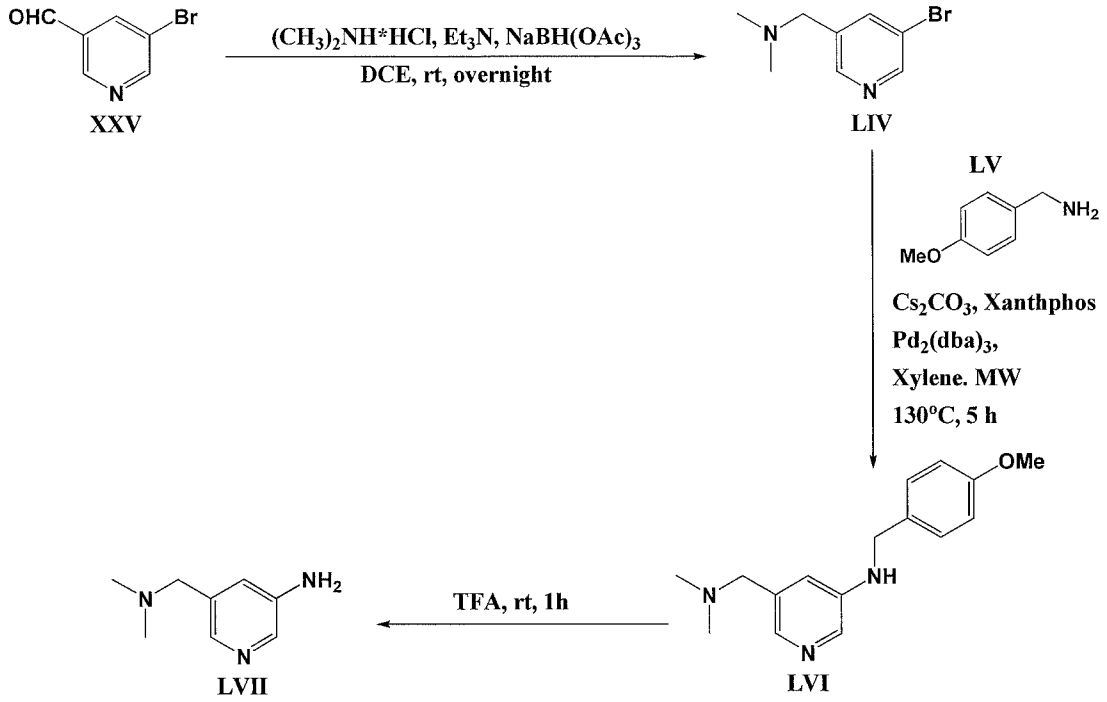


Scheme 12

Step **1**

[00274] To a microwave vial was added 3-amino-5-bromopyridine (**LII**) (0.400 g, 2.31 mmol), 3-fluorophenyl boronic acid (**XLIX**) (0.356 g, 2.54 mmol), tetrakis(triphenylphosphine)palladium(0) (0.133 g, 0.116 mmol), potassium phosphate (0.736 g, 3.47 mmol), water (1 mL), and DMF (5 mL). The reaction vial was capped, purged with argon and heated under microwave irradiation for 1 h at 180°C. The solution was filtered through a pad of Celite and concentrated under vacuum. The residue was purified by column chromatography (4:6 EtOAc:hexanes → 7:3 EtOAc:hexanes) to afford the 5-(3-fluorophenyl)pyridin-3-amine (**LIII**) (0.360 g, 1.92 mmol, 83% yield) as a yellow-white solid. ESIMS found for $C_{11}H_9FN_2$ *m/z* 189.1 (M+H).

[00275] Preparation of intermediate 5-((dimethylamino)methyl)pyridin-3-amine (**LVII**) is depicted below in Scheme **13**.



Scheme 13

Step **1**

[00276] 5-Bromonicontinaldehyde (**XXV**) (5.01g, 26.9 mmol) and dimethylamine hydrochloride (4.39 g, 53.8 mmol) were suspended in 1,2-dichloroethane (108 mL). Triethylamine (7.50 mL, 53.8 mmol) was added, and the reaction was stirred at room temperature for 1 h. Sodium triacetoxyborohydride (8.56 g, 40.4 mmol) was added, and the reaction was further stirred at room temperature overnight. The reaction was diluted with saturated sodium bicarbonate solution and DCM. The organic layer was separated, washed sequentially with water and brine, dried over $MgSO_4$, filtered and concentrated to give 1-(5-bromopyridin-3-yl)-N,N-dimethylmethanamine (**LIV**) (1.19 g, 23.9 mmol, 89% yield) as a brown oil: ^{1}H NMR (DMSO-d_6) δ ppm 8.59 (d, *J* =3Hz, 1H), 8.47 (d, *J*=2Hz, 1H), 7.94 (s, 1H), 3.43 (s, 2H), 2.15 (s, 6H); ESIMS found for $C_8H_{11}BrN_2$ *m/z* 215 (M+H).

Step **2**

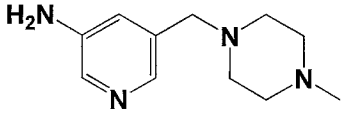
[00277] In a 25 mL microwave vessel, 1-(5-bromopyridin-3-yl)-N,N-dimethylmethanamine (**LIV**) (1.27 g, 5.92 mmol), 4-methoxybenzylamine (**LV**) (0.77

mL, 5.92 mmol), cesium carbonate (2.70 g, 8.29 mmol) and xanthphos (0.17g, 0.30 mmol) were suspended in xylenes (12.0 mL). The solvent was degassed, and tris(dibenzylideneacetone)dipalladium(0) (0.27 g, 0.30 mmol) was added. The vessel was sealed, and the reaction was heated to 130°C for 5 h in a microwave reactor. The solvent was decanted away from the solid material and concentrated to a residue. The residue was purified by silica gel chromatography using a 40 g Thomson normal-phase silica gel cartridge (100% $CHCl_3$ → 3:97 MeOH[7N NH_3]:$CHCl_3$) to afford 5-((dimethylamino)methyl)-N-(4-methoxybenzyl)pyridin-3-amine (**LVI**) (0.68 g, 2.49 mmol, 42% yield) as a yellow solid. ^{1}H NMR (DMSO-d_6) δ ppm 7.84 (d, *J*=3Hz, 1H), 7.64 (d, *J*=2Hz, 1H), 7.27 (d, *J*=11Hz, 2H), 6.88 (d, *J*=11Hz, 2H), 6.83-6.82 (m, 1H), 6.35 (t, *J*=8Hz, 1H), 4.20 (d, *J*=8Hz, 2H), 3.72 (s, 3H), 3.24 (s, 2H), 2.08 (s, 6H); ESIMS found for $C_{16}H_{21}N_3O$ *m/z* 272 (M+H).

Step **3**

[00278] 5-((dimethylamino)methyl)-N-(4-methoxybenzyl)pyridin-3-amine (**LVI**) (0.15 g, 0.56 mmol) was dissolved in TFA (2.0 mL) and stirred at room temperature for 1 h. The TFA was removed, and the residue was treated with 7N ammonia in MeOH/chloroform mixture (7/93) to neutralize the TFA and concentrated again to a residue. The residue was purified by flash silica gel chromatography utilizing a 4 g Thomson normal-phase silica gel cartridge (100% $CHCl_3$ → 3:97 MeOH[7N NH_3]:$CHCl_3$) to afford 5-((dimethylamino)methyl)pyridin-3-amine (**LVII**) (0.044 g, 0.29 mmol, 52% yield) as a brown oil. ESIMS found for $C_8H_{13}N_3$ *m/z* 152 (M+H).

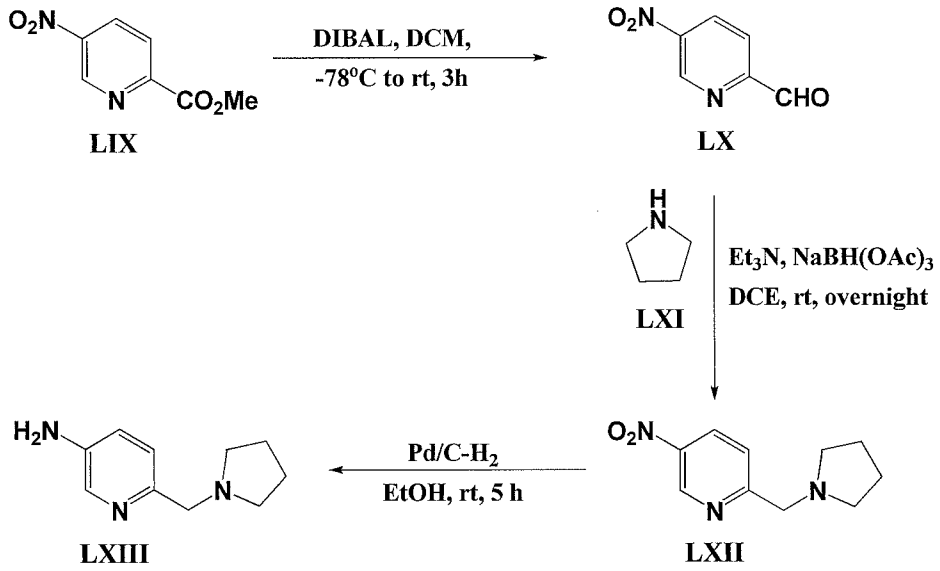
[00279] The following intermediate was prepared in accordance with the procedure described in the above Scheme **13**.



LVIII

[00280] 5-((4-Methylpiperazin-1-yl)methyl)pyridin-3-amine (**LVIII**): Dark yellow solid (138 mg, 0.67 mmol, 71% yield). ESIMS found for $C_{11}H_{18}N_4$ *m/z* 207 (M+H).

[00281] Preparation of intermediate 6-(pyrrolidin-1-ylmethyl)pyridin-3-amine (**LXIII**) is depicted below in Scheme **14**.



Scheme 14

Step **1**

[00282] To a suspension of methyl 5-nitropicolinate (**LIX**) (1.282 g, 7.03 mmol) in DCM (25 mL) stirred at -78°C under argon was slowly added DIBAL (1M in toluene) (9.14 mL, 9.14 mmol). The solution was allowed to warm to room temperature over 3 h. An aqueous solution of potassium sodium tartrate was added, diluted further with water and DCM. The solution was stirred at room temperature for another 30 min before the organic layer was separated. The aqueous layer was extracted 2x DCM, combined with the organic layer, dried over MgSO4, filtered and evaporated under reduced pressure. The residue was purified by column chromatography to produce 5-nitropicolinaldehyde (**LX**) as a brown oil (0.64 g, 4.2 mmol, 60% yield). ^{1}H NMR (DMSO-d_6) δ ppm 8.17 (d, *J*=9Hz, 1H), 8.81 (dd, *J*=9Hz, *J*=2Hz, 1H), 9.56 (d, J=2Hz, 1H), 10.08 (s, 1H).

Step **2**

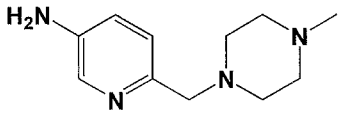
[00283] Preparation of 5-nitro-2-(pyrrolidin-1-ylmethyl)pyridine (**LXII**) was performed following the procedure listed in Scheme 5, Step 1. Purple oil (0.41 g, 1.98

mmol, 86% yield). ^{1}H NMR (DMSO-d_6) δ ppm 9.28 (d, *J*=3Hz, 1H), 8.56 (dd, *J*=11Hz, 3Hz, 1H), 7.72 (d, *J*=11Hz, 1H), 3.85 (s, 2H), 2.53-2.50 (m, 4H), 1.75-1.70 (m, 4H).

Step **3**

[00284] Preparation of intermediate 6-(pyrrolidin-1-ylmethyl)pyridin-3-amine (**LXIII**) was performed following the procedure listed in Scheme 11, Step 2. Dark brown oil (0.35 g, 1.97 mmol, quantitative). ESIMS found for $C_{10}H_{15}N_3$ *m/z* 178 (M+H).

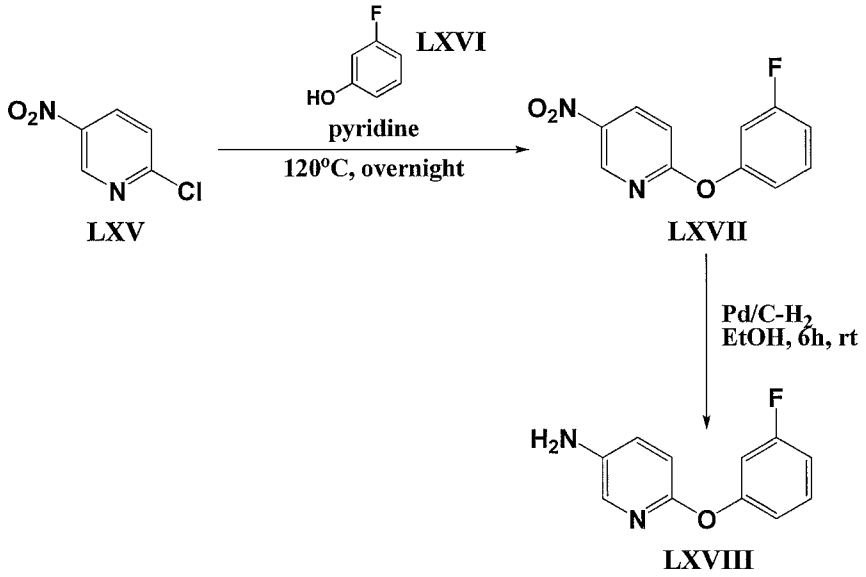
[00285] The following intermediate was prepared in accordance with the procedure described in the above Scheme **14**.



LXIV

[00286] 6-((4-Methylpiperazin-1-yl)methyl)pyridin-3-amine (**LXIV**): Brown oil (120 mg, 0.58 mmol, 100% yield). ESIMS found for $C_{11}H_{18}N_4$ *m/z* 207 (M+H).

[00287] Preparation of intermediate 6-(3-fluorophenoxy)pyridin-3-amine (**LXVIII**) is depicted below in Scheme **15**.



Scheme 15

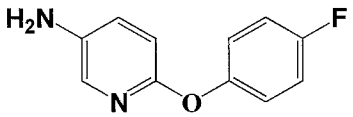
Step **1**

[00288] A solution of 2-chloro-5-nitropyridine (**LXV**) (1.98 g, 12.5 mmol) and 3-fluorophenol (**LXVI**) (1.4 g, 12.5 mmol) in pyridine (20 mL) was heated at 120°C overnight under argon. The solution was cooled to room temperature and concentrated under vacuum. The residue was dissolved in EtOAc, washed with water, brine, dried over $MgSO_4$ and evaporated. The residue was purified by silica gel column chromatography (100% hexane → 2:98 EtOAc:hexane) to give 2-(3-fluorophenoxy)-5-nitropyridine (**LXVII**) as a yellow viscous oil (2.27 g, 9.7 mmol, 77% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.11 (dd, *J*=8Hz, *J*=2Hz, 1H), 7.17 (dt, *J*=8Hz, *J*=6Hz, 1H), 7.23 (td, *J*=10Hz, *J*=2Hz, 1H), 7.31 (d, *J*=9Hz, 1H), 7.52 (q, *J*=9Hz, 1H), 8.64 (dd, *J*=9Hz, *J*=3Hz, 1H), 9.05 (d, *J*=3Hz, 1H); ESIMS found for $C_{11}H_7FN_2O_3$ *m/z* 234.9 (M+H).

Step 2

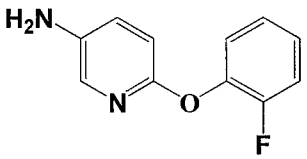
[00289] Preparation of intermediate 6-(3-fluorophenoxy)pyridin-3-amine (**LXVIII**) was performed following the procedure listed in Scheme 11, Step 2. Black green viscous oil (1.90 g, 9.3 mmol, 96% yield). ^{1}H NMR (DMSO-d_6) δ ppm 5.18 (brs, 2H), 6.74-6.83 (m, 3H), 6.90 (dt, 1H), 7.09 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.34 (q, *J*=7Hz, 1H), 7.57 (d, *J*=3Hz, 1H); ESIMS found for $C_{11}H_9FN_2O$ *m/z* 204.4 (M+).

[00290] The following intermediates were prepared in accordance with the procedure described in the above Scheme **15**.



LXIX

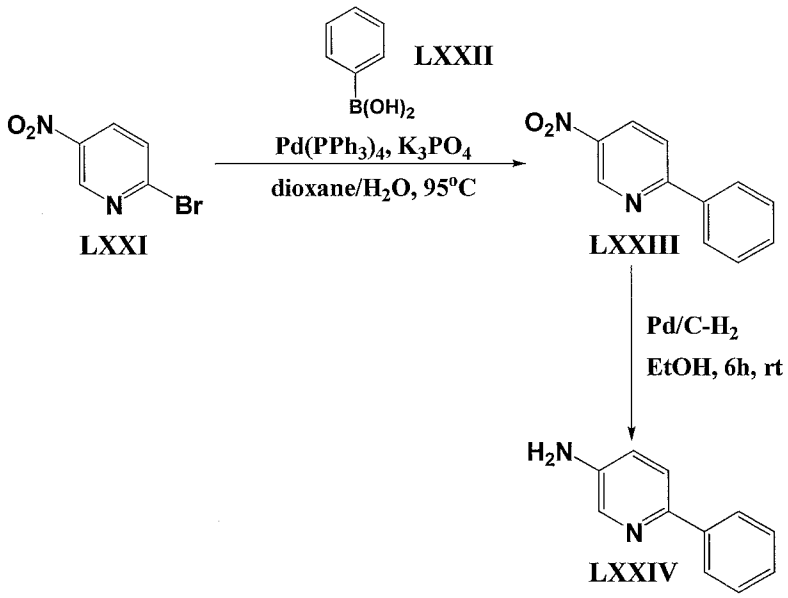
[00291] 6-(4-Fluorophenoxy)pyridin-3-amine (**LXIX**): Dark brown oil (870 mg, 4.3 mmol, 100% yield). ^{1}H NMR (DMSO-d_6) δ ppm 5.08 (brs, 2H), 6.75 (d, *J*=15Hz, 1H), 6.90-7.01 (m, 2H), 7.07 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.16 (t, 9Hz, 1H), 7.26-7.30 (m, 1H), 7.73 (d, *J*=3Hz, 1H); ESIMS found for $C_{11}H_9FN_2O$ *m/z* 204.9 (M+H).



LXX

[00292] 6-(2-Fluorophenoxy)pyridin-3-amine (**LXX**): Dark brown oil (611 mg, 3.0 mmol, 91% yield). ESIMS found for $C_{11}H_9FN_2O$ *m/z* 204.9 (M+H).

[00293] Preparation of intermediate 6-phenylpyridin-3-amine (**LXXIV**) is depicted below in Scheme **16**.



Scheme 16

Step **1**

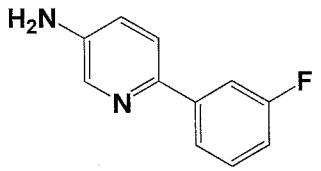
[00294] To a solution of 2-bromo-5-nitropyridine (**LXXI**) (302 mg, 1.49 mmol) in a mixture of dioxane (14 mL) and water (3 mL) was added phenylboronic acid (**LXXII**) (199 mg, 1.64 mmol), $Pd(PPh_3)_4$ (86 mg, 0.74 mmol) and K_3PO_4 (473 mg, 2.23 mmol). The reaction was microwaved at 95°C for 1h. The reaction was cooled and the organic phase was separated, dried over $MgSO_4$ and evaporated under vacuum. The residue was purified by silica gel column chromatography (100% hexane → 5:95 EtOAc:hexane) to give 5-nitro-2-phenylpyridine (**LXXIII**) as off-white needles (254 mg, 1.27 mmol, 85% yield). ESIMS found for $C_{11}H_8N_2O_2$ *m/z* 200.9 (M+H).

Step **2**

[00295] Preparation of intermediate 6-phenylpyridin-3-amine (**LXXIV**) was performed following the procedure listed in Scheme 11, Step 2. Black green viscous oil (211 mg, 1.24 mmol, 98% yield). ^1H NMR (DMSO-d_6) δ ppm 5.45 (s, 2H), 6.99 (dd,

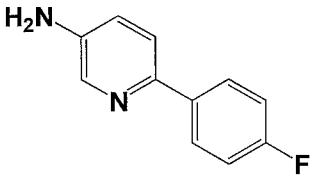
J=11Hz, *J*=3Hz, 1H), 7.25-7.28 (m, 1H), 7.38-7.40 (m, 2H), 7.62 (d, *J*=11Hz, 1H0, 7.89-7.91 (m, 1H), 8.02 (d, *J*=3Hz, 1H); ESIMS found for $C_{11}H_{10}N_2$ *m/z* 171 (M+H).

[00296] The following intermediates were prepared in accordance with the procedure described in the above Scheme **16**.



LXXV

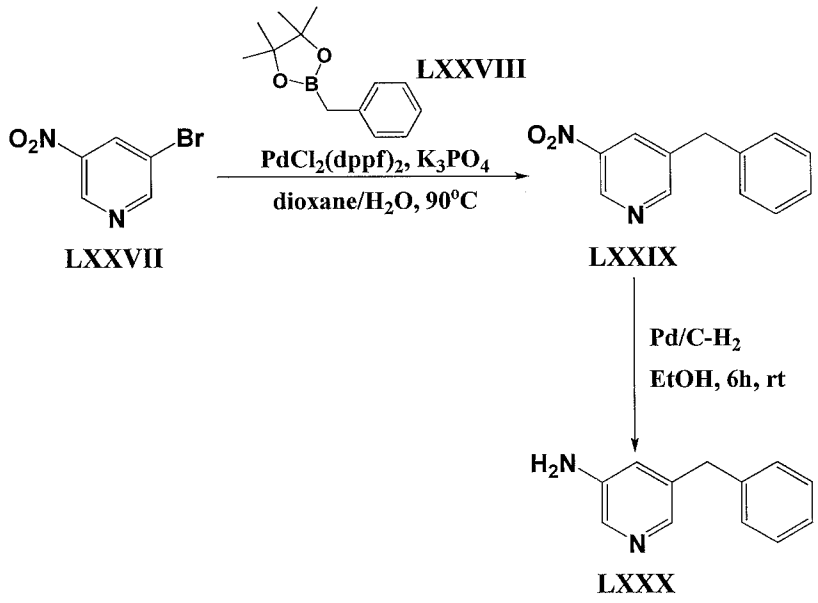
[00297] 6-(3-Fluorophenyl)pyridin-3-amine (**LXXV**): Brown oil (252 mg, 1.34 mmol, 98% yield). ESIMS found for $C_{11}H_9FN_2$ *m/z* 189 (M+H).



LXXVI

[00298] 6-(4-Fluorophenyl)pyridin-3-amine (**LXXVI**): Deep purple oil (202 mg, 1.07 mmol, 98% yield). ESIMS found for $C_{11}H_9FN_2$ *m/z* 189 (M+H).

[00299] Preparation of intermediate 5-benzylpyridin-3-amine (**LXXX**) is depicted below in Scheme **17**.



Scheme 17

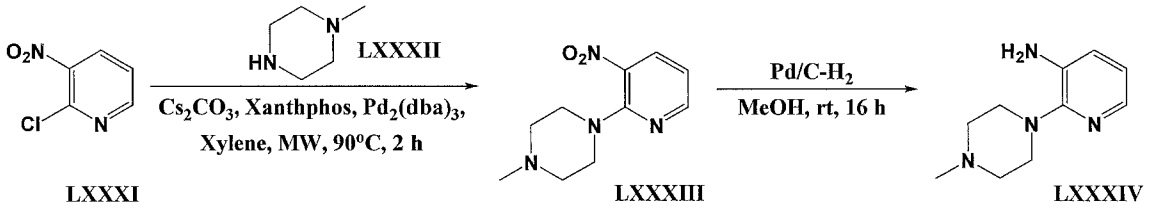
Step **1**

[00300] To a solution of 3-bromo-5-nitropyridine (**LXXVII**) (295 mg, 1.45 mmol) in dioxane (14 mL) was added 2-benzyl-4,4,5,5-tetramethyl-1,3,2-dioxaborolane (**LXXVIII**) (420 μL, 1.89 mmol), $PdCl_2(dppf)_2$, (120 mg, 0.15 mmol) and 2M aqueous K_3PO_4 (2.2 mL, 4.36 mmol). The reaction was microwaved at 90°C for 2h. The reaction was cooled and the organic phase was separated, dried over $MgSO_4$ and evaporated under vacuum. The residue was purified by silica gel column chromatography (100% hexane → 6:94 EtOAc:hexane) to give 3-benzyl-5-nitropyridine (**LXXIX**) as brown oil (117 mg, 0.54 mmol, 37% yield). ^{1}H NMR (DMSO-d_6) δ ppm 4.16 (s, 2H), 7.21-7.25 (m, 1H), 7.31-7.33 (m, 4H), 8.45-8.46 (m, 1H), 8.93 (d, *J*=2Hz, 1H), 9.21 (d, *J*=3Hz, 1H); ESIMS found for $C_{12}H_{10}N_2O_2$ *m/z* 215 (M+H).

Step **2**

[00301] Preparation of 5-benzylpyridin-3-amine (**LXXX**) was performed following the procedure listed in Scheme 11, Step 2. Black green viscous oil (139 mg, 0.75 mmol, 98% yield). ESIMS found for $C_{12}H_{12}N_2$ *m/z* 185 (M+H).

[00302] Preparation of intermediate 2-(4-methylpiperazin-1-yl)pyridin-3-amine (**LXXXIV**) is depicted below in Scheme **18**.



Scheme 18

Step **1**

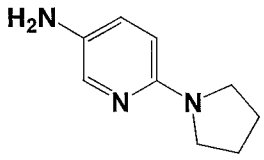
[00303] To a microwave vial was added 2-chloro-3-nitropyridine (**LXXXI**) (1.00 g, 6.31 mmol), 1-methylpiperazine (**LXXXII**) (0.758 g, 7.57 mmol), cesium carbonate (2.88 g, 8.83 mmol), $Pd_2(dba)_3$ (0.173 g, 0.189 mmol), xanthphos (0.109 g, 0.189 mmol), and dioxane (5 mL). The reaction vial was capped and purged with argon. The solution into the reaction vial was heated under microwave irradiation for 2 h at 90°C. The solution was filtered through a pad of Celite and concentrated to a residue

under vacuum. The residue was purified by column chromatography (1:99 MeOH:$CHCl_3$ → 8:92 MeOH:$CHCl_3$) to afford 1-methyl-4-(3-nitro-pyridin-2-yl)-piperazine (**LXXXIII**) (1.30 g, 5.85 mmol, 93% yield) as a brown oil.

Step **2**

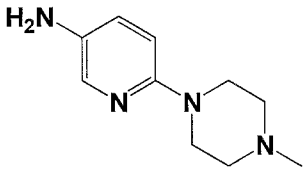
[00304] To a stirring solution of 1-methyl-4-(3-nitro-pyridin-2-yl)-piperazine (**LXXXIII**) (1.30 g, 5.85 mmol) in MeOH (15 mL) was added 10% Pd/C. The solution was purged with hydrogen. The solution was stirred at room temperature for 16 h under hydrogen. The solution was filtered through a pad of Celite and concentrated to a residue under vacuum. The residue was purified by column chromatography (100% $CHCl_3$ → 2:98 MeOH[7N NH_3]:$CHCl_3$) to afford 2-(4-methylpiperazin-1-yl)pyridin-3-amine (**LXXXIV**) (0.466 g, 2.42 mmol, 52% yield) as a tan solid. ESIMS found for $C_{10}H_{16}N_4$ *m/z* 192.4 (M+H).

[00305] The following intermediates were prepared in accordance with the procedure described in the above Scheme **18**.



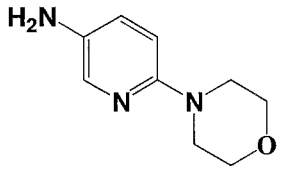
LXXXV

[00306] 6-(Pyrrolidin-1-yl)pyridin-3-amine (**LXXXV**): Deep purple oil (1.43 g, 8.77 mmol, 100% yield). ESIMS found for $C_9H_{13}N_3$ *m/z* 164 (M+H).



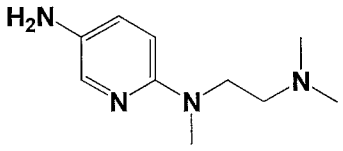
LXXXVI

[00307] 6-(4-Methylpiperazin-1-yl)pyridin-3-amine (**LXXXVI**): Purple solid (598 mg, 3.11 mmol, 32% yield). ESIMS found for $C_{10}H_{16}N_4$ *m/z* 193 (M+H).



LXXXVII

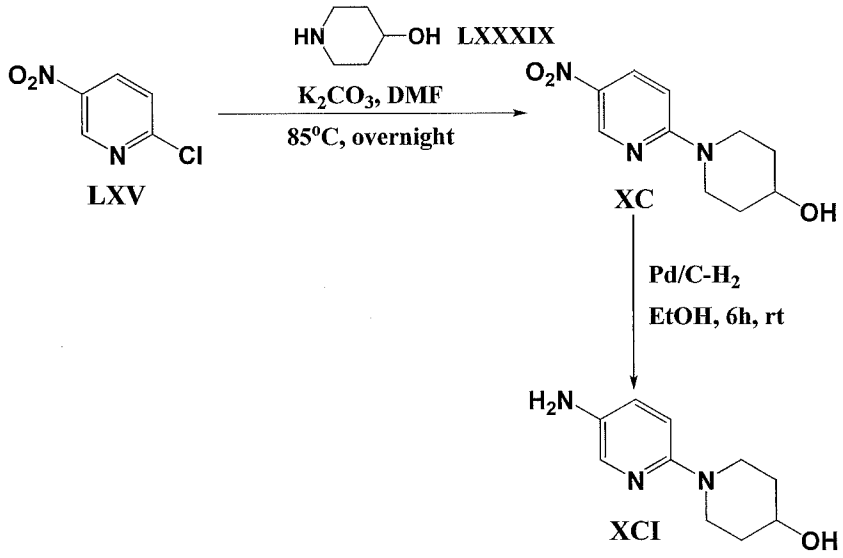
[00308] 6-Morpholinopyridin-3-amine (**LXXXVII**): Purple solid (782 mg, 4.36 mmol, 95% yield). ESIMS found for $C_9H_{13}N_3O$ *m/z* 180 (M+H).



LXXXVIII

[00309] N^2-(2-(Dimethylamino)ethyl)-N^2-methylpyridine-2,5-diamine (**LXXXVIII**): Deep purple oil (1.55 g, 7.98 mmol, 96% yield). ESIMS found for $C_{10}H_{18}N_4$ *m/z* 195 (M+H).

[00310] Preparation of intermediate 1-(5-aminopyridin-2-yl)piperidin-4-ol (**XCI**) is depicted below in Scheme **19**.



Scheme 19

Step **1**

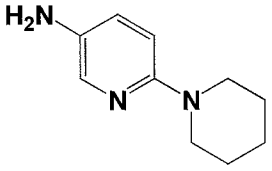
[00311] To a solution of 2-chloro-5-nitropyridine (**LXV**) (5.0 g, 31.5 mmol) in DMF (50 mL) was added piperidin-4-ol (**LXXXIX**) (3.5 g, 34.65 mmol) and K_2CO_3 (8.7 g, 63.0 mmol). The reaction was headed at 85°C overnight. The solution was poured into ice water, stirred for 15 min and then filtered. The solid was washed with cold water and dried under vacuum to produce 1-(5-aminopyridin-2-yl)piperidin-4-ol (**XC**) as a yellow solid (6.62 g, 29.67 mmol, 94.2% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.34-1.42 (m, 2H), 1.77-1.83 (m, 2H), 3.40-3.56 (m, 2H), 3.76-3.83 (m, 1H), 4.12 (brd, 2H), 4.81 (d, *J*=4Hz,

1H), 6.94 (d, *J*=10Hz, 1H), 8.17 (dd, *J*=10Hz, *J*=3Hz, 1H), 8.94 (d, *J*=3Hz, 1H); ESIMS found for $C_{10}H_{13}N_3O_3$ *m/z* 224.1 (M+H).

Step 2

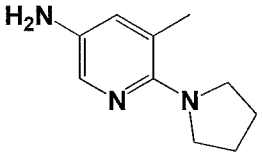
[00312] Preparation of intermediate 1-(5-aminopyridin-2-yl)piperidin-4-ol (**XCI**) was performed following the procedure listed in Scheme 11, Step 2. Dark brown oil (5.7 g, 29.5 mmol, 99.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36 (tq, *J*=13Hz, *J*=4Hz, 2H), 1.72-1.76 (m, 2H), 2.79 (dt, *J*=13Hz, *J*=3Hz, 2H), 3.54-3.61 (m, 1H), 3.70-3.78 (m, 2H), 4.49 (s, 2H), 4.61 (d, *J*=4Hz, 1H), 6.61 (d, *J*=9Hz, 1H), 6.88 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.57 (d, *J*=3Hz, 1H); ESIMS found for $C_{10}H_{15}N_3O$ *m/z* 194.1 (M+H).

[00313] The following intermediates were prepared in accordance with the procedure described in the above Scheme **19**.



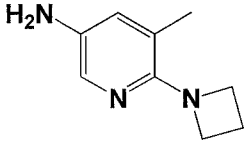
XCII

[00314] 6-(Piperidin-1-yl)pyridin-3-amine (**XCII**): Dark red viscous oil (4.93 g, 27.81 mmol, 95.9% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.48-1.71 (m, 8H), 3.42-3.53 (m, 2H), 4.48 (brs, 2H), 6.59 (d, *J*=9Hz, 1H), 6.89 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.58 (d, *J*=3Hz, 1H); ESIMS found for $C_{10}H_{15}N_3$ *m/z* 178.0 (M+H).



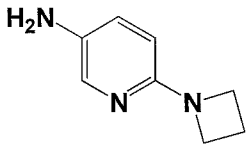
XCIII

[00315] 5-Methyl-6-(pyrrolidin-1-yl)pyridin-3-amine (**XCIII**): Dark blue viscous oil (2.06 g, 12.62 mmol, 100% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.76-1.82 (m, 4H), 2.13 (s, 3H), 3.15-3.20 (m, 4H), 4.53 (brs, 2H), 6.74 (d, *J*=3.5Hz, 1H), 7.42 (d, *J*=2.7Hz, 1H); ESIMS found for $C_{10}H_{15}N_3$ *m/z* 178.1 (M+H).



XCIV

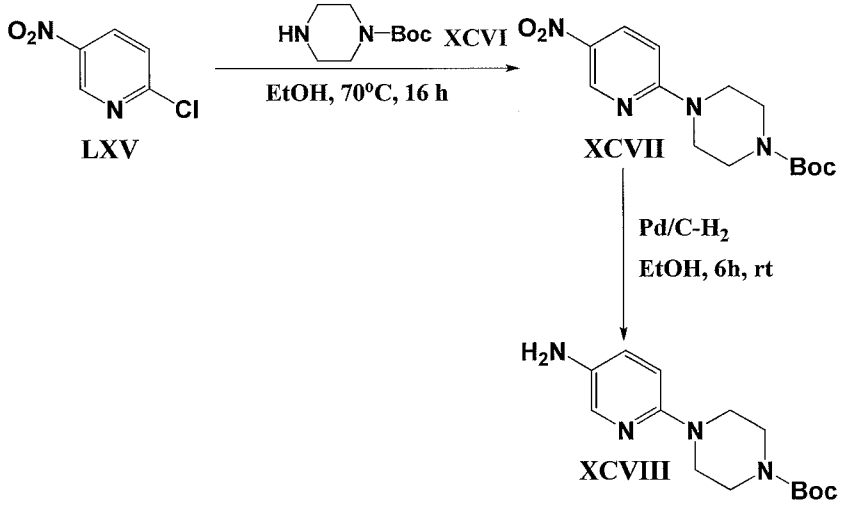
[00316] 6-(Azetidin-1-yl)-5-methylpyridin-3-amine (**XCIV**): Dark red solid (2.0 g, 11.29 mmol, 86.9% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.11 (quin, *J*=7Hz, 2H), 3.76-3.87 (m, 4H), 4.50 (brs, 2H), 6.72 (d, *J*=2.5Hz, 1H), 7.38 (d, *J*=2.5Hz, 1H); ESIMS found for $C_9H_{13}N_3$ *m/z* 164.4 (M+H).



XCV

[00317] 6-(Azetidin-1-yl)pyridin-3-amine (**XCV**): Burgundy solid (1.45 g, 9.70 mmol, 99.3% yield). ESIMS found for $C_8H_{11}N_3$ *m/z* 149.0 (M+H).

[00318] Preparation of intermediate *tert*-butyl 4-(5-aminopyridin-2-yl)piperazine-1-carboxylate (**XCVIII**) is depicted below in Scheme **20**.



Scheme 20

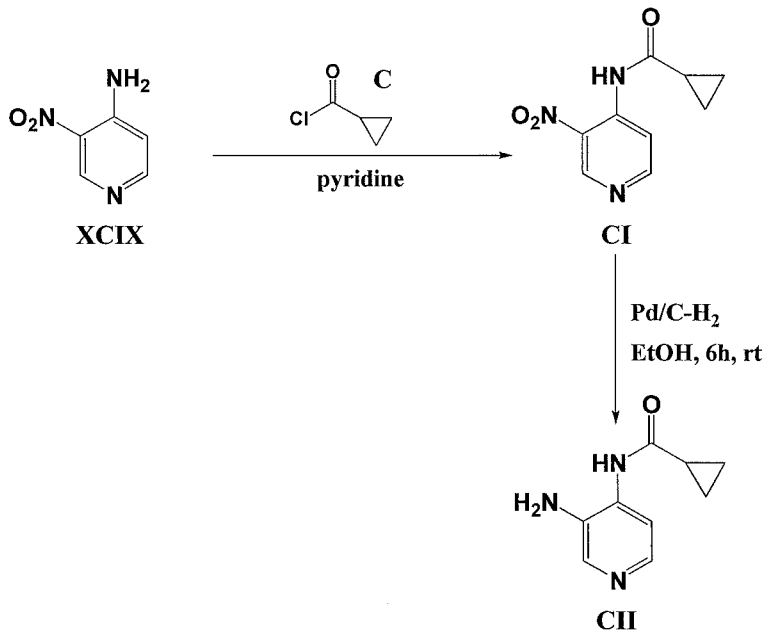
Step **1**

[00319] To a solution of 2-chloro-5-nitropyridine (**LXV**) (2.0 g, 12.6 mmol) in EtOH (20 mL) was added *tert*-butyl piperazine-1-carboxylate (**XCVI**) (7.05 g, 37.9 mmol). The reaction was headed at 70°C for 16 h. The reaction was concentrated under vacuum and then dissolved in EtOAc. The EtOAc was washed with 1 M NaOH, brine and then dried over MgSO4 to give tert-butyl 4-(5-nitropyridin-2-yl)piperazine-1-carboxylate (**XCVII**) as a yellow solid (4.94 g). ESIMS found for $C_{14}H_{20}N_4O_4$ *m/z* 309.0 (M+H).

Step **2**

[00320] Preparation of intermediate *tert*-butyl 4-(5-aminopyridin-2-yl)piperazine-1-carboxylate (**XCVIII**) was performed following the procedure listed in Scheme 11, Step 2. Purple solid (990 mg, 3.56 mmol, quantitative). ESIMS found for $C_{14}H_{22}N_4O_2$ *m/z* 278.8 (M+H).

[00321] Preparation of intermediate N-(3-aminopyridin-4-yl) cyclopropanecarboxamide (**CII**) is depicted below in Scheme **21**.



Scheme 21

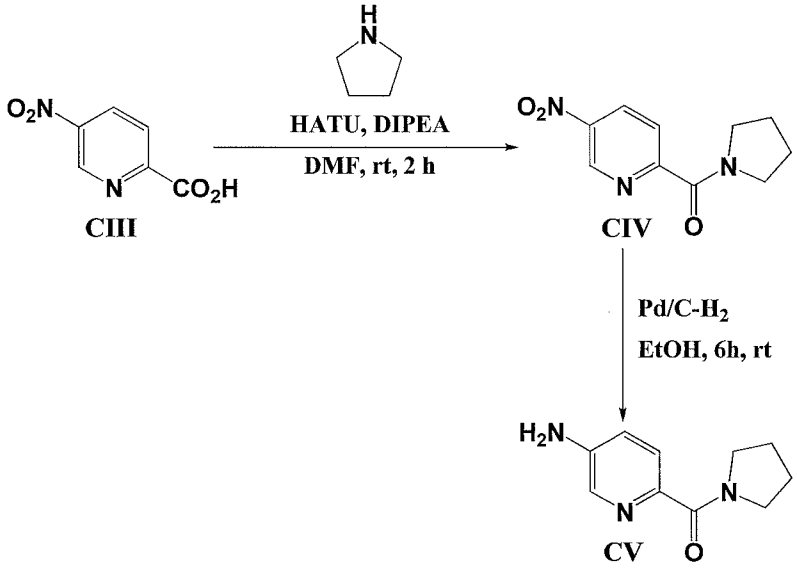
Step **1**

[00322] Preparation of N-(3-nitropyridin-4-yl)cyclopropanecarboxamide (**CI**) was performed following the procedure listed in Scheme 4, Step 1. Orange solid (130 mg, 0.93 mmol, 13% yield). ESIMS found for $C_9H_9N_3O_3$ *m/z* 207.8 (M+H).

Step **2**

[00323] Preparation of intermediate N-(3-aminopyridin-4-yl) cyclopropanecarboxamide (**CII**) was performed following the procedure listed in Scheme 11, Step 2. Dark grey solid (100 mg, 0.56 mmol, quantitative). ESIMS found for $C_9H_{11}N_3O$ *m/z* 178.3 (M+H).

[00324] Preparation of intermediate (5-aminopyridin-2-yl)(pyrrolidin-1-yl)methanone (**CV**) is depicted below in Scheme **22**.



Scheme 22

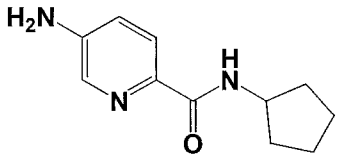
Step **1**

[00325] To a solution of 5-nitropicolinic acid (**CIII**) (500 mg, 2.97 mmol) in DMF (15 mL) was added pyrrolidine (244 µl, 2.47 mmol) and DIPEA (1.03 mL, 5.95 mmol). The reaction was cooled at 0°C before adding HATU (1.13 g, 2.47 mmol). The reaction was warmed to room temperature and stirred for 2 hrs. The reaction was concentrated under vacuum and then dissolved in a mixture of water and 10% iPrOH/$CHCl_3$. The organic layer was separated and the aqueous phase was washed again with 10% iPrOH/$CHCl_3$. The combined organic phases were washed with brine, dried over MgSO4 and evaporated to yield (5-nitropyridin-2-yl)(pyrrolidin-1-yl)methanone (**CIV**) as a red solid (849 mg). ESIMS found for $C_{10}H_{11}N_3O_3$ *m/z* 222.1 (M+H).

Step **2**

[00326] Preparation of intermediate (5-aminopyridin-2-yl)(pyrrolidin-1-yl)methanone (**CV**) was performed following the procedure listed in Scheme 11, Step 2. Yellow solid (708 mg, 7.3 mmol, 96.4% yield). ESIMS found for $C_{10}H_{13}N_3O$ *m/z* 191.4 (M+H).

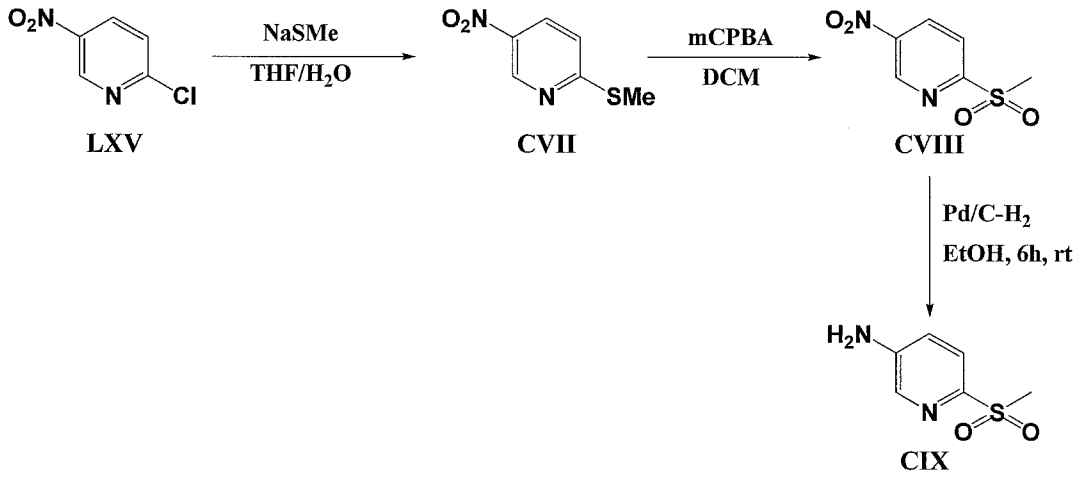
[00327] The following intermediate was prepared in accordance with the procedure described in the above Scheme **22**.



CVI

[00328] 5-Amino-N-cyclopentylpicolinamide (**CVI**): Yellow solid (450 mg, 2.19 mmol, 93.7% yield). ESIMS found for $C_{11}H_{15}N_3O$ *m/z* 206.1 (M+H).

[00329] Preparation of intermediate 6-(methylsulfonyl)pyridin-3-amine (**CIX**) is depicted below in Scheme **23**.



Scheme 23

Step **1**

[00330] To a solution of sodium thiomethoxide in THF (53 mL) and H_2O (20 mL) cooled to 0°C was added 2-chloro-5-nitropyridine (**LXV**) (5.09 g, 32.09 mmol). The reaction was warmed to room temperature and stirred for 2 hrs. The reaction was poured into ice water and stirred for 10 minutes, filtered, washed with water, dried under vacuum to yield 2-(methylthio)-5-nitropyridine (**CVII**) as a yellow solid (5.14 g, 30.20 mmol, 94.1%). ^{1}H NMR (DMSO-d_6) δ ppm 2.62 (s, 3H), 7.57 (d, *J*=8.9Hz, 1H), 8.38 (d, *J*=8.9Hz, 1H), 9.22 (d, *J*=2.7Hz, 1H); ESIMS found for $C_6H_6N_2O_2S$ *m/z* 171.1 (M+H).

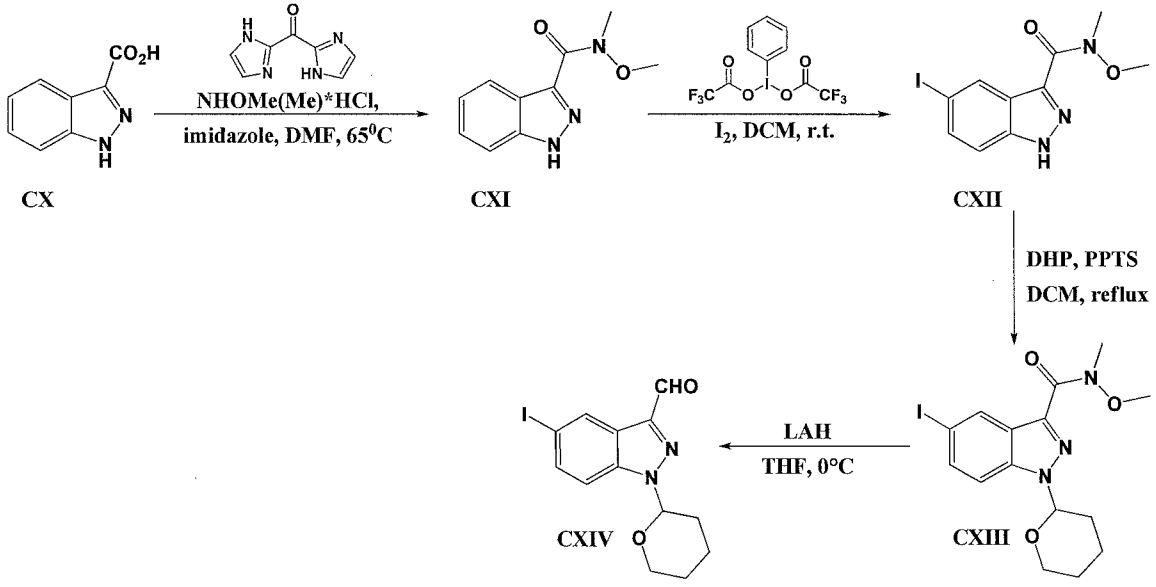
Step **2**

[00331] To a solution of 2-(methylthio)-5-nitropyridine (**CVII**) (502 mg, 2.95 mmol) in DCM (60 mL) was mCPBA (1.33 g, 5.90 mmol). The reaction was stirred at room temperature for 1 hr. Two additional portions of mCPBA (2 x 250 mg) were added at 1 hr intervals for a total reaction time of 4 hr. The reaction was poured into saturated aqueous $NaHCO_3$. The organic phase was separated and washed with water, brine and then dried over MgSO4. The solvent was removed under vacuum to produce crude 2-(methylsulfonyl)-5-nitropyridine (**CVIII**) (854 mg) which was used without purification for step 3. ESIMS found for $C_6H_6N_2O_4S$ *m/z* 203.0 (M+H).

Step **3**

[00332] Preparation of intermediate 6-(methylsulfonyl)pyridin-3-amine (**CIX**) was performed following the procedure listed in Scheme 11, Step 2. The crude product was used as is without purification. ESIMS found for $C_6H_8N_2O_2S$ *m/z* 173.0 (M+H).

[00333] Preparation of intermediate 5-iodo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carbaldehyde (**CXIV**) is depicted below in Scheme **24**.



Scheme 24

Step **1**

[00334] 1*H*-indazole-3-carboxylic acid (**CX**) (100 g, 617 mmol) in DMF was treated with carbonyldiimidazole (110 g, 678 mmol) at room temperature until the evolution of gas ceased (ca. 15 minutes). The reaction was heated to 60-65°C for 2 h and

then allowed to cool to room temperature. N,O-Dimethylhydroxylamine-HCl (66.2 g, 678 mmol) was added as a solid and the mixture was heated to 65°C for 3 h. The reaction was concentrated to a paste, taken up in DCM and washed subsequently with water and 2 N HCl. The product could be seen coming out of solution. The solid was filtered and rinsed separately with EtOAc. The EtOAc and DCM layers were separately washed with sodium bicarbonate followed by brine, dried over $MgSO_4$ and concentrated under reduced pressure. The resulting solids were combined, triturated with 1:1 mixture of DCM-ether, filtered, and dried to produce N-methoxy-N-methyl-1H-indazole-3-carboxamide (**CXI**) as a white solid (100 g, 487 mmol, 79% yield). ^{1}H NMR (DMSO-d_6) δ ppm 3.46 (s, 3H), 3.69-3.85 (m, 3H), 7.13-7.31 (m, 1H), 7.41 (t, *J*=7.25 Hz, 1H), 7.56-7.65 (m, 1H), 7.93-8.08 (m, 1H); ESIMS found for $C_{10}H_{11}N_3O_2$ *m/z* 206 (M+H).

Step **2**

[00335] To N-methoxy-N-methyl-1H-indazole-3-carboxamide (**CXI**) (20 g, 97.4 mmol) in DCM (1 L) was added (Bis(trifluoroacetoxy)iodo)benzene (46 g, 107 mmol) followed by portionwise addition of iodine (14.84 g, 58.5 mmol) at room temperature. After 1 h, saturated aqueous $NaHSO_3$ (600 mL) was added and a solid began to precipitate which was filtered and rinsed with excess DCM. The filtrate was washed with brine, dried over $MgSO_4$, concentrated and the remaining solid was triturated with a minimal amount of DCM. The combined solids were dried under vacuum over KOH to produce 5-iodo-N-methoxy-N-methyl-1H-indazole-3-carboxamide (**CXII**) as a white solid (23.2 g, 70 mmol, 72% yield). ^{1}H NMR (DMSO-d_6) δ ppm 3.45 (s, 3H), 3.77 (s, 3H), 7.45-7.54 (m, 1H), 7.66 (dd, *J*=8.81, 1.51 Hz, 1H), 8.40 (d, *J*=1.01 Hz, 1H); ESIMS found for $C_{10}H_{10}IN_3O_2$ *m/z* 331 (M+H).

Step **3**

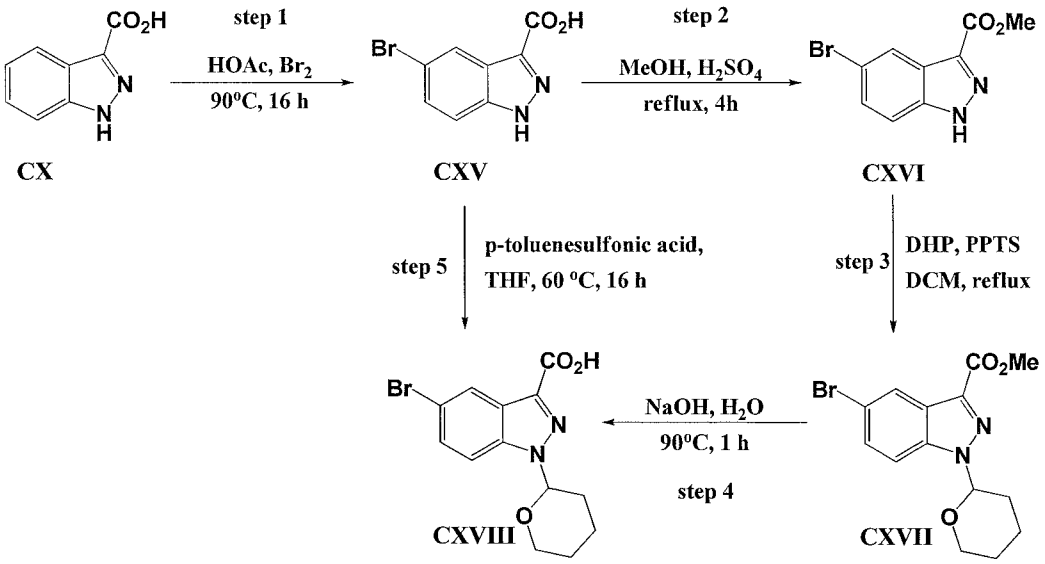
[00336] A mixture of 5-iodo-N-methoxy-N-methyl-1H-indazole-3-carboxamide (**CXII**) (16.5 g, 50 mmol), 3,4-dihydro-2*H*-pyran (10.3 mL, 113 mmol) and PPTS (0.12 g, 0.6 mmol) in DCM was heated to reflux for 5 h. The solution was poured into a saturated aqueous $NaHCO_3$ solution, the layers were separated, and the aqueous layer was extracted with DCM. The combined organic layers were washed with 5%

aqueous citric acid and brine, dried over $MgSO_4$, and concentrated. The crude product was purified on a silica gel column (100% EtOAc → 3:97 MeOH:DCM) to provide 5-iodo-N-methoxy-N-methyl-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXIII**) as a white viscous oil (19.1 g, 46 mmol, 92% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.28-1.84 (m, 6H), 3.43 (s, 3H), 3.60-4.04 (s, 5H), 5.86-6.08 (m, 1H), 7.45-7.87 (m, 2H), 8.39 (s, 1H); ESIMS found for $C_{15}H_{18}IN_3O_3$ *m/z* 416 (M+H).

Step **4**

[00337] Lithium aluminum hydride (160 mg, 4.21 mmol) was added in portions to a cooled (0°C) solution of 5-iodo-N-methoxy-N-methyl-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXIII**) (1.46 g, 3.5 mmol) in THF. Stirring was continued at 0°C until the reaction was completed, approximately 30 min. The reaction was quenched by the slow addition of EtOAc at 0°C, and the whole mixture was poured into 0.4 N aqueous $NaHSO_4$. The organic layer was washed with brine, dried over $MgSO_4$, concentrated, and purified on a silica gel column (100% EtOAc → 3:97 MeOH:DCM) to give 5-iodo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carbaldehyde (**CXIV**) as a white solid (0.90 g, 3.15 mmol, 72% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.50-1.71 (m, 2H), 1.71-1.87 (m, 1H), 1.97-2.15 (m, 2H), 2.31-2.42 (m, 1H), 3.66-3.99 (m, 2H), 5.96-6.17 (m, 1H), 7.78 (d, *J*=6 Hz, 1H), 7.84 (d, *J*=6 Hz, 1H), 8.50 (s, 1H), 10.13 (s, 1H); ESIMS found for $C_{13}H_{13}IN_2O_2$ *m/z* 357 (M+H).

[00338] Preparation of intermediate 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXVIII**) is depicted below in Scheme **25**.



Scheme 25

Step **1**

[00339] A suspension of indazole-3-carboxylic acid (**CX**) (1.0 g, 6.16 mmol) in glacial acetic acid (60 mL) was heated at 120°C to get a clear solution. The solution was cooled to 90°C. A solution of bromine (0.633 mL, 12.33 mmol) in glacial acetic acid (2 mL) was added slowly to the solution while heating at 90°C. The solution was further heated 16 h at 90°C. The solution was cooled to room temperature, poured into ice water and further stirred at room temperature for 15 min. The solids formed were filtered, washed with cold water and dried under vacuum at room temperature to get 5-bromo-1H-indazole-3-carboxylic acid (**CXV**) as a white solid (1.30 g, 5.39 mmol, 87.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.95 (s, 1H), 13.18 (br s, 1H), 8.21 (d, J = 1.2 Hz, 1H), 7.65 (d, J = 7.0 Hz, 1H), 7.56 (dd, J = 7.0, 1.2 Hz, 1H); ESIMS found for $C_8H_4BrN_2O_2$ *m/z* 242.0 (M+H).

Step **2**

[00340] Concentrated sulfuric acid (1 mL) was added to a suspension of 5-bromo-1H-indazole-3-carboxylic acid (**CXV**) (1.30 g, 5.39 mmol) in dry MeOH (50 mL) and heated to reflux for 4 h under argon. The solution was cooled to room temperature and the MeOH was evaporated under vacuum. The residue was dissolved in EtOAc and washed with water. The organic phase was dried over Na_2SO_4, filtered and concentrated

to afford methyl 5-bromo-1H-indazole-3-carboxylate (**CXVI**) as a white solid (1.35 g, 5.29 mmol, 98% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.13 (s, 1H), 8.21 (d, J = 1.6 Hz, 1H), 7.67 (d, J = 7.2 Hz, 1H), 7.59 (dd, J = 7.2, 1.2 Hz, 1H), 3.92 (s, 3H); ESIMS found for $C_9H_7BrN_2O_2$ *m/z* 256.0 (M+H).

Step **3**

[00341] A suspension of methyl 5-bromo-1H-indazole-3-carboxylate (**CXVI**) (1.35 g, 5.29 mmol), pyridinium p-toluenesulfonate (0.143 g, 0.56 mmol) and 3,4 dihydro-2*H*-pyran (1.02 mL, 11.90 mmol) in anhydrous dichloroethane (20 mL) was refluxed 5 h under argon. The suspension was turned into the clear solution. The solution was cooled and the excess solvent was evaporated under vacuum. The residue was dissolved in EtOAc and washed with dilute $NaHCO_3$ solution (sat^d. $NaHCO_3$ sol^n/H_2O: 1:9). The organic layer was dried over Na_2SO_4, filtered and concentrated. The residue was purified by column chromatography (100% hexanes → 5:95 EtOAc:hexanes) to get methyl 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylate (**CXVII**) as a white solid (1.47 g, 4.34 mmol, 82% yield). ^{1}H NMR (DMSO-d_6) δ ppm 8.22 (d, J = 1.4 Hz, 1H), 7.89 (d, J = 7.2 Hz, 1H), 7.68 (dd, J = 7.2, 1.6 Hz, 1H),), 6.02 (dd, J = 8.0, 2.4 Hz, 1H), 3.94 (s, 3H), 3.88 (m, 1H), 3.79 (m, 1H), 2.37-2.31 (m, 1H), 2.05-1.96 (m, 2H), 1.77-1.73 (m, 1H). 1.60-1.58 (m, 2H); ESIMS found for $C_{14}H_{15}BrN_2O_3$ *m/z* 340.0 (M+H).

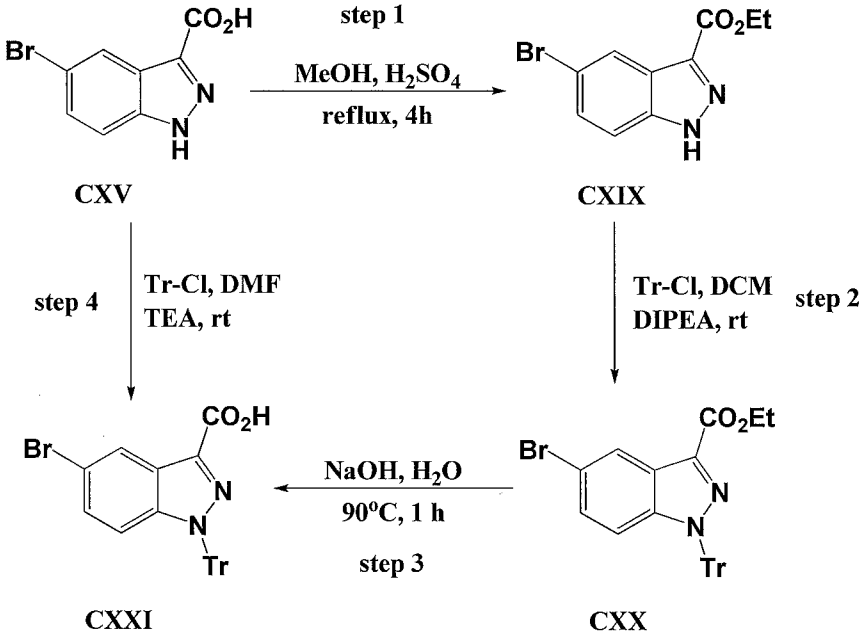
Step **4**

[00342] 2 N Aqueous NaOH solution (10 mL) was added to a suspension of methyl 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylate (**CXVII**) (1.30 g, 3.83 mmol) in water (20 mL) and heated at 90°C for 1 h. The solution was cooled to room temperature, diluted with ice water and acidified to pH 3.0 with 10% aqueous HCl. The solids formed were filtered, washed with cold water and dried under vacuum at room temperature to get 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXVIII**) as a white solid (0.87 g, 2.68 mmol, 70% yield). ESIMS found for $C_{13}H_{13}BrN_2O_3$ *m/z* 326.0 (M+H).

Step 5

[00343] To a solution of 5-bromo-1H-indazole-3-carboxylic acid (**CXV**) (59.8 g, 248 mmol) in THF (800 mL) under argon was added 3,4 dihydro-2*H*-pyran (50.6 mL, 558 mmol) and p-TsOH (4.72 g, 24.8 mmol). The reaction was heated to reflux at 60°C for 16 h. An additional portion of p-TsOH (0.025 eq) and 3,4 dihydro-2*H*-pyran (0.56 eq) was added and the reflux continued for 5 h. The solution was concentrated under vacuum. EtOAc was added to the residue and the suspension was filtered and dried under high vacuum overnight to produce 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXVIII**) as a white solid (49.07 g, 150.9 mmol, 60.8% yield). ESIMS found for $C_{13}H_{13}BrN_2O_3$ *m/z* 326.3 (M+H).

[00344] Preparation of intermediate 5-bromo-1-trityl-1H-indazole-3-carboxylic acid (**CXXI**) is depicted below in Scheme **26**.



Scheme 26

Step 1

[00345] Preparation of intermediate ethyl 5-bromo-1H-indazole-3-carboxylate (**CXIX**) was performed following the procedure listed in Scheme 25, Step 2. White solid. (3.60 g, 13.38 mmol, 64.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37 (t, *J*=7Hz, 3H), 4.40 (q, *J*=7Hz, 2H), 7.57 (dd, *J*=9Hz, *J*=2Hz, 1H), 7.66 (d, *J*=9Hz, 1H), 8.20 (d, *J*=2Hz, 1H), 14.11 (brs, 1H); ESIMS found for $C_{10}H_9BrN_2O_2$ *m/z* 269.0 (M+H).

Step **2**

[00346] To a solution of ethyl 5-bromo-1H-indazole-3-carboxylate (**CXIX**) and trityl chloride in DCM was slowly added DIPEA. The solution was stirred at room temperature overnight. The reaction was poured into water and stirred for 5 min. The organic layer was separated, dried over $MgSO_4$ and concentrated under vacuum. The residue was purified by column chromatography using a ISCO 200RF system with a SiO2 column (12 g) (100% hexanes → 10:90 EtOAc:hexanes) to produce a white solid. (357 mg, 0.70 mmol, 69.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.34 (t, *J*=7Hz, 3H), 4.38 (q, *J*=7Hz, 2H), 6.43 (d, *J*=9.5Hz, 1H), 7.11-7.14 (m, 6H), 7.31-7.35 (m, 10H), 8.23 (d, *J*=2Hz, 1H); ESIMS found for $C_{29}H_{23}BrN_2O_2$ *m/z* 511.0 (M+H).

Step **3**

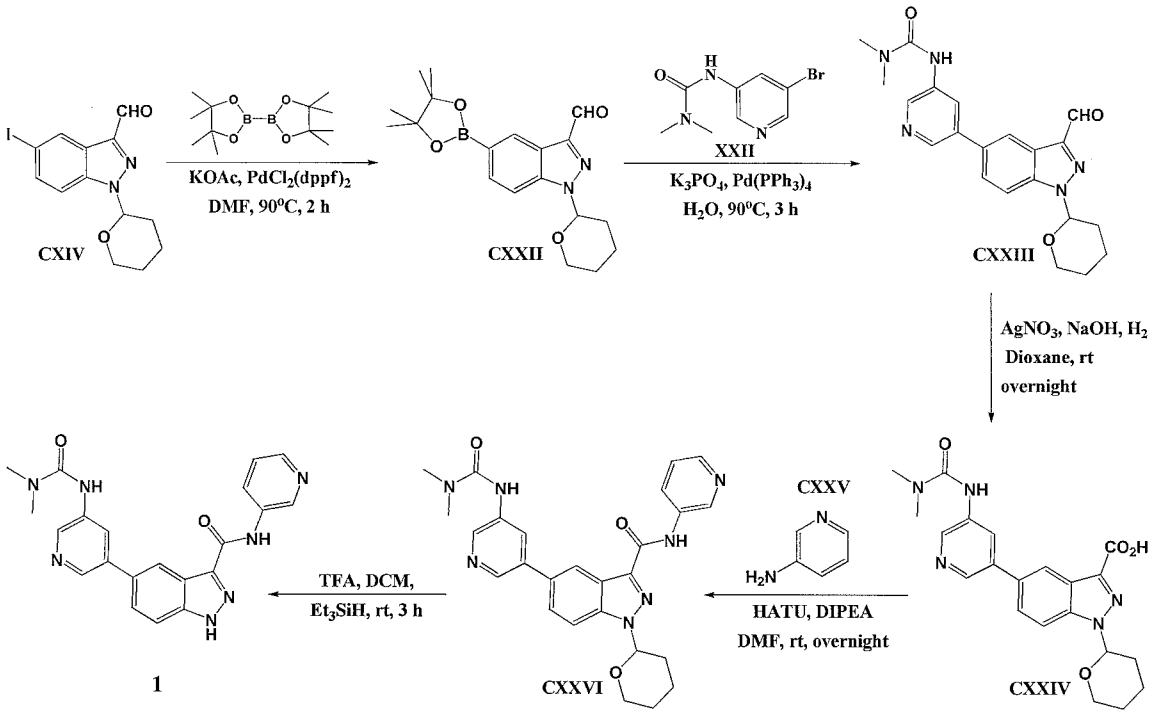
[00347] Preparation of intermediate 5-bromo-1-trityl-1H-indazole-3-carboxylic acid (**CXXI**) by hydrolysis of ethyl 5-bromo-1-trityl-1H-indazole-3-carboxylate (**CXX**) can be performed following the procedure listed in Scheme 25, Step 3.

Step **4**

[00348] Preparation of intermediate 5-bromo-1-trityl-1H-indazole-3-carboxylic acid (**CXXI**) by tritylation of 5-bromo-1H-indazole-3-carboxylic acid (**CXV**) can be performed following the procedure listed in the *Journal of Medicinal Chemistry* **(2003)**, *46(25)*, 5458-5470.

Example 1

[00349] Preparation of 5-(5-(3,3-dimethylureido)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide (**1**) is depicted below in Scheme **27**.



Scheme 27

Step **1-2**

[00350] A solution of 5-iodo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carbaldehyde (**CXIV**) (1.780 g, 5.0 mmol), bis(pinacolato)diboron (1.523 g, 6.0 mmol), KOAc (1.471 g, 15 mmol) and dry DMF (20 mL) was purged with argon. $PdCl_2(dppf)_2$ (0.245 g, 0.3 mmol) was added to the reaction and purged again with argon. The solution was heated at 90°C for 2 h. Once TLC showed the disappearance of (**CXIV**), the solution was cooled to room temperature. To this solution was added K_3PO_4 (1.592 g, 7.5 mmol), 3-(5-bromopyridin-3-yl)-1,1-dimethylurea (**XXII**) (1.220 g, 5.0 mmol), $Pd(PPh_3)_4$ (173 mg, 0.15 mmol) and water (2 mL). The solution was purged with argon and heated at 90°C for 3 h. The solution was cooled to room temperature and then concentrated under reduced pressure. The residue was dissolved in DCM and washed with water, dried over $MgSO_4$, filtered and then evaporated under vacuum. The residue was purified on a silica gel column (100% DCM → 2:98 MeOH:DCM) to give 3-(5-(3-formyl-1-(tetrahydro-2H-pyran-2-yl)-1H-indazol-5-yl)pyridin-3-yl)-1,1-dimethylurea (**CXXIII**) as a brown viscous oil which solidified under vacuum at room temperature (354 mg, 0.90 mmol, 18% yield for 2 steps). ^1H NMR (DMSO-d_6) δ ppm 10.22 (s, 1H), 8.76 (d, J = 1.6 Hz,

1H), 8.63 (s, 1H), 8.52 (d, J = 1.6 Hz, 1H), 8.36 (s, 1H), 8.24 (m, 1H), 8.05 (d, J = 7.2 Hz, 1H), 7.91 (dd, J = 7.2, 1.4 Hz, 1H), 6.13 (dd, J = 7.6, 2.0 Hz, 1H), 3.93 (m, 1H), 3.85 (m, 1H), 2.98 (s, 6H), 2.47-2.42 (m, 1H), 2.11-2.06 (m, 2H), 1.82-1.79 (m, 1H) 1.64 (m, 2H); ESIMS found for $C_{21}H_{23}N_5O_3$ *m/z* 394.0(M+H).

Step 3

[00351] A solution of sodium hydroxide (0.173 g, 4.33 mmol) in water (5 mL) was added to a solution of silver nitrate (0.367 g, 2.16 mmol) in water (5 mL) to give a brown precipitate. 3-(5-(3-formyl-1-(tetrahydro-2H-pyran-2-yl)-1H-indazol-5-yl) pyridin-3-yl)-1,1-dimethylurea (**CXXIII**) (0.340 g, 0.86 mmol) was dissolved in 1,4-dioxane (10 mL) and added to the reaction which was stirred overnight at room temperature. The solution was diluted with water and then extracted with diethyl ether. The aqueous layer was separated and carefully brought to pH = 3 with aqueous HCl. The aqueous layer was then extracted with 10% iPrOH/chloroform. The combined organic layers were then dried (Na_2SO_4), filtered and concentrated to give 5-(5-(3,3-dimethylureido)pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXXIV**) as a brownish white solid (246 mg, 0.60 mmol, 70% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.26 (br. s, 1H), 8.87 (s, 1H), 8.63 (s, 1H), 8.41 (s, 1H), 8.34 (s, 1H), 8.03 (d, J = 7.1 Hz, 1H), 7.86 (dd, J = 7.2, 1.3 Hz, 1H), 6.06 (dd, J = 8.0, 4.0 Hz, 1H), 3.92 (m, 1H), 3.80 (m, 1H), 2.98 (s, 6H), 2.42-2.39 (m, 1H), 2.03-2.02 (m, 2H), 1.79-1.77 (m, 1H) 1.61 (m, 2H); ESIMS found for $C_{21}H_{23}N_5O_4$ *m/z* 410.0(M+H).

Step 4

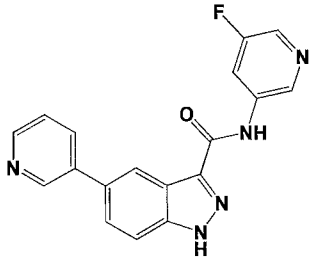
[00352] HATU (0.190 g, 0.5 mmol) was added to a solution of 5-(5-(3,3-dimethylureido)pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXXIV**) (0.39 g, 1.21 mmol) and diisopropylethylamine (0.174 mL, 1.0 mmol) in DMF stirred at room temperature under argon. After stirring 5 min, the solution was added with 3-aminopyridine (**CXXV**) (0.047 g, 0.5 mmol). The solution was stirred overnight at room temperature under argon. The DMF was removed under reduced pressure, and the residue was treated with water, sonicated briefly and filtered. The solids were washed with cold water and dried at room temperature. The product was

purified by column chromatography using a 4 g Thomson normal phase silica gel cartridge (100% DCM → 5:95 MeOH:DCM) to afford 5-(5-(3,3-dimethylureido)pyridin-3-yl)-N-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXXVI**) as an off white solid (323 mg, 0.67 mmol, 55% yield). ^{1}H NMR (DMSO-d_6) δ ppm 10.56 (s, 1H), 9.06 (d, J = 2.0 Hz, 1H), 8.75 (d, J = 1.6 Hz, 1H), 8.64 (s, 1H), 8.53 (d, J = 1.6 Hz, 1H), 8.46 (s, 1H), 8.34-8.29 (m, 2H), 8.26 (m, 1H), 8.03 (d, J = 7.0 Hz, 1H), 7.88 (dd, J = 7.0, 1.2 Hz, 1H), 7.43 (dd, J = 6.64, 3.84 Hz, 1H), 6.07 (dd, J = 8.0, 1.8 Hz, 1H), 3.98 (m, 1H), 3.82 (m, 1H), 2.98 (s, 6H), 2.63-2.60 (m, 1H), 2.11-2.06 (m, 2H), 1.83-1.81 (m, 1H) 1.52 (m, 2H); ESIMS found for $C_{21}H_{23}N_5O_4$ *m/z* 410.0(M+H).

Step **5**

[00353] TFA (5 mL) was added to a solution of 5-(5-(3,3-dimethylureido)pyridin-3-yl)-N-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXXVI**) (0.134 g, 0.27 mmol) and triethylsilane (0.110 mL, 0.69 mmol) in DCM (5 mL) and stirred 3 h at room temperature. The solvent was removed under vacuum. The residue was treated with water, sonicated briefly to disperse the solids, basified to pH 9.0 with 5 N NH_4OH and sonicated again. The solids were filtered, washed with cold water and purified by column chromatography (100% DCM → 5:95 MeOH[7N NH_3]:DCM) to afford 5-(5-(3,3-dimethylureido)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide (**1**) as a white solid (35.8 mg, 0.09 mmol, 33% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.99 (s, 1H), 10.69 (s, 1H), 9.08 (d, J = 1.2 Hz, 1H), 8.74 (d, J = 1.8 Hz, 1H), 8.63 (s, 1H), 8.51 (d, J = 1.5 Hz, 1H), 8.47 (s, 1H), 8.33-8.30 (m, 2H), 8.26 (m, 1H), 7.80 (s, 2H), 7.41 (dd, J = 6.6, 3.6 Hz, 1H), 2.98 (s, 6H); ESIMS found for $C_{21}H_{19}N_7O_2$ *m/z* 402.3(M+H).

[00354] The following compound was prepared in accordance with the procedure described in the above Example **1**.

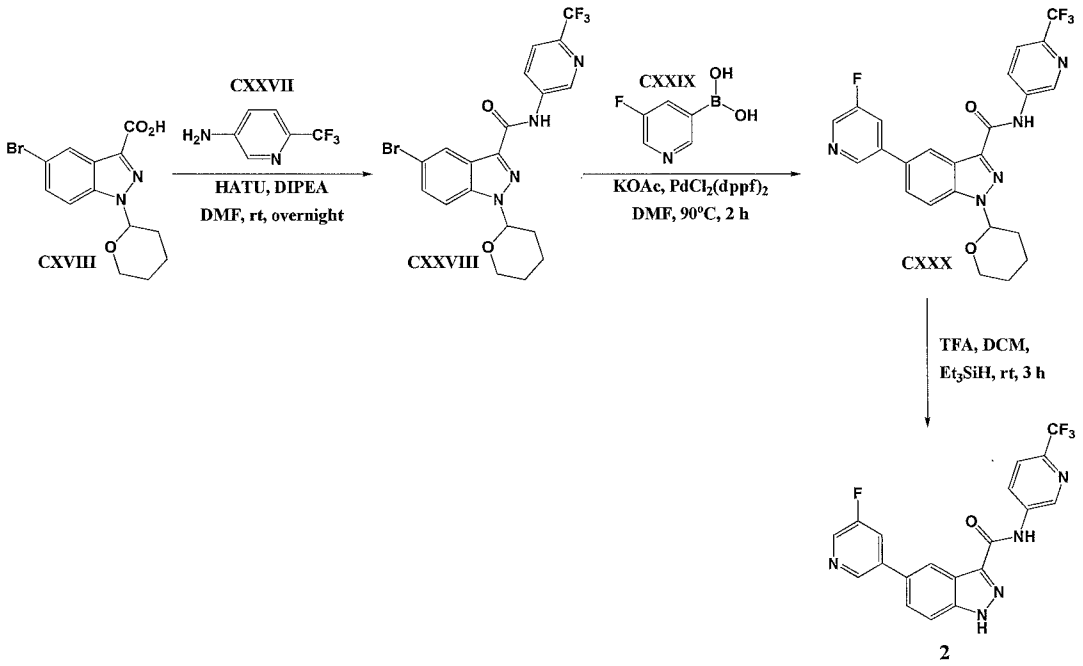


[00355] N-(5-Fluoropyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **23**.

[00356] Light tan solid. ^{1}H NMR (DMSO-d_6) δ ppm 7.53 (dd, J=8Hz, J=5Hz, 1H), 7.82-7.86 (m, 2H), 8.13-8.15 (m, 1H), 8.31-8.34 (m, 2H), 8.47-8.48 (m, 1H), 8.60 (dd, *J*=5Hz, *J*=2Hz, 1H), 894 (d, *J*=2Hz, 1H), 8.99 (d, *J*=2Hz, 1H), 10.97 (s, 1H), 14.05 (s, 1H); ESIMS found for $C_{18}H_{12}FN_5O$ *m/z* 334 (M+1).

Example **2**

[00357] Preparation of 5-(5-fluoropyridin-3-yl)-N-(6-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**2**) is depicted below in Scheme **28**.



Scheme 28

Step **1**

[00358] HATU (1.125 g, 2.96 mmol) was added to a solution of 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXVIII**) (0.876 g, 2.69 mmol) and diisopropylethylamine (1.03 mL, 5.92 mmol) in DMF stirred at room temperature under argon. After stirring 5 min, the solution was added with 5-amino-2-

trifluoromethyl pyridine (**CXXVII**) (0.479 g, 2.96 mmol). The solution was stirred 24 h at room temperature under argon. The DMF was removed under reduced pressure, and the residue was treated with water, sonicated briefly and filtered. The solids were washed with cold water and dried at room temperature. The product was purified by silica gel column chromatography (100% hexanes → 7:93 EtOAc:hexanes) to afford 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-N-(6-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXVIII**) as a white solid (1.17 g, 2.50 mmol, 93% yield). ^{1}H NMR (DMSO-d_6) δ ppm 10.93 (s, 1H), 9.23 (d, J = 1.9 Hz, 1H), 8.60 (dd, J = 6.8, 1.4 Hz, 1H), 8.38 (d, J = 4.4 Hz, 1H), 7.95 (m, 2H), 7.70 (dd, J = 7.1, 1.5 Hz, 1H),), 6.04 (dd, J = 8.1, 1.9 Hz, 1H), 3.98 (m, 1H), 3.82 (m, 1H), 2.59-2.54 (m, 1H), 2.08-2.03 (m, 2H), 1.81-1.77 (m, 1H). 1.66-1.61 (m, 2H); ESIMS found for $C_{19}H_{16}BrF_3N_4O_2$ *m/z* 470.0 (M+H).

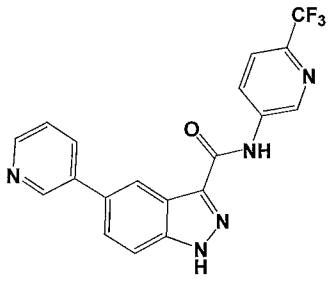
Step 2

[00359] A solution of 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-N-(6-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXVIII**) (0.469 g, 1 mmol), 5-fluoro-pyridyl-3-boronic acid (**CXXIX**) (0.156 g, 1.1 mmol), potassium phosphate tribasic (0.318 g, 1.5 mmol) and water (degassed, 1 mL) in DMF (10 mL) was purged with argon. Tetrakis(triphenylphosphine)palladium(0) (0.034 g, 0.03 mmol) was added and the solution was purged again with argon. The reaction was heated to 90°C for 3 h when TLC showed disappearance of starting material. The solution was cooled to room temperature and excess solvent was removed under vacuum. The residue was treated with water, sonicated briefly and the solids formed were filtered. The solids were washed with cold water and dried under vacuum at room temperature which was purified by silica gel column chromatography (2:8 EtOAc:hexanes → 3:7 EtOAc:hexanes) to afford 5-(5-fluoropyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-N-(6-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXX**) as a white solid (427 mg, 0.88 mmol, 88% yield). ^{1}H NMR (DMSO-d_6) δ ppm 10.95 (s, 1H), 9.25 (d, J = 1.8 Hz, 1H), 8.85 (m, 1H), 8.63 (d, J = 1.8 Hz, 1H), 8.61 (d, J = 2.1 Hz, 1H), 8.53 (m, 1H), 8.16-8.13 (m, 1H), 8.08 (d, J = 7.1 Hz, 1H), 7.97-7.94 (m, 2H), 6.11 (dd, J = 8.1, 1.8 Hz, 1H), 4.01 (m, 1H), 3.88-3.83 (m, 1H), 2.63-2.60 (m, 1H), 2.11-2.07 (m, 2H), 1.83-1.80 (m, 1H). 1.69-1.65 (m, 2H); ESIMS found for $C_{24}H_{19}F_4N_5O_2$ *m/z* 486.0 (M+H).

Step **3**

[00360] TFA (10 mL) was added to a solution of 5-(5-fluoropyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-N-(6-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXX**) (0.420 g, 0.86 mmol) and triethylsilane (0.345 mL, 2.16 mmol) in DCM (10 mL) and stirred 5 h at room temperature. The solvent was removed under vacuum. The residue was treated with water, sonicated briefly to disperse the solids, basified to pH 9.0 with 5 N NH_4OH and sonicated again. The solids were filtered, washed with cold water and air dried at room temperature. The solids were suspended in DCM:MeOH (1:1) mixture and boiled to get a clear solution. The solution was cooled to room temperature. The solids formed were filtered washed with DCM and dried under vacuum at room temperature to get 5-(5-fluoropyridin-3-yl)-N-(6-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**2**) as a white solid (72.9 mg, 0.18 mmol, 21% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.13 (br. s, 1H), 11.11 (s, 1H), 9.27 (d, J = 1.8 Hz, 1H), 8.84 (m, 1H), 8.63 (dd, J = 6.8, 1.8 Hz, 1H), 8.60 (d, J = 2.0 Hz, 1H), 8.53 (m, 1H), 8.14-8.11 (m, 1H), 7.94 (d, J = 6.9 Hz, 1H), 7.90-7.83 (m, 2H); ESIMS found for $C_{19}H_{11}F_4N_5O$ *m/z* 402.30 (M+H).

[00361] The following compound was prepared in accordance with the procedure described in the above Example **2**.

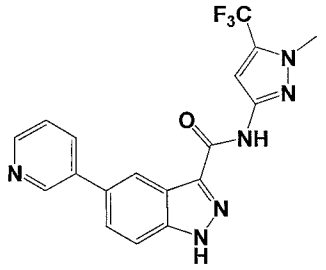


3

[00362] 5-(Pyridin-3-yl)-N-(6-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **3**.

[00363] White solid (19% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.03 (br. s, 1H), 11.10 (s, 1H), 9.27 (d, J = 1.8 Hz, 1H), 8.94 (d, J = 1.6 Hz, 1H), 8.63 (dd, J = 6.8,

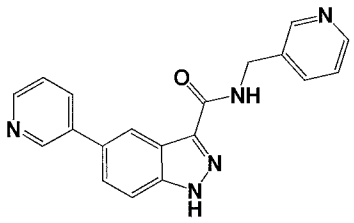
1.7 Hz, 1H), 8.60 (m, 1H), 8.48 (s, 1H), 8.15-8.13 (m, 1H), 7.93 (d, J = 6.9 Hz, 1H), 7.85 (s, 2H), 7.54 (m, 1H); ESIMS found for $C_{19}H_{12}F_3N_5O$ m/z 384.0 (M+H).



37

[00364] N-(1-Methyl-5-(trifluoromethyl)-1H-pyrazol-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **37**.

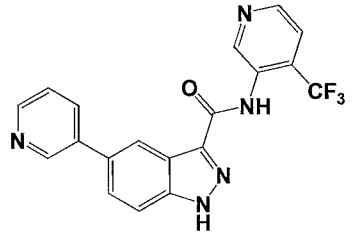
[00365] Light green solid (76.7 mg, 0.20 mmol, 48.4% yield). ^{1}H NMR (DMSO-d_6) δ ppm 3.93 (s, 3H), 7.18 (s, 1H), 7.55 (dt, J=8Hz, J=3Hz, 1H), 7.81 (dd, J=15Hz, J=9Hz, 2H), 8.16 (d, J=8Hz, 1H), 8.45 (s, 1H), 8.61 (d, J=4Hz, 1H), 8.95 (s, 1H), 10.81 (s, 1H), 13.96 (s, 1H); ESIMS found for $C_{18}H_{13}F_3N_6O$ m/z 387.1 (M+H).



42

[00366] 5-(Pyridin-3-yl)-N-(pyridin-3-ylmethyl)-1H-indazole-3-carboxamide **42**.

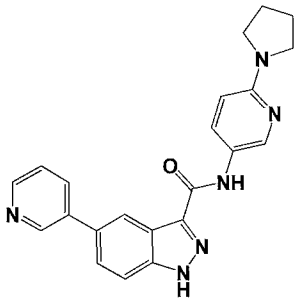
[00367] White solid (54.5 mg, 0.17 mmol, 78% yield). ^{1}H NMR (DMSO-d_6) δ ppm 4.53 (d, J=6Hz, 2H), 7.35 (dd, J=8Hz, J=5Hz, 1H), 7.49-7.52 (m, 1H), 7.74-7.78 (m, 3H), 8.09-8.11 (m, 1H), 8.41-8.42 (m, 1H), 8.45 (dd, J=5Hz, J=2Hz, 1H), 8.57 (dd, J=5Hz, J=2Hz, 1H), 8.59 (d, J=2Hz, 1H), 8.90 (d, J=2Hz, 1H), 9.16 (t, J=6Hz, 1H), 13.77 (s, 1H); ESIMS found for $C_{19}H_{15}N_5O$ m/z 330 (M+H).



48

[00368] 5-(Pyridin-3-yl)-N-(4-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **48**.

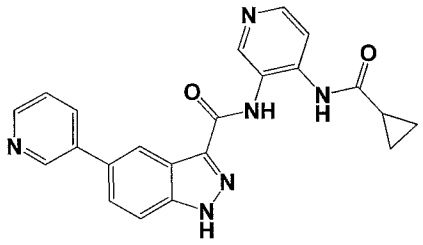
[00369] White solid (67 mg, 0.17 mmol, 62% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.52 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.83-7.87 (m, 3H), 8.12 (td, *J*=8Hz, *J*=2Hz, 1H), 8.41 (t, *J*=1Hz, 1H), 8.59 (dd, *J*=5Hz, *J*=2Hz, 1H), 8.75 (d, *J*=5Hz, 1H), 8.92 (d, *J*=3Hz, 1H), 9.08 (s, 1H), 10.21 (s, 1H), 14.06 (brs, 1H); ESIMS found for $C_{19}H_{12}F_3N_5O$ *m/z* 384.0 (M+H).



53

[00370] 5-(Pyridin-3-yl)-N-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **53**.

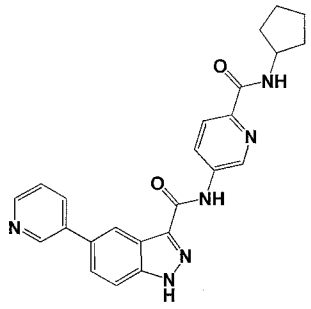
[00371] Beige solid (23.8 mg, 0.06 mmol, 44.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.92-1.97 (m, 4H), 3.38 (t, *J*=7Hz, 4H), 6.46 (d, *J*=9Hz, 1H), 7.52 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.80 (dq, *J*=9Hz, *J*=2Hz, 2H), 7.97 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.12 (dd, *J*=8Hz, *J*=4Hz, 1H), 8.47 (s, 1H), 8.50 (d, *J*=3Hz, 1H), 8.59 (dd, *J*=5Hz, *J*=2Hz, 1H), 8.92 (d, *J*=2Hz, 1H), 10.22 (s, 1H), 13.86 (s, 1H); ESIMS found for $C_{22}H_{20}N_6O$ *m/z* 385.1 (M+H).



58

[00372] N-(4-(Cyclopropanecarboxamido)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **58**.

[00373] White solid (32.7 mg, 0.08 mmol, 37.0% yield). ^{1}H NMR (DMSO-d_6) δ ppm 0.84-0.88 (m, 2H), 0.88-0.92 (m, 2H), 1.91-1.99 (m, 1H), 7.52 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.73 (d, *J*=6Hz, 1H), 7.82 (dd, *J*=12Hz, *J*=9Hz, 2H), 8.12 (dt, *J*=9Hz, *J*=4Hz, 1H), 8.34 (d, *J*=6Hz, 1H), 8.44 (s, 1H), 8.59 (dd, *J*=5Hz, *J*=2Hz, 1H), 8.80 (s, 1H), 8.92 (d, *J*=2Hz, 1H), 10.03 (s, 1H), 10.31 (s, 1H), 13.98 (s, 1H); ESIMS found for $C_{22}H_{18}N_6O_2$ *m/z* 399.0 (M+H).



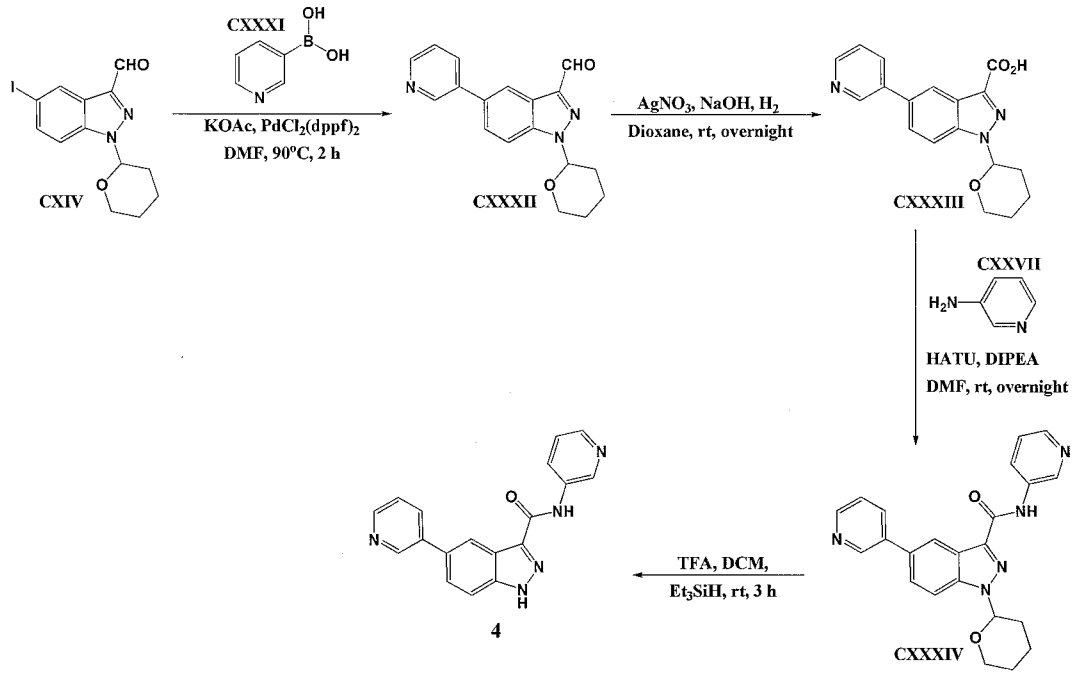
181

[00374] N-(6-(Cyclopentylcarbamoyl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **181**.

[00375] Light yellow solid (18 mg, 0.04 mmol, 16.6% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.50-1.64 (m, 4H), 1.67-1.76 (m, 2H), 1.85-1.94 (m, 4H), 4.24 (quin, *J*=8Hz, 1H), 7.53 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.84 (ABq, 2H), 8.03 (d, *J*=9Hz, 1H), 8.14 (d, *J*=8Hz, 1H), 8.45 (d, *J*=8Hz, 1H), 8.48 (s, 1H), 8.54 (dd, *J*=9Hz, *J*=2,5Hz, 1H), 8.60 (d, *J*=4Hz, 1H), 8.94 (d, *J*=2Hz, 1H), 9.16 (d, *J*=2Hz, 1H), 10.97 (s, 1H), 14.08 (brs, 1H); ESIMS found for $C_{24}H_{22}N_6O_2$ *m/z* 427.1 (M+H).

Example **3**

[00376] Preparation of N,5-di(pyridin-3-yl)-1H-indazole-3-carboxamide (**4**) is depicted below in Scheme **29**.



Scheme 29

Step **1**

[00377] 5-Iodo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carbaldehyde (**CXIV**) (1.53 g, 4.30 mmol), pyridine-3-boronic acid (**CXXXI**) (0.58 g, 4.73 mmol), and potassium phosphate tribasic (1.37 g, 6.45 mmol) was dissolved in 1,4-dioxane (43.0 mL) and water (9.0 mL). Tetrakis(triphenylphosphine)palladium(0) (0.50 g, 0.4301 mmol) was added, and the reaction was heated to 95°C for 2.5 h. The solvent was removed, and the residue was partitioned between EtOAc and water. The organic phase was separated and washed sequentially with water and brine. The material was dried ($MgSO_4$), concentrated, and purified by flash chromatography using a 40 g Thomson normal phase silica gel cartridge (100% hexanes → 1:1 EtOAc:hexanes) to afford 5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carbaldehyde (**CXXXII**) (0.62 g, 2.02 mmol, 47% yield) as a tan amorphous solid. ^{1}H NMR (DMSO-d_6) δ ppm 10.23 (s, 1H), 8.95 (d, J = 2.3 Hz, 1H), 8.61 (dd, J = 4.8, 1.5 Hz, 1H), 8.39 (d, J = 0.98 Hz, 1H), 8.17-8.14 (m, 1H), 8.06 (d, J = 8.8 Hz, 1H), 7.95-7.93 (m, 1H), 7.64-7.60 (m, 1H), 6.13 (dd, J = 9.4, 2.4 Hz, 1H), 3.93-3.90 (m, 1H), 3.86-3.81 (m, 1H), 2.45-2.41 (m, 1H), 2.11-2.07 (m, 2H), 1.82-1.78 (m, 1H), 1.66-1.62 (m, 2H); ESIMS found for $C_{18}H_{17}N_3O_2$ *m/z* 308 (M+H).

Step **2**

[00378] To a solution of silver nitrate (0.55 g, 3.25 mmol) in water (10 mL) was added a solution of sodium hydroxide (0.26 g, 6.50 mmol) in water (5 mL) to give a brown precipitate. 5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carbaldehyde (**CXXXII**) (0.40 g, 1.30 mmol) dissolved in 1,4-dioxane (3 mL) was added to the reaction which was stirred at room temperature for 2 h. The reaction was then extracted with diethyl ether. The aqueous layer was separated and carefully brought to pH = 3 with 10% aqueous HCl. The aqueous layer was then extracted five times with iPrOH/chloroform (1/9). The combined organic layers were then dried ($MgSO_4$) and concentrated to afford 5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXXXIII**) (0.30 g, 0.93 mmol, 70% yield) as a white solid. ^{1}H NMR (DMSO-d_6) δ ppm 13.28 (br, 1H), 8.93 (s, 1H), 8.60 (d, J = 4.1 Hz, 1H), 8.32 (d, J = 0.83 Hz, 1H), 8.14-8.12 (m, 1H), 8.00 (d, J = 8.8 Hz, 1H), 7.86 (dd, J = 8.8, 1.7 Hz, 1H), 7.52 (dd, J = 7.8, 4.7 Hz, 1H), 6.04 (dd, J = 9.3, 2.3 Hz, 1H), 3.92-3.90 (m, 1H), 3.83-3.78 (m, 1H), 2.44-2.37 (m, 1H), 2.08-2.02 (m, 2H), 1.79-1.76 (m, 1H), 1.63-1.61 (m, 2H).

Step **3**

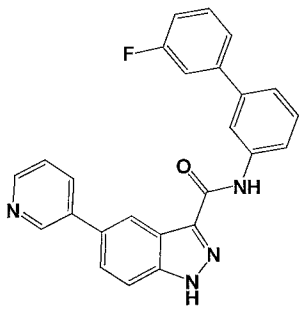
[00379] To a solution of 5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXXXIII**) (0.39 g, 1.21 mmol) and 3-aminopyridine (**CXXVII**) (0.11 g, 1.21 mmol) in DMF (4.0 mL) was added N,N-diisopropylethylamine (0.42 mL, 1.21 mmol). The solution was cooled to 0°C before adding HATU (0.46 g, 1.21 mmol). The ice bath was removed, and the reaction warmed to room temperature and stirred for 2 h. The DMF was removed under reduced pressure, and the residue was partitioned between chloroform and water. The organic phase was separated and washed sequentially with water and brine, dried over $MgSO_4$, filtered, and concentrated. The product was purified by column chromatography using a 25 g Thomson normal phase silica gel cartridge (100% $CHCl_3$ → 2:98 MeOH:$CHCl_3$) to afford N,5-di(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXXXIV**) (0.36 g, 0.90 mmol, 75% yield) as an off-white solid. ^{1}H NMR (DMSO-d_6) δ ppm 10.56 (s, 1H), 9.06 (d, J = 2.4 Hz, 1H), 8.94 (d, J = 2.3 Hz, 1H), 8.60 (dd, J = 4.8, 1.5 Hz, 1H), 8.47 (d, J =

1.1 Hz, 1H), 8.34-8.33 (m, 1H), 8.31-8.29 (m, 1H), 8.16-8.14 (m, 1H), 8.04 (d, J = 8.8 Hz, 1H), 7.90 (dd, J = 8.8, 1.8 Hz, 1H), 7.54-7.52 (m, 1H), 7.43-7.41 (m, 1H), 7.43-7.41 (m, 1H), 6.08-6.06 (m, 1H), 4.01-3.99 (m, 1H), 3.87-3.82 (m, 1H), 2.64-2.57 (m, 1H), 2.11-2.06 (m, 2H), 1.84-1.80 (m, 1H), 1.69-1.65 (m, 2H); ESIMS found for $C_{23}H_{21}N_5O_2$ *m/z* 400 (M+H).

Step **4**

[00380] TFA (5.0 mL) was added to a solution of N,5-di(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXXXIV**) (0.36 g, 0.90 mmol) and triethylsilane (0.29 mL, 1.81 mmol) in DCM (5.0 mL). The solution was stirred overnight at room temperature. An additional 5.0 mL of TFA was added, and the solution was again stirred overnight. The solvents were removed, and the residue was treated with 7 N ammonia in MeOH. The solvents were again removed, and the product was purified by flash chromatography using a 12 g Thomson normal phase silica gel cartridge (100% $CHCl_3$ → 5:95 MeOH[7N NH_3]:$CHCl_3$) to afford N,5-di(pyridin-3-yl)-1H-indazole-3-carboxamide (**4**) (0.23 g, 0.73 mmol, 82% yield) as a white solid. ^{1}H NMR (DMSO-d_6) δ ppm 14.00 (s, 1H), 10.69 (s, 1H), 9.08 (d, J = 2.0 Hz, 1H), 8.93 (d, J = 2.0 Hz, 1H), 8.60 (dd, J = 4.8, 1.3 Hz, 1H), 8.48-8.47 (m, 1H), 8.33-8.31 (m, 2H), 8.15-8.12 (m, 1H), 7.85-7.81 (m, 2H), 7.54-7.51 (m, 1H), 7.41-7.39 (m, 1H); ESIMS found for $C_{18}H_{13}N_5O$ *m/z* 316 (M+H).

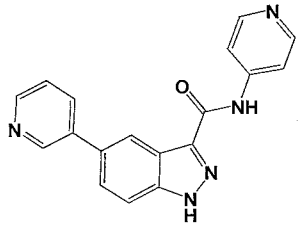
[00381] The following compounds were prepared in accordance with the procedure described in the above Example **3**.



5

[00382] N-(3'-Fluorobiphenyl-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **5**.

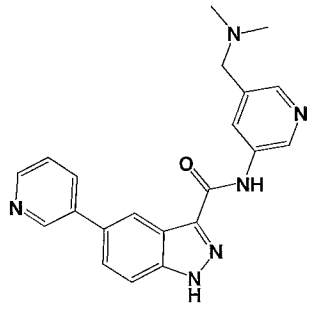
[00383] White solid (77 mg, 0.19 mmol, 69% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.95 (s, 1H), 10.50 (s, 1H), 8.94 (d, J = 2.3 Hz, 1H), 8.59 (dd, J = 4.6, 1.5 Hz, 1H), 8.51 (d, J = 1.0 Hz, 1H), 8.31-8.30 (m, 1H), 8.15-8.13 (m, 1H), 7.99-7.97 (m, 1H), 7.83-7.82 (m, 2H), 7.55-7.45 (m, 6H), 7.24-7.22 (m, 1H); ESIMS found for $C_{25}H_{17}FN_4O$ *m/z* 409 (M+H).



6

[00384] 5-(Pyridin-3-yl)-N-(pyridin-4-yl)-1H-indazole-3-carboxamide **6**.

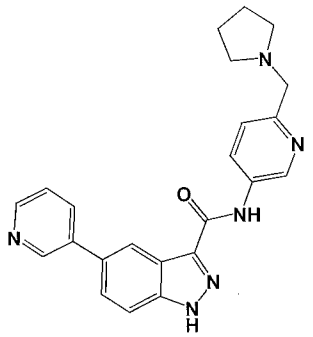
[00385] Off-white solid (52 mg, 0.16 mmol, 77% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.05 (br, 1H), 10.83 (s, 1H), 8.94 (d, J = 2.0 Hz, 1H), 8.60 (dd, J = 4.6, 1.2 Hz, 1H), 8.48-8.47 (m, 3H), 8.15-8.13 (m, 1H), 7.94 (dd, J = 5.0, 1.4 Hz, 2H), 7.86-7.82 (m, 2H), 7.54-7.52 (m, 1H); ESIMS found for $C_{18}H_{13}N_5O$ *m/z* 316 (M+H).



7

[00386] N-(5-((Dimethylamino)methyl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **7**.

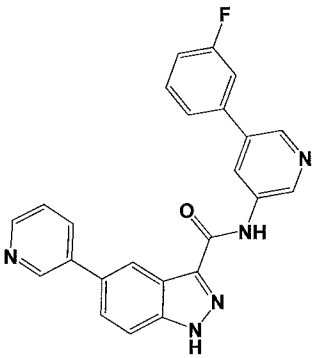
[00387] Off-white solid (37 mg, 0.10 mmol, 47% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.00 (s, 1H), 10.68 (s, 1H), 8.94 (d, J = 2.0 Hz, 1H), 8.91 (d, J = 2.3 Hz, 1H), 8.60 (dd, J = 4.7, 1.2 Hz, 1H), 8.49-8.48 (m, 1H), 8.38-8.37 (m, 1H), 8.21 (d, J = 2.2 Hz, 1H), 8.16-8.13 (m, 1H), 7.85-7.81 (m, 2H), 7.52 (dd, J = 7.9, 4.9 Hz, 1H), 3.44 (s, 2H), 2.19 (s, 6H); ESIMS found for $C_{21}H_{20}N_6O$ *m/z* 373 (M+H).



8

[00388] 5-(Pyridin-3-yl)-N-(6-(pyrrolidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **8**.

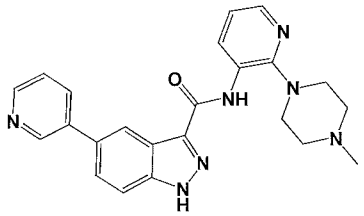
[00389] Off-white solid (38 mg, 0.10 mmol, 77% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.99 (br, 1H), 10.64 (s, 1H), 8.96 (d, J = 2.5 Hz, 1H), 8.93 (d, J = 2.4 Hz, 1H), 8.59 (dd, J = 4.8, 1.5 Hz, 1H), 8.48 (d, J = 1.2 Hz, 1H), 8.27 (dd, J = 8.5, 2.5 Hz, 1H), 8.16-8.12 (m, 1H), 7.84-7.80 (m, 2H), 7.54-7.51 (m, 1H), 7.41 (d, J = 8.5 Hz, 1H), 2.37 (s, 2H), 2.50-2.47 (m, 4H), 1.72-1.70 (m, 4H); ESIMS found for $C_{23}H_{22}N_6O$ *m/z* 399 (M+H).



9

[00390] N-(5-(3-Fluorophenyl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **9**.

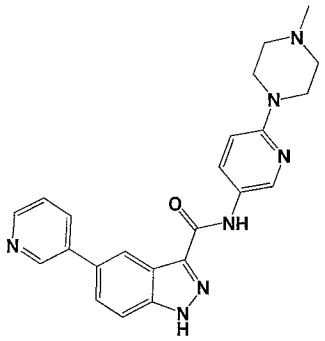
[00391] White solid (35 mg, 0.09 mmol, 47% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.05 (br s, 1H), 10.79 (s, 1H), 9.13 (d, J = 2.0 Hz, 1H), 8.94 (d, J = 1.9 Hz, 1H), 8.68-8.65 (m, 2H), 8.60 (dd, J = 4.83, 4.83 Hz, 1H), 8.52-8.49 (m, 1H), 8.16-8.12 (m, 1H), 7.85-7.81 (m, 2H), 7.62-7.56 (m, 3H), 7.54-7.50 (m, 1H), 7.31-7.26 (m, 1H). ESIMS found for $C_{24}H_{16}FN_5O$ *m/z* 410.5 (M+H).



11

[00392] N-(2-(4-Methylpiperazin-1-yl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **11**.

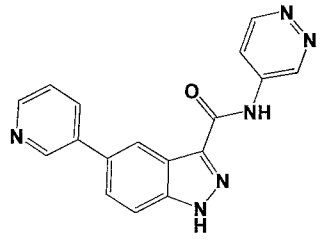
[00393] White solid (11 mg, 0.03 mmol, 65% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.10 (s, 1H), 9.63 (s, 1H), 8.93 (d, J = 2.1 Hz, 1H), 8.65-8.59 (m, 2H), 8.48 (s, 1H), 8.16-8.12 (m, 1H), 8.11-8.09 (m, 1H), 7.87-7.80 (m, 2H), 7.55-7.51 (m, 1H), 7.20-7.17 (m, 1H), 3.10-3.06 (m, 4H), 2.80-2.40 (m, 4H), 2.30 (s, 3H). ESIMS found for $C_{23}H_{23}N_7O$ *m/z* 414.0 (M+H).



12

[00394] N-(6-(4-Methylpiperazin-1-yl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **12**.

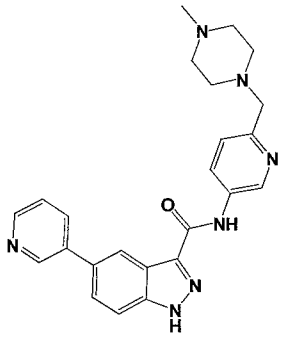
[00395] White solid (31 mg, 0.07 mmol, 39% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.86 (br s, 1H), 10.33 (s, 1H), 8.92 (d, J = 2.1 Hz, 1H), 8.60-8.58 (m, 2H), 8.46 (s, 1H), 8.14-8.11 (m, 1H), 8.10-8.02 (m, 1H), 7.83-7.78 (m, 2H), 7.54-7.50 (m, 1H), 6.86 (d, J = 9.1 Hz, 1H), 3.45-3.42 (m, 4H), 2.42-2.39 (m, 4H), 2.21 (s, 3H). ESIMS found for $C_{23}H_{23}N_7O$ *m/z* 414.3 (M+H).



14

[00396] N-(Pyridazin-4-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **14**.

[00397] Off-white solid (50 mg, 0.16 mmol, 99% yield). ^{1}H NMR (DMSO-d_6) δ ppm 14.20-13.90 (br, 1H), 11.15 (s, 1H), 9.71-9.70 (m, 1H), 9.09-9.08 (m, 1H), 8.94 (d, J = 2.0 Hz, 1H), 8.61-8.60 (m, 1H), 8.47-8.46 (m, 1H), 8.25 (dd, J = 5.9, 2.8 Hz, 1H), 8.16-8.13 (m, 1H), 7.86-7.85 (m, 2H), 7.53 (dd, J = 7.8, 5.0 Hz, 1H); ESIMS found for $C_{17}H_{12}N_6O$ *m/z* 317 (M+H).



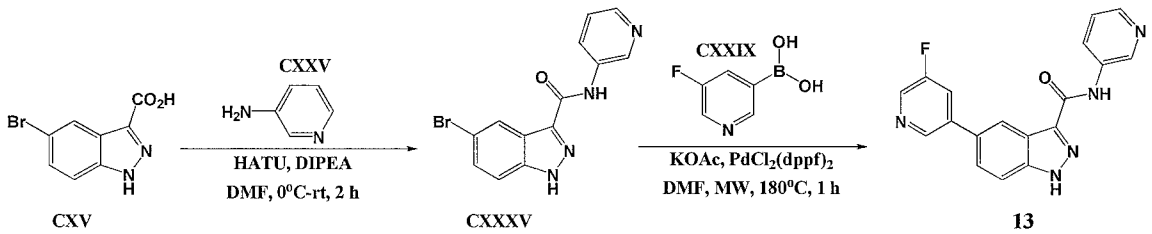
15

[00398] N-(6-((4-Methylpiperazin-1-yl)methyl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **15**.

[00399] White solid (42 mg, 0.10 mmol, 81% yield). ^{1}H NMR (DMSO-d_6) δ ppm 13.97 (br, 1H), 10.65 (s, 1H), 8.97 (d, J = 2.4 Hz, 1H), 8.93 (d, J = 2.1 Hz, 1H), 8.59 (dd, J = 4.7, 1.5 Hz, 1H), 8.48-8.47 (m, 1H), 8.28 (dd, J = 8.5, 2.5 Hz, 1H), 8.15-8.12 (m, 1H), 7.85-7.81 (m, 2H), 7.54-7.51 (m, 1H), 7.40 (d, J = 8.5 Hz, 1H), 3.55 (s, 2H), 2.42-2.28 (m, 8H),2.15 (s, 3); ESIMS found for $C_{24}H_{25}N_7O$ *m/z* 428 (M+H).

Example **4**

[00400] Preparation of 5-(5-fluoropyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide (**13**) is depicted below in Scheme **30**.



Scheme 30

Step **1**

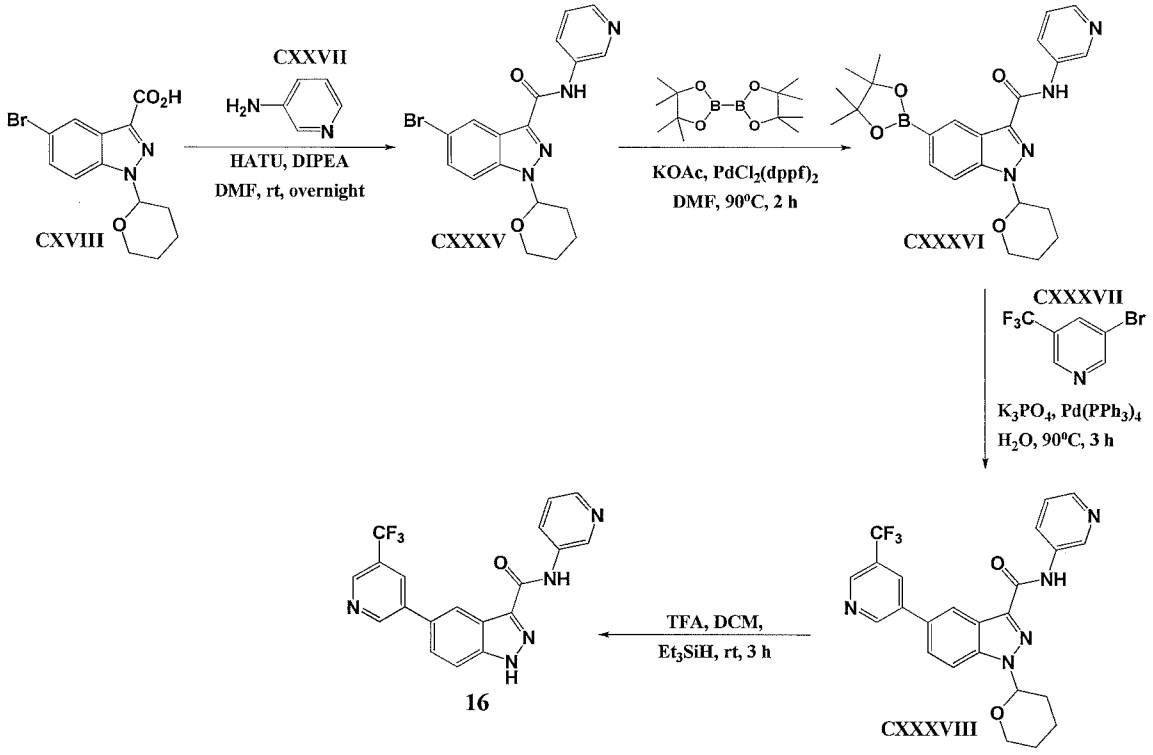
[00401] To a stirring solution of 3-aminopyridine (**CXXV**) (0.195 g, 0.2.07 mmol) in DMF (10 mL) was added 5-bromo-1*H*-indazole-3-carboxylic acid (**CXV**) (0.500 g, 0.2.07 mmol) and *N*,*N*-diisopropylethylamine (0.723 mL, 4.15 mmol). The reaction mixture was cooled to 0°C and added with HATU (0.787 g, 2.07 mmol). The reaction mixture was allowed to warm to room temperature and stirred for an additional 2 h. The solution was concentrated under vacuum. The residue was purified by column chromatography (1:99 MeOH[7N NH_3]:$CHCl_3$ → 4:96 MeOH[7N NH_3]:$CHCl_3$) to afford 5-bromo-N-(pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXXV**) (0.200 g, 0.63 mmol, 30% yield) as a white solid. ESIMS found for $C_{13}H_9BrN_4O$ *m/z* 318.0 (M+H).

Step **2**

[00402] To a microwave vial was added 5-bromo-N-(pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXXV**) (0.200 g, 0.63 mmol), 5-fluoropyridine-3-boronic acid (**CXXIX**) (0.098 g, 0.694 mmol), tetrakis(triphenylphosphine)palladium(0) (0.036 g, 0.032 mmol), potassium phosphate (0.201 g, 0.947 mmol), water (1 mL), and DMF (5 mL). The reaction vial was capped, purged with argon and heated under microwave irradiation for 1 h at 180°C. The solution was filtered through a pad of Celite and concentrated under vacuum. The crude product was purified by column chromatography (100% $CHCl_3$ → 2:98 MeOH[7N NH_3]: $CHCl_3$) to afford 5-(5-fluoropyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide (**13**) (4 mg, 0.01 mmol, 2% yield) as a white solid. ^{1}H NMR (DMSO-d_6) δ ppm 14.02 (br s, 1H), 10.70 (s, 1H), 9.08 (d, J = 2.5 Hz, 1H), 8.83 (t, J = 1.8 Hz, 1H), 8.60 (d, J = 2.7 Hz, 1H), 8.53-8.52 (m, 1H), 8.34-8.29 (m, 2H), 8.14-8.09 (m, 1H), 7.89-7.81 (m, 2H), 7.42-7.38 (m, 1H). ESIMS found for $C_{18}H_{12}FN_5O$ *m/z* 334.0 (M+H).

Example **5**

[00403] Preparation of N-(pyridin-3-yl)-5-(5-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**16**) is depicted below in Scheme **31**.



Scheme 31

Step **1**

[00404] Preparation of intermediate 5-bromo-N-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXXXV**) was performed following the procedure listed in Scheme 19, Step 4. Light yellow solid (5.5 g, 13.7 mmol, 88% yield). ESIMS found for $C_{18}H_{17}BrN_4O_2$ *m/z* 401.1 (M^{79Br}+H) and 403.1 (M^{81Br}+H).

Steps **2-3**

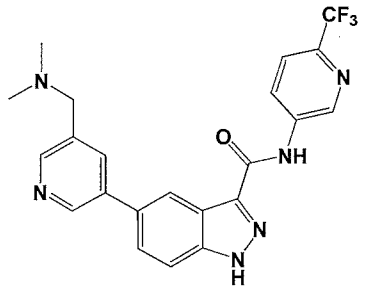
[00405] Preparation of intermediate N-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-5-(5-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**CXXXVIII**) was performed following the procedure listed in Scheme 26, Steps 1-2. Tan solid (295 mg, 0.63 mmol, 84% yield). ESIMS found for $C_{24}H_{20}F_3N_5O_2$ *m/z* 468.1 (M+H).

Step **4**

[00406] Preparation of N-(pyridin-3-yl)-5-(5-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**16**) was performed following the procedure listed in

Scheme 28, Step 4. White solid (95 mg, 0.25 mmol, 39.3% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.40 (dd, *J*=2.2Hz, *J*=2Hz, 1H), 7.84 (d, *J*=6.7Hz, 1H), 7.93 (dd, *J*=1.5Hz, *J*=7Hz, 1H), 8.29-8.34 (m, 2H), 8.50 (s, 1H), 8.57 (s, 1H), 8.99 (s, 1H), 9.09 (d, *J*=2Hz, 1H), 9.25 (d, *J*=1.6Hz, 1H), 10.72 (brs, 1H); ESIMS found for $C_{19}H_{12}F_3N_5O$ *m/z* 383.9 (M+H).

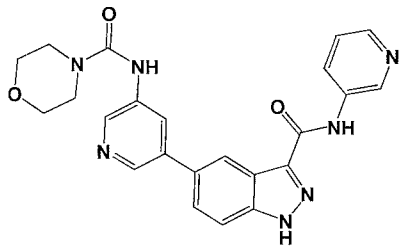
[00407] The following compounds were prepared in accordance with the procedure described in the above Example **5**.



26

[00408] 5-(5-((Dimethylamino)methyl)pyridin-3-yl)-N-(6-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **26**.

[00409] White solid (93 mg, 0.21 mmol, 78% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.24 (s, 6H), 3.57 (s, 2H), 7.86 (Abq, *J*=8Hz, 2H), 7.93 (d, *J*=9Hz, 1H), 8.04 (brs, 1H), 8.50 (d, *J*=7Hz, 1H), 8.63 (dd, *J*=9Hz, *J*=2Hz, 1H), 8.85 (d, *J*=2Hz, 1H), 9.27 (d, *J*=2Hz, 1H), 11.11 (s, 1H), 14.11 (s, 1H); ESIMS found for $C_{22}H_{19}F_3N_6O$ *m/z* 441.0 (M+H)

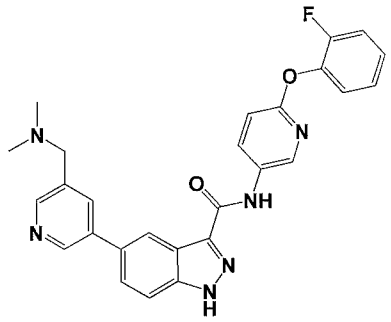


32

[00410] N-(5-(3-(Pyridin-3-ylcarbamoyl)-1H-indazol-5-yl)pyridin-3-yl) morpholine-4-carboxamide **32**.

[00411] White solid (132 mg, 0.30 mmol, 56% yield). ^{1}H NMR (DMSO-d_6) δ ppm 3.49 (t, *J*=5Hz, 4H), 3.64 (t, *J*=5Hz, 4H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.82 (d, *J*=1Hz, 1H), 8.26 (t, *J*=2Hz, 1H), 8.30-8.34 (m, 2H), 8.47 (s, 1H), 8.54 (d, *J*=2Hz, 1H),

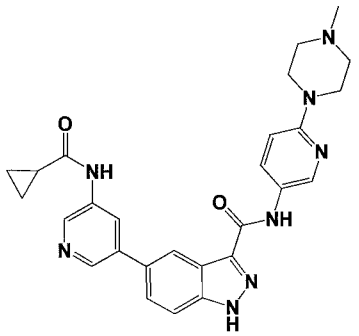
8.72 (d, *J*=2Hz, 1H), 8.87 (s, 1H), 9.09 (d, 2Hz, 1H), 10.71 (s, 1H), 14.01 (s, 1H); ESIMS found for $C_{23}H_{21}N_7O_3$ *m/z* 444.3 (M+H).



36

[00412] 5-(5-((Dimethylamino)methyl)pyridin-3-yl)-N-(6-(2-fluorophenoxy) pyridin-3-yl)-1H-indazole-3-carboxamide **36**.

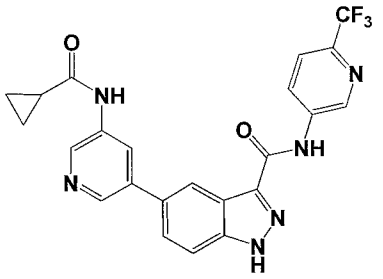
[00413] White solid (137 mg, 0.28 mmol, 53% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.20 (s, 6H), 3.53 (s, 2H), 7.16 (d, *J*=9Hz, 1H), 7.22-7.40 (m, 4H), 7.82 (d/Abq, *J*=9Hz, *J*=1Hz, 2H), 8.00 (t, *J*=2Hz, 1H), 8.38 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.47 (s, 1H), 8.49 (d, *J*=2Hz, 1H), 8.55 (d, *J*=3Hz, 1H), 8.83 (d, *J*=2Hz, 1H), 10.67 (s, 1H), 13.97 (brs, 1H); ESIMS found for $C_{27}H_{23}FN_6O_2$ *m/z* 383.1 (M+H).



38

[00414] 5-(5-(Cyclopropanecarboxamido)pyridin-3-yl)-N-(6-(4-methylpiperazin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **38**.

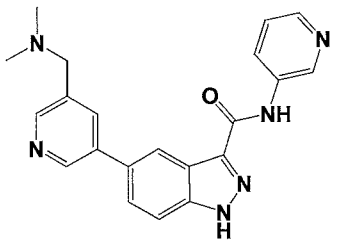
[00415] White solid (39 mg, 0.08 mmol, 61% yield). ^{1}H NMR (DMSO-d_6) δ ppm 0.83-0.90 (m, 4H), 1.80-1.86 (m, 1H), 2.25 (brs, 3H), 2.45 (brs, 4H), 3.45 (brs, 4H), 6.86 (d, *J*=9Hz, 1H), 7.79 (d, *J*=1Hz, 1H), 8.04 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.42 (t, *J*=2Hz, 1H), 8.46 (s, 1H), 8.60 (dd, *J*=10Hz, *J*=3Hz, 2H), 8.76 (d, *J*=2Hz, 1H), 10.34 (s, 1H), 10.56 (s, 1H), 13.90 (s, 1H); ESIMS found for $C_{27}H_{27}N_8O_2$ *m/z* 497.4 (M+H).



39

[00416] 5-(5-(Cyclopropanecarboxamido)pyridin-3-yl)-N-(6-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **39**.

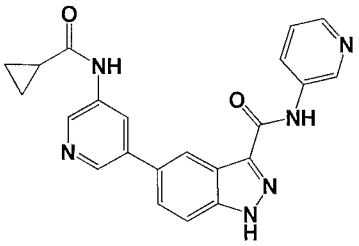
[00417] White solid (128 mg, 0.27 mmol, 45% yield). ^{1}H NMR (DMSO-d_6) δ ppm 0.82-0.90 (m, 4H), 1.80-1.86 (m, 1H), 7.84 (s, 2H0, 7.92 (d, *J*=9Hz, 1H), 8.43 (d, *J*=2Hz, 1H), 8.48 (s, 1H), 8.61-8.65 (m, 2H), 8.77 (d, *J*=2Hz, 1H), 9.27 (d, *J*=2Hz, 1H), 10.57 (s, 1H), 11.11 (s, 1H), 14.11 (s, 1H); ESIMS found for $C_{23}H_{17}F_3N_6O_2$ *m/z* 467.1 (M+H).



40

[00418] 5-(5-((Dimethylamino)methyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **40**.

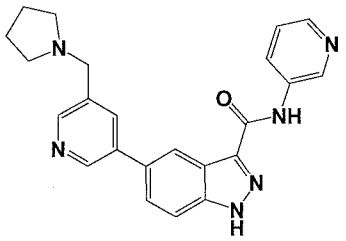
[00419] White solid (312 mg, 0.84 mmol, 77% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.21 (s, 6H), 3.53 (s, 2H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.83 (d/Abq, *J*=9Hz, *J*=2Hz, 2H), 8.01 (t, *J*=2Hz, 1H), 8.29-8.34 (m, 2H), 8.48 (dd, *J*=4Hz, *J*=1Hz, 1H), 8.83 (d, *J*=2Hz, 1H), 9.08 (d, *J*=3Hz, 1H), 10.70 (s, 1H), 13.99 (brs, 1H); ESIMS found for $C_{21}H_{20}N_6O$ *m/z* 373.0 (M+H).



41

[00420] 5-(5-(Cyclopropanecarboxamido)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **41**.

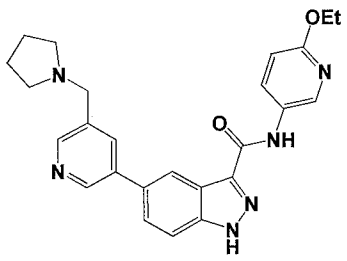
[00421] White solid (148 mg, 0.37 mmol, 71% yield). ^{1}H NMR (DMSO-d_6) δ ppm 0.83-0.90 (m, 4H), 1.80-1.87 (m, 1H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.82 (d, *J*=1Hz, 1H), 8.29-8.34 (m, 2H), 8.43 (t, *J*=2Hz, 1H), 8.47 (s, 1H), 8.62 (d, *J*=2Hz, 1H), 8.76 (d, *J*=2Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.57 (s, 1H), 10.70 (s, 1H), 14.01 (s, 1H); ESIMS found for $C_{22}H_{18}N_6O_2$ *m/z* 399.0 (M+H).



43

[00422] N-(Pyridin-3-yl)-5-(5-(pyrrolidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **43**.

[00423] White solid (157 mg, 0.39 mmol, 76% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.70-1.74 (m, 4H), 2.46-2.52 (m, 4H), 3.71 (s, 2H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.83 (d/Abq, *J*=9Hz, *J*=2Hz, 2H), 8.02 (t, *J*=2Hz, 1H), 8.29-8.34 (m, 2H), 8.48 (s, 1H), 8.51 (d, *J*=2Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.70 (s, 1H), 14.00 (s, 1H); ESIMS found for $C_{23}H_{22}N_6O$ *m/z* 399.0 (M+H).

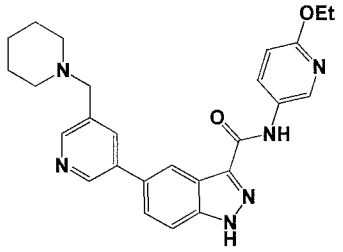


44

[00424] N-(6-Ethoxypyridin-3-yl)-5-(5-(pyrrolidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **44**.

[00425] White solid (62 mg, 0.14 mmol, 39% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.32 (t, J=7Hz, 3H), 1.70-1.74 (m, 4H), 2.47-2.52 (m, 4H), 3.71 (s, 2H), 4.29 (q,

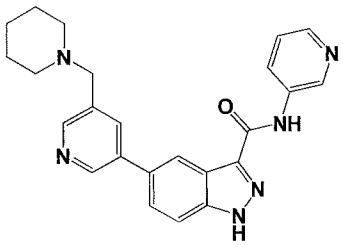
J=7Hz, 2H), 6.81 (d, *J*=9Hz, 1H), 7.82 (d/Abq, *J*=9Hz, *J*=2Hz, 2H), 8.01 (t, *J*=2Hz, 1H), 8.16 (dd, J=9Hz, J=3Hz, 1H), 8.46 (s, 1H), 8.51 (d, *J*=2Hz, 1H), 8.63 (d, *J*=2Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.51 (s, 1H), 13.94 (brs, 1H); ESIMS found for $C_{25}H_{26}N_6O_2$ *m/z* 443.4 (M+H).



45

[00426] N-(6-Ethoxypyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **45**.

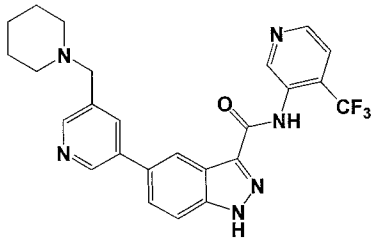
[00427] White solid (98 mg, 0.21 mmol, 44% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.32 (t, J=7Hz, 3H), 1.34-1.42 (m, 2H), 1.47-1.53 (m, 4H), 2.38 (brs, 4H), , 3.56 (s, 2H), 4.29 (q, J=7Hz, 2H), 6.81 (d, *J*=9Hz, 1H), 7.81 (d/Abq, *J*=9Hz, *J*=2Hz, 2H), 7.99 (t, *J*=2Hz, 1H), 8.16 (dd, J=9Hz, J=3Hz, 1H), 8.46 (d, J=1Hz, 1H), 8.49 (d, *J*=2Hz, 1H), 8.63 (d, *J*=2Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.51 (s, 1H), 13.92 (brs, 1H); ESIMS found for $C_{26}H_{28}N_6O_2$ *m/z* 457.3 (M+H).



46

[00428] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **46**.

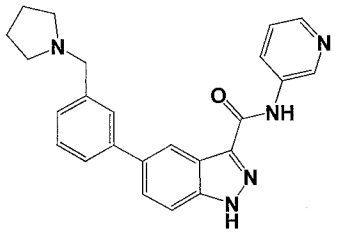
[00429] White solid (126 mg, 0.31 mmol, 52% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.42 (m, 2H), 1.48-1.55 (m, 4H), 2.39 (brs, 4H), 3.57 (s, 2H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.83 (d/Abq, *J*=9Hz, *J*=2Hz, 2H), 7.99 (t, *J*=2Hz, 1H), 8.30-8.34 (m, 2H), 8.48 (d, J=1Hz, 1H), 8.49 (d, *J*=2Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.70 (s, 1H), 14.00 (brs, 1H); ESIMS found for $C_{24}H_{24}N_6O$ *m/z* 413.0 (M+H).



47

[00430] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(4-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **47**.

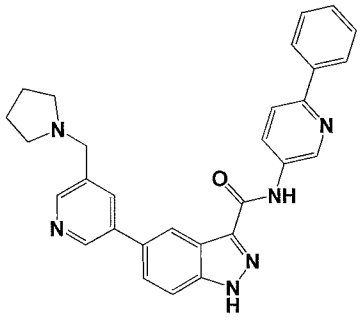
[00431] White solid (150 mg, 0.31 mmol, 71% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.34-1.42 (m, 2H), 1.46-1.53 (m, 4H), 2.37 (brs, 4H), 3.55 (s, 2H), 7.81-7.87 (m, 3H), 7.98 (s, 1H), 8.41 (s, 1H), 8.48 (d, *J*=2Hz, 1H), 8.75 (d, *J*=5Hz, 1H), 8.80 (d, *J*=2Hz, 1H), 9.07 (s, 1H), 10.22 (s, 1H), 14.06 (brs, 1H); ESIMS found for $C_{25}H_{23}F_3N_6O$ *m/z* 481.0 (M+H).



49

[00432] N-(Pyridin-3-yl)-5-(3-(pyrrolidin-1-ylmethyl)phenyl)-1H-indazole-3-carboxamide **49**.

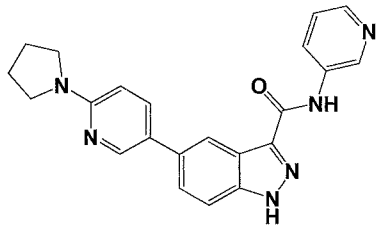
[00433] Tan amorphous solid (53.4 mg, 0.13 mmol, 72% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.70-1.71 (m, 4H), 2.47-2.49 (m, 4H), 3.67 (s, 2H), 7.31 (d, *J*=8Hz, 1H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.44 (t, *J*=8Hz, 1H), 7.58-7.60 (m, 1H), 7.63-7.64 (m, 1H), 7.76-7.78 (m, 2H), 8.30-8.34 (m, 2H), 8.44 (s, 1H), 9.08 (d, *J*=2Hz, 1H), 10.68 (s, 1H), 13.93 (s, 1H); ESIMS found for $C_{24}H_{23}N_5O$ *m/z* 398 (M+H).



50

[00434] N-(6-Phenylpyridin-3-yl)-5-(5-(pyrrolidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **50**.

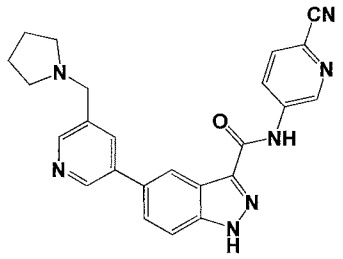
[00435] Tan flaky solid (61.3 mg, 0.13 mmol, 74% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.71-1.72 (m, 4H), 3.72 (s, 2H), 7.39-7.42 (m, 1H), 7.47-7.50 (m, 2H), 7.81-7.86 (m, 2H), 8.00 (d, *J*=9Hz, 1H), 8.02-8.03 (m, 1H), 8.08-8.10 (m, 2H), 8.45 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.49-8.50 (m, 1H), 8.51 (d, *J*=2Hz, 1H), 8.83 (d, *J*=2Hz, 1H), 9.18 (d, *J*=3Hz, 1H), 10.81 (s, 1H), 14.03 (s, 1H); ESIMS found for $C_{29}H_{26}N_6O$ *m/z* 475 (M+H).



51

[00436] N-(Pyridin-3-yl)-5-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **51**.

[00437] Yellow solid (32 mg, 0.08 mmol, 37.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.94-2.01 (m, 4H), 3.42-3.48 (m, 4H), 6.57 (d, *J*=9Hz, 1H), 7.40 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.72 (d, *J*=1Hz, 2H), 7.85 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.29-8.34 (m, 3H), 8.43 (d, *J*=2Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.63 (s, 1H), 13.87 (s, 1H); ESIMS found for $C_{22}H_{20}N_6O$ *m/z* 385.0 (M+H).

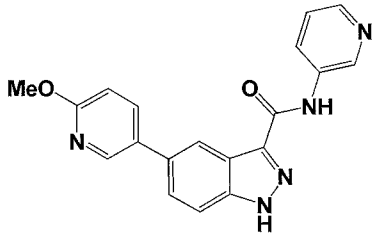


52

[00438] N-(6-Cyanopyridin-3-yl)-5-(5-(pyrrolidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **52**.

[00439] Beige solid (52 mg, 0.12 mmol, 49.1% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.70-1.75 (m, 4H), 3.31-3.36 (m, 4H), 7.85 (dq, *J*=9Hz, *J*=2Hz, 2H), 8.02 (s, 1H),

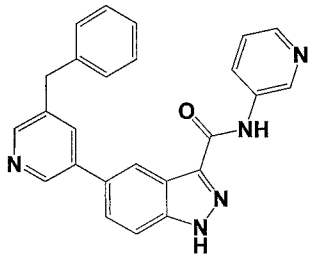
8.05 (d, *J*=9Hz, 1H), 8.47 (s, 1H), 8.52 (d, *J*=2Hz, 1H), 8.58 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 9.28 (d, *J*=2Hz, 1H), 11.18 (s, 1H), 14.13 (brs, 1H); ESIMS found for $C_{24}H_{21}N_7O$ *m/z* 424.3 (M+H).



54

[00440] 5-(6-Methoxypyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **54**.

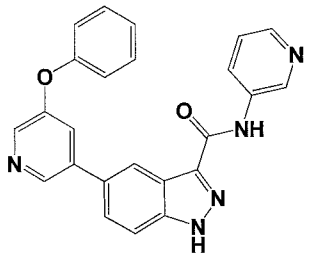
[00441] White solid (79.7 mg, 0.23 mmol, 44.2% yield). ^{1}H NMR (DMSO-d_6) δ ppm 3.91 (s, 3H), 6.95 (d, *J*=9Hz, 1H), 7.40 (dd, *J*=9Hz, *J*=5Hz, 1H), 7.78 (dd, *J*=11Hz, *J*=2Hz, 2H), 8.06 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.29-8.34 (m, 2H), 8.39 (s, 1H), 8.51 (d, *J*=2Hz, 1H), 9.08 (d, *J*=3Hz, 1H), 10.67 (s, 1H), 13.91 (brs, 1H); ESIMS found for $C_{19}H_{15}N_5O_2$ *m/z* 346.0 (M+H).



55

[00442] 5-(5-Benzylpyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **55**.

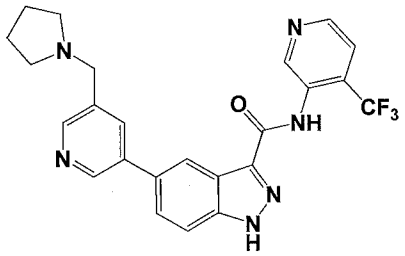
[00443] Yellow solid (101.9 mg, 0.25 mmol, 76% yield). ^{1}H NMR (DMSO-d_6) δ ppm 4.09 (s, 2H), 7.19-7.23 (m, 1H), 7.30-7.35 (m, 4H), 7.39-7.41 (m, 1H), 7.78-7.82 (m, 2H), 7.99 (t, *J*=2Hz, 1H), 8.31-8.33 (m, 2H), 8.45 (s, 1H), 8.51 (d, *J*=2Hz, 1H), 8.76 (d, *J*=2Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.69 (s, 1H), 14.00 (s, 1H); ESIMS found for $C_{25}H_{19}N_5O$ *m/z* 406 (M+H).



56

[00444] 5-(5-Phenoxypyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **56**.

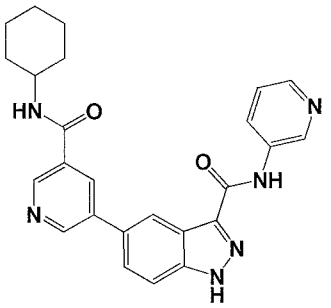
[00445] White solid (73.6 mg, 0.18 mmol, 75% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.17-7.18 (m, 2H), 7.22-7.23 (m, 1H), 7.38-7.41 (m, 1H), 7.44-7.47 (m, 2H), 7.72-7.73 (m, 1H), 7.80-7.81 (m, 2H), 8.29-8.31 (m, 2H), 8.37-8.38 (m, 1H), 8.44-8.45 (m, 1H), 8.74 (d, *J*=2Hz, 1H), 9.06 (d, *J*=2Hz, 1H), 10.69 (s, 1H), 14.00 (s, 1H); ESIMS found for $C_{24}H_{17}N_5O_2$ *m/z* 408 (M+H).



57

[00446] 5-(5-(Pyrrolidin-1-ylmethyl)pyridin-3-yl)-N-(4-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **57**.

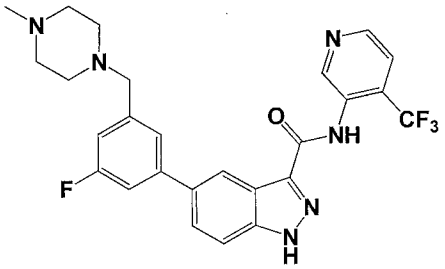
[00447] White solid (64 mg, 0.14 mmol, 35.2% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.67-1.74 (m, 4H), 2.44-2.52 (m, 4H), 3.70 (s, 2H), 7.81-7.88 (m, 3H), 8.00 (d, *J*=2Hz, 1H), 8.41 (s, 1H), 8.50 (d, *J*=2Hz, 1H), 8.75 (d, *J*=5Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 9.07 (s, 1H), 10.22 (s, 1H), 14.01 (brs, 1H); ESIMS found for $C_{24}H_{21}F_3N_6O$ *m/z* 467.3 (M+H).



59

[00448] 5-(5-(Cyclohexylcarbamoyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **59**.

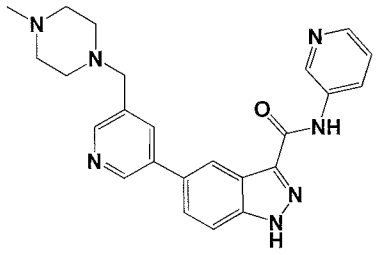
[00449] Light brown solid (117 mg, 0.27 mmol, 49.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.10-1.21 (m, 1H), 1.28-1.39 (m, 4H), 1.63 (d, *J*=12Hz, 1H), 1.72-1.78 (m, 2H), 1.86-1.91 (m, 2H), 3.77-3.87 (m, 1H), 7.41 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.84 (d, *J*=8Hz, 1H), 7.91 (d, *J*=9Hz, 1H), 8.30-8.36 (m, 2H), 8.48 (t, *J*=2Hz, 1H), 8.55 (s, 1H), 8.59 (d, *J*=8Hz, 1H), 8.99 (d, *J*=2Hz, 1H), 9.04 (d, *J*=2Hz, 1H), 9.09 (d, *J*=2Hz, 1H), 10.72 (s, 1H), 14.04 (s, 1H); ESIMS found for $C_{25}H_{24}N_6O_2$ *m/z* 441.0 (M+H).



60

[00450] 5-(3-Fluoro-5-((4-methylpiperazin-1-yl)methyl)phenyl)-N-(4-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **60**.

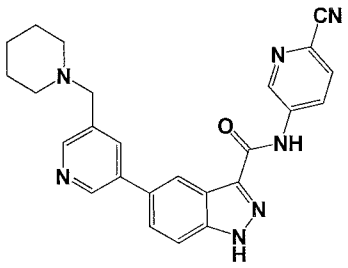
[00451] White solid (43 mg, 0.08 mmol, 76.3% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.23 (s, 3H), 2.22-2.50 (m, 8H), 3.56 (s, 2H), 7.12 (d, *J*=9Hz, 1H), 7.42 (dd, *J*=8Hz, *J*=2Hz, 1H), 7.47 (s, 1H), 7.80 (d, *J*=1Hz, 2H), 7.85 (d, *J*=5Hz, 1H), 8.39 (s, 1H), 8.75 (d, *J*=5Hz, 1H), 9.08 (s, 1H), 10.22 (s, 1H), 14.02 (brs, 1H); ESIMS found for $C_{26}H_{24}F_4N_6O$ *m/z* 513.3 (M+H).



61

[00452] 5-(5-((4-Methylpiperazin-1-yl)methyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **61**.

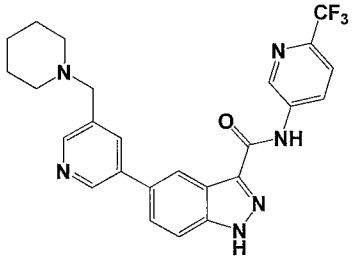
[00453] White solid (81.6 mg, 0.19 mmol, 55% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.14 (s, 3H), 2.33-2.42 (m, 8H), 3.60 (s, 2H), 7.39-7.41 (m, 1H), 7.81-7.85 (m, 2H), 8.00-8.01 (m, 1H), 8.31-8.33 (m, 2H), 8.47-8.48 (m, 1H), 8.49 (d, *J*=2Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 9.08 (d, *J*=3Hz, 1H), 10.74 (s, 1H), 14.00 (s, 1H); ESIMS found for $C_{24}H_{25}N_7O$ *m/z* 427.8 (M+H).



62

[00454] N-(6-Cyanopyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **62**.

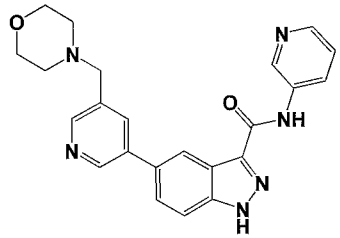
[00455] Off-white solid (42 mg, 0.10 mmol, 36.9% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.42 (m, 2H), 1.47-1.54 (m, 4H), 2.38 (brs, 4H), 3.57 (s, 2H), 7.85 (d, *J*=1Hz, 2H), 8.00 (t, *J*=2Hz, 1H), 8.05 (d, *J*=9Hz, 1H), 8.47 (d, *J*=1Hz, 1H), 8.50 (d, *J*=2Hz, 1H), 8.58 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 9.28 (d, *J*=2Hz, 1H), 11.18 (s, 1H), 14.12 (brs, 1H); ESIMS found for $C_{25}H_{23}N_7O$ *m/z* 438.1 (M+H).



63

[00456] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(6-(trifluoromethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **63**.

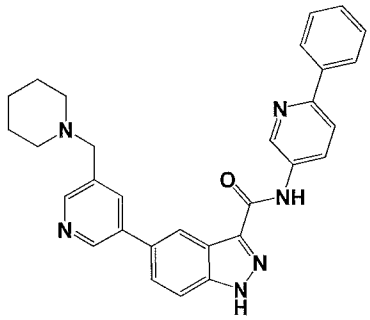
[00457] White solid (78 mg, 0.16 mmol, 49% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.35-1.44 (m, 2H), 1.46-1.57 (m, 4H), 2.40 (brs, 4H), 3.59 (brs, 2H), 7.85 (s, 2H), 7.93 (d, *J*=9Hz, 1H), 8.01 (s, 1H), 8.48 (s, 1H), 8.50 (s, 1H), 8.63 (d, *J*=8Hz, 1H), 8.83 (s, 1H), 9.27 (s, 1H), 11.11 (s, 1H), 14.11 (brs, 1H); ESIMS found for $C_{25}H_{23}F_3N_6O$ *m/z* 481.1 (M+H).



64

[00458] 5-(5-(Morpholinomethyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **64**.

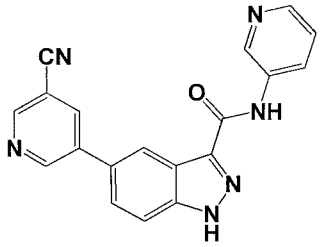
[00459] White solid (77 mg, 0.19 mmol, 66% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.41-2.43 (m, 4H), 3.58-3.60 (m, 4H), 3.61 (s, 2H), 7.39-7.41 (m, 1H), 7.81-7.85 (m, 2H), 8.02-8.03 (m, 1H), 8.31-8.33 (m, 2H), 8.47-8.48 (m, 1H), 8,51 (d, *J*=2Hz, 1H), 8.83 (d, *J*=2Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.70 (s, 1H), 14.00 (s, 1H); ESIMS found for $C_{23}H_{22}N_6O_2$ *m/z* 415 (M+H).



65

[00460] N-(6-Phenylpyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **65**.

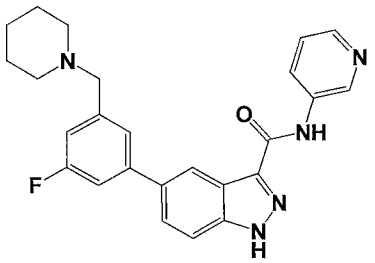
[00461] White solid (61.5 mg, 0.13 mmol, 68% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.49-1.53 (m, 4H), 2.38-2.39 (m, 4H), 3.57 (s, 2H), 7.39-7.43 (m, 1H), 7.47-7.50 (m, 2H), 7.82-7.86 (m, 2H), 7.99-8.01 (m, 2H), 8.08-8.10 (m, 2H), 8.44 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.50-8.51 (m, 2H), 8.83 (d, *J*=2Hz, 1H), 9.18 (d, *J*=3Hz, 1H), 10.81 (s, 1H), 14.02 (s, 1H); ESIMS found for $C_{30}H_{28}N_6O$ *m/z* 489 (M+H).



66

[00462] 5-(5-Cyanopyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **66**.

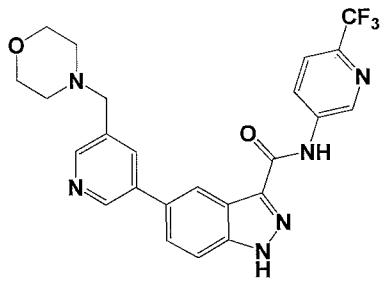
[00463] Beige solid (107 mg, 0.31 mmol, 66.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.40 (dd, *J*=8Hz, *J*=4Hz, 1H), 7.84 (d, *J*=8Hz, 1H), 7.91 (dd, *J*=9Hz, *J*=2Hz, 1H), 8.30-8.34 (m, 2H), 8.57 (s, 1H), 8.72 (t, *J*=2Hz, 1H), 9.03 (d, *J*=2Hz, 1H), 9.09 (d, *J*=2Hz, 1H), 9.23 (d, *J*=2Hz, 1H), 10.72 (s, 1H), 14.06 (s, 1H); ESIMS found for $C_{19}H_{12}N_6O$ *m/z* 340.8 (M+H).



67

[00464] 5-(3-Fluoro-5-(piperidin-1-ylmethyl)phenyl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **67**.

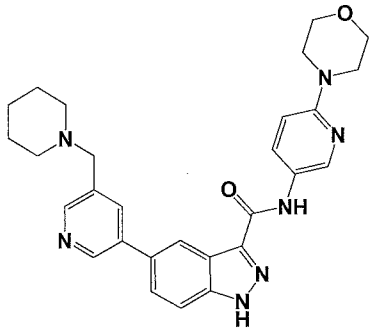
[00465] Yellow solid (84 mg, 0.20 mmol, 66% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.39 (m, 2H), 1.49-1.54 (m, 4H), 2.37-2.38 (m, 4H), 3.54 (s, 2H), 7.12-7.13 (m, 1H), 7.39-7.43 (m, 2H), 7.47-7.48 (m, 1H), 7.77-7.81 (m, 2H), 8.31-8.33 (m, 2H), 8.44-8.45 (m, 1H), 9.08 (d, *J*=2Hz, 1H), 10.69 (s, 1H), 13.97 (s, 1H); ESIMS found for $C_{25}H_{24}FN_5O$ *m/z* 430 (M+H).



68

[00466] 5-(5-(Morpholinomethyl)pyridin-3-yl)-N-(6-(trifluoromethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **68**.

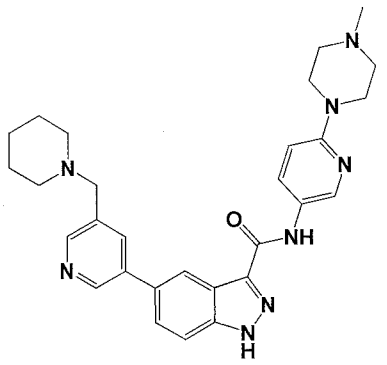
[00467] White solid (72 mg, 0.15 mmol, 30.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.43 (brs, 4H), 3.56-3.63 (m, 4H), 3.62 (s, 2H), 7.85 (Abq, *J*=9Hz, 2H), 7.93 (d, *J*=9Hz, 1H), 8.04 (s, 1H), 8.49 (s, 1H), 8.52 (d, *J*=1Hz, 1H), 8.63 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.84 (d, *J*=2Hz, 1H), 9.27 (d, *J*=2Hz, 1H), 11.11 (s, 1H), 14.11 (brs, 1H); ESIMS found for $C_{24}H_{21}F_3N_6O_2$ *m/z* 483.3 (M+H).



69

[00468] N-(6-Morpholinopyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **69**.

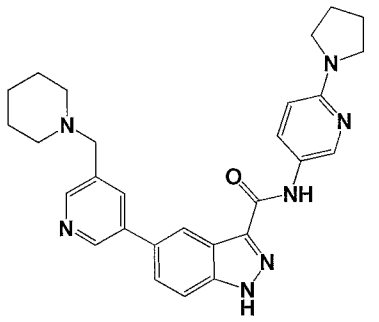
[00469] Light yellow solid (58 mg, 0.12 mmol, 36.4% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.44 (m, 2H), 1.51 (quin, *J*=5Hz, 4H), 2.33-2.40 (m, 4H), 3.40 (t, *J*=5Hz, 4H), 3.56 (s, 2H), 3.71 (t, 5Hz, 4H), 6.89 (d, *J*=9Hz, 1H), 7.78 (d, *J*=8Hz, 1H), 7.81 (d, *J*=9Hz, 1H), 7.97 (t, *J*=2Hz, 1H), 8.06 (dd, *J*=9Hz, *J*=2Hz, 1H), 8.46 (d, *J*=10Hz, 1H), 8.60 (d, *J*=2Hz, 1H), 8.79 (d, *J*=2Hz, 1H), 10.35 (s, 1H), 13.90 (brs, 1H); ESIMS found for $C_{28}H_{31}N_7O_2$ *m/z* 498.0 (M+H).



70

[00470] N-(6-(4-Methylpiperazin-1-yl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **70**.

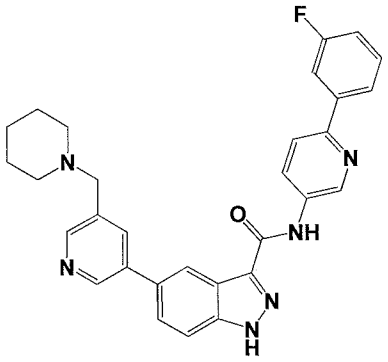
[00471] Light yellow solid (37 mg, 0.07 mmol, 39.2% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.44 (m, 2H), 1.51 (quin, *J*=5Hz, 4H), 2.22 (s, 3H), 2.35-2.42 (m, 8H), 3.44 (t, *J*=5Hz, 4H), 3.56 (s, 2H), 6.86 (d, *J*=9Hz, 1H), 7.79 (d, *J*=9Hz, 1H), 7.82 (d, *J*=10Hz, 1H), 7.98 (d, *J*=2Hz, 1H), 8.03 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.48 (d, *J*=11Hz, 1H), 8.58 (d, *J*=3Hz, 1H), 8.81 (d, *J*=3Hz, 1H), 10.34 (s, 1H), 13.89 (brs, 1H); ESIMS found for $C_{29}H_{34}N_8O$ *m/z* 511.5 (M+H).



71

[00472] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(6-(pyrrolidin-1-yl) pyridin-3-yl)-1H-indazole-3-carboxamide **71**.

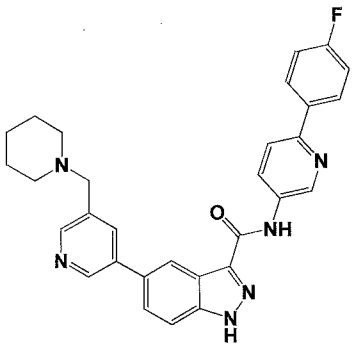
[00473] Tan solid (53.9 mg, 0.11 mmol, 53% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.38-1.39 (m, 2H), 1.51-1.52 (m, 4H), 1.93-1.96 (m, 4H), 2.36-2.38 (m, 4H), 3.36-3.39 (m, 4H), 3.56 (s, 2H), 6.46 (d, *J*=9Hz, 1H), 7.78-7.83 (m, 2H), 7.96 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.98-7.99 (m, 1H), 8.46-8.47 (m, 2H), 8.49 (, d, *J*=3Hz, 1H), 8.80-8.81 (m, 1H), 10.23 (s, 1H), 13.87 (s, 1H); ESIMS found for $C_{28}H_{31}N_7O$ *m/z* 482 (M+H).



72

[00474] N-(6-(3-Fluorophenyl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **72**.

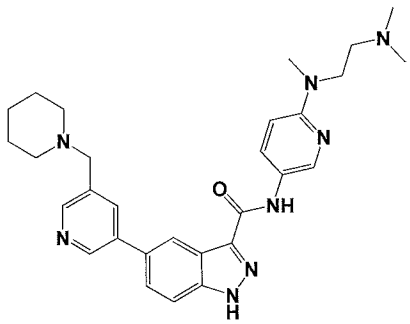
[00475] White solid (54.8 mg, 0.11 mmol, 64% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.50-1.54 (m, 4H), 2.38-2.39 (m, 4H), 3.57 (s, 2H), 7.22-7.26 (m, 1H), 7.51-7.55 (m, 1H), 7.82-7.86 (m, 2H), 7.88-7.91 (m, 1H), 7.94-7.96 (m, 1H), 8.00-8.01 (m, 1H), 8.06 (d, *J*=9Hz, 1H), 8.46 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.50 (s, 2H), 8.82 (d, *J*=2Hz, 1H), 9.20 (d, *J*=2Hz, 1H), 10.86 (s, 1H), 14.03 (s, 1H); ESIMS found for $C_{30}H_{27}FN_6O$ *m/z* 507 (M+H).



73

[00476] N-(6-(4-Fluorophenyl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **73**.

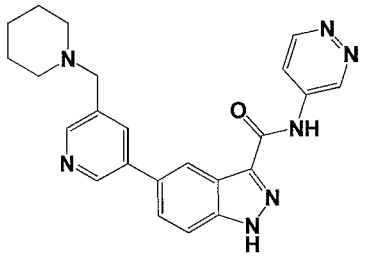
[00477] White solid (50.8 mg, 0.10 mmol, 55% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.49-1.53 (m, 4H), 2.36-2.39 (m, 4H), 3.57 (s, 2H), 7.29-7.32 (m, 2H), 7.82-7.86 (m, 2H), 7.98-8.01 (m, 2H), 8.12-8.15 (m, 2H), 8.43 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.49 (s, 2H), 8.82 (d, *J*=2Hz, 1H), 9.17 (d, *J*=3Hz, 1H), 10.81 (s, 1H), 14.02 (s, 1H); ESIMS found for $C_{30}H_{27}FN_6O$ *m/z* 507 (M+H).



74

[00478] N-(6-((2-(Dimethylamino)ethyl)(methyl)amino)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **74**.

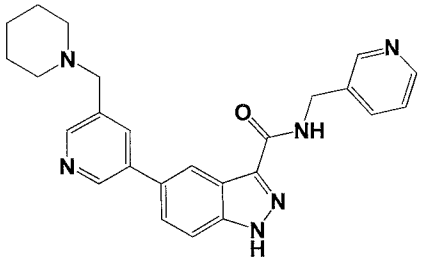
[00479] Light yellow solid (88.5 mg, 0.17 mmol, 61.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.38-1.42 (m, 2H), 1.51 (quin, *J*=5Hz, 4H), 2.18 (s, 6H), 2.34-2.40 (m, 6H), 2.99 (s, 3H), 3.56 (s, 2H), 3.61 (t, *J*=7Hz, 2H), 6.61 (d, *J*=9Hz, 1H), 7.79 (d, *J*=9Hz, 1H), 7.81 (d, *J*=9Hz, 1H), 7.95 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.98 (t, *J*=2Hz, 1H), 8.46 (s, 1H), 8.48 (d, *J*=2Hz, 2H), 8.81 (d, *J*=2Hz, 1H), 10.24 (s, 1H), 13.84 (brs, 1H); ESIMS found for $C_{29}H_{36}N_8O$ *m/z* 513.5 (M+H).



75

[00480] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(pyridazin-4-yl)-1H-indazole-3-carboxamide **75**.

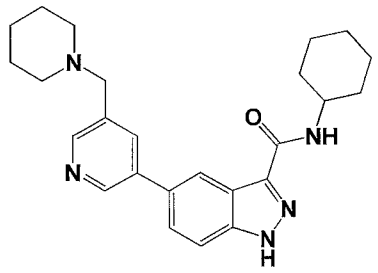
[00481] White solid (53 mg, 0.13 mmol, 33.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.47-1.54 (m, 4H), 2.33-2.42 (m, 4H), 3.57 (s, 2H), 7.85 (s, 2H), 8.00 (t, *J*=2Hz, 1H), 8.25 (dd, *J*=6Hz, *J*=3Hz, 1H), 8.47 (t, *J*=1Hz, 1H), 8.50 (d, *J*=2Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 9.09 (d, *J*=6Hz, 1H), 9.71 (dd, *J*=3Hz, *J*=1Hz, 1H), 11.16 (s, 1H), 14.16 (brs, 1H); ESIMS found for $C_{23}H_{23}N_7O$ *m/z* 414.1 (M+H).



76

[00482] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(pyridin-3-ylmethyl)-1H-indazole-3-carboxamide **76**.

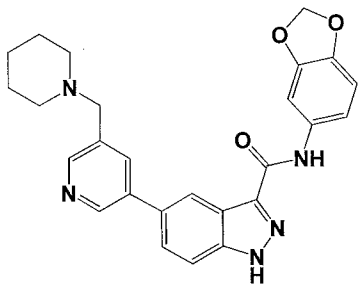
[00483] White solid (26.8 mg, 0.06 mmol, 27% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.38-1.39 (m, 2H), 1.49-1.51 (m, 4H), 2.36-2.37 (m, 4H), 3.55 (s, 2H), 4.53 (d, *J*=6Hz, 2H), 7.35 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.74-7.80 (m, 3H), 7.95-7.96 (m, 1H), 8.41-8.42 (m, 1H), 8.45-8.46 (m, 1H), 8.48-8.49 (m, 1H), 8.58-8.59 (m, 1H), 8.78 (d, *J*=2Hz, 1H), 9.17 (t, *J*=6Hz, 1H), 13.77 (s, 1H); ESIMS found for $C_{25}H_{26}N_6O$ *m/z* 427 (M+H).



77

[00484] N-Cyclohexyl-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **77**.

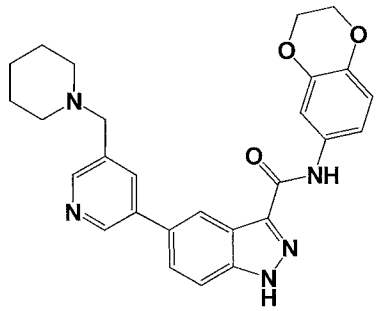
[00485] White solid (50.4 mg, 0.12 mmol, 72.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.12-1.47 (m, 7H), 1.50-1.53 (m, 4H), 1.60-1.63 (m, 1H), 1.73-1.75 (m, 2H), 1.83-1.84 (m, 2H), 2.37-2.38 (m, 4H), 3.55 (s, 2H), 3.81-3.87 (m, 1H), 7.73-7.78 (m, 2H), 7.95-7.96 (m, 1H), 8.14 (d, *J*=8Hz, 1H), 8.41-8.42 (m, 1H), 8.47 (d, *J*=2Hz, 1H), 8.78 (d, *J*=2Hz, 1H), 13.67 (s, 1H); ESIMS found for $C_{25}H_{31}N_5O$ *m/z* 418 (M+H).



78

[00486] N-(Benzo[*d*][1,3]dioxol-5-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **78**.

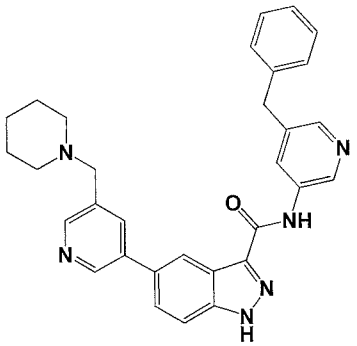
[00487] White solid (48.6 mg, 0.11 mmol, 22.1% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.43 (m, 2H), 1.51 (quin, *J*=5Hz, 4H), 2.36-2.42 (m, 4H), 3.56 (s, 2H), 6.01 (s, 2H), 6.90 (d, *J*=9Hz, 1H), 7.37 (dd, *J*=9Hz, *J*=2Hz, 1H), 7.57 (d, *J*=2Hz, 1H), 7.91 (dd, *J*=9Hz, *J*=Hz, 1H), 7.82 (dd, *J*=9Hz, *J*=1Hz, 1H), 7.99 (t, *J*=2Hz, 1H), 8.47 (dd, *J*=12Hz, *J*=2Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.34 (s, 1H), 13.89 (s, 1H); ESIMS found for $C_{26}H_{25}N_5O_3$ *m/z* 456.0 (M+H).



79

[00488] N-(2,3-Dihydrobenzo[*b*][1,4]dioxin-6-yl)-5-(5-(piperidin-1-ylmethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **79**.

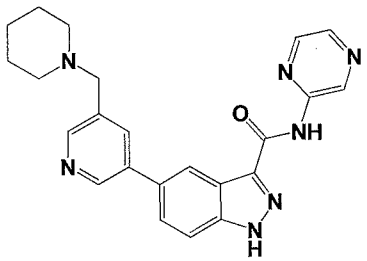
[00489] White solid (98.4 mg, 0.21 mmol, 38.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.42 (m, 2H), 1.51 (quin, *J*=5Hz, 4H), 2.34-2.41 (m, 4H), 3.56 (s, 2H), 4.20-4.27 (m, 4H), 6.82 (d, *J*=9Hz, 1H), 7.35 (dd, *J*=9Hz, *J*=3Hz, 1H), 7.51 (d, *J*=3Hz, 1H), 7.78 (dd, *J*=9Hz, *J*=1Hz, 1H), 7.81 (dd, *J*=9Hz, *J*=1Hz, 1H), 7.98 (t, *J*=2Hz, 1H), 8.47 (dd, *J*=12Hz, *J*=2Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.26 (s, 1H), 13.87 (brs, 1H); ESIMS found for $C_{27}H_{27}N_5O_3$ *m/z* 470.4 (M+H).



80

[00490] N-(5-Benzylpyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **80**.

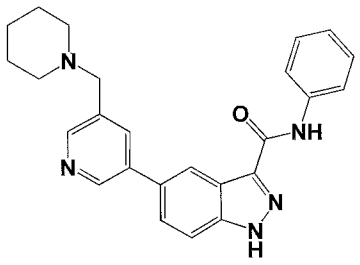
[00491] White solid (81.9 mg, 0.16 mmol, 59% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.41 (m, 2H), 1.49-1.53 (m, 4H), 2.37-2.39 (m, 4H), 3.56 (s, 2H), 4.00 (s, 2H), 7.20-7.23 (m, 1H), 7.28-7.34 (m, 4H), 7.79-7.84 (m, 2H), 7.98-7.99 (m, 1H), 8.23-8.24 (m, 1H), 8.25 (d, *J*=2Hz, 1H), 8.45-8.46 (m, 1H), 8.49 (d, *J*=2Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 8.89 (d, *J*=2Hz, 1H), 10.65 (s, 1H), 13.97 (s, 1H); ESIMS found for $C_{31}H_{30}N_6O$ *m/z* 503 (M+H).



81

[00492] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(pyrazin-2-yl)-1H-indazole-3-carboxamide **81**.

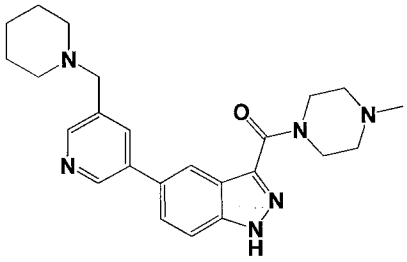
[00493] White solid (104 mg, 0.25 mmol, 41.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.35-1.42 (m, 2H), 1.51 (quin, *J*=5Hz, 4H), 2.33-2.42 (m, 4H), 3.57 (s, 2H), 7.83 (d, *J*=9Hz, 1H), 7.85 (d, *J*=9Hz, 1H), 8.00 (s, 1H), 8.45 (d, *J*=2Hz, 1H), 8.46 (s, 1H), 8.50 (s, 1H), 8.83 (d, *J*=2Hz, 1H), 9.50 (s, 1H), 10.36 (s, 1H), 14.11 (brs, 1H); ESIMS found for $C_{23}H_{23}N_7O$ *m/z* 413.9 (M+H).



82

[00494] N-Phenyl-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **82**.

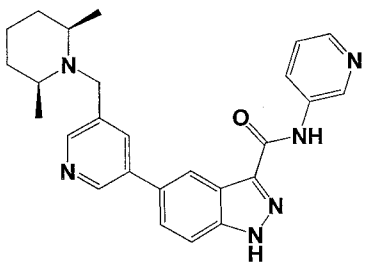
[00495] White solid (97.8 mg, 0.24 mmol, 81% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.49-1.53 (m, 4H), 2.37-2.39 (m, 4H), 3.57 (s, 2H), 7.09-7.12 (m, 1H), 7.34-7.37 (m, 2H), 7.80 (d, *J*=9Hz, 1H), 7.83 (dd, *J*=9Hz, 2Hz, 1H), 7.907.92 (m, 2H), 7.99-8.00 (m, 1H), 8.47-8.48 (m, 1H), 8.49 (d, *J*=2Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.40 (s, 1H), 13.92 (s, 1H); ESIMS found for $C_{25}H_{25}N_5O$ *m/z* 412 (M+H).



83

[00496] (4-Methylpiperazin-1-yl)(5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazol-3-yl)methanone **83**.

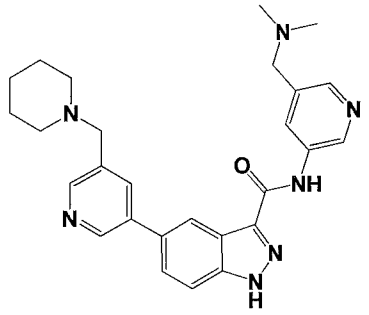
[00497] Light yellow amorphous solid (74.6 mg, 0.18 mmol, 93% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.38-1.39 (m, 2H), 1.48-1.53 (m, 4H), 2.22 (s, 3H), 2.36-2.41 (m, 8H), 3.55 (s, 2H), 3.72-3.73 (m, 2H), 4.01-4.02 (m, 2H), 7.73 (d, *J*=9Hz, 1H), 7.79 (dd, *J*=9Hz, *J*=2Hz, 1H), 7.95-7.96 (m, 1H), 8.22 (d, *J*=1Hz, 1H), 8.46 (d, *J*=2Hz, 1H), 8.78 (d, *J*=2Hz, 1H), 13.64 (s, 1H); ESIMS found for $C_{24}H_{30}N_6O$ *m/z* 419 (M+H).



84

[00498] 5-(5-(((2R,6S)-2,6-Dimethylpiperidin-1-yl)methyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **84**.

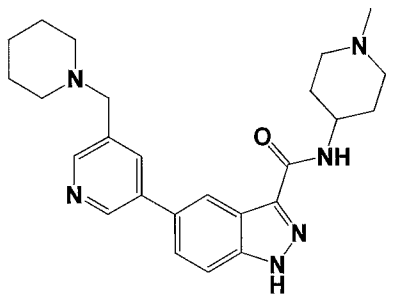
[00499] Beige solid (76.5 mg, 0.17 mmol, 75.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.00 (d, *J*=6Hz, 6H), 1.21-1.35 (m, 3H), 1.55 (d, *J*=11Hz, 2H), 1.60-1.65 (m, 1H), 2.45-2.53 (m, 2H), 3.84 (s, 1H), 7.40 (dd, *J*=7Hz, 3Hz, 1H), 7.79 (dd, *J*=9Hz, *J*=2Hz, 1H), 7.83 (dd, *J*=9Hz, *J*=1Hz, 1H), 8.04 (s, 1H), 8.29-8.35 (m, 2H), 8.46 (s, 1H), 8.60 (d, *J*=2Hz, 1H), 8.73 (d, *J*=2Hz, 1H), 9.08 (d, *J*=3Hz, 1H), 10.70 (s, 1H), 14.00 (brs, 1H); ESIMS found for $C_{26}H_{28}N_6O$ *m/z* 441.3 (M+H).



86

[00500] N-(5-((Dimethylamino)methyl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **86**.

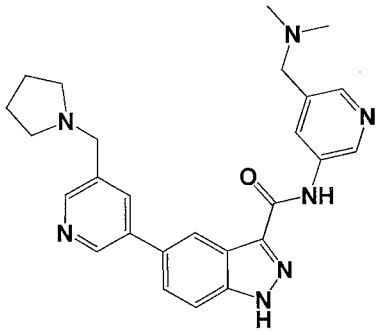
[00501] White solid (41.5 mg, 0.09 mmol, 72% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.49-1.54 (m, 4H), 2.19 (s, 6H), 2.36-2.39 (m, 4H), 3.44 (s, 2H), 3.58 (s, 2H), 7.81 (d, *J*=9Hz, 1H), 7.85 (dd, *J*=9Hz, *J*=2Hz, 1H), 8.00-8.01 (m, 1H), 8.21 (d, *J*=2Hz, 1H), 8.37-8.38 (m, 1H), 8.49-8.50 (m, 2H), 8.83 (d, *J*=2Hz, 1H), 8.91 (d, *J*=2Hz, 1H), 10.69 (s, 1H), 14.01 (brs, 1H); ESIMS found for $C_{27}H_{31}N_7O$ *m/z* 470 (M+H).



87

[00502] N-(1-Methylpiperidin-4-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **87**.

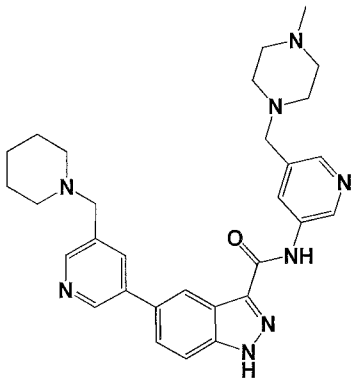
[00503] White amorphous solid (18.2 mg, 0.04 mmol, 59.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.49-1.53 (m, 4H), 1.66-1.75 (m, 4H), 1.95-2.00 (m, 2H), 2.18 (s, 3H), 2.37-2.38 (m, 4H), 2.77 (d, *J*=11Hz, 2H), 3.55 (s, 2H), 3.81-3.83 (m, 1H), 7.73-7.75 (m, 1H), 7.77-7.79 (m, 1H), 7.95-7.96 (m, 1H), 8.25 (d, *J*=8Hz, 1H), 8.41-8.42 (m, 1H), 8.47 (d, *J*=2Hz, 1H), 8.78 (d, *J*=2Hz, 1H), 13.70 (s, 1H); ESIMS found for $C_{25}H_{32}N_6O$ *m/z* 433 (M+H).



106

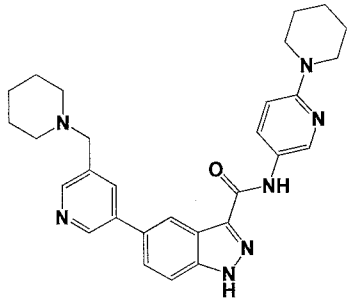
[00504] N-(5-((Dimethylamino)methyl)pyridin-3-yl)-5-(5-(pyrrolidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **106**.

[00505] White solid (39.4 mg, 0.09 mmol, 74% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.71-1.73 (m, 4H), 2.49-2.50 (m, 4H), 2.18 (s, 6H), 3.43 (s, 2H), 3.71 (s, 2H), 7.81 (d, *J*=9Hz, 1H), 7.84 (ABq, *J*=9Hz, 1H), 8.02-8.03 (m, 1H), 8.21 (d, *J*=2Hz, 1H), 8.37-8.38 (m, 1H), 8.48-8.49 (m, 1H), 8.51 (d, *J*=2Hz, 1H), 8.83 (d, *J*=2Hz, 1H), 8.91 (d, *J*=2Hz, 1H), 10.68 (s, 1H), 13.98 (s, 1H); ESIMS found for $C_{26}H_{29}N_7O$ *m/z* 456 (M+H).



124

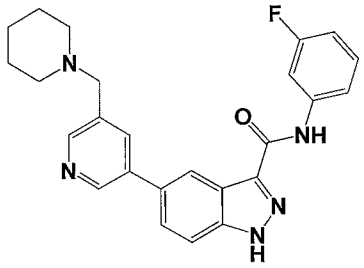
[00506] N-(5-((4-Methylpiperazin-1-yl)methyl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **124**.



126

[00507] N-(6-(Piperidin-1-yl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **126**.

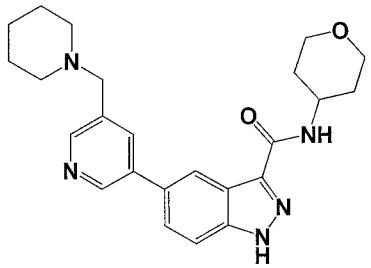
[00508] Grey solid (92.7 mg, 0.19 mmol, 29.0% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.48-1.64 (m, 12H), 2.32-2.43 (m, 4H), 3.48 (t, *J*=4.5Hz, 4H), 3.56 (s, 2H), 6.83 (d, *J*=9Hz, 1H), 7.80 (ABq, *J*=10Hz, 2H), 7.98 (s, 1H), 8.00 (d, *J*=2.4Hz, 1H), 8.47 (d, *J*=10Hz, 2H), 8.55 (d, *J*=2.5Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.27 (s, 1H), 13.86 (s, 1H); ESIMS found for $C_{29}H_{33}N_7O$ *m/z* 496.5 (M+H).



162

[00509] N-(3-Fluorophenyl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **162**.

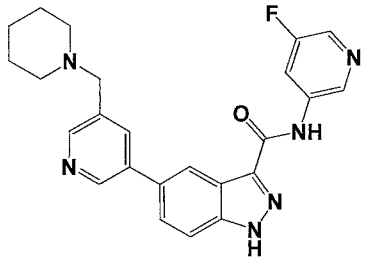
[00510] White solid (176 mg, 0.41 mmol, 56.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.47-1,55 (m, 4H), 2.38 (brs, 4H), 3.56 (s, 2H), 6.93 (dt, *J*=9Hz, *J*=3Hz, 1H), 7.39 (q, *J*=8Hz, 1H), 7.75 (dd, *J*=8Hz, *J*=1Hz, 1H), 7.82 (d/Abq, *J*=9Hz, *J*=1Hz, 2H), 7.89 (td, *J*=12Hz, *J*=2Hz, 1H), 7.99 (t, *J*=2Hz, 1H), 8.47 (s, 1H), 8.49 (d, *J*=2Hz, 1H), 8.82 (d, *J*=2Hz, 1H), 10.66 (s, 1H), 13.97 (brs, 1H); ESIMS found for $C_{25}H_{24}FN_5O$ *m/z* 430.0 (M+H).



163

[00511] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(tetrahydro-2H-pyran-4-yl)-1H-indazole-3-carboxamide **163**.

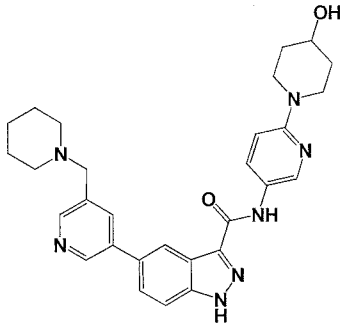
[00512] Tan amorphous solid (88 mg, 0.21 mmol, 88% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39-1.40 (m, 2H), 1.49-1.53 (m, 4H), 1.69-1.76 (m, 4H), 2.37-2.38 (m, 4H), 3.39-3.42 (m, 2H), 3.56 (s, 2H), 3.88-3.90 (m, 2H), 4.05-4.10 (m, 1H), 7.74 (d, *J*=9Hz, 1H), 7.77-7.79 (m, 1H), 7.95-7.96 (m, 1H), 8.37 (d, *J*=8Hz, 1H), 8.41-8.42 (m, 1H), 8.47 (d, *J*=2Hz, 1H), 8.79 (d, *J*=2Hz, 1H), 13.72 (s, 1H); ESIMS found for $C_{24}H_{29}N_5O_2$ *m/z* 420 (M+H).



168

[00513] N-(5-Fluoropyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **168**.

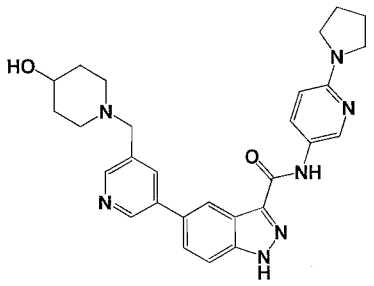
[00514] White solid (286 mg, 0.66 mmol, 56% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.39 (m, 2H), 1.49-1.53 (m, 4H), 2.38 (brs, 4H), 3.56 (s, 2H), 7.81-7.86 (m, 2H), 7.99 (s, 1H), 8.31-8.34 (m, 2H), 8.47 (s, 1H), 8.49 (d, *J*=1.3 Hz, 1H), 8.82 (d, *J*=1.7Hz, 1H), 8.99 (s, 1H), 10.97 (s, 1H), 14.07 (brs, 1H); ESIMS found for $C_{24}H_{23}FN_6O$ *m/z* 431.4 (M+H).



169

[00515] N-(6-(4-Hydroxypiperidin-1-yl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **169**.

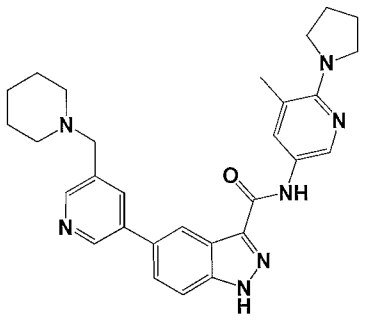
[00516] Off-white solid (33 mg, 0.06 mmol, 53.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.32-1.43 (m, 4H), 1.45-1.57 (m, 4H), 1.74-1.83 (m, 2H), 2.33-2.44 (m, 4H), 3.04 (t, *J*=10Hz, 2H), 3.56 (s, 2H), 3.63-3.73 (m, 1H), 3.93-4.02 (m, 2H), 4.72 (s, 1H), 6.85 (d, *J*=9Hz, 1H), 7.80 (ABq, *J*=10Hz, 2H), 7.99 (d, *J*=7Hz, 2H), 8.47 (d, *J*=10Hz, 2H), 8.54 (s, 1H), 8.81 (s, 1H), 10.28 (s, 1H), 13.87 (s, 1H); ESIMS found for $C_{29}H_{33}N_7O_2$ *m/z* 512.3 (M+H).



170

[00517] 5-(5-((4-Hydroxypiperidin-1-yl)methyl)pyridin-3-yl)-N-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **170**.

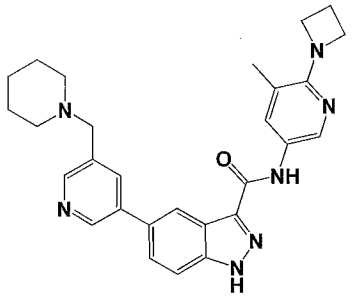
[00518] Off-white solid (125.4 mg, 0.25 mmol, 73.2% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.93-1.96 (m, 4H), 2.09-2.12 (m, 2H), 2.70-2.72 (m, 2H), 3.37-3.39 (m, 4H), 3.46-3.47 (m, 1H), 3.58 (s, 1H), 4.52 (d, *J*=4Hz, 1H), 6.46 d, *J*=9Hz, 1H), 7.77-7.82 (m, 2H), 7.95-7.98 (m, 2H), 8.44-8.48 (m, 2H), 8.49 (d, *J*=2.5Hz, 1H), 8.80 (d, *J*=2.1Hz, 1H), 10.20 (s, 1H), 13.85 (s, 1H); ESIMS found for $C_{28}H_{31}N_7O_2$ *m/z* 498 (M+H).



172

[00519] N-(5-Methyl-6-(pyrrolidin-1-yl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **172**.

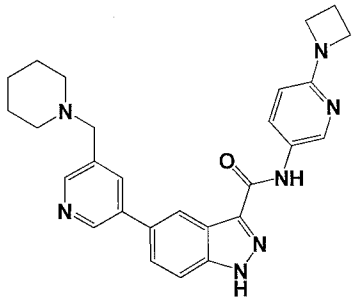
[00520] Off-white solid (186 mg, 0.38 mmol, 72.2% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.34-1.43 (m, 2H), 1.47-1.55 (m, 4H), 1.82-1.89 (m, 4H), 2.30 s, 3H), 2.33-2.42 (m, 4H), 3.43 (t, *J*=6.6Hz, 4H), 3.56 (s, 2H), 7.81 (ABq, *J*=10Hz, 2H), 7.89 (d, *J*=2Hz, 1H), 7.98 (s, 1H), 8.38 (d, *J*=2Hz, 1H), 8.47 (d, *J*=8Hz, 2H), 8.81 (d, *J*=2Hz, 1H), 10.24 (s, 1H), 13.86 (s, 1H); ESIMS found for $C_{29}H_{33}N_7O$ *m/z* 496.4 (M+H).



173

[00521] N-(6-(Azetidin-1-yl)-5-methylpyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **173**.

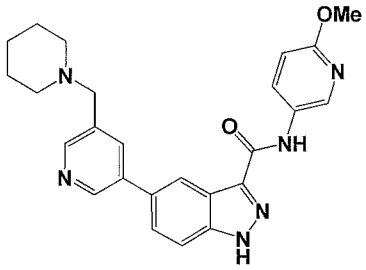
[00522] Off-white solid (184 mg, 0.38 mmol, 62.6% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.35-1.43 (m, 2H), 1.47-1.54 (m, 4H), 2.16 (s, 3H), 2.22 (quin, *J*=7Hz, 2H), 2.34-2.42 (m, 4H), 3.56 (s, 2H), 4.00 (t, *J*=7Hz, 4H), 7.81 (ABq, *J*=10Hz, 2H), 7.85 (d, *J*=2Hz, 1H), 8.39 (d, *J*=2Hz, 1H), 8.47 (d, *J*=10Hz, 2H), 8.81 (d, *J*=2Hz, 1H), 10.24 (s, 1H), 13.87 (s, 1H); ESIMS found for $C_{28}H_{31}N_7O$ *m/z* 482.0 (M+H).



174

[00523] N-(6-(Azetidin-1-yl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **174**.

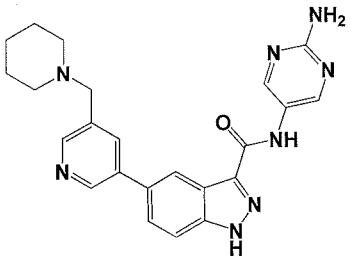
[00524] White solid (14.9 mg, 0.03 mmol, 11.0% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.47-1.54 (m, 4H), 2.32 (quin, *J*=7Hz, 2H), 2.35-2.42 (m, 4H), 3.56 (s, 2H), 3.92 (t, *J*=7Hz, 4H), 6.39 (d, J=9Hz, 1H), 7.77-7.83 (m, 2H), 7.98 (dd, J=9Hz, *J*=2Hz, 2H), 8.42-8.53 (m, 3H), 8.78-8.84 (m, 1H), 10.27 (s, 1H), 13.87 (s, 1H); ESIMS found for $C_{27}H_{29}N_7O$ *m/z* 468.0 (M+H).



175

[00525] N-(6-Methoxypyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **175**.

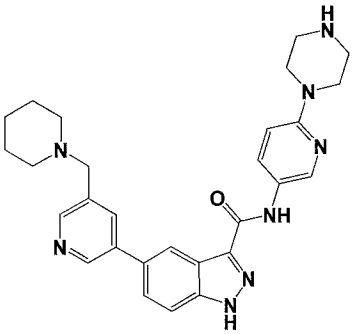
[00526] White solid (31.2 mg, 0.07 mmol, 25.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.47-1.55 (m, 4H), 2.33-2.42 (m, 4H), 3.56 (s, 2H), 3.85 (s, 3H), 6.84 (d, *J*=9Hz, 1H), 7.81 (ABq, *J*=12Hz, 2H), 7.98 (s, 1H), 8.18 (dd, *J*=9Hz, *J*=2.7Hz, 1H), 8.47 (dd, *J*=10Hz, *J*=1Hz, 2H), 8.65 (d, *J*=2.6Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.50 (s, 1H), 13.91 (brs, 1H); ESIMS found for $C_{25}H_{26}N_6O_2$ *m/z* 443.4 (M+H).



176

[00527] N-(2-Aminopyrimidin-5-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **176**.

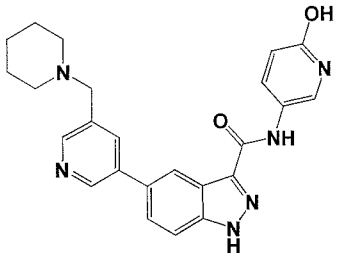
[00528] Yellow solid (412 mg, 0.96 mmol, 52.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.43 (m, 2H), 1.47-1.54 (m, 4H), 2.35-2.41 (m, 4H), 3.56 (s, 2H), 6.49 (s, 2H), 7.81 (ABq, *J*=10Hz, 2H), 7.98 (s, 1H), 8.47 (dd, *J*=12Hz, *J*=2Hz, 2H), 8.63 (s, 1H), 8.81 (d, *J*=2Hz, 1H), 10.32 (s, 1H), 13.91 (s, 1H); ESIMS found for $C_{23}H_{24}N_8O$ *m/z* 429.3 (M+H).



177

[00529] N-(6-(Piperazin-1-yl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **177**.

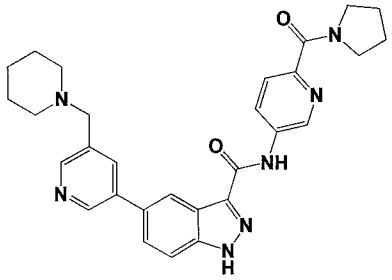
[00530] Tan solid (160 mg, 0.32 mmol, 28.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.43 (m, 2H), 1.48-1.54 (m, 4H), 2.34-2.41 (m, 4H), 2.79 (t, *J*=5Hz, 4H), 3.36 (t, *J*=5Hz, 4H), 3.56 (s, 2H), 6.82 (d, *J*=9Hz, 1H), 7.81 (ABq, *J*=10Hz, 2H), 7.98 (s, 1H), 8.02 (dd, *J*=9Hz, *J*=2.7Hz, 1H), 8.47 (dd, *J*=9Hz, *J*=2Hz, 2H), 8.57 (d, *J*=2.5Hz, 1H), 8.81 (d, *J*=2Hz, 1H), 10.29 (s, 1H); ESIMS found for $C_{28}H_{32}N_8O$ *m/z* 497.1 (M+H).



178

[00531] N-(6-Hydroxypyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **178**.

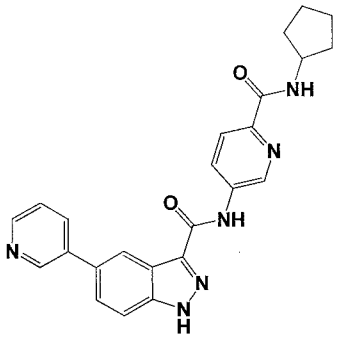
[00532] Off-white solid (78.3 mg, 0.18 mmol, 52.4% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.48-1.54 (m, 4H), 2.35-2.42 (m, 4H), 3.56 (s, 2H), 6.38 (d, *J*=10Hz, 1H), 7.80 (ABq, *J*=11Hz, 2H), 7.83 (dd, *J*=10Hz, *J*=3Hz, 1H), 7.97 (s, 1H), 8.04 (d, *J*=2.5Hz, 1H), 8.44 (s, 1H), 8.48 (d, *J*=2Hz, 1H), 8.80 (d, *J*=2Hz, 1H), 10.27 (s, 1H), 11.42 (brs, 1H), 13.87 (brs, 1H); ESIMS found for $C_{24}H_{24}N_6O_2$ *m/z* 429.1 (M+H).



179

[00533] 5-(5-(Piperidin-1-ylmethyl)pyridin-3-yl)-N-(6-(pyrrolidine-1-carbonyl)pyridin-3-yl)-1H-indazole-3-carboxamide **179**.

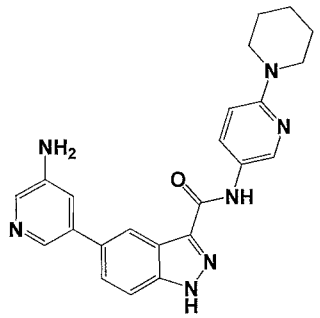
[00534] Light yellow solid (61 mg, 0.12 mmol, 37.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.37-1.43 (m, 2H), 1.48-1.55 (m, 4H), 1.82-1.90 (m, 4H), 2.38 (brs, 4H), 3.17 (d, *J*=5Hz, 2H), 3.51 (t, *J*=7Hz, 2H), 3.57 (s, 2H), 3.70 (t, *J*=7Hz, 2H), 7.79 (d, *J*=9Hz, 1H), 7.84 (Abq, *J*=11Hz, 2H), 8.00 (s, 1H), 8.46 (dd, *J*=9Hz, *J*=2.5Hz, 1H), 8.48 (dd, *J*=9Hz, *J*=2Hz, 2H), 8.82 (d, *J*=2Hz, 1H), 9.10 (d, *J*=2Hz, 1H), 10.91 (s, 1H), 14.05 (brs, 1H); ESIMS found for $C_{29}H_{31}N_7O_2$ *m/z* 510.6 (M+H).



181

[00535] N-(6-(Cyclopentylcarbamoyl)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **181**.

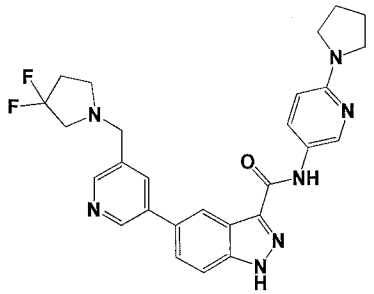
[00536] Light yellow solid (18 mg, 0.04 mmol, 16.6% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.50-1.64 (m, 4H), 1.67-1.76 (m, 2H), 1.85-1.94 (m, 4H), 4.24 (quin, *J*=8Hz, 1H), 7.53 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.84 (ABq, 2H), 8.03 (d, *J*=9Hz, 1H), 8.14 (d, *J*=8Hz, 1H), 8.45 (d, *J*=8Hz, 1H), 8.48 (s, 1H), 8.54 (dd, *J*=9Hz, *J*=2,5Hz, 1H), 8.60 (d, *J*=4Hz, 1H), 8.94 (d, *J*=2Hz, 1H), 9.16 (d, *J*=2Hz, 1H), 10.97 (s, 1H), 14.08 (brs, 1H); ESIMS found for $C_{24}H_{22}N_6O_2$ *m/z* 427.1 (M+H).



182

[00537] 5-(5-Aminopyridin-3-yl)-N-(6-(piperidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **182**.

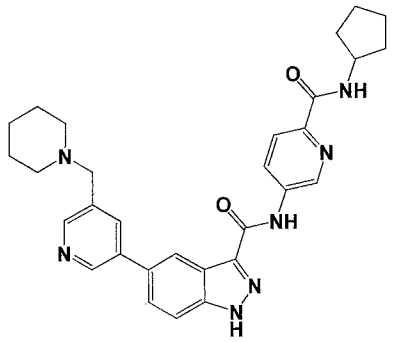
[00538] Off-white solid (23.4 mg, 0.06 mmol, 19.4% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.51-1.63 (m, 6H), 3.47 (t, *J*=5Hz, 4H), 5.45 (s, 2H), 6.83 (d, *J*=10Hz, 1H), 7.24 (t, *J*=2Hz, 1H), 7.73 (dq, *J*=9Hz, *J*=2Hz, 2H), 7.94 (d, *J*=2.5Hz, 1H), 8.00 (dd, *J*=9Hz, *J*=2.5Hz, 1H), 8.08 (d, *J*=2Hz, 1H), 8.40 (s, 1H), 8.56 (d, *J*=2.5Hz, 1H), 10.27 (s, 1H), 13.84 (s, 1H); ESIMS found for $C_{23}H_{23}N_7O$ *m/z* 414.3 (M+H).



183

[00539] 5-(5-((3,3-Difluoropyrrolidin-1-yl)methyl)pyridin-3-yl)-N-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **183**.

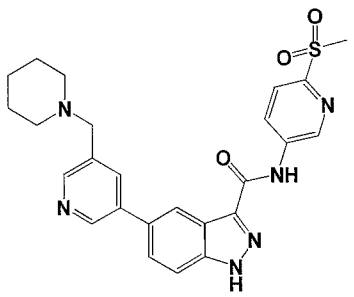
[00540] Off-white solid (307 mg, 0.61 mmol, 39.6% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.95 (t, *J*=6.5Hz, 4H), 2.28 (tt, *J*=13.5Hz, *J*=7Hz, 2H), 2.76 (t, *J*=7Hz, 2H), 2.94 (t, *J*=13.5Hz, 2H), 3.38 (t, *J*=6.5Hz, 4H), 3.77 (s, 2H), 6.46 (d, *J*=9Hz, 1H), 7.81 (dq, *J*=8.5Hz, *J*=1.5Hz, 2H), 7.97 (dd, *J*=9Hz, *J*=2.5Hz, 1H), 8.03 (s, 1H), 8.48 (s, 1H), 8.49 (d, *J*=2.5Hz, 1H), 8.52 (s, 1H), 8.84 (d, *J*=2Hz, 1H), 10.23 (s, 1H), 13.87 (s, 1H); ESIMS found for $C_{27}H_{27}F_2N_7O$ *m/z* 504.0 (M+H).



184

[00541] N-(6-(Cyclopentylcarbamoyl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide **184**.

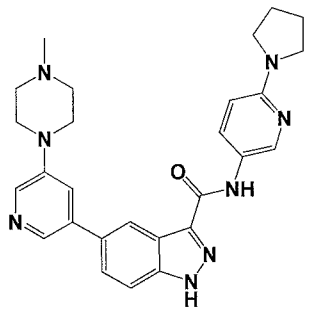
[00542] White solid (3.2 mg, 0.01 mmol, 18.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.43-1.64 (m, 8H), 1.64-1.76 (m, 2H), 1.82-1.93 (m, 2H), 2.38 (brs, 4H), 3.57 (s, 2H), 4.24 (quin, *J*=7Hz, 1H), 7.84 (ABq, *J*=10Hz, 2H), 8.00 (s, 1H), 8.03 (d, *J*=9Hz, 1H), 8.44 (d, *J*=8Hz, 1H), 8.48 (dd, *J*=8Hz, *J*=2Hz, 2H), 8.55 (dd, *J*=9Hz, *J*=2.5Hz, 1H), 8.82 (d, *J*=2.5Hz, 1H), 9.16 (d, *J*=2.5Hz, 1H), 10.98 (s, 1H), 14.06 (brs, 1H); ESIMS found for $C_{30}H_{33}N_7O_2$ *m/z* 524.5 (M+H).



185

[00543] N-(6-(Methylsulfonyl)pyridin-3-yl)-5-(5-(piperidin-1-ylmethyl) pyridin-3-yl)-1H-indazole-3-carboxamide **185**.

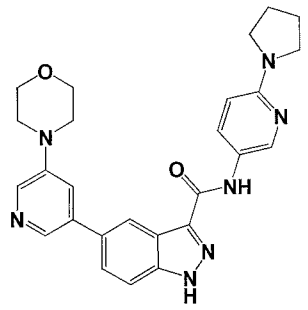
[00544] White solid (72 mg, 0.15 mmol, 56.4% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.43 (m, 2H), 1.48-1.55 (m, 4H), 2.39 (brs, 4H), 3.27 (s, 3H), 3.57 (s, 2H), 7.85 (s, 2H), 8.00 (s, 1H), 8.08 (d, *J*=8.5Hz, 1H), 8.49 (dd, *J*=10Hz, *J*=1.5Hz, 2H), 8.83 (d, *J*=2.5Hz, 1H), 9.26 (d, *J*=2.5Hz, 1H), 11.19 (s, 1H), 14.13 (brs, 1H); ESIMS found for $C_{25}H_{26}N_6O_3S$ *m/z* 491.1 (M+H).



186

[00545] 5-(5-(4-Methylpiperazin-1-yl)pyridin-3-yl)-N-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **186**.

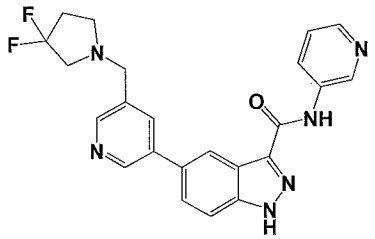
[00546] Off-white solid (196 mg, 0.41 mmol, 47.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.89-1.98 (m, 4H), 2.27 (brs, 3H), 3.25-3.42 (m, 12H), 6.45 (d, *J*=9Hz, 1H), 7.53 (s, 1H), 7.77 (q, *J*=8.5Hz, 2H), 7.96 (d, *J*=6.5Hz, 1H), 8.31 (d, *J*=5.5Hz, 2H), 8.43 (s, 1H), 8.48 (s, 1H), 10.21 (s, 1H), 13.83 (s, 1H); ESIMS found for $C_{27}H_{30}N_8O$ *m/z* 483.4 (M+H).



187

[00547] 5-(5-Morpholinopyridin-3-yl)-N-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **187**.

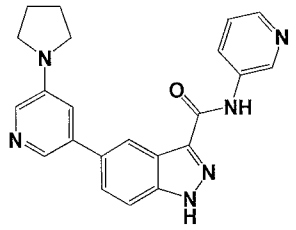
[00548] White solid (92 mg, 0.20 mmol, 43.5% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.94 (t, *J*=6.5 Hz, 4H), 3.28 (t, *J*=4.5Hz, 4H), 3.38 (t, *J*=6.5Hz, 4H), 3.78 (t, *J*=4.5Hz, 4H), 6.45 (d, *J*=9Hz, 1H), 7.55 (s, 1H), 7.77 (dq, *J*=8.5Hz, *J*=1.5Hz, 2H), 7.96 (dd, *J*=9Hz, *J*=2.5Hz 1H), 8.33 (dd, *J*=6.5Hz, *J*=3Hz, 2H), 8.44 (s, 1H), 8.49 (d, *J*=2.5Hz, 1H), 10.21 (s, 1H), 13.83 (s, 1H); ESIMS found for $C_{26}H_{27}N_7O_2$ *m/z* 470.5 (M+H).



188

[00549] 5-(5-((3,3-Difluoropyrrolidin-1-yl)methyl)pyridin-3-yl)-N-(pyridin-3-yl)-1H-indazole-3-carboxamide **188**.

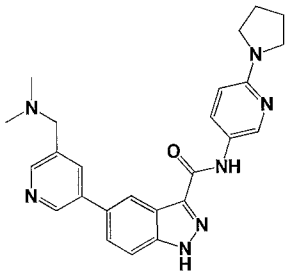
[00550] White solid (209 mg, 0.48 mmol, 56.6% yield). ^{1}H NMR (DMSO-d_6) δ ppm 2.23-2.32 (m, 2H), 2.76 (t, *J*=7Hz, 2H), 2.94 (t, *J*=13.5Hz, 2H), 3.77 (s, 2H), 7.40 (q, *J*=8Hz, 1H), 7.83 (dq, *J*=8Hz, *J*=2Hz, 2H), 8.04 (s, 1H), 8.31-8.34 (m, 2H), 8.49 (s, 1H), 8.53 (d, *J*=2Hz, 1H), 8.85 (d, *J*=2.5Hz, 1H), 9.08 (d, *J*=2Hz, 1H), 10.70 (s, 1H), 14.01 (brs, 1H); ESIMS found for $C_{23}H_{20}F_2N_6O$ *m/z* 435.2 (M+H).



189

[00551] N-(Pyridin-3-yl)-5-(5-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **189**.

[00552] White solid (30 mg, 0.08 mmol, 26.0% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.91-2.05 (m, 4H), 3.33-3.39 (m, 4H), 7.09 (s, 1H), 7.40 (q, *J*=8Hz, 1H), 7.79 (s, 2H), 7.96 (d, *J*=2.5Hz, 1H), 8.14 (s, 1H), 8.30-8.34 (m, 2H), 8.44 (s, 1H), 9.07 (d, *J*=2Hz, 1H), 10.68 (s, 1H), 13.97 (brs, 1H); ESIMS found for $C_{22}H_{20}N6O$ *m/z* 385.2 (M+H).



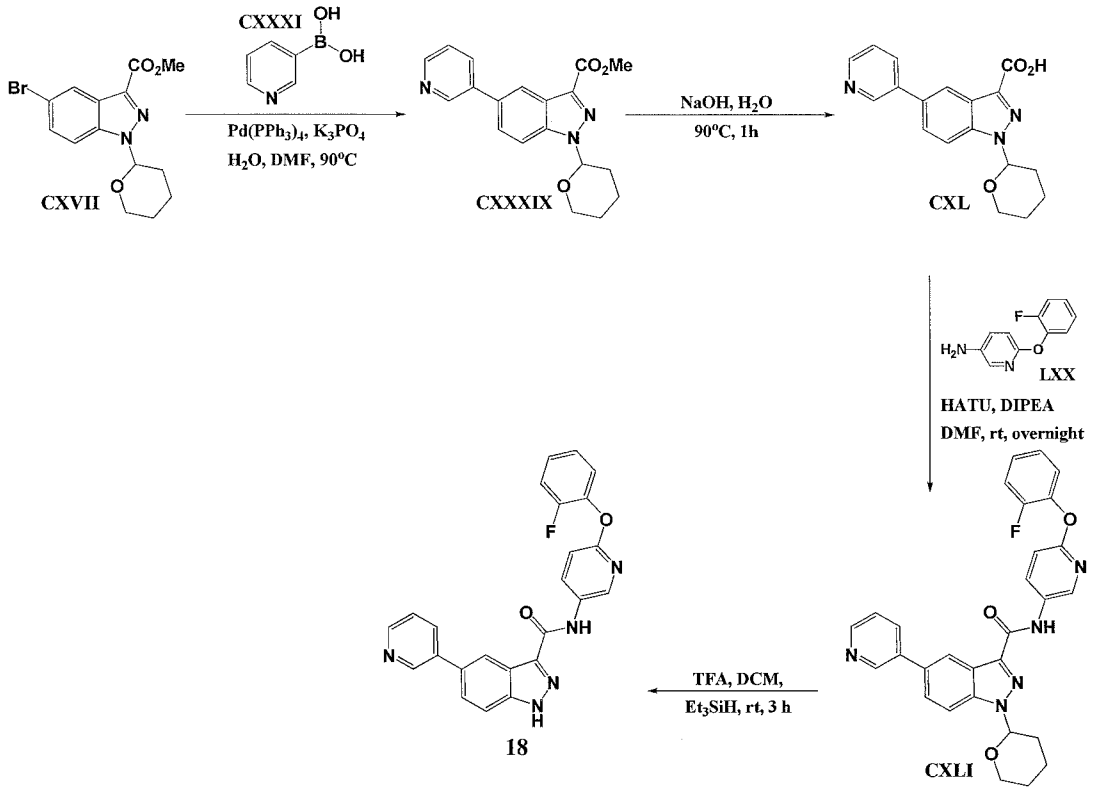
190

[00553] 5-(5-((Dimethylamino)methyl)pyridin-3-yl)-N-(6-(pyrrolidin-1-yl)pyridin-3-yl)-1H-indazole-3-carboxamide **190**.

[00554] White solid (142 mg, 0.32 mmol, 39.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.92-1.97 (m, 4H), 2.20 (s, 6H), 3.35-3.40 (m, 4H), 3.53 (s, 2H), 6.46 (d, *J*=9Hz, 1H), 7.80 (dq, *J*=9Hz, *J*=1.5Hz, 2H), 7.97 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.00 (s, 1H), 8.46-8.50 (m, 3H), 8.82 (d, *J*=2.5Hz, 1H), 10.22 (s, 1H), 13.86 (brs, 1H); ESIMS found for $C_{25}H_{27}N_7O$ *m/z* 442.4 (M+H).

Example **6**

[00555] Preparation of N-(6-(2-fluorophenoxy)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide (**18**) is depicted below in Scheme **32**.



Scheme 32

Step **1**

[00556] To a solution of methyl 5-bromo-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylate (**CXVII**) (7.0 g, 20.6 mmol) in DMF (80 mL) and water (16 mL) was added K_3PO_4 (6.56 g, 30.9 mmol), pyridin-3-ylboronic acid (**CXXXI**) (2.79 g, 22.7 mmol), $Pd(PPh_3)_4$ (1.19 g, 1.03 mmol) and. The solution was purged with argon and heated at 90°C for 3 h. The solution was cooled to room temperature and then concentrated under reduced pressure. The residue was dissolved in DCM and washed with water, dried over $MgSO_4$, filtered and then evaporated under vacuum. The residue was purified on a silica gel column (100% DCM → 1.5:98.5 MeOH:DCM) to give methyl 5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylate (**CXXXIX**) as an orange oil which solidified at rt (6.28 g, 18.6 mmol, 90% yield). ESIMS found for $C_{19}H_{19}N_3O_3$ *m/z* 338.0 (M+H).

Step **2**

[00557] Preparation of intermediate 5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxylic acid (**CXL**) was performed following the procedure listed in Scheme 25, Step 4. White solid (900 mg, 2.78 mmol, 15% yield). ESIMS found for $C_{18}H_{17}N_3O_3$ *m/z* 324.1 (M+H).

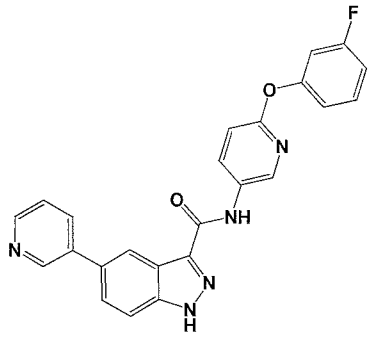
Step **3**

[00558] Preparation of intermediate N-(6-(2-fluorophenoxy)pyridin-3-yl)-5-(pyridin-3-yl)-1-(tetrahydro-2H-pyran-2-yl)-1H-indazole-3-carboxamide (**CXLI**) was performed following the procedure listed in Scheme 28, Step 3. Off-white solid (207 mg, 0.41 mmol, 66% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.60-1.69 (m, 2H), 1.76-1.87 (m, 1H), 2.03-2.13 (m, 2H), 2.56-2.65 (m, 1H), 3.84 (dt, *J*=11Hz, *J*=4Hz, 1H), 3.99 (t, *J*=11Hz, 1H), 6.07 (dd, *J*=10Hz, *J*=2Hz, 1H), 6.98 (dd, *J*=3Hz, *J*=2Hz, 1H), 7.03-7.08 (m, 2H), 7.14 (d, *J*=9Hz, 1H), 7.46 (t, *J*=7Hz, 1H), 7.61 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.91 (dd, *J*=9Hz, *J*=2Hz, 1H), 8.05 (d, *J*=9Hz, 1H), 8.25 (d, *J*=8Hz, 1H), 8.37 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.49 (s, 1H), 8.64 (dd, *J*=5Hz, *J*=2Hz, 1H), 8.66 (d, *J*=3Hz, 1H), 9.00 (d, *J*=2Hz, 1H), 10.59 (s, 1H); ESIMS found for $C_{29}H_{24}FN_5O_3$ *m/z* 509.2 (M+H).

Step **4**

[00559] Preparation of N-(6-(2-fluorophenoxy)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide (**18**) was performed following the procedure listed in Scheme 28, Step 4. White solid (128 mg, 0.30 mmol, 54.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.16 (d, *J*=9Hz, 1H), 7.23-7.39 (m, 4H), 7.52 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.79-7.85 (m, 2H), 8.13 (td, *J*=8Hz, *J*=2Hz, 1H), 8.38 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.46 (s, 1H), 8.56 (d, *J*=3Hz, 1H), 8.59 (dd, *J*=5Hz, *J*=1Hz, 1H), 8.93 (d, *J*=2Hz, 1H), 10.65 (s, 1H), 13.96 (brs, 1H); ESIMS found for $C_{24}H_{16}FN_5O_2$ *m/z* 426.0 (M+H).

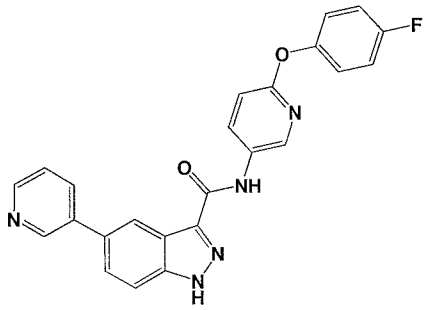
[00560] The following compounds were prepared in accordance with the procedure described in the above Example **6**.



19

[00561] N-(6-(3-Fluorophenoxy)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **19**.

[00562] Off-white solid (148 mg, 0.35 mmol, 89.3% yield). ^{1}H NMR (DMSO-d_6) δ ppm 6.98 (dd, *J*=8Hz, *J*=2Hz, 1H), 7.01-7.06 (m, 2H), 7.13 (d, *J*=9Hz, 1H), 7.44 (q, *J*=7Hz, 1H), 7.53 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.80-7.85 (m, 2H), 8.14 (td, *J*=6Hz, *J*=2Hz, 1H), 8.40 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.47 (s, 1H), 8.60 (dd, *J*=5Hz, *J*=1Hz, 1H), 8.69 (d, *J*=3Hz, 1H), 8.93 (d, *J*=2Hz, 1H), 10.71 (s, 1H), 13.99 (s, 1H); ESIMS found for $C_{24}H_{16}FN_5O_2$ *m/z* 426.0 (M+H).



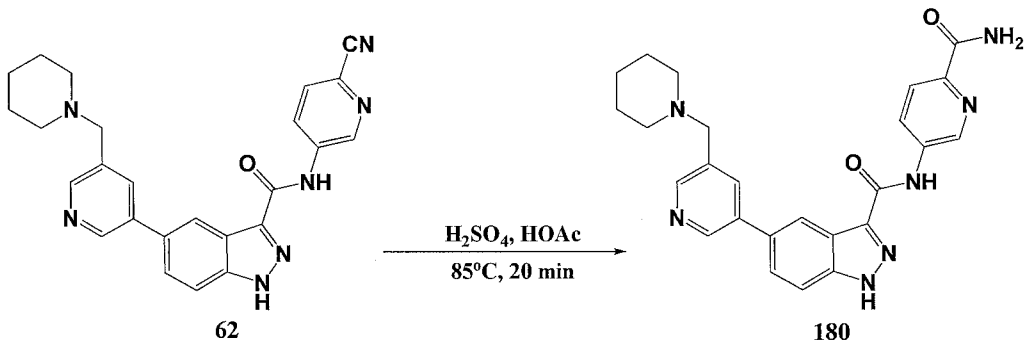
20

[00563] N-(6-(4-Fluorophenoxy)pyridin-3-yl)-5-(pyridin-3-yl)-1H-indazole-3-carboxamide **20**.

[00564] White solid (82 mg, 0.19 mmol, 91.8% yield). ^{1}H NMR (DMSO-d_6) δ ppm 7.08 (d, *J*=9Hz, 1H), 7.15-7.21 (m, 2H), 7.22-7.27 (m, 2H), 7.67 (dd, *J*=8Hz, *J*=5Hz, 1H), 7.81-7.88 (m, 2H), 8.31 (d, *J*=8Hz, 1H), 8.36 (dd, *J*=9Hz, *J*=3Hz, 1H), 8.51 (s, 1H), 8.63 (d, *J*=3Hz, 1H), 8.66 (dd, *J*=5Hz, *J*=1Hz, 1H), 9.02 (d, 2Hz, 1H), 10.67 (s, 1H), 14.00 (s, 1H); ESIMS found for $C_{24}H_{16}FN_5O_2$ *m/z* 426.0 (M+H).

Example 7

[00565] Preparation of N-(6-carbamoylpyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**180**) is depicted below in Scheme **33**.



Scheme 33

Step **1**

[00566] To a solution of N-(6-cyanopyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**62**) (200 mg, 0.45 mmol) in glacial acetic acid (2 mL) heated at 85°C was carefully added dropwise sulfuric acid (2 mL). The reaction was heated at 85°C for another 20 minutes before pouring into ice. The solution was basified with cold 5N NH_4OH. The solids formed were filtered, washed with cold washed and dried under vacuum. The dry solid was suspended in DCM and a few drops of MeOH were added. The insoluble solids were filtered and discarded. The filtrate was concentrated and suspended again in DCM, boiled for 15 minutes and filtered. The solid was dried under vacuum to give N-(6-carbamoylpyridin-3-yl)-5-(5-(piperidin-1-ylmethyl)pyridin-3-yl)-1H-indazole-3-carboxamide (**180**) as a white solid (192 mg, 0.42 mmol, 93.7% yield). ^{1}H NMR (DMSO-d_6) δ ppm 1.36-1.42 (m, 2H), 1.48-1.55 (m, 4H), 2.38 (brs, 4H), 3.56 (s, 2H), 7.49 (s, 1H), 7.65 (d, *J*=9Hz, 1H), 7.80 (d, *J*=9Hz, 1H), 7.97 (s, 1H), 8.03 (s, 2H), 8.41 (s, 1H), 8.45 (d, *J*=2Hz, 1H), 8.54 (dd, *J*=9Hz, *J*=2.5Hz, 1H), 8.80 (d, *J*=2Hz, 1H), 9.15 (d, *J*=2Hz, 1H), 10.83 (brs, 1H); ESIMS found for $C_{25}H_{25}N_7O_2$ *m/z* 456.4 (M+H).

Administration and Pharmaceutical Compositions

[00567] Some embodiments include pharmaceutical compositions comprising: (a) a safe and therapeutically effective amount of the indazole-3-carboxamide, or its corresponding enantiomer, diastereoisomer or tautomer, or pharmaceutically acceptable salt; and (b) a pharmaceutically acceptable carrier.

[00568] The compounds of this invention may also be useful in combination (administered together or sequentially) with other known agents.

[00569] Administration of the compounds disclosed herein or the pharmaceutically acceptable salts thereof can be via any of the accepted modes of administration for agents that serve similar utilities including, but not limited to, orally, subcutaneously, intravenously, intranasally, topically, transdermally, intraperitoneally, intramuscularly, intrapulmonarilly, vaginally, rectally, ontologically, neuro-otologically, intraocularly, subconjuctivally, via anterior eye chamber injection, intravitreally, intraperitoneally, intrathecally, intracystically, intrapleurally, via wound irrigation, intrabuccally, intra-abdominally, intra-articularly, intra-aurally, intrabronchially, intracapsularly, intrameningeally, via inhalation, via endotracheal or endobronchial instillation, via direct instillation into pulmonary cavities, intraspinally, intrasynovially, intrathoracically, via thoracostomy irrigation, epidurally, intratympanically, intracisternally, intravascularly, intraventricularly, intraosseously, via irrigation of infected bone, or via application as part of any admixture with a prosthetic devices. Oral and parenteral administrations are customary in treating the indications.

[00570] Compounds of the invention intended for pharmaceutical use may be administered as crystalline or amorphous products. Pharmaceutically acceptable compositions may include solid, semi-solid, liquid, solutions, colloidal, liposomes, emulsions, suspensions, complexes, coacervates and aerosols. Dosage forms, such as, *e.g.*, tablets, capsules, powders, liquids, suspensions, suppositories, aerosols, implants, controlled release or the like. They may be obtained, for example, as solid plugs, powders, or films by methods such as precipitation, crystallization, milling, grinding, supercritical fluid processing, coacervation, complex coacervation, encapsulation, emulsification, complexation, freeze drying, spray drying, or evaporative drying. Microwave or radio frequency drying may be used for this purpose. The compounds can also be administered in sustained or controlled release dosage forms, including depot

injections, osmotic pumps, pills (tablets and or capsules), transdermal (including electrotransport) patches, implants and the like, for prolonged and/or timed, pulsed administration at a predetermined rate.

[00571] The compounds can be administered either alone or more typically in combination with a conventional pharmaceutical carrier, excipient or the like. The term "excipient" is used herein to describe any ingredient other than the compound(s) of the invention. Pharmaceutically acceptable excipients include, but are not limited to, ion exchangers, alumina, aluminum stearate, lecithin, self-emulsifying drug delivery systems (SEDDS) such as d-α-tocopherol polyethylene glycol 1000 succinate, surfactants used in pharmaceutical dosage forms such as Tweens, poloxamers or other similar polymeric delivery matrices, serum proteins, such as human serum albumin, buffer substances such as phosphates, tris, glycine, sorbic acid, potassium sorbate, partial glyceride mixtures of saturated vegetable fatty acids, water, salts or electrolytes, such as protamine sulfate, disodium hydrogen phosphate, potassium hydrogen phosphate, sodium-chloride, zinc salts, colloidal silica, magnesium trisilicate, polyvinyl pyrrolidone, cellulose-based substances, polyethylene glycol, sodium carboxymethyl cellulose, polyacrylates, waxes, polyethylene-polyoxypropylene-block polymers, and wool fat. Cyclodextrins such as α-, β, and γ-cyclodextrin, or chemically modified derivatives such as hydroxyalkylcyclodextrins, including 2- and 3-hydroxypropyl-b-cyclodextrins, or other solubilized derivatives can also be advantageously used to enhance delivery of compounds of the formulae described herein. Dosage forms or compositions containing a compound as described herein in the range of 0.005% to 100% with the balance made up from non-toxic carrier may be prepared. The contemplated compositions may contain 0.001%-100% active ingredient, in one embodiment 0.1-95%, in another embodiment 75-85%, in a further embodiment 20-80%, Actual methods of preparing such dosage forms are known, or will be apparent, to those skilled in this art; for example, see *Remington: The Science and Practice of Pharmacy*, 21st Edition (Lippincott Williams & Wilkins. 2005).

[00572] In one preferred embodiment, the compositions will take the form of a unit dosage form such as a pill or tablet and thus the composition may contain, along with the active ingredient, a diluent such as lactose, sucrose, dicalcium phosphate, or the like;

a lubricant such as magnesium stearate or the like; and a binder such as starch, gum acacia, polyvinylpyrrolidine, gelatin, cellulose, cellulose derivatives or the like. In another solid dosage form, a powder, marume, solution or suspension (*e.g.*, in propylene carbonate, vegetable oils, PEG's, poloxamer 124 or triglycerides) is encapsulated in a capsule (gelatin or cellulose base capsule). Unit dosage forms in which the two active ingredients are physically separated are also contemplated; *e.g.*, capsules with granules (or tablets in a capsule) of each drug; two-layer tablets; two-compartment gel caps, etc. Enteric coated or delayed release oral dosage forms are also contemplated.

[00573] Liquid pharmaceutically administrable compositions can, for example, be prepared by dissolving, dispersing, etc. an active compound as defined above and optional pharmaceutical adjuvants in a carrier (*e.g.*, water, saline, aqueous dextrose, glycerol, glycols, ethanol or the like) to form a solution, colloid, liposome, emulsion, complexes, coacervate or suspension. If desired, the pharmaceutical composition can also contain minor amounts of nontoxic auxiliary substances such as wetting agents, emulsifying agents, co-solvents, solubilizing agents, pH buffering agents and the like (*e.g.*, sodium acetate, sodium citrate, cyclodextrine derivatives, sorbitan monolaurate, triethanolamine acetate, triethanolamine oleate, and the like).

[00574] In some embodiments, the unit dosage of compounds of Formula (**I**) is 0.25 mg/Kg to 50 mg/Kg in humans.

[00575] In some embodiments, the unit dosage of compounds of Formula (**I**) is 0.25 mg/Kg to 20 mg/Kg in humans.

[00576] In some embodiments, the unit dosage of compounds of Formula (**I**) is 0.50 mg/Kg to 19 mg/Kg in humans.

[00577] In some embodiments, the unit dosage of compounds of Formula (**I**) is 0.75 mg/Kg to 18 mg/Kg in humans.

[00578] In some embodiments, the unit dosage of compounds of Formula (**I**) is 1.0 mg/Kg to 17 mg/Kg in humans.

[00579] In some embodiments, the unit dosage of compounds of Formula (**I**) is 1.25 mg/Kg to 16 mg/Kg in humans.

[00580] In some embodiments, the unit dosage of compounds of Formula (**I**) is 1.50 mg/Kg to 15 mg/Kg in humans.

[00581] In some embodiments, the unit dosage of compounds of Formula (**I**) is 1.75 mg/Kg to 14 mg/Kg in humans.

[00582] In some embodiments, the unit dosage of compounds of Formula (**I**) is 2.0 mg/Kg to 13 mg/Kg in humans.

[00583] In some embodiments, the unit dosage of compounds of Formula (**I**) is 3.0 mg/Kg to 12 mg/Kg in humans.

[00584] In some embodiments, the unit dosage of compounds of Formula (**I**) is 4.0 mg/Kg to 11 mg/Kg in humans.

[00585] In some embodiments, the unit dosage of compounds of Formula (**I**) is 5.0 mg/Kg to 10 mg/Kg in humans.

[00586] In some embodiments, the compositions are provided in unit dosage forms suitable for single administration of a precise dose.

[00587] In some embodiments, the compositions are provided in unit dosage forms suitable for twice a day administration of a precise dose.

[00588] In some embodiments, the compositions are provided in unit dosage forms suitable for three times a day administration of a precise dose.

[00589] Injectables can be prepared in conventional forms, either as liquid solutions, colloid, liposomes, complexes, coacervate or suspensions, as emulsions, or in solid forms suitable for reconstitution in liquid prior to injection. The percentage of active compound contained in such parenteral compositions is highly dependent on the specific nature thereof, as well as the activity of the compound and the needs of the subject. However, percentages of active ingredient of 0.01% to 10% in solution are employable, and could be higher if the composition is a solid or suspension, which could be subsequently diluted to the above percentages.

[00590] In some embodiments, the composition will comprise 0.1-10% of the active agent in solution.

[00591] In some embodiments, the composition will comprise 0.1-5% of the active agent in solution.

[00592] In some embodiments, the composition will comprise 0.1-4% of the active agent in solution.

[00593] In some embodiments, the composition will comprise 0.15-3% of the active agent in solution.

[00594] In some embodiments, the composition will comprise 0.2-2% of the active agent in solution.

[00595] In some embodiments, the compositions are provided in dosage forms suitable for continuous dosage by intravenous infusion over a period of 1-96 hours.

[00596] In some embodiments, the compositions are provided in dosage forms suitable for continuous dosage by intravenous infusion over a period of 1-72 hours.

[00597] In some embodiments, the compositions are provided in dosage forms suitable for continuous dosage by intravenous infusion over a period of 1-48 hours.

[00598] In some embodiments, the compositions are provided in dosage forms suitable for continuous dosage by intravenous infusion over a period of 1-24 hours.

[00599] In some embodiments, the compositions are provided in dosage forms suitable for continuous dosage by intravenous infusion over a period of 1-12 hours.

[00600] In some embodiments, the compositions are provided in dosage forms suitable for continuous dosage by intravenous infusion over a period of 1-6 hours.

[00601] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 5 mg/m^2 to 300 mg/m^2.

[00602] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 5 mg/m^2 to 200 mg/m^2.

[00603] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 5 mg/m^2 to 100 mg/m^2.

[00604] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 10 mg/m^2 to 50 mg/m^2.

[00605] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 50 mg/m^2 to 200 mg/m^2.

[00606] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 75 mg/m^2 to 175 mg/m^2.

[00607] In some embodiments, these compositions can be administered by intravenous infusion to humans at doses of 100 mg/m^2 to 150 mg/m^2.

[00608] In one preferred embodiment, the compositions can be administered to the respiratory tract (including nasal and pulmonary) e.g., through a nebulizer, metered-dose inhalers, atomizer, mister, aerosol, dry powder inhaler, insufflator, liquid instillation or other suitable device or technique.

[00609] In some embodiments, aerosols intended for delivery to the nasal mucosa are provided for inhalation through the nose. For optimal delivery to the nasal cavities, inhaled particle sizes of about 5 to about 100 microns are useful, with particle sizes of about 10 to about 60 microns being preferred. For nasal delivery, a larger inhaled particle size is desired to maximize impaction on the nasal mucosa and to minimize or prevent pulmonary deposition of the administered formulation. In some embodiments, aerosols intended for delivery to the lung are provided for inhalation through the nose or the mouth. For optimal delivery to the lung, inhaled aerodynamic particle sizes of equal or less than 10 μm are useful, with an aerodynamic particle size of about 0.1 to 10 microns being preferred. Inhaled particles may be defined as liquid droplets containing dissolved drug, liquid droplets containing suspended drug particles (in cases where the drug is insoluble in the suspending medium), dry particles of pure drug substance, drug substance incorporated with excipients, liposomes, emulsions, colloidal systems, coacervates, aggregates of drug nanoparticles, or dry particles of a diluent which contain embedded drug nanoparticles.

[00610] In some embodiments, compounds of Formula (**I**) disclosed herein intended for respiratory delivery (either systemic or local) can be administered as aqueous formulations, as non-aqueous solutions or suspensions, as suspensions or solutions in halogenated hydrocarbon propellants with or without alcohol, as a colloidal system, as emulsions, coacervates or as dry powders. Aqueous formulations may be aerosolized by liquid nebulizers employing either hydraulic or ultrasonic atomization or by modified micropump systems (like the soft mist inhalers, the Aerodose® or the AERx® systems). Propellant-based systems may use suitable pressurized metered-dose inhalers (pMDIs). Dry powders may use dry powder inhaler devices (DPIs), which are capable of dispersing the drug substance effectively. A desired particle size and distribution may be obtained by choosing an appropriate device.

[00611] In some embodiments, the compositions of Formula (**I**) disclosed herein can be administered to the ear by various methods. For example, a round window catheter (e.g., U.S. Pat. Nos. 6,440,102 and 6,648,873) can be used.

[00612] Alternatively, formulations can be incorporated into a wick for use between the outer and middle ear (e.g., U.S. Pat. No. 6,120,484) or absorbed to collagen sponge or other solid support (e.g., U.S. Pat. No. 4,164,559).

[00613] If desired, formulations of the invention can be incorporated into a gel formulation (e.g., U.S. Pat. Nos. 4,474,752 and 6,911,211).

[00614] In some embodiments, compounds of Formula (**I**) disclosed herein intended for delivery to the ear can be administered via an implanted pump and delivery system through a needle directly into the middle or inner ear (cochlea) or through a cochlear implant stylet electrode channel or alternative prepared drug delivery channel such as but not limited to a needle through temporal bone into the cochlea.

[00615] Other options include delivery via a pump through a thin film coated onto a multichannel electrode or electrode with a specially imbedded drug delivery channel (pathways) carved into the thin film for this purpose. In other embodiments the acidic or basic solid gacyclidine can be delivered from the reservoir of an external or internal implanted pumping system.

[00616] Formulations of the invention also can be administered to the ear by intratympanic injection into the middle ear, inner ear, or cochlea (e.g., U.S. Pat. No. 6,377,849 and Ser. No. 11/337,815).

[00617] Intratympanic injection of therapeutic agents is the technique of injecting a therapeutic agent behind the tympanic membrane into the middle and/or inner ear. In one embodiment, the formulations described herein are administered directly onto the round window membrane via transtympanic injection. In another embodiment, the ion channel modulating agent auris-acceptable formulations described herein are administered onto the round window membrane via a non-transtympanic approach to the inner ear. In additional embodiments, the formulation described herein is administered onto the round window membrane via a surgical approach to the round window membrane comprising modification of the crista fenestrae cochleae.

[00618] In some embodiments, the compounds of Formula (**I**) are formulated in rectal compositions such as enemas, rectal gels, rectal foams, rectal aerosols, suppositories, jelly suppositories, or retention enemas, containing conventional suppository bases such as cocoa butter or other glycerides, as well as synthetic polymers such as polyvinylpyrrolidone, PEG (like PEG ointments), and the like. In suppository forms of the compositions, a low-melting wax such as, but not limited to, a mixture of fatty acid glycerides, optionally in combination with cocoa butter is first melted.

[00619] Suppositories for rectal administration of the drug (either as a solution, colloid, suspension or a complex) can be prepared by mixing the drug with a suitable non-irritating excipient that is solid at ordinary temperatures but liquid at the rectal temperature and will therefore melt or erode/dissolve in the rectum and release the drug. Such materials include cocoa butter, glycerinated gelatin, hydrogenated vegetable oils, poloxamers, mixtures of polyethylene glycols of various molecular weights and fatty acid esters of polyethylene glycol.

[00620] It is to be noted that concentrations and dosage values may also vary with the severity of the condition to be alleviated. It is to be further understood that for any particular patient, specific dosage regimens should be adjusted over time according to the individual need and the professional judgment of the person administering or supervising the administration of the compositions, and that the concentration ranges set forth herein are exemplary only and are not intended to limit the scope or practice of the claimed compositions.

[00621] Solid compositions can be provided in various different types of dosage forms, depending on the physicochemical properties of the drug, the desired dissolution rate, cost considerations, and other criteria. In one of the embodiments, the solid composition is a single unit. This implies that one unit dose of the drug is comprised in a single, physically shaped solid form or article. In other words, the solid composition is coherent, which is in contrast to a multiple unit dosage form, in which the units are incoherent.

[00622] Examples of single units which may be used as dosage forms for the solid composition include tablets, such as compressed tablets, film-like units, foil-like units, wafers, lyophilized matrix units, and the like. In a preferred embodiment, the solid

composition is a highly porous lyophilized form. Such lyophilizates, sometimes also called wafers or lyophilized tablets, are particularly useful for their rapid disintegration, which also enables the rapid dissolution of the active compound.

[00623] On the other hand, for some applications the solid composition may also be formed as a multiple unit dosage form as defined above. Examples of multiple units are powders, granules, microparticles, pellets, mini-tablets, beads, lyophilized powders, and the like. In one embodiment, the solid composition is a lyophilized powder. Such a dispersed lyophilized system comprises a multitude of powder particles, and due to the lyophilization process used in the formation of the powder, each particle has an irregular, porous microstructure through which the powder is capable of absorbing water very rapidly, resulting in quick dissolution. Effervescent compositions are also contemplated to aid the quick dispersion and absorption of the compound.

[00624] Another type of multiparticulate system which is also capable of achieving rapid drug dissolution is that of powders, granules, or pellets from water-soluble excipients which are coated with the drug, so that the drug is located at the outer surface of the individual particles. In this type of system, the water-soluble low molecular weight excipient is useful for preparing the cores of such coated particles, which can be subsequently coated with a coating composition comprising the drug and, preferably, one or more additional excipients, such as a binder, a pore former, a saccharide, a sugar alcohol, a film-forming polymer, a plasticizer, or other excipients used in pharmaceutical coating compositions.

[00625] Also provided herein are kits. Typically, a kit includes one or more compounds or compositions as described herein. In certain embodiments, a kit can include one or more delivery systems, e.g., for delivering or administering a compound as provided above, and directions for use of the kit (e.g., instructions for treating a patient). In another embodiment, the kit can include a compound or composition as described herein and a label that indicates that the contents are to be administered to a patient with cancer. In another embodiment, the kit can include a compound or composition as described herein and a label that indicates that the contents are to be administered to a patient with one or more of hepatocellular carcinoma, colon cancer, leukemia, lymphoma, sarcoma, ovarian cancer, diabetic retinopathy, pulmonary fibrosis,

rheumatoid arthritis, scleroderma, mycotic and viral infections, bone and cartilage diseases, Alzheimer's disease, lung disease, osteoarthritis, polyposis coli, bone density and vascular defects in the eye (Osteoporosis-pseudoglioma Syndrome, OPPG), familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-amelia, Müllerian-duct regression and virilization, SERKAL syndrome, type II diabetes, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman's syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome

[00626] The actual dose of the active compounds of the present invention depends on the specific compound, and on the condition to be treated; the selection of the appropriate dose is well within the knowledge of the skilled artisan.

Methods of Treatment

[00627] The compounds and compositions provided herein can be used as inhibitors and/or modulators of one or more components of the Wnt pathway, which may include one or more Wnt proteins, and thus can be used to treat a variety of disorders and diseases in which aberrant Wnt signaling is implicated, such as cancer and other diseases associated with abnormal angiogenesis, cellular proliferation, and cell cycling. Accordingly, the compounds and compositions provided herein can be used to treat cancer, to reduce or inhibit angiogenesis, to reduce or inhibit cellular proliferation, to correct a genetic disorder, and/or to treat a neurological condition/disorder/disease due to mutations or dysregulation of the Wnt pathway and/or of one or more of Wnt signaling components. Non-limiting examples of diseases which can be treated with the compounds and compositions provided herein include a variety of cancers, diabetic retinopathy, pulmonary fibrosis, rheumatoid arthritis, scleroderma, mycotic and viral infections, bone and cartilage diseases, neurological conditions/diseases such as Alzheimer's disease, amyotrophic lateral sclerosis (ALS), motor neurone disease, multiple sclerosis or autism, lung disease, osteoarthritis, polyposis coli, bone density and

vascular defects in the eye (Osteoporosis-pseudoglioma Syndrome, OPPG), familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-amelia, Müllerian-duct regression and virilization, SERKAL syndrome, type II diabetes, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman's syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome.

[00628] With respect to cancer, the Wnt pathway is known to be constitutively activated in a variety of cancers including, for example, colon cancer, hepatocellular carcinoma, lung cancer, ovarian cancer, prostate cancer , pancreatic cancer and leukemias such as CML, CLL and T-ALL. The constitutive activation is due to constitutively active β-catenin, perhaps due to its stabilization by interacting factors or inhibition of the degradation pathway. Accordingly, the compounds and compositions described herein may be used to treat these cancers in which the Wnt pathway is constitutively activated. In certain embodiments, the cancer is chosen from hepatocellular carcinoma, colon cancer, leukemia, lymphoma, sarcoma and ovarian cancer.

[00629] Other cancers can also be treated with the compounds and compositions described herein.

[00630] More particularly, cancers that may be treated by the compound, compositions and methods described herein include, but are not limited to, the following:

[00631] 1) Breast cancers, including, for example ER^+ breast cancer, ER^- breast cancer, $her2^-$ breast cancer, $her2^+$ breast cancer, stromal tumors such as fibroadenomas, phyllodes tumors, and sarcomas, and epithelial tumors such as large duct papillomas; carcinomas of the breast including *in situ* (noninvasive) carcinoma that includes ductal carcinoma *in situ* (including Paget's disease) and lobular carcinoma *in situ*, and invasive (infiltrating) carcinoma including, but not limited to, invasive ductal carcinoma, invasive lobular carcinoma, medullary carcinoma, colloid (mucinous) carcinoma, tubular carcinoma, and invasive papillary carcinoma; and miscellaneous malignant neoplasms. Further examples of breast cancers can include luminal A, luminal B, basal A, basal B,

and triple negative breast cancer, which is estrogen receptor negative (ER^-), progesterone receptor negative, and her2 negative ($her2^-$). In some embodiments, the breast cancer may have a high risk Oncotype score.

[00632] 2) Cardiac cancers, including, for example sarcoma, e.g., angiosarcoma, fibrosarcoma, rhabdomyosarcoma, and liposarcoma; myxoma; rhabdomyoma; fibroma; lipoma and teratoma.

[00633] 3) Lung cancers, including, for example, bronchogenic carcinoma, e.g., squamous cell, undifferentiated small cell, undifferentiated large cell, and adenocarcinoma; alveolar and bronchiolar carcinoma; bronchial adenoma; sarcoma; lymphoma; chondromatous hamartoma; and mesothelioma.

[00634] 4) Gastrointestinal cancer, including, for example, cancers of the esophagus, e.g., squamous cell carcinoma, adenocarcinoma, leiomyosarcoma, and lymphoma; cancers of the stomach, e.g., carcinoma, lymphoma, and leiomyosarcoma; cancers of the pancreas, e.g., ductal adenocarcinoma, insulinoma, glucagonoma, gastrinoma, carcinoid tumors, and vipoma; cancers of the small bowel, e.g., adenocarcinoma, lymphoma, carcinoid tumors, Kaposi's sarcoma, leiomyoma, hemangioma, lipoma, neurofibroma, and fibroma; cancers of the large bowel, e.g., adenocarcinoma, tubular adenoma, villous adenoma, hamartoma, and leiomyoma.

[00635]) Genitourinary tract cancers, including, for example, cancers of the kidney, e.g., adenocarcinoma, Wilm's tumor (nephroblastoma), lymphoma, and leukemia; cancers of the bladder and urethra, e.g., squamous cell carcinoma, transitional cell carcinoma, and adenocarcinoma; cancers of the prostate, e.g., adenocarcinoma, and sarcoma; cancer of the testis, e.g., seminoma, teratoma, embryonal carcinoma, teratocarcinoma, choriocarcinoma, sarcoma, interstitial cell carcinoma, fibroma, fibroadenoma, adenomatoid tumors, and lipoma.

[00636] 6) Liver cancers, including, for example, hepatoma, e.g., hepatocellular carcinoma; cholangiocarcinoma; hepatoblastoma; angiosarcoma; hepatocellular adenoma; and hemangioma.

[00637] 7) Bone cancers, including, for example, osteogenic sarcoma (osteosarcoma), fibrosarcoma, malignant fibrous histiocytoma, chondrosarcoma, Ewing's sarcoma, malignant lymphoma (reticulum cell sarcoma), multiple myeloma, malignant

giant cell tumor chordoma, osteochrondroma (osteocartilaginous exostoses), benign chondroma, chondroblastoma, chondromyxofibroma, osteoid osteoma and giant cell tumors.

[00638] 8) Nervous system cancers, including, for example, cancers of the skull, e.g., osteoma, hemangioma, granuloma, xanthoma, and osteitis deformans; cancers of the meninges, e.g., meningioma, meningiosarcoma, and gliomatosis; cancers of the brain, e.g., astrocytoma, medulloblastoma, glioma, ependymoma, germinoma (pinealoma), glioblastoma multiform, oligodendroglioma, schwannoma, retinoblastoma, and congenital tumors; and cancers of the spinal cord, e.g., neurofibroma, meningioma, glioma, and sarcoma.

[00639] 9) Gynecological cancers, including, for example, cancers of the uterus, e.g., endometrial carcinoma; cancers of the cervix, e.g., cervical carcinoma, and pre tumor cervical dysplasia; cancers of the ovaries, e.g., ovarian carcinoma, including serous cystadenocarcinoma, mucinous cystadenocarcinoma, unclassified carcinoma, granulosa theca cell tumors, Sertoli Leydig cell tumors, dysgerminoma, and malignant teratoma; cancers of the vulva, e.g., squamous cell carcinoma, intraepithelial carcinoma, adenocarcinoma, fibrosarcoma, and melanoma; cancers of the vagina, e.g., clear cell carcinoma, squamous cell carcinoma, botryoid sarcoma, and embryonal rhabdomyosarcoma; and cancers of the fallopian tubes, e.g., carcinoma.

[00640] 10) Hematologic cancers, including, for example, cancers of the blood, e.g., acute myeloid leukemia, chronic myeloid leukemia, acute lymphoblastic leukemia, chronic lymphocytic leukemia, myeloproliferative diseases, multiple myeloma, and myelodysplastic syndrome, Hodgkin's lymphoma, non Hodgkin's lymphoma (malignant lymphoma) and Waldenström's macroglobulinemia.

[00641] 11) Skin cancers and skin disorders, including, for example, malignant melanoma, basal cell carcinoma, squamous cell carcinoma, Kaposi's sarcoma, moles dysplastic nevi, lipoma, angioma, dermatofibroma, keloids, and scleroderma.

[00642] 12) Adrenal gland cancers, including, for example, neuroblastoma.

[00643] Cancers may be solid tumors that may or may not be metastatic. Cancers may also occur, as in leukemia, as a diffuse tissue. Thus, the term "tumor cell," as provided herein, includes a cell afflicted by any one of the above identified disorders.

[00644] A method of treating cancer using a compound or composition as described herein may be combined with existing methods of treating cancers, for example by chemotherapy, irradiation, or surgery (e.g., oophorectomy). In some embodiments, a compound or composition can be administered before, during, or after another anticancer agent or treatment.

[00645] The compounds and compositions described herein can be used as anti-angiogenesis agents and as agents for modulating and/or inhibiting the activity of protein kinases, thus providing treatments for cancer and other diseases associated with cellular proliferation mediated by protein kinases. Accordingly, provided herein is a method of treating cancer or preventing or reducing angiogenesis through kinase inhibition.

[00646] In addition, and including treatment of cancer, the compounds and compositions described herein can function as cell-cycle control agents for treating proliferative disorders in a patient. Disorders associated with excessive proliferation include, for example, cancers, scleroderma, immunological disorders involving undesired proliferation of leukocytes, and restenosis and other smooth muscle disorders. Furthermore, such compounds may be used to prevent de-differentiation of post-mitotic tissue and/or cells.

[00647] Diseases or disorders associated with uncontrolled or abnormal cellular proliferation include, but are not limited to, the following:

- a variety of cancers, including, but not limited to, carcinoma, hematopoietic tumors of lymphoid lineage, hematopoietic tumors of myeloid lineage, tumors of mesenchymal origin, tumors of the central and peripheral nervous system and other tumors including melanoma, seminoma and Kaposi's sarcoma.
- a disease process which features abnormal cellular proliferation, e.g., benign prostatic hyperplasia, familial adenomatosis polyposis, neurofibromatosis, atherosclerosis, arthritis, glomerulonephritis, restenosis following angioplasty or vascular surgery, inflammatory bowel disease, transplantation rejection, endotoxic shock, and fungal infections. Fibrotic disorders such as skin fibrosis; scleroderma; progressive systemic fibrosis;

lung fibrosis; muscle fibrosis; kidney fibrosis; glomerulosclerosis; glomerulonephritis; hypertrophic scar formation; uterine fibrosis; renal fibrosis; cirrhosis of the liver, liver fibrosis; adhesions, such as those occurring in the abdomen, pelvis, spine or tendons; chronic obstructive pulmonary disease; fibrosis following myocardial infarction; pulmonary fibrosis; fibrosis and scarring associated with diffuse/interstitial lung disease; central nervous system fibrosis, such as fibrosis following stroke; fibrosis associated with neuro-degenerative disorders such as Alzheimer's Disease or multiple sclerosis; fibrosis associated with proliferative vitreoretinopathy (PVR); restenosis; endometriosis; ischemic disease and radiation fibrosis.

- defective apoptosis-associated conditions, such as cancers (including but not limited to those types mentioned herein), viral infections (including but not limited to herpesvirus, poxvirus, Epstein-Barr virus, Sindbis virus and adenovirus), prevention of AIDS development in HIV-infected individuals, autoimmune diseases (including but not limited to systemic lupus erythematosus, rheumatoid arthritis, scleroderma, autoimmune mediated glomerulonephritis, inflammatory bowel disease and autoimmune diabetes mellitus), neurodegenerative disorders (including but not limited to Alzheimer's disease, lung disease, amyotrophic lateral sclerosis, retinitis pigmentosa, Parkinson's disease, AIDS-related dementia, spinal muscular atrophy and cerebellar degeneration), myelodysplastic syndromes, aplastic anemia, ischemic injury associated with myocardial infarctions, stroke and reperfusion injury, arrhythmia, atherosclerosis, toxin-induced or alcohol related liver diseases, hematological diseases (including but not limited to chronic anemia and aplastic anemia), degenerative diseases of the musculoskeletal system (including but not limited to osteroporosis and arthritis), aspirin-sensitive rhinosinusitis, cystic fibrosis, multiple sclerosis, kidney diseases and cancer pain.
- genetic diseases due to mutations in Wnt signaling components, such as polyposis coli, bone density and vascular defects in the eye (Osteoporosis-

pseudoglioma Syndrome, OPPG), familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-amelia, Müllerian-duct regression and virilization, SERKAL syndrome, type II diabetes, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman's syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome.

[00648] Furthermore, the compounds and compositions described herein can be used to treat neurological conditions, disorders and/or diseases caused by dysfunction in the Wnt signaling pathway. Non-limiting examples of neurological conditions/disorders/diseases which can be treated with the compounds and compositions provided herein include Alzheimer's disease, aphasia, apraxia, arachnoiditis, ataxia telangiectasia, attention deficit hyperactivity disorder, auditory processing disorder, autism, alcoholism, Bell's palsy, bipolar disorder, brachial plexus injury, Canavan disease, carpal tunnel syndrome, causalgia, central pain syndrome, central pontine myelinolysis, centronuclear myopathy, cephalic disorder, cerebral aneurysm, cerebral arteriosclerosis, cerebral atrophy, cerebral gigantism, cerebral palsy, cerebral vasculitis, cervical spinal stenosis, Charcot-Marie-Tooth disease, Chiari malformation, chronic fatigue syndrome, chronic inflammatory demyelinating polyneuropathy (CIDP), chronic pain, Coffin–Lowry syndrome, complex regional pain syndrome, compression neuropathy, congenital facial diplegia, corticobasal degeneration, cranial arteritis, craniosynostosis, Creutzfeldt-Jakob disease, cumulative trauma disorder, Cushing's syndrome, cytomegalic inclusion body disease (CIBD), Dandy-Walker syndrome, Dawson disease, De Morsier's syndrome, Dejerine-Klumpke palsy, Dejerine-Sottas disease, delayed sleep phase syndrome, dementia, dermatomyositis, developmental dyspraxia, diabetic neuropathy, diffuse sclerosis, Dravet syndrome, dysautonomia, dyscalculia, dysgraphia, dyslexia, dystonia, empty sella syndrome, encephalitis, encephalocele, encephalotrigeminal angiomatosis, encopresis, epilepsy, Erb's palsy,

erythromelalgia, essential tremor, Fabry's disease, Fahr's syndrome, familial spastic paralysis, febrile seizure, Fisher syndrome, Friedreich's ataxia, fibromyalgia, Foville's syndrome, Gaucher's disease, Gerstmann's syndrome, giant cell arteritis, giant cell inclusion disease, globoid cell leukodystrophy, gray matter heterotopia, Guillain-Barré syndrome, HTLV-1 associated myelopathy, Hallervorden-Spatz disease, hemifacial spasm, hereditary spastic paraplegia, heredopathia atactica polyneuritiformis, herpes zoster oticus, herpes zoster, Hirayama syndrome, holoprosencephaly, Huntington's disease, hydranencephaly, hydrocephalus, hypercortisolism, hypoxia, immune-mediated encephalomyelitis, inclusion body myositis, incontinentia pigmenti, infantile phytanic acid storage disease, infantile Refsum disease, infantile spasms, inflammatory myopathy, intracranial cyst, intracranial hypertension, Joubert syndrome, Karak syndrome, Kearns-Sayre syndrome, Kennedy disease, Kinsbourne syndrome, Klippel Feil syndrome, Krabbe disease, Kugelberg-Welander disease, kuru, Lafora disease, Lambert-Eaton myasthenic syndrome, Landau-Kleffner syndrome, lateral medullary (Wallenberg) syndrome, Leigh's disease, Lennox-Gastaut syndrome, Lesch-Nyhan syndrome, leukodystrophy, Lewy body dementia, lissencephaly, locked-in syndrome, Lou Gehrig's disease, lumbar disc disease, lumbar spinal stenosis, Lyme disease, Machado-Joseph disease (Spinocerebellar ataxia type 3), macrencephaly, macropsia, megalencephaly, Melkersson-Rosenthal syndrome, Menieres disease, meningitis, Menkes disease, etachromatic leukodystrophy, microcephaly, micropsia, Miller Fisher syndrome, misophonia, mitochondrial myopathy, Mobius syndrome, monomelic amyotrophy, motor neurone disease, motor skills disorder, Moyamoya disease, mucopolysaccharidoses, multi-infarct dementia, multifocal motor neuropathy, multiple sclerosis, multiple system atrophy, muscular dystrophy, myalgic encephalomyelitis, myasthenia gravis, myelinoclastic diffuse sclerosis, myoclonic Encephalopathy of infants, myoclonus, myopathy, myotubular myopathy, myotonia congenital, narcolepsy, neurofibromatosis, neuroleptic malignant syndrome, lupus erythematosus, neuromyotonia, neuronal ceroid lipofuscinosis, Niemann-Pick disease, O'Sullivan-McLeod syndrome, occipital Neuralgia, occult Spinal Dysraphism Sequence, Ohtahara syndrome, olivopontocerebellar atrophy, opsoclonus myoclonus syndrome, optic neuritis, orthostatic hypotension, palinopsia, paresthesia, Parkinson's disease, paramyotonia Congenita, paraneoplastic

diseases, paroxysmal attacks, Parry-Romberg syndrome, Pelizaeus-Merzbacher disease, periodic paralyses, peripheral neuropathy, photic sneeze reflex, phytanic acid storage disease, Pick's disease, polymicrogyria (PMG), polymyositis, porencephaly, post-polio syndrome, postherpetic neuralgia (PHN), postural hypotension, Prader-Willi syndrome, primary lateral sclerosis, prion diseases, progressive hemifacial atrophy, progressive multifocal leukoencephalopathy, progressive supranuclear palsy, pseudotumor cerebri, Ramsay Hunt syndrome type I, Ramsay Hunt syndrome type II, Ramsay Hunt syndrome type III, Rasmussen's encephalitis, reflex neurovascular dystrophy, Refsum disease, restless legs syndrome, retrovirus-associated myelopathy, Rett syndrome, Reye's syndrome, rhythmic movement disorder, Romberg syndrome, Saint Vitus dance, Sandhoff disease, schizophrenia, Schilder's disease, schizencephaly, sensory integration dysfunction, septo-optic dysplasia, Shy-Drager syndrome, Sjögren's syndrome, snatiation, Sotos syndrome, spasticity, spina bifida, spinal cord tumors, spinal muscular atrophy, spinocerebellar ataxia, Steele-Richardson-Olszewski syndrome, Stiff-person syndrome, stroke, Sturge-Weber syndrome, subacute sclerosing panencephalitis, subcortical arteriosclerotic encephalopathy, superficial siderosis, Sydenham's chorea, syncope, synesthesia, syringomyelia, tarsal tunnel syndrome, tardive dyskinesia, tardive dysphrenia, Tarlov cyst, Tay-Sachs disease, temporal arteritis, tetanus, tethered spinal cord syndrome, Thomsen disease, thoracic outlet syndrome, tic douloureux, Todd's paralysis, Tourette syndrome, toxic encephalopathy, transient ischemic attack, transmissible spongiform encephalopathies, transverse myelitis, tremor, trigeminal neuralgia, tropical spastic paraparesis, trypanosomiasis, tuberous sclerosis, ubisiosis, Von Hippel-Lindau disease (VHL), Viliuisk Encephalomyelitis (VE), Wallenberg's syndrome, Werdnig, Hoffman disease, west syndrome, Williams syndrome, Wilson's disease and Zellweger syndrome.

[00649] The compounds and compositions may also be useful in the inhibition of the development of invasive cancer, tumor angiogenesis and metastasis.

[00650] In some embodiment, the invention provides a method for treating a disease or disorder associated with aberrant cellular proliferation by administering to a patient in need of such treatment an effective amount of one or more of the compounds of

Formula (**I**), in combination (simultaneously or sequentially) with at least one other agent.

[00651] In some embodiments, the pharmaceutical composition comprises a therapeutically effective amount of a compound of Formula (**I**), or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable excipient.

[00652] In some embodiments, the method of treats a disorder or disease in which aberrant Wnt signaling is implicated in a patient, the method comprises administering to the patient a therapeutically effective amount of a compound of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00653] In some embodiments, the disorder or disease is cancer.

[00654] In some embodiments, the disorder or disease is diabetic retinopathy.

[00655] In some embodiments, the disorder or disease is pulmonary fibrosis.

[00656] In some embodiments, the disorder or disease is rheumatoid arthritis.

[00657] In some embodiments, the disorder or disease is scleroderma.

[00658] In some embodiments, the disorder or disease is a mycotic or viral infection.

[00659] In some embodiments, the disorder or disease is a bone or cartilage disease.

[00660] In some embodiments, the disorder or disease is osteoarthritis.

[00661] In some embodiments, the disorder or disease is lung disease.

[00662] In some embodiments, the disorder or disease is a genetic disease caused by mutations in Wnt signaling components, wherein the genetic disease is selected from: polyposis coli, osteoporosis-pseudoglioma syndrome, familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-amelia syndrome, Müllerian-duct regression and virilization, SERKAL syndrome, diabetes mellitus type 2, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication syndrome, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome.

[00663] In some embodiments, the patient is a human.

[00664] In some embodiments, the cancer is chosen from: hepatocellular carcinoma, colon cancer, breast cancer, pancreatic cancer, chronic myeloid leukemia (CML), chronic myelomonocytic leukemia, chronic lymphocytic leukemia (CLL), acute myeloid leukemia, acute lymphocytic leukemia, Hodgkin lymphoma, lymphoma, sarcoma and ovarian cancer.

[00665] In some embodiments, the cancer is chosen from: lung cancer - non-small cell, lung cancer - small cell, multiple myeloma, nasopharyngeal cancer, neuroblastoma, osteosarcoma, penile cancer, pituitary tumors, prostate cancer, retinoblastoma, rhabdomyosarcoma, salivary gland cancer, skin cancer - basal and squamous cell, skin cancer – melanoma, small intestine cancer, stomach cancers, testicular cancer, thymus cancer, thyroid cancer, uterine sarcoma, vaginal cancer, vulvar cancer, laryngeal or hypopharyngeal cancer, kidney cancer, Kaposi sarcoma, gestational trophoblastic disease, gastrointestinal stromal tumor, gastrointestinal carcinoid tumor, gallbladder cancer, eye cancer (melanoma and lymphoma), Ewing tumor, esophagus cancer, endometrial cancer, colorectal cancer, cervical cancer, brain or spinal cord tumor, bone metastasis, bone cancer, bladder cancer, bile duct cancer, anal cancer and adrenal cortical cancer.

[00666] In some embodiments, the cancer is hepatocellular carcinoma.

[00667] In some embodiments, the cancer is colon cancer.

[00668] In some embodiments, the cancer is breast cancer.

[00669] In some embodiments, the cancer is pancreatic cancer.

[00670] In some embodiments, the cancer is chronic myeloid leukemia (CML).

[00671] In some embodiments, the cancer is chronic myelomonocytic leukemia.

[00672] In some embodiments, the cancer is chronic lymphocytic leukemia (CLL).

[00673] In some embodiments, the cancer is acute myeloid leukemia.

[00674] In some embodiments, the cancer is acute lymphocytic leukemia.

[00675] In some embodiments, the cancer is Hodgkin lymphoma.

[00676] In some embodiments, the cancer is lymphoma.

[00677] In some embodiments, the cancer is sarcoma.

[00678] In some embodiments, the cancer is ovarian cancer.

[00679] In some embodiments, the cancer is lung cancer - non-small cell.

[00680] In some embodiments, the cancer is lung cancer - small cell.

[00681] In some embodiments, the cancer is multiple myeloma.

[00682] In some embodiments, the cancer is nasopharyngeal cancer.

[00683] In some embodiments, the cancer is neuroblastoma.

[00684] In some embodiments, the cancer is osteosarcoma.

[00685] In some embodiments, the cancer is penile cancer.

[00686] In some embodiments, the cancer is pituitary tumors.

[00687] In some embodiments, the cancer is prostate cancer.

[00688] In some embodiments, the cancer is retinoblastoma.

[00689] In some embodiments, the cancer is rhabdomyosarcoma.

[00690] In some embodiments, the cancer is salivary gland cancer.

[00691] In some embodiments, the cancer is skin cancer - basal and squamous cell.

[00692] In some embodiments, the cancer is skin cancer – melanoma.

[00693] In some embodiments, the cancer is small intestine cancer.

[00694] In some embodiments, the cancer is stomach cancers.

[00695] In some embodiments, the cancer is testicular cancer.

[00696] In some embodiments, the cancer is thymus cancer.

[00697] In some embodiments, the cancer is thyroid cancer.

[00698] In some embodiments, the cancer is uterine sarcoma.

[00699] In some embodiments, the cancer is vaginal cancer.

[00700] In some embodiments, the cancer is vulvar cancer.

[00701] In some embodiments, the cancer is Wilms tumor.

[00702] In some embodiments, the cancer is laryngeal or hypopharyngeal cancer.

[00703] In some embodiments, the cancer is kidney cancer.

[00704] In some embodiments, the cancer is Kaposi sarcoma.

[00705] In some embodiments, the cancer is gestational trophoblastic disease.

[00706] In some embodiments, the cancer is gastrointestinal stromal tumor.

[00707] In some embodiments, the cancer is gastrointestinal carcinoid tumor.

[00708] In some embodiments, the cancer is gallbladder cancer.

[00709] In some embodiments, the cancer is eye cancer (melanoma and lymphoma).

[00710] In some embodiments, the cancer is Ewing tumor.

[00711] In some embodiments, the cancer is esophagus cancer.

[00712] In some embodiments, the cancer is endometrial cancer.

[00713] In some embodiments, the cancer is colorectal cancer.

[00714] In some embodiments, the cancer is cervical cancer.

[00715] In some embodiments, the cancer is brain or spinal cord tumor.

[00716] In some embodiments, the cancer is bone metastasis.

[00717] In some embodiments, the cancer is bone cancer.

[00718] In some embodiments, the cancer is bladder cancer.

[00719] In some embodiments, the cancer is bile duct cancer.

[00720] In some embodiments, the cancer is anal cancer.

[00721] In some embodiments, the cancer is adrenal cortical cancer.

[00722] In some embodiments, the disorder or disease is a neurological condition, disorder or disease, wherein the neurological condition/disorder/disease is selected from: Alzheimer's disease, frontotemporal dementias, dementia with lewy bodies, prion diseases, Parkinson's disease, Huntington's disease, progressive supranuclear palsy, corticobasal degeneration, mutiple system atrophy, amyotrophic lateral sclerosis (ALS), inclusion body myositis, autism, degenerative myopathies, diabetic neuropathy, other metabolic neuropathies, endocrine neuropathies, orthostatic hypotension, multiple sclerosis and Charcot-Marie-Tooth disease.

[00723] In some embodiments, the compound of Formula (**I**) inhibits one or more proteins in the Wnt pathway.

[00724] In some embodiments, the compound of Formula (**I**) inhibits signaling induced by one or more Wnt proteins.

[00725] In some embodiments, the Wnt proteins are chosen from: WNT1, WNT2, WNT2B, WNT3, WNT3A, WNT4. WNT5A, WNT5B, WNT6, WNT7A,

WNT7B, WNT8A, WNT8B, WNT9A, WNT9B, WNT10A, WNT10B, WNT11, and WNT16.

[00726] In some embodiments, the compound of Formula (**I**) inhibits a kinase activity.

[00727] In some embodiments, the method of treats a disease or disorder mediated by the Wnt pathway in a patient, the method comprises administering to the patient a therapeutically effective amount of a compound (or compounds) of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00728] In some embodiments, the compound of Formula (**I**) inhibits one or more Wnt proteins.

[00729] In some embodiments, the method of treats a disease or disorder mediated by kinase activity in a patient, the method comprises administering to the patient a therapeutically effective amount of a compound (or compounds) of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00730] In some embodiments, the disease or disorder comprises tumor growth, cell proliferation, or angiogenesis.

[00731] In some embodiments, the method of inhibits the activity of a protein kinase receptor, the method comprises contacting the receptor with an effective amount of a compound (or compounds) of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00732] In some embodiments, the method treats a disease or disorder associated with aberrant cellular proliferation in a patient; the method comprises administering to the patient a therapeutically effective amount of a compound (or compounds) of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00733] In some embodiments, the method prevents or reduces angiogenesis in a patient; the method comprises administering to the patient a therapeutically effective amount of a compound (or compounds) of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00734] In some embodiments, the method prevents or reduces abnormal cellular proliferation in a patient; the method comprises administering to the patient a

therapeutically effective amount of a compound (or compounds) of Formula (**I**), or a pharmaceutically acceptable salt thereof.

[00735] In some embodiments, the method of treats a disease or disorder associated with aberrant cellular proliferation in a patient, the method comprising administering to the patient a pharmaceutical composition comprising one or more of the compounds of claim 1 in combination with a pharmaceutically acceptable carrier and one or more other agents.

[00736] Moreover, the compounds and compositions, for example, as inhibitors of the CDKs, can modulate the level of cellular RNA and DNA synthesis and therefore are expected to be useful in the treatment of viral infections such as HIV, human papilloma virus, herpes virus, Epstein-Barr virus, adenovirus, Sindbis virus, pox virus and the like.

[00737] Compounds and compositions described herein can inhibit the kinase activity of, for example, CDK/cyclin complexes, such as those active in the G_0. or G_1 stage of the cell cycle, e.g., CDK2, CDK4, and/or CDK6 complexes.

Evaluation of Biological Activity

[00738] The biological activity of the compounds described herein can be tested using any suitable assay known to those of skill in the art, e.g., WO 2001/053268 or WO 2005/009997. For example, the activity of a compound may be tested using one or more of the test methods outlined below.

[00739] In one example, tumor cells may be screened for Wnt independent growth. In such a method, tumor cells of interest are contacted with a compound (i.e. inhibitor) of interest, and the proliferation of the cells, e.g. by uptake of tritiated thymidine, is monitored. In some embodiments, tumor cells may be isolated from a candidate patient who has been screened for the presence of a cancer that is associated with a mutation in the Wnt signaling pathway. Candidate cancers include, without limitation, those listed above.

[00740] In another example, one may utilize *in vitro* assays for Wnt biological activity, e.g. stabilization of β-catenin and promoting growth of stem cells. Assays for biological activity of Wnt include stabilization of β-catenin, which can be measured, for

example, by serial dilutions of a candidate inhibitor composition. An exemplary assay for Wnt biological activity contacts a Wnt composition in the presence of a candidate inhibitor with cells, e.g. mouse L cells. The cells are cultured for a period of time sufficient to stabilize β-catenin, usually at least about 1 hour, and lysed. The cell lysate is resolved by SDS PAGE, then transferred to nitrocellulose and probed with antibodies specific for β-catenin.

[00741] In a further example, the activity of a candidate compound can be measured in a Xenopus secondary axis bioassay (Leyns, L. *et al. Cell (***1997***), 88(6),* 747-756).

Example 7

[00742] Another screening assay for Wnt activity is described as follows. Reporter cell lines can be generated by stably transducing cells of cancer cell lines (e.g., colon cancer) with a lentiviral construct that include a wnt-responsive promoter driving expression of the firefly luciferase gene.

[00743] Lentiviral constructs can be made in which the SP5 promoter, a promoter having eight TCF/LEF binding sites derived from the SP5 promoter, is linked upstream of the firefly luciferase gene. The lentiviral constructs can also include a hygromycin resistance gene as a selectable marker. The SP5 promoter construct can be used to transduce SW480 cells, a colon cancer cell line having a mutated APC gene that generates a truncated APC protein, leading to de-regulated accumulation of β-catenin. A control cell line can be generated using another lentiviral construct containing the luciferase gene under the control of the SV40 promoter which does not require β-catenin for activation.

[00744] Cultured SW480 cells bearing a reporter construct can be distributed at approximately 10,000 cells per well into 96 well or 384 well plates. Compounds from a small molecule compound library can then be added to the wells in half-log dilutions using a ten micromolar top concentration. A series of control wells for each cell type receive only buffer and compound solvent. Twenty-four to forty hours after the addition of compound, reporter activity for luciferase can be assayed, for example, by addition of the BrightGlo luminescence reagent (Promega) and the Victor3 plate reader (Perkin

Elmer). Readings can be normalized to DMSO only treated cells, and normalized activities can then be used in the IC_{50} calculations. Table 2 shows the activity of selected indazole-3-carboxamide analogs.

Table 2.

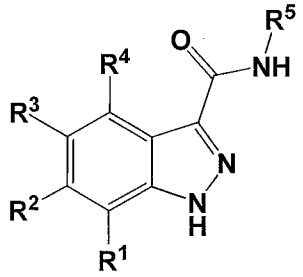
Compound	Wnt inhibition	Compound	Wnt inhibition
1	175 nM	**2**	5,000 nM
3	200 nM	**4**	160 nM
5	10,000 nM	**6**	270 nM
7	110 nM	**8**	130 nM
9	10,000 nM	**11**	10,000 nM
12	63 nM	**13**	1,250 nM
14	106 nM	**15**	37 nM
16	10,000 nM	**18**	122 nM
19	107 nM	**20**	118 nM
23	120 nM	**26**	210 nM
32	1,250 nM	**36**	275 nM
37	1,120 nM	**38**	120 nM
39	65 nM	**40**	65 nM
41	67 nM	**42**	500 nM
43	63 nM	**44**	158 nM
45	110 nM	**46**	15 nM
47	71 nM	**48**	10,000 nM
49	57 nM	**50**	71 nM
51	26 nM	**52**	57 nM
53	63 nM	**54**	158 nM
55	44 nM	**56**	160 nM
57	10, 000 nM	**58**	71 nM
59	3,100 nM	**60**	10,000 nM
61	239 nM	**62**	16 nM
63	100 nM	**64**	6 nM
65	101 nM	**66**	10,000 nM
67	10,000 nM	**68**	48 nM
69	50 nM	**70**	41 nM
71	25 nM	**72**	215 nM
73	322 nM	**74**	65 nM
75	40 nM	**76**	850 nM
77	2,650 nM	**78**	239 nM
79	123 nM	**80**	158 nM
81	77-142 nM	**82**	143-188 nM
83	2,500-3,400 nM	**84**	822-898 nM
86	66 nM	**87**	2,440 nM
106	33 nM	**124**	67 nM
126	22 nM	**162**	426 nM

163	15,400 nM	**168**	66 nM
169	49 nM	**170**	43 nM
172	60 nM	**173**	36 nM
174	48 nM	**175**	25 nM
176	30 nM	**177**	183 nM
178	297 nM	**179**	30 nM
180	13 nM	**181**	38 nM
182	35 nM	**183**	49 nM
184	40 nM	**185**	27 nM
186	460 nM	**187**	215 nM
188	9 nM	**189**	85 nM
190	1,200 nM		

[00745] 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.

WHAT IS CLAIMED IS:

1. A compound or pharmaceutically acceptable salt or prodrug thereof having the structure of formula **I**:



I

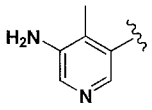
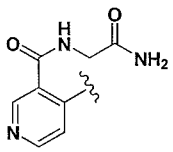
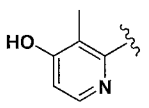
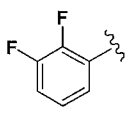
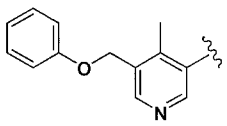
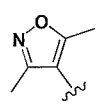
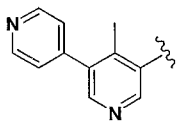
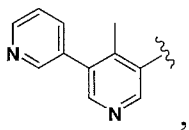
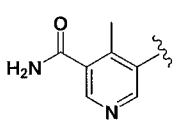
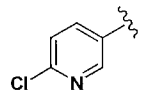
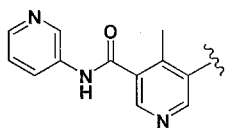
wherein:

R^1, R^2 and R^4 are independently selected from the group consisting of H, C_{1-9} alkyl, halide, $-N(R^{10})_2$, $-XR^{10}$, CN, $-OCF_3$ and $-CF_3$;

R^3 is selected from the group consisting of carbocyclylR^6, heterocyclylR^6, arylR^6 and heteroarylR^6;

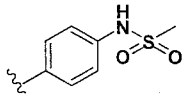
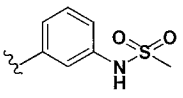
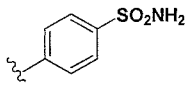
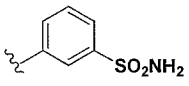
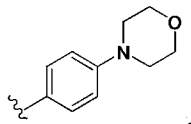
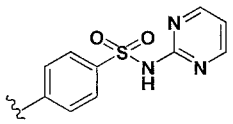
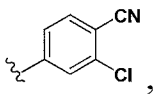
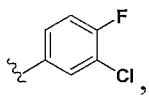
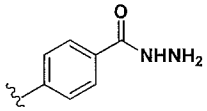
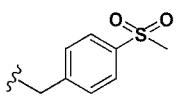
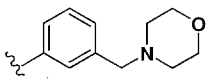
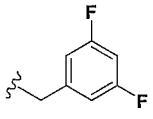
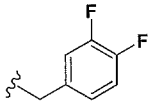
with the proviso that when R^3 is heteroaryl, the heteroaryl is not selected from the group consisting of isoquinoline, 1H-pyrrolo[2,3-*c*]pyridine and tetrazole;

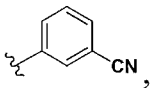
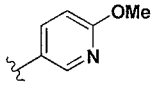
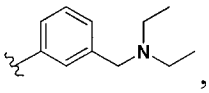
R^5 is selected from the group consisting of $-(C_{1-9}$ alkyl$)_n$carbocyclylR^7, $-(C_{1-9}$ alkyl$)_n$heterocyclylR^7, $-(C_{1-9}$ alkyl$)_n$arylR^7 and $-(C_{1-9}$ alkyl$)_n$heteroarylR^7;

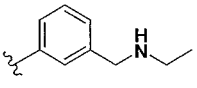
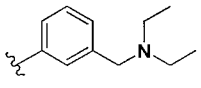
with the proviso that R^5 is not 4-pyridylR^7 when R^1, R^2 and R^4 are H, R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6, 2-pyridylR^6, phenylR^6, thiazoleR^6, imidazoleR^6, pyrimidineR^6, oxazoleR^6,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H;

with the proviso that R^5 is not $-(CH_2)$(3-pyridyl)R^7 when R^1, R^2 and R^4 are H, R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6 and thiazoleR^6, and R^6 and R^7 are both H;

with the proviso that R^5 is not phenylR^7 when R^1, R^2 and R^4 are H, R^3 is 4-pyridylR^6 and R^6 and R^7 are both H;

with the proviso that R^3 is not 3-pyridylR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of phenylR^7,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H;

with the proviso that R^3 is not oxazoleR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of  ,  and  , and R^6 is H;

with the proviso that R^3 is not thiazoleR^6 when R^1, R^2 and R^4 are H, R^5 is selected from the group consisting of  and  , and R^6 is H;

each R^6 is 1-5 substituents each selected from the group consisting of H, C_{1-9} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-XR^{10}$, $-(C_{1-9}$ alkyl$)_n$carbocyclylR^8, $-(C_{1-9}$ alkyl$)_n$heterocyclylR^8, $-(C_{1-9}$ alkyl$)_n$arylR^8, $-(C_{1-9}$ alkyl$)_n$heteroarylR^8, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-(C_{1-9}$ alkyl$)_nN(R^{10})_2$, $-(C_{1-9}$ alkyl$)_nN(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$;

each R^7 is 1-5 substituents each selected from the group consisting of H, C_{1-9} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-XR^{10}$, $-(C_{1-9}$ alkyl$)_n$carbocyclylR^9, $-(C_{1-9}$ alkyl$)_n$heterocyclylR^9, $-(C_{1-9}$ alkyl$)_n$arylR^9, $-(C_{1-9}$ alkyl$)_n$heteroarylR^9, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$, $-(C_{1-9}$ alkyl$)_nN(R^{10})_2$, $-(C_{1-9}$ alkyl$)_nN(R^{10})SO_2R^{11}$ and $-SO_2R^{11}$;

each R^8 is 1-5 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, OCF_3, $-CF_3$ -CN, $-XR^{12}$, $-C(=O)R^{13}$, $-N(R^{12})C(=O)R^{13}$, $-(C_{1-9}$ alkyl$)_nN(R^{12})_2$, $-(C_{1-9}$ alkyl$)_nN(R^{12})SO_2R^{13}$ and $-SO_2R^{13}$;

each R^9 is 1-5 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$ -CN, $-XR^{12}$, $-C(=O)R^{13}$, $-N(R^{12})C(=O)R^{13}$, $-(C_{1-9}$ alkyl$)_nN(R^{12})_2$, $-(C_{1-9}$ alkyl$)_nN(R^{12})SO_2R^{13}$ and $-SO_2R^{13}$;

each R^{10} is independently selected from the group consisting of H, C_{1-9} alkyl, $-(C_{1-9}$ alkyl$)_nN(R^{14})_2$, $-(C_{1-9}$ alkyl$)_n$carbocyclylR^8, $-(C_{1-9}$ alkyl$)_n$heterocyclylR^8, $-(C_{1-9}$ alkyl$)_n$arylR^8 and $-(C_{1-9}$ alkyl$)_n$heteroarylR^8;

each R^{11} is independently selected from the group consisting of C_{1-9} alkyl, $-N(R^{14})_2$, $-(C_{1-9}$ alkyl$)_n$carbocyclylR^8, $-(C_{1-9}$ alkyl$)_n$heterocyclylR^8, $-(C_{1-9}$ alkyl$)_n$arylR^8 and $-(C_{1-9}$ alkyl$)_n$heteroarylR^8;

each R^{12} is independently selected from the group consisting of H, C_{1-9} alkyl, $-(C_{1-9}$ alkyl$)_nN(R^{14})_2$, $-(C_{1-9}$ alkyl$)_n$carbocyclyl, $-(C_{1-9}$ alkyl$)_n$heterocyclyl, $-(C_{1-9}$ alkyl$)_n$aryl and $-(C_{1-9}$ alkyl$)_n$heteroaryl;

each R^{13} is independently selected from the group consisting of C_{1-9} alkyl, $-N(R^{14})_2$, $-(C_{1-9}$ alkyl$)_n$carbocyclyl, $-(C_{1-9}$ alkyl$)_n$heterocyclyl, $-(C_{1-9}$ alkyl$)_n$aryl and $-(C_{1-9}$ alkyl$)_n$heteroaryl;

each R^{14} is independently selected from the group consisting of H, C_{1-3} alkyl, carbocyclyl and aryl;

each X is selected from the group consisting of a bond, -O- and -S-; and

each n is 0 or 1.

2. The compound of claim 1 wherein n is 0.

3. The compound of claim 1 wherein n is 1.

4. The compound of claim 1 wherein X is O.

5. The compound of claim 1 wherein R^1, R^2 and R^4 are H.

6. The compound of claim 1 wherein R^3 is –heteroarylR^6.

7. The compound of claim 6 wherein the heteroaryl is 3-pyridyl.

8. The compound of claim 6 wherein the heteroaryl is 5-pyrimidinyl.

9. The compound of claim 6 wherein the heteroaryl is 4-pyridazinyl.

10. The compound of claim 6 wherein R^6 is one substituent and is selected from the group consisting of H and -$N(R^9)C(=O)R^{10}$.

11. The compound of claim 1 wherein R^5 is –heteroarylR^7.

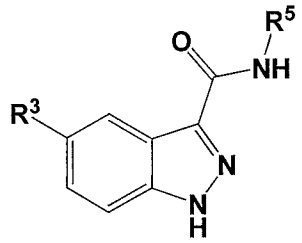
12. The compound of claim 11 wherein the heteroaryl is 3-pyridyl.

13. The compound of claim 11 wherein the heteroaryl is 5-pyrimidinyl.

14. The compound of claim 11 wherein the heteroaryl is 4-pyridazinyl.

15. The compound of claim 11 wherein R^7 is one substituent and is selected from the group consisting of H, halide, -OCF_3, -CF_3, -$(C_{1\text{-}9}$ alkyl$)_n$heterocyclylR^9, -$(C_{1\text{-}9}$ alkyl$)_nN(R^{10})_2$, -$(C_{1\text{-}9}$ alkyl$)_nN(R^{10})SO_2R^{11}$ and -$N(R^{10})C(=O)R^{11}$.

16. A compound or pharmaceutically acceptable salt or prodrug thereof having the structure of formula **Ia**:



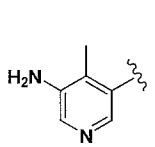
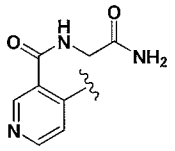
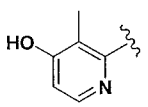
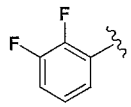
Ia

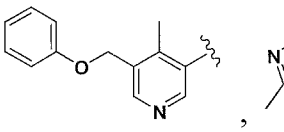
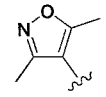
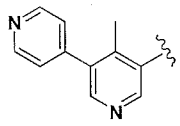
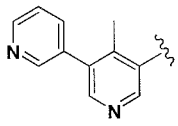
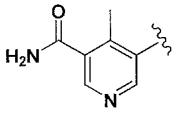
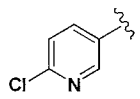
wherein:

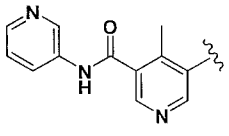
R^3 is selected from the group consisting of arylR^6 and heteroarylR^6;

with the proviso that when R^3 is heteroaryl, the heteroaryl is not selected from the group consisting of isoquinoline, 1H-pyrrolo[2,3-*c*]pyridine and tetrazole;

R^5 is selected from the group consisting of -carbocyclylR^7, -heterocyclylR^7, -arylR^7, -heteroarylR^7, and -$(C_{1\text{-}2}$ alkyl)heteroarylR^7;

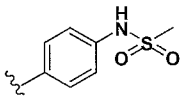
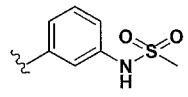
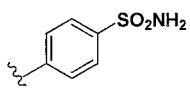
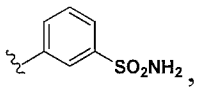
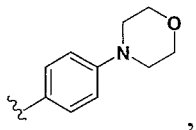
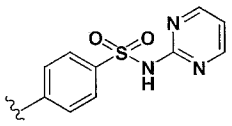
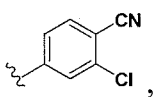
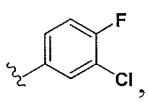
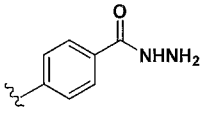
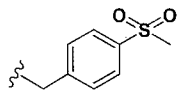
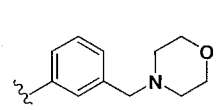
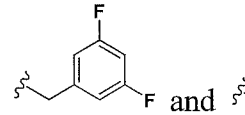
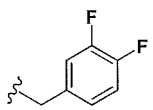
with the proviso that R^5 is not 4-pyridylR^7 when R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6, 2-pyridylR^6, phenylR^6, thiazoleR^6, imidazoleR^6, pyrimidineR^6, oxazoleR^6,  ,  ,  ,  ,

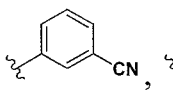
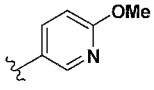
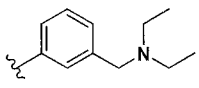
 ,  ,  ,  ,  , 

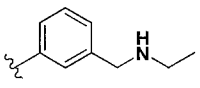
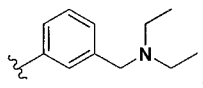
and  , and R^6 and R^7 are both H;

with the proviso that R^5 is not $-(CH_2)$(3-pyridyl)R^7 when R^3 is selected from the group consisting of 3-pyridylR^6, 4-pyridylR^6 and thiazoleR^6, and R^6 and R^7 are both H;

with the proviso that R^5 is not phenylR^7 when R^3 is 4-pyridylR^6 and R^6 and R^7 are both H;

with the proviso that R^3 is not 3-pyridylR^6 when R^5 is selected from the group consisting of phenylR^7,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  and  , and R^6 and R^7 are both H;

with the proviso that R^3 is not oxazoleR^6 when R^5 is selected from the group consisting of  ,  and  , and R^6 is H;

with the proviso that R^3 is not thiazoleR^6 when R^5 is selected from the group consisting of  and  , and R^6 is H;

each R^6 is 1-2 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-OR^{10}$, $-(C_{1-2}$ alkyl)heterocyclylR^8, -heterocyclylR^8, $-(C_{1-2}$ alkyl)arylR^8, $-C(=O)R^{11}$, $-N(R^{10})C(=O)R^{11}$ and $-(C_{1-2}$ alkyl)$N(R^{10})_2$;

each R^7 is 1-2 substituents each selected from the group consisting of H, C_{1-3} alkyl, halide, amino, $-OCF_3$, $-CF_3$, -CN, $-OR^{10}$, $-(C_{1-2}$ alkyl)heterocyclylR^9, -

heterocyclylR^9, -arylR^9, -(C$_{1-2}$ alkyl)arylR^9, -C(=O)R^{11}, -N(R^{10})C(=O)R^{11}, -N(R^{10})$_2$, -(C$_{1-2}$ alkyl)N(R^{10})$_2$, -N(R^{10})SO$_2$R^{11} and -SO$_2$R^{11};

each R^8 is 1-2 substituents each selected from the group consisting of H, C$_{1-3}$ alkyl, halide, amino, OCF$_3$, -CF$_3$ –CN and -OR^{12};

each R^9 is 1-2 substituents each selected from the group consisting of H, C$_{1-3}$ alkyl, halide, amino, -OCF$_3$, -CF$_3$ –CN and -OR^{12};

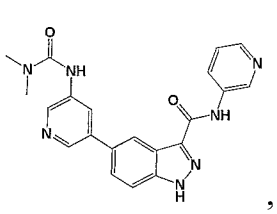
each R^{10} is independently selected from the group consisting of H, C$_{1-3}$ alkyl, -(C$_{1-3}$ alkyl)N(R^{14})$_2$ and -arylR^8;

each R^{11} is independently selected from the group consisting of C$_{1-3}$ alkyl, -N(R^{14})$_2$, -carbocyclylR^8 and -heterocyclylR^8;

each R^{12} is independently selected from the group consisting of H and C$_{1-3}$ alkyl;

each R^{14} is independently selected from the group consisting of H, C$_{1-3}$ alkyl and carbocyclyl.

17. The compound of claim 1 having a structure selected from the group consisting of: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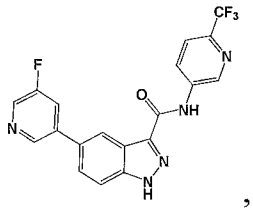
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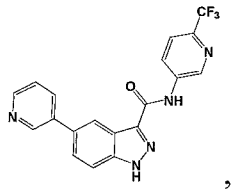
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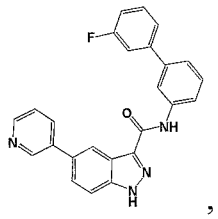
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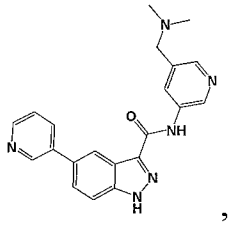
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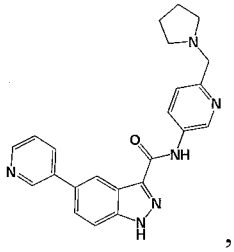
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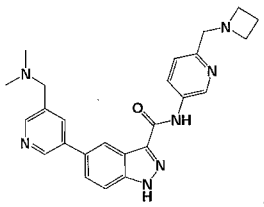
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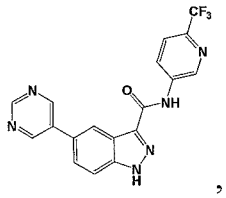
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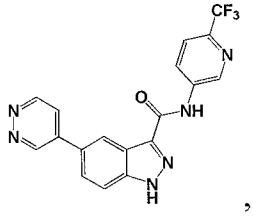
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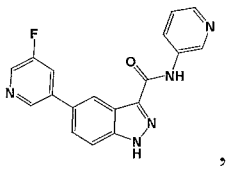
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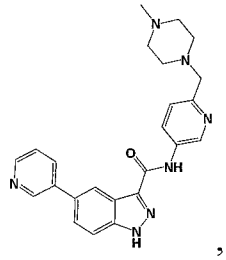
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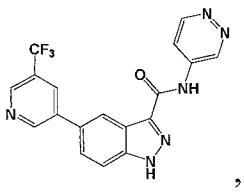
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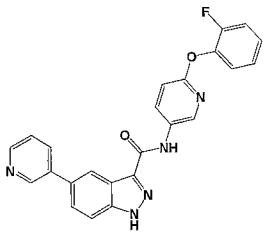
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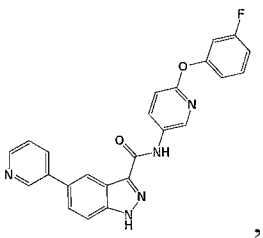
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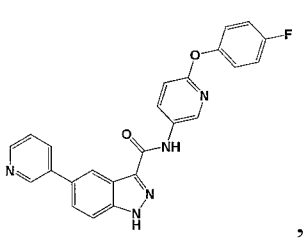
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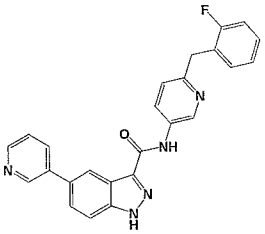
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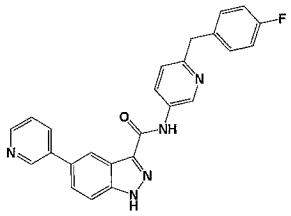
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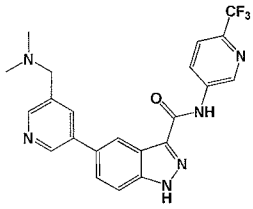
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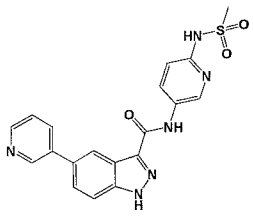
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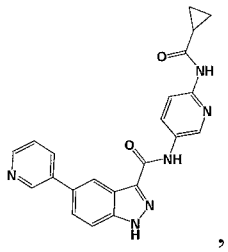
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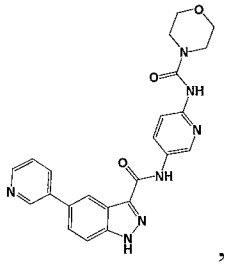
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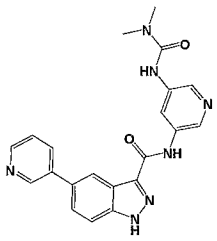
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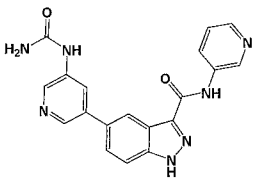
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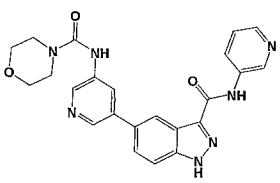
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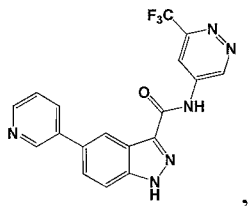
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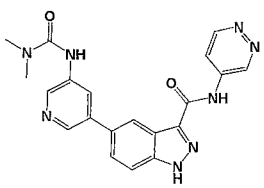
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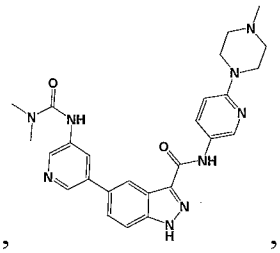
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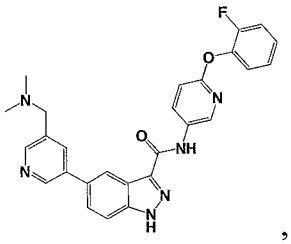
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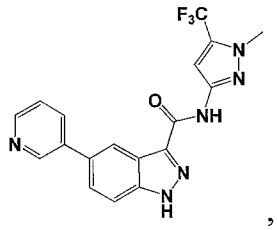
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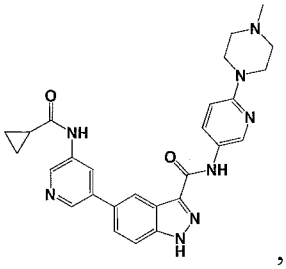
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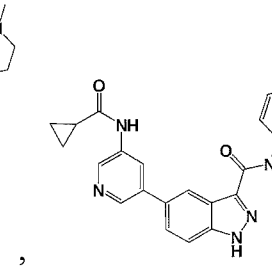
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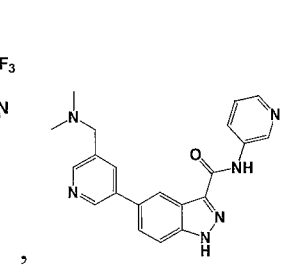
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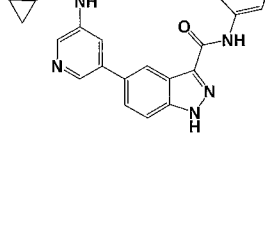
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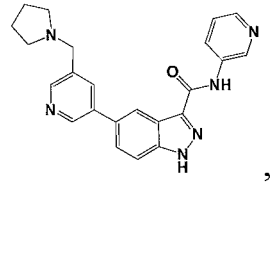
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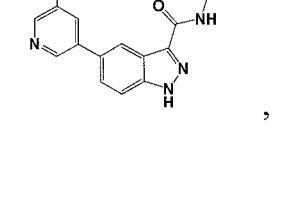
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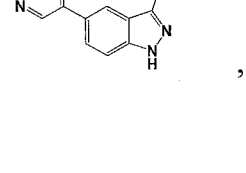
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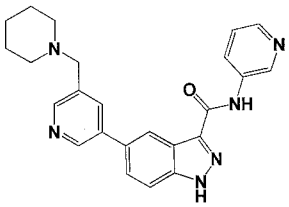
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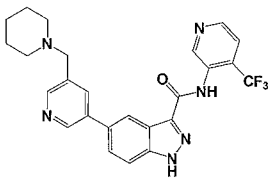
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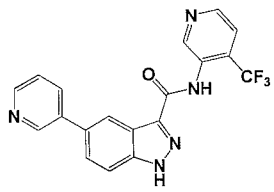
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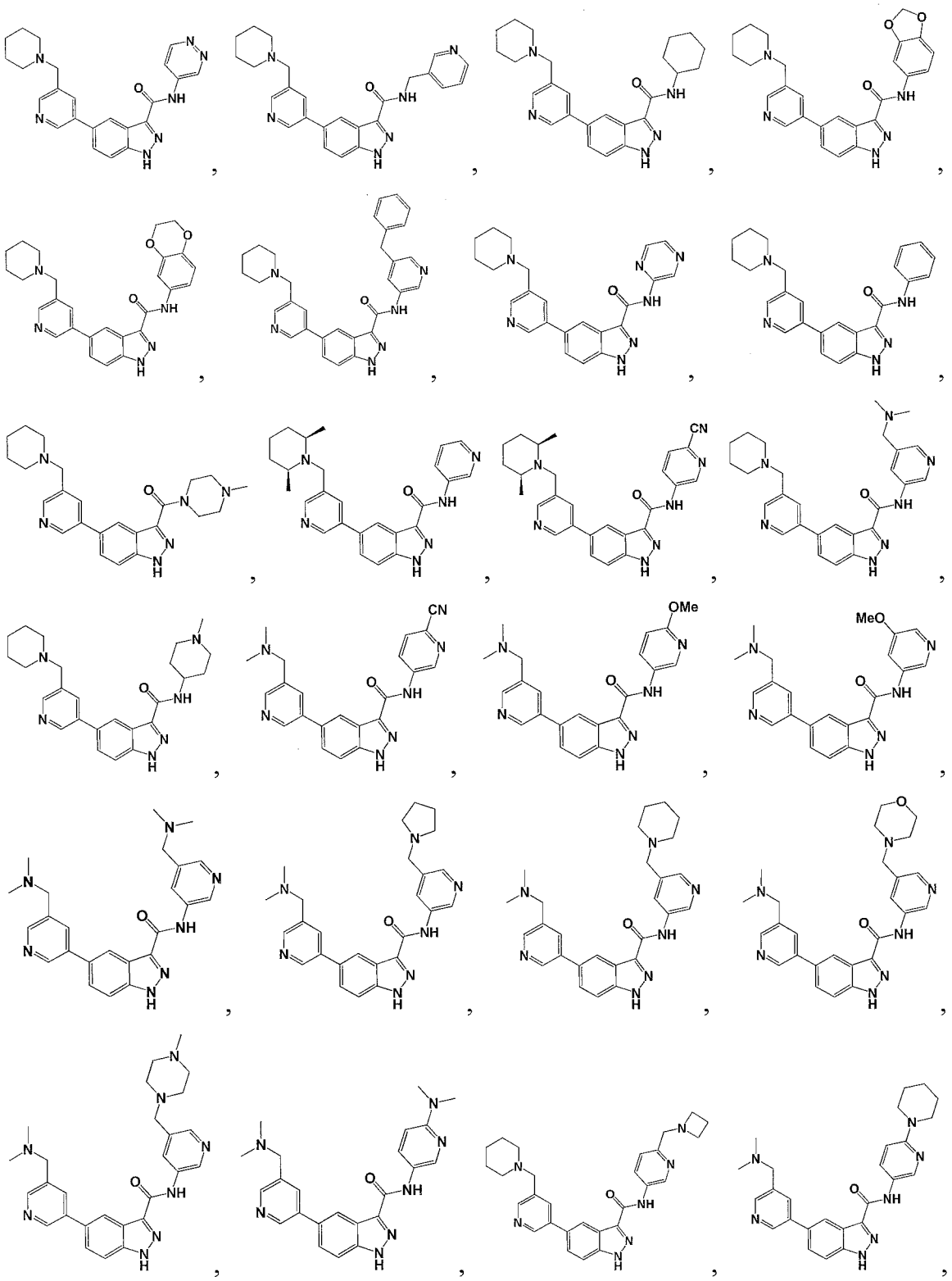

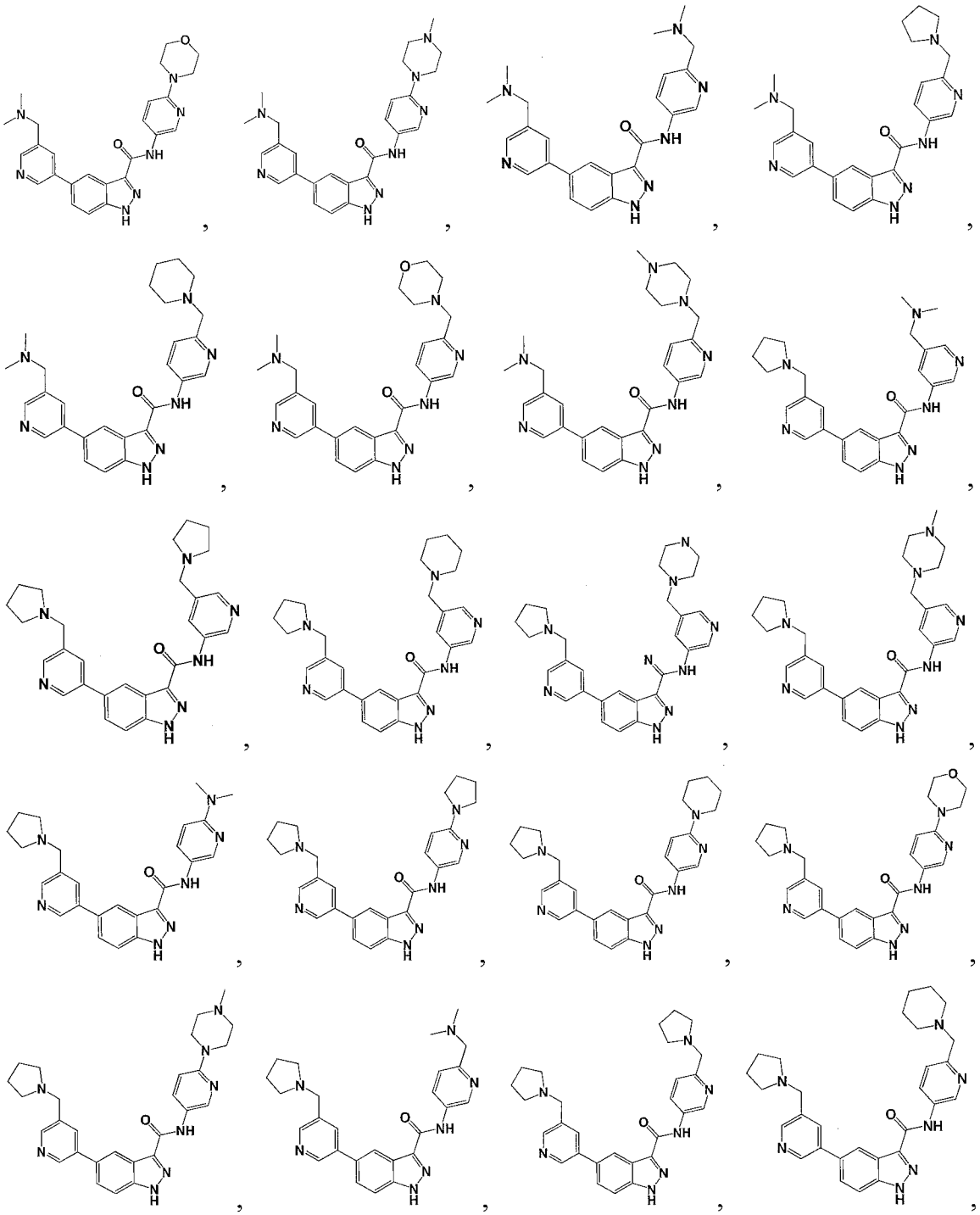

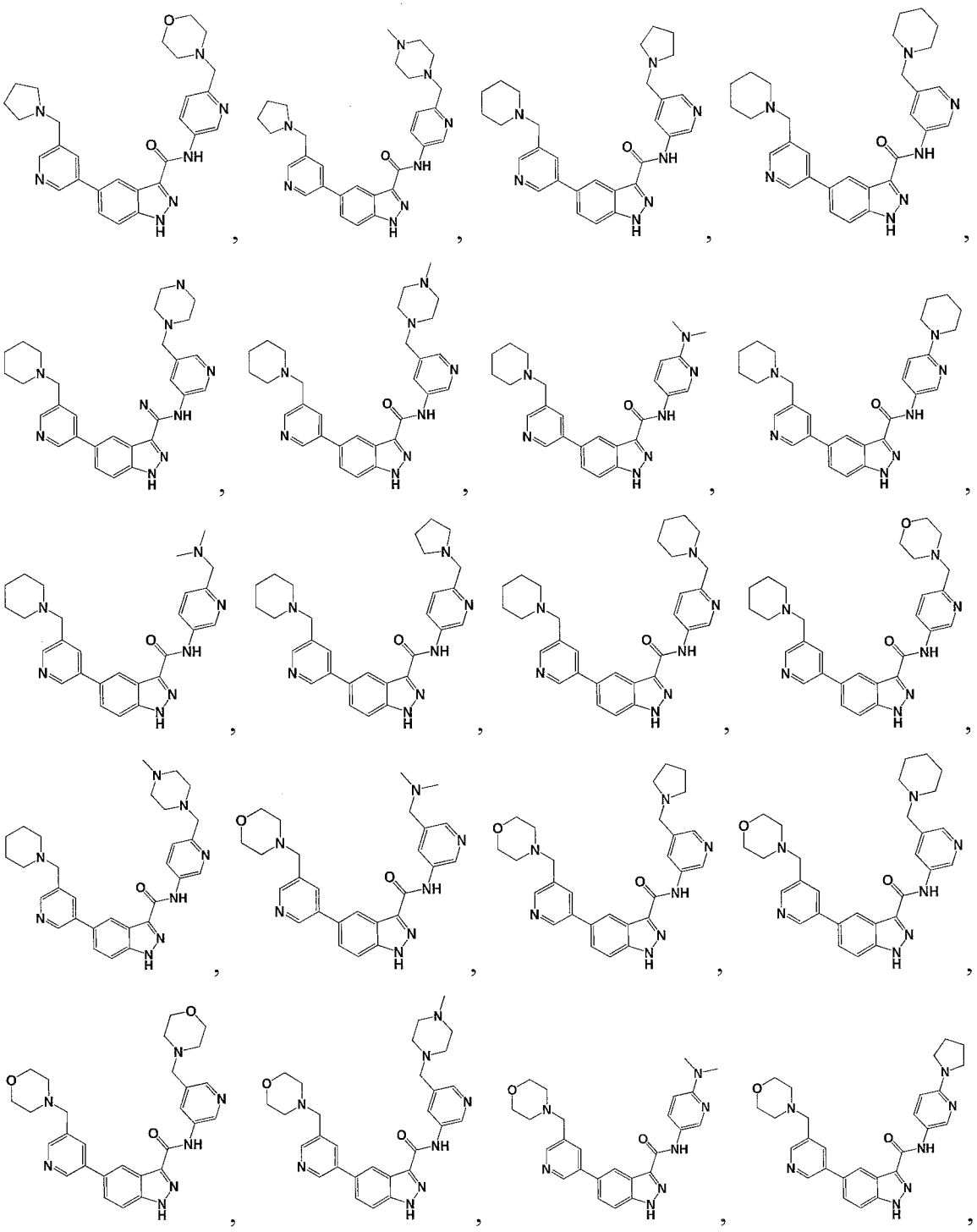

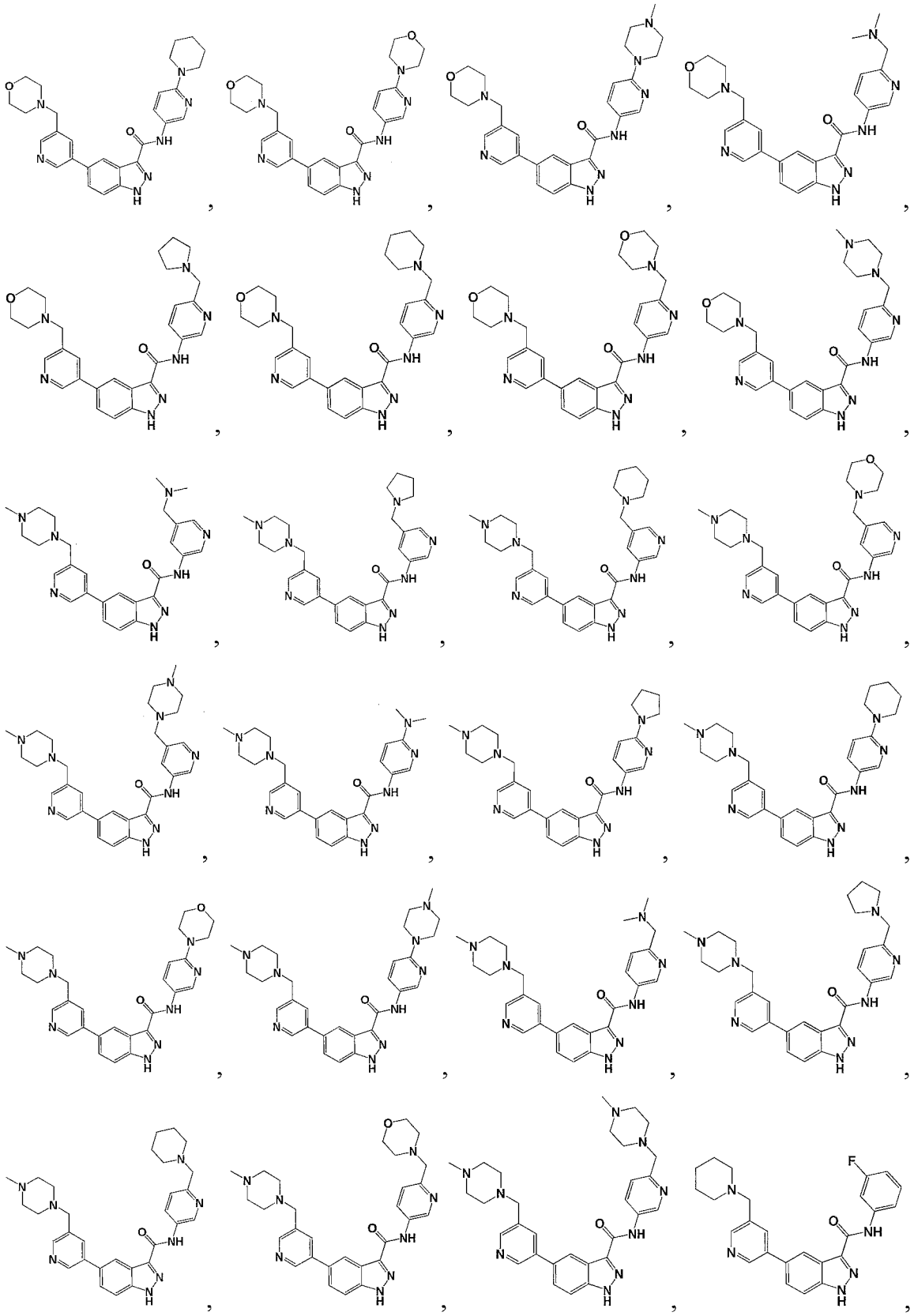

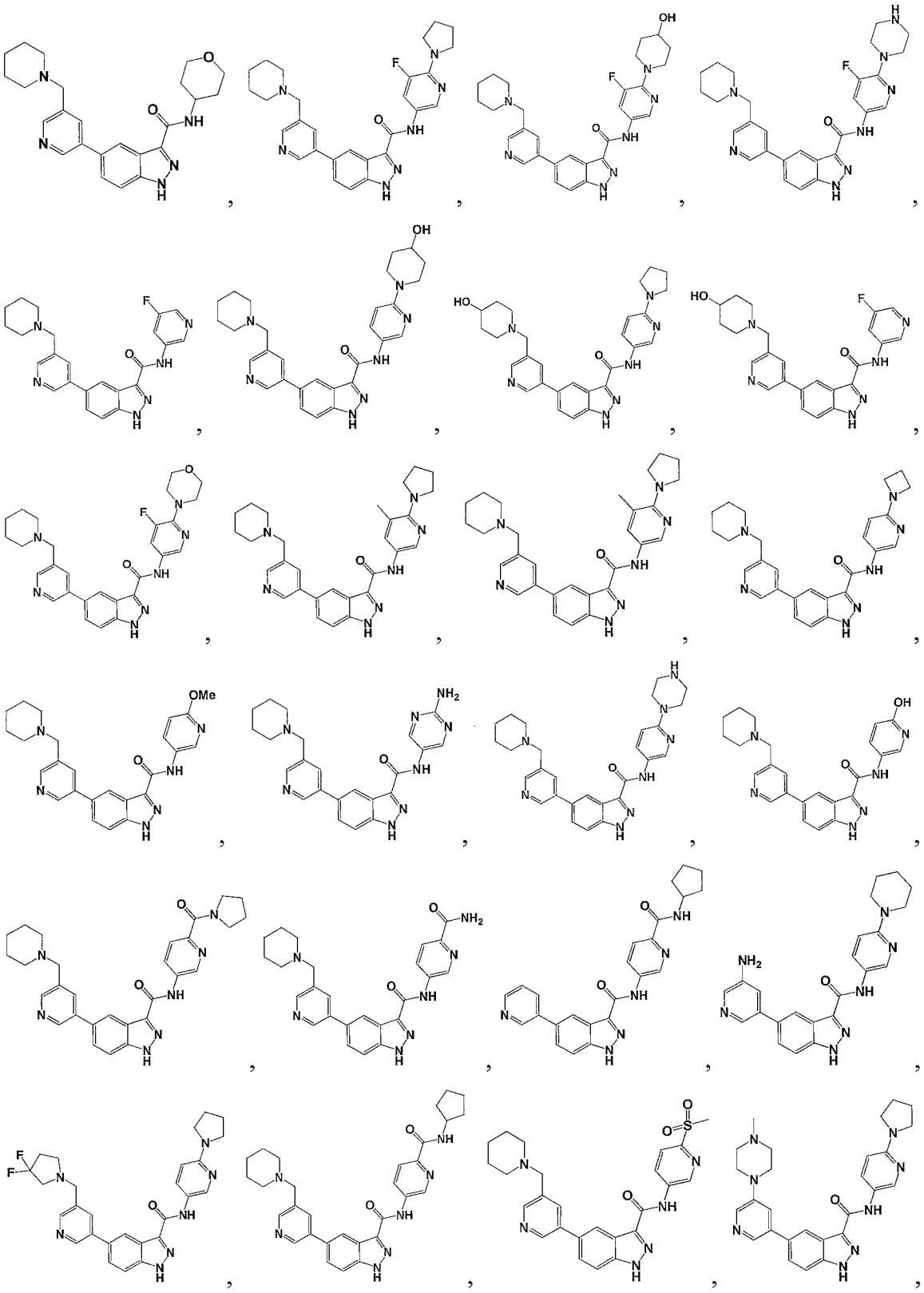

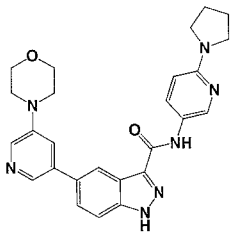
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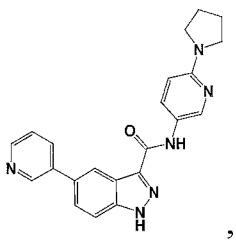
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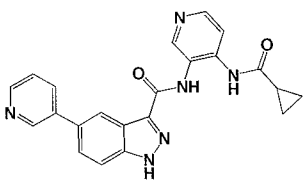
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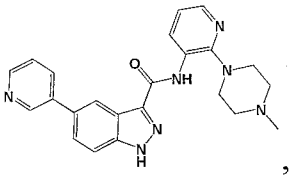
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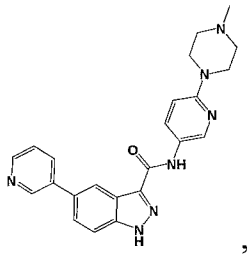
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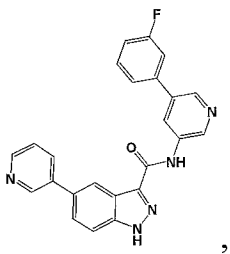
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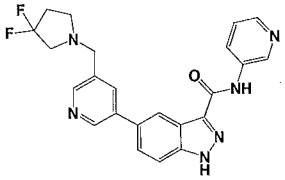
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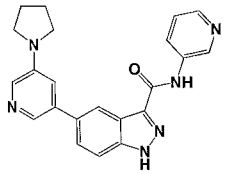
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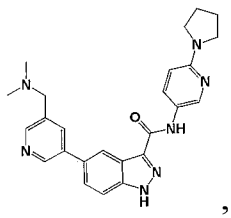
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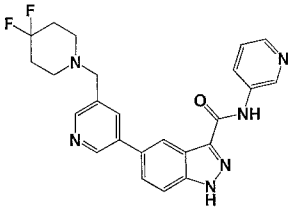
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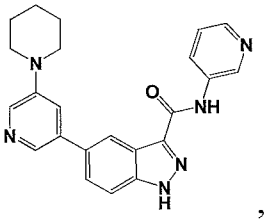
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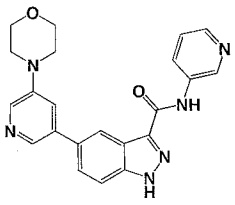
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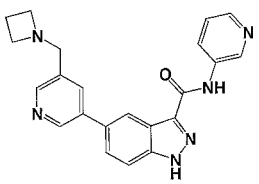
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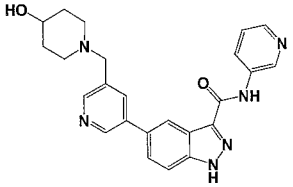
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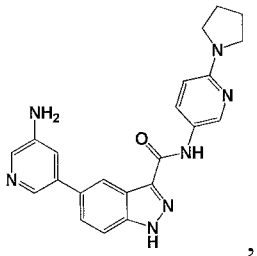
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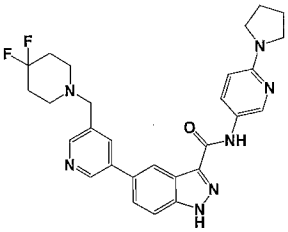
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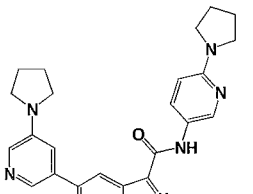
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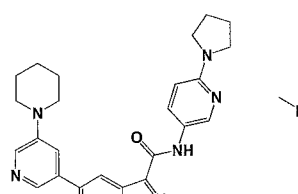
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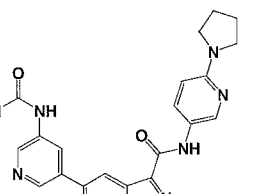
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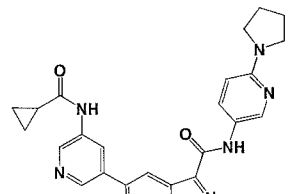
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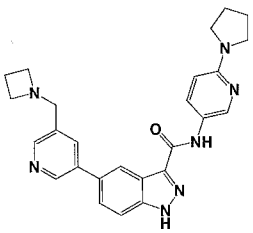
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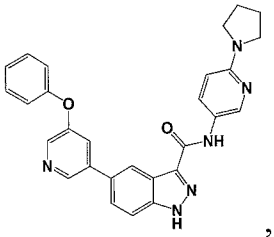
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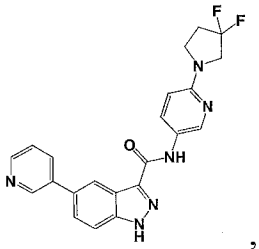
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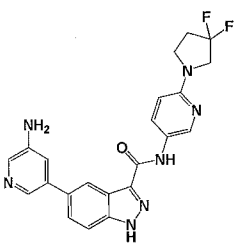
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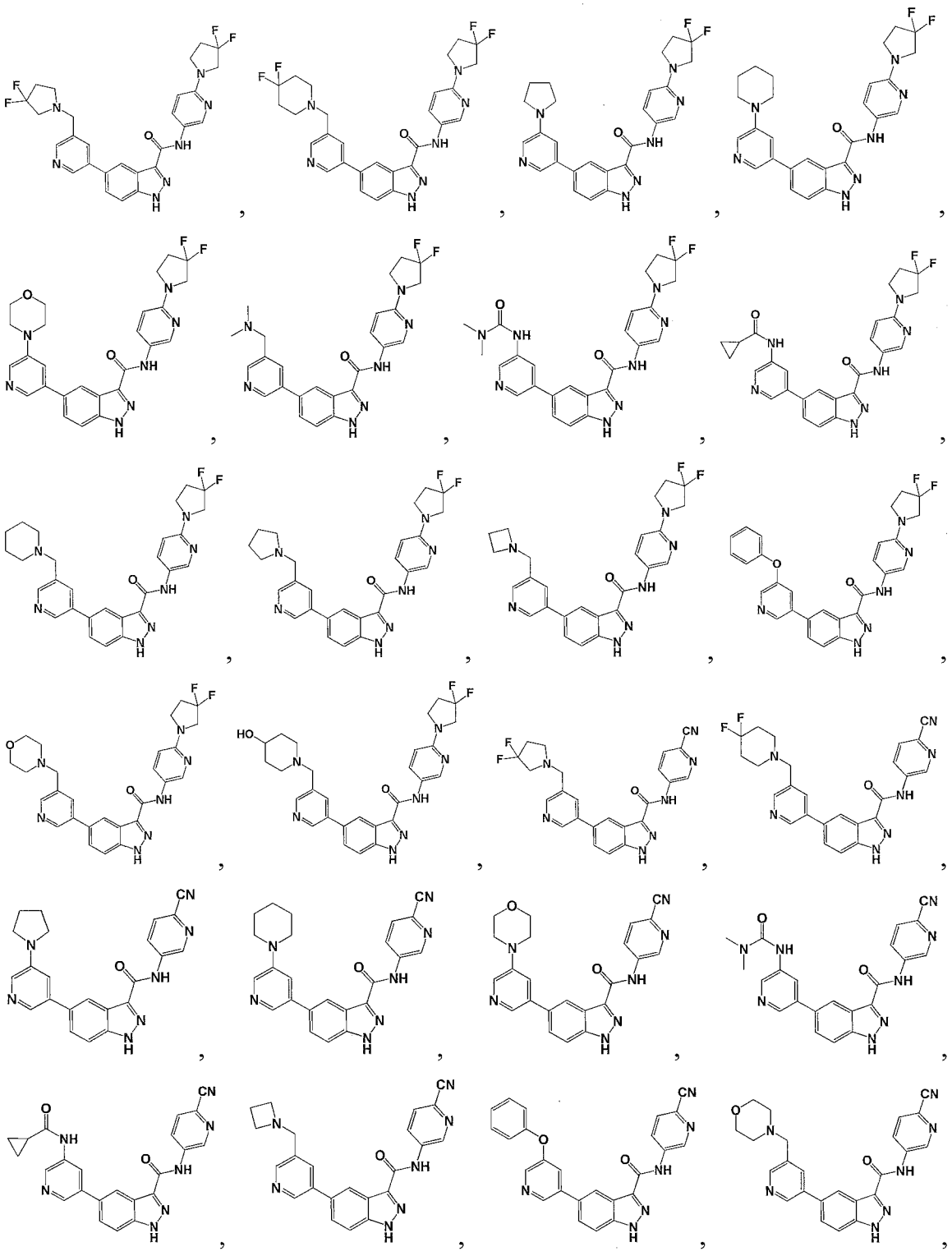

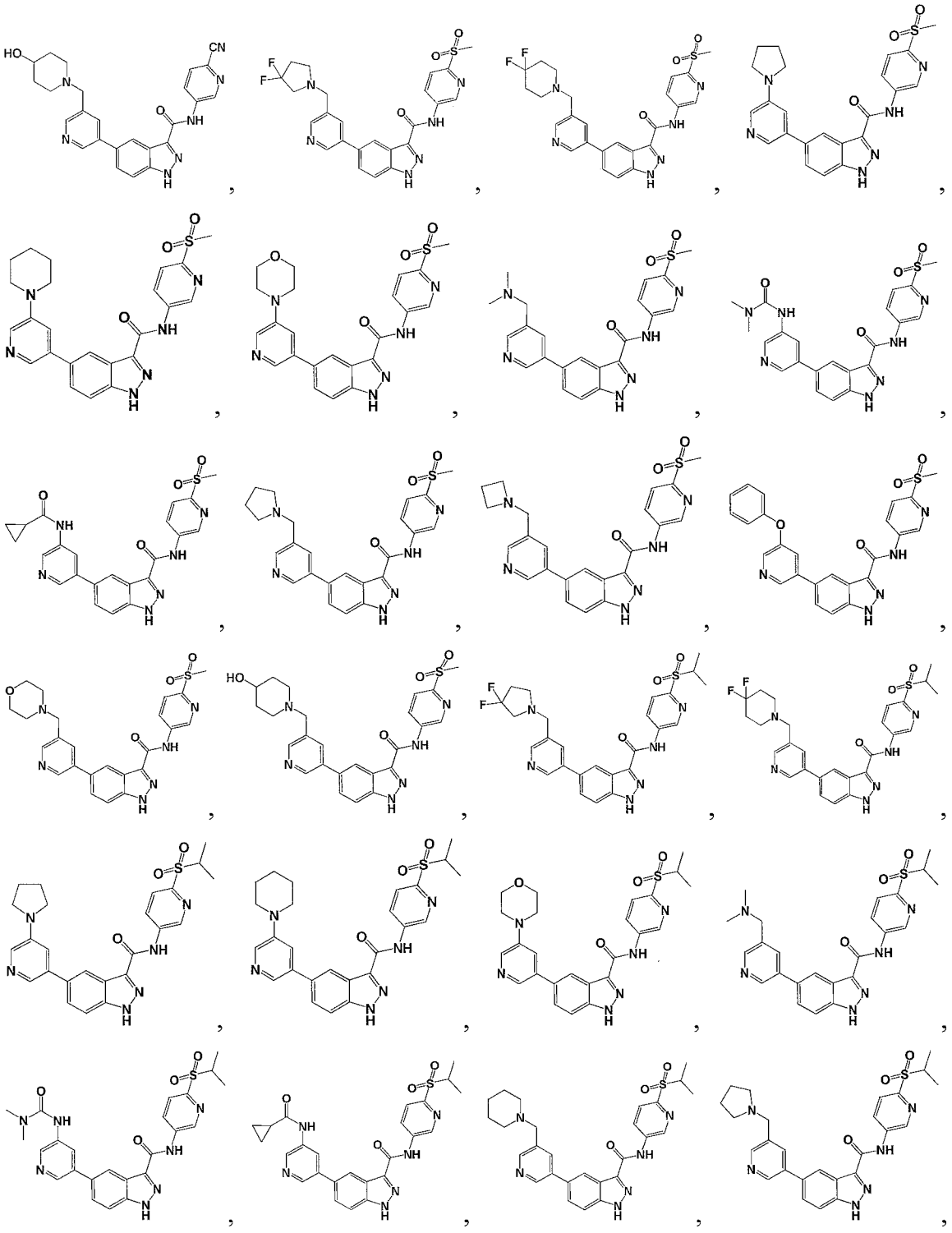

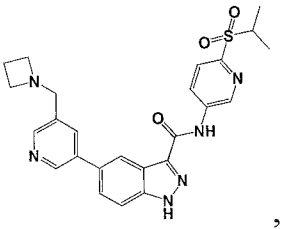
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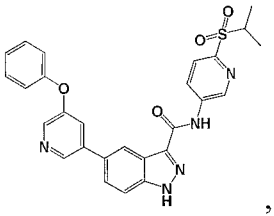
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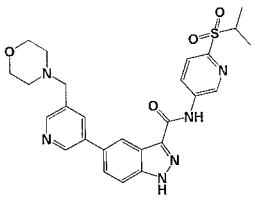
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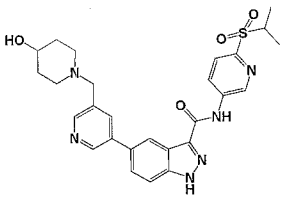
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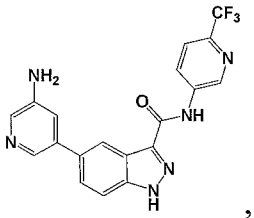
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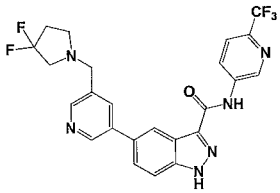
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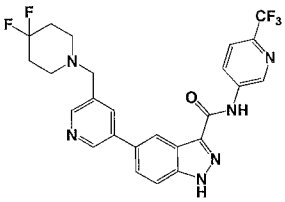
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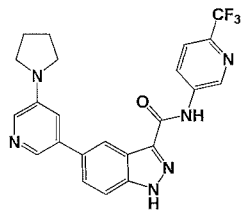
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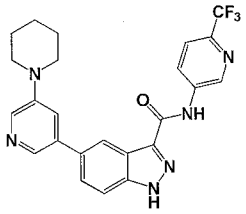
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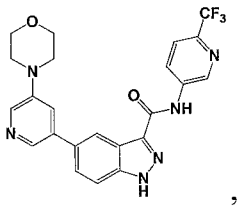
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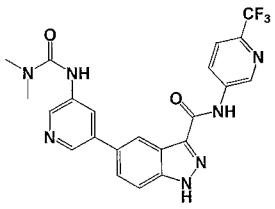
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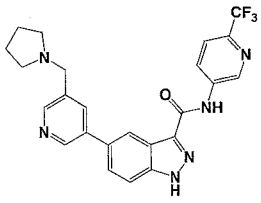
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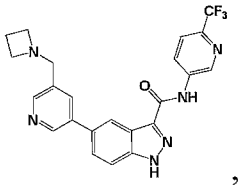
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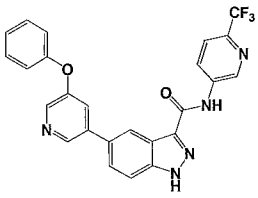
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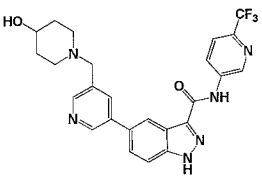
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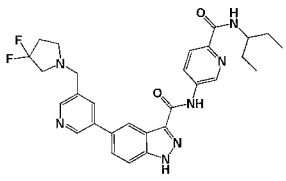
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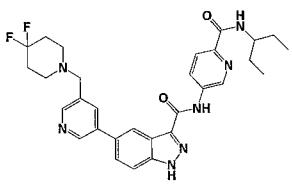
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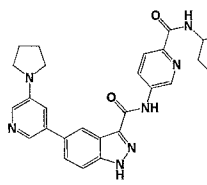
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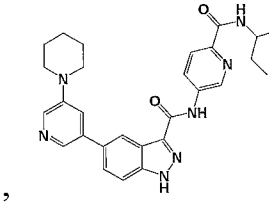
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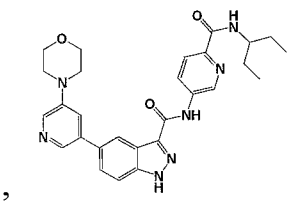
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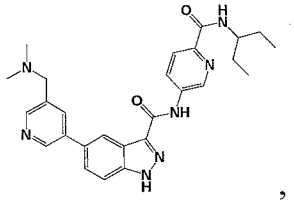
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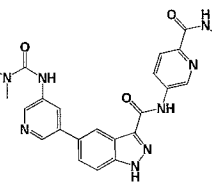
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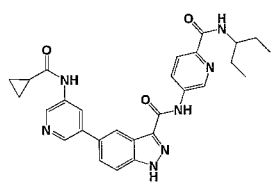
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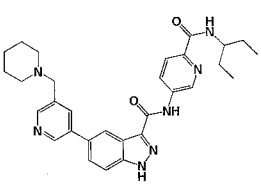
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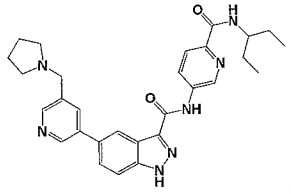
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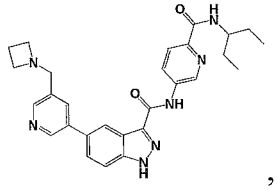
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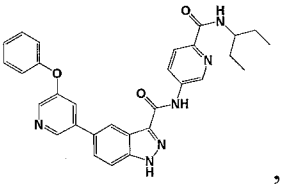
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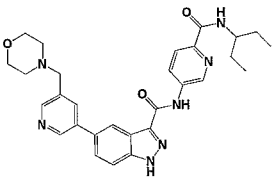
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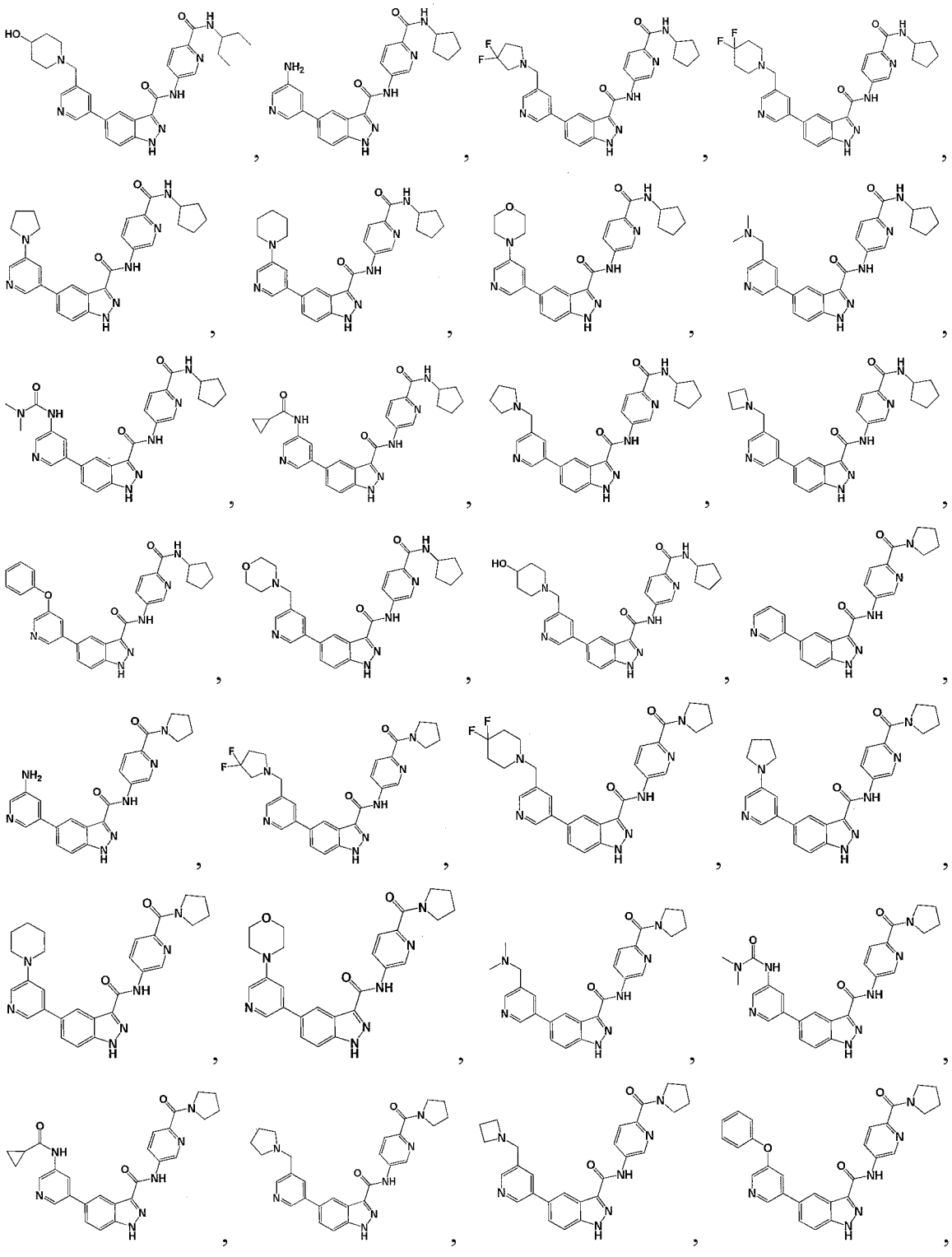

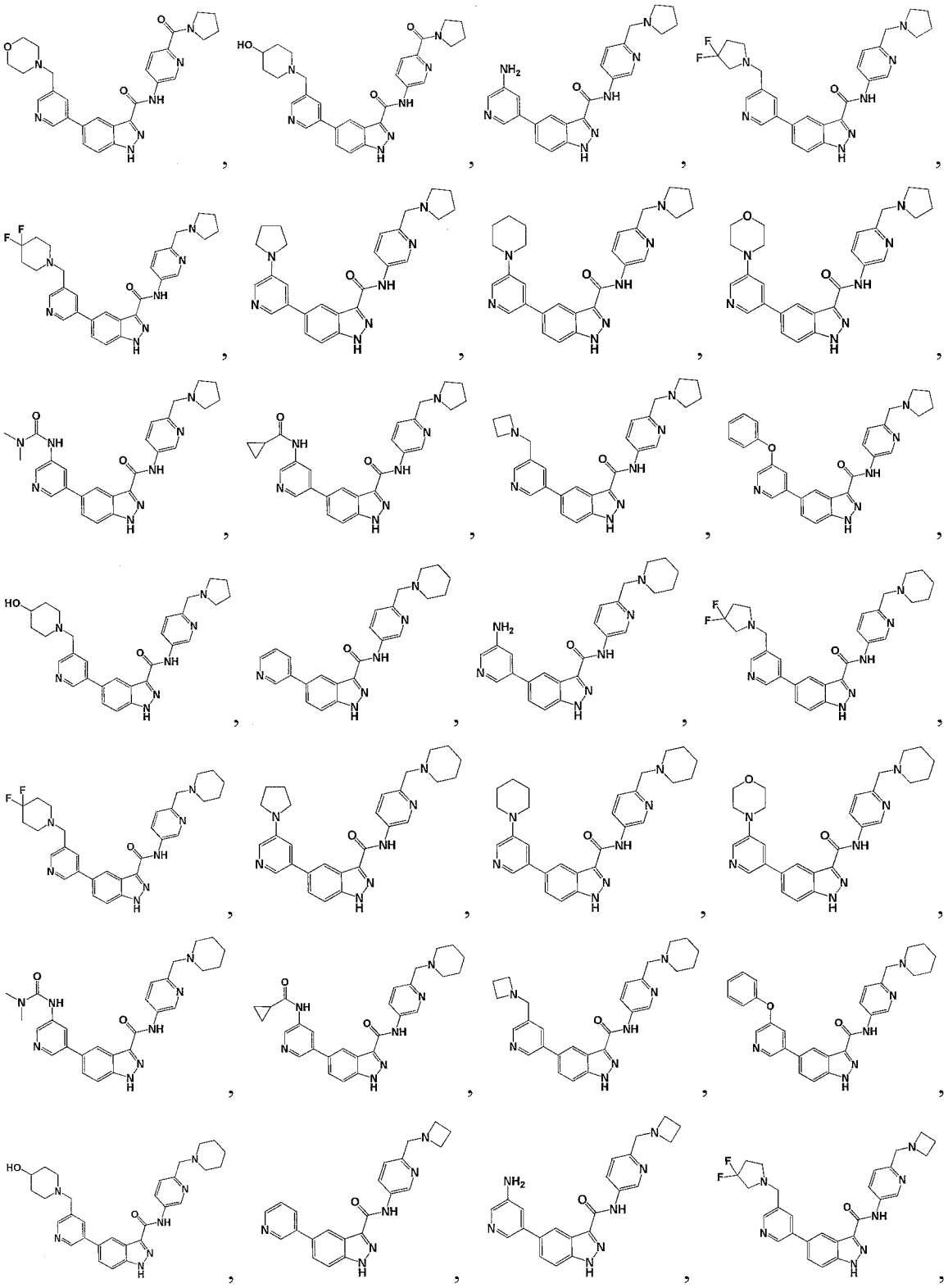

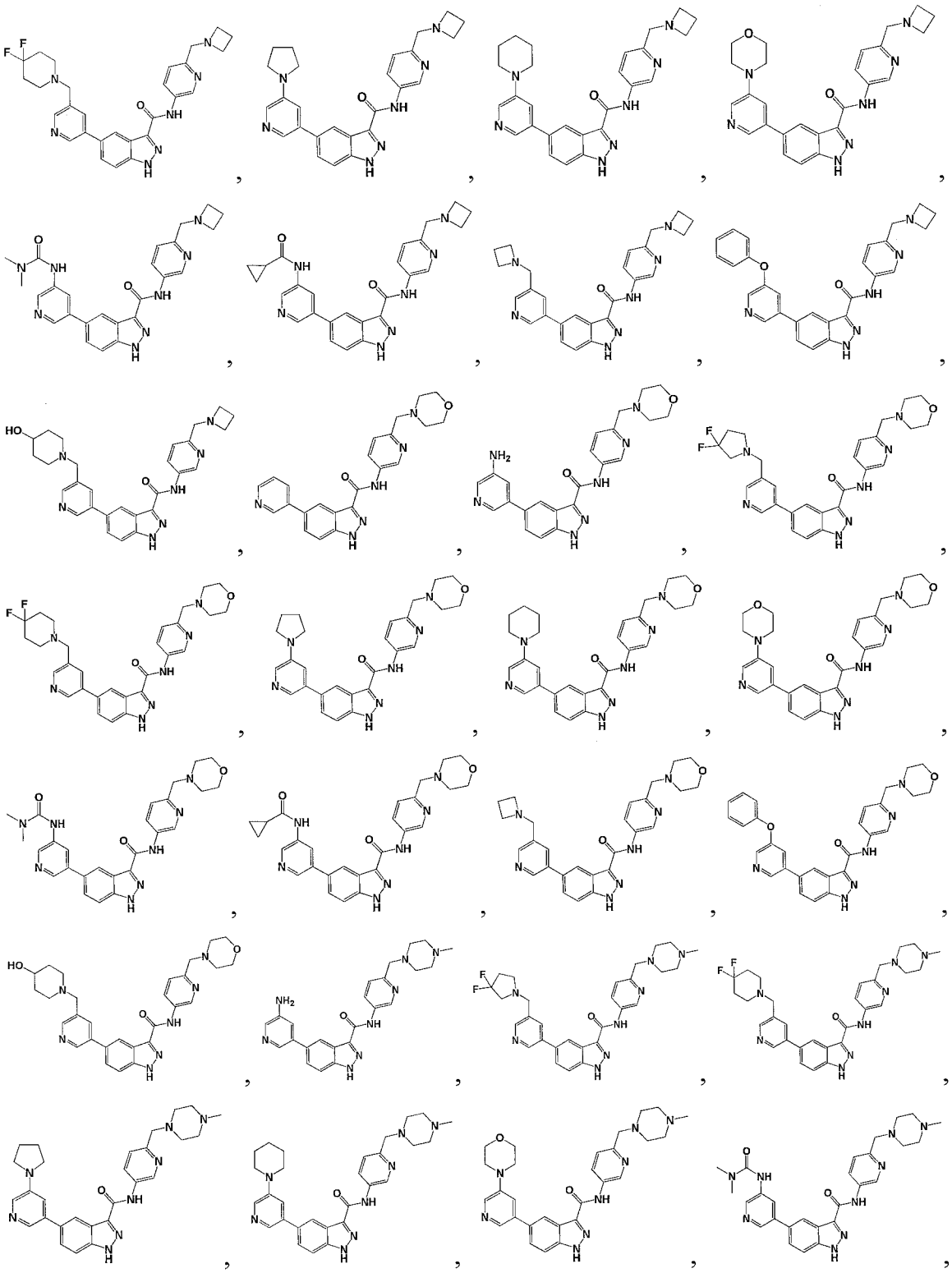

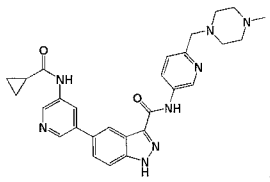
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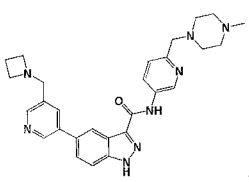
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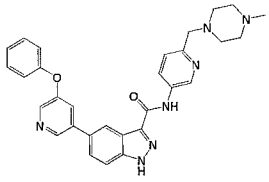
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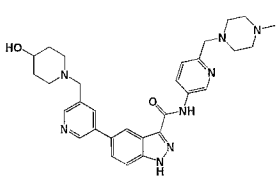
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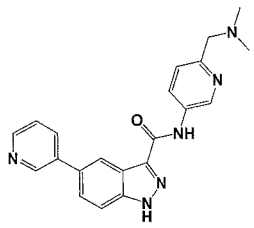
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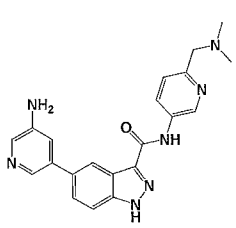
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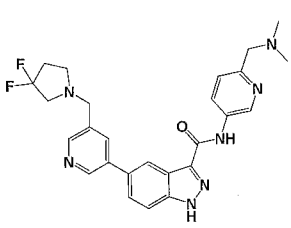
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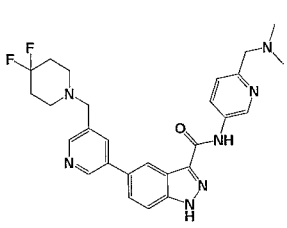
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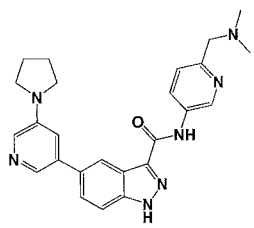
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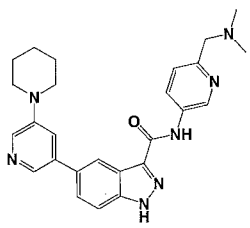
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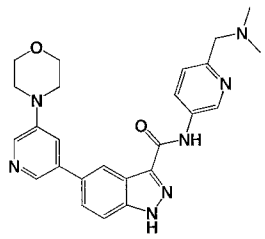
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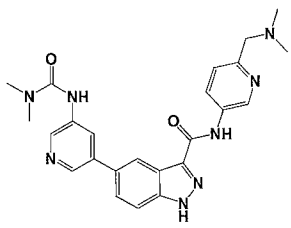
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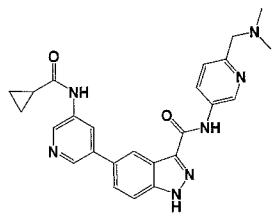
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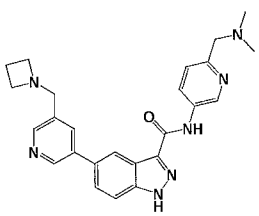
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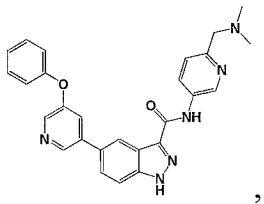
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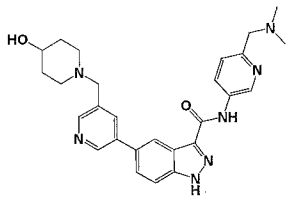
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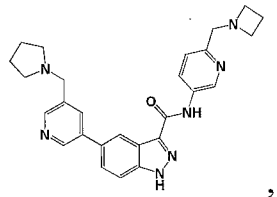
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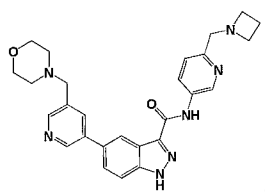
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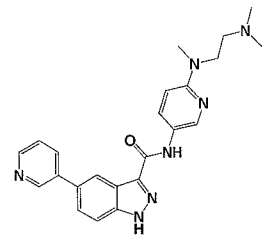
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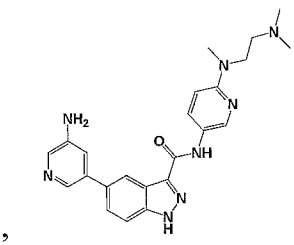
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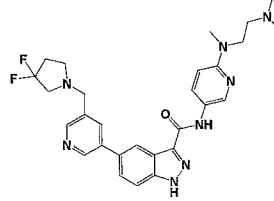
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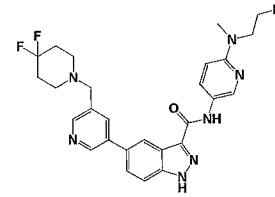
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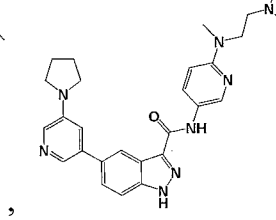
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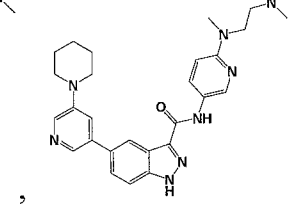
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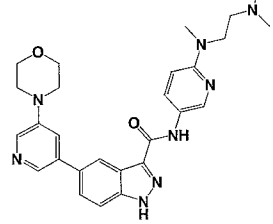
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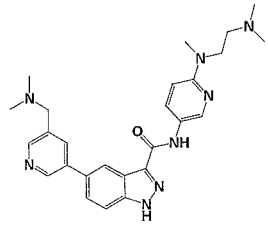
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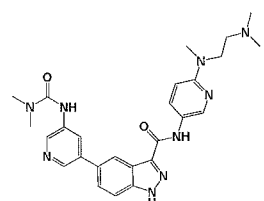
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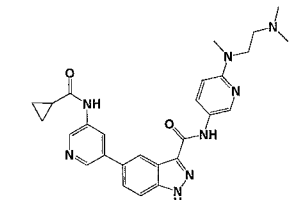
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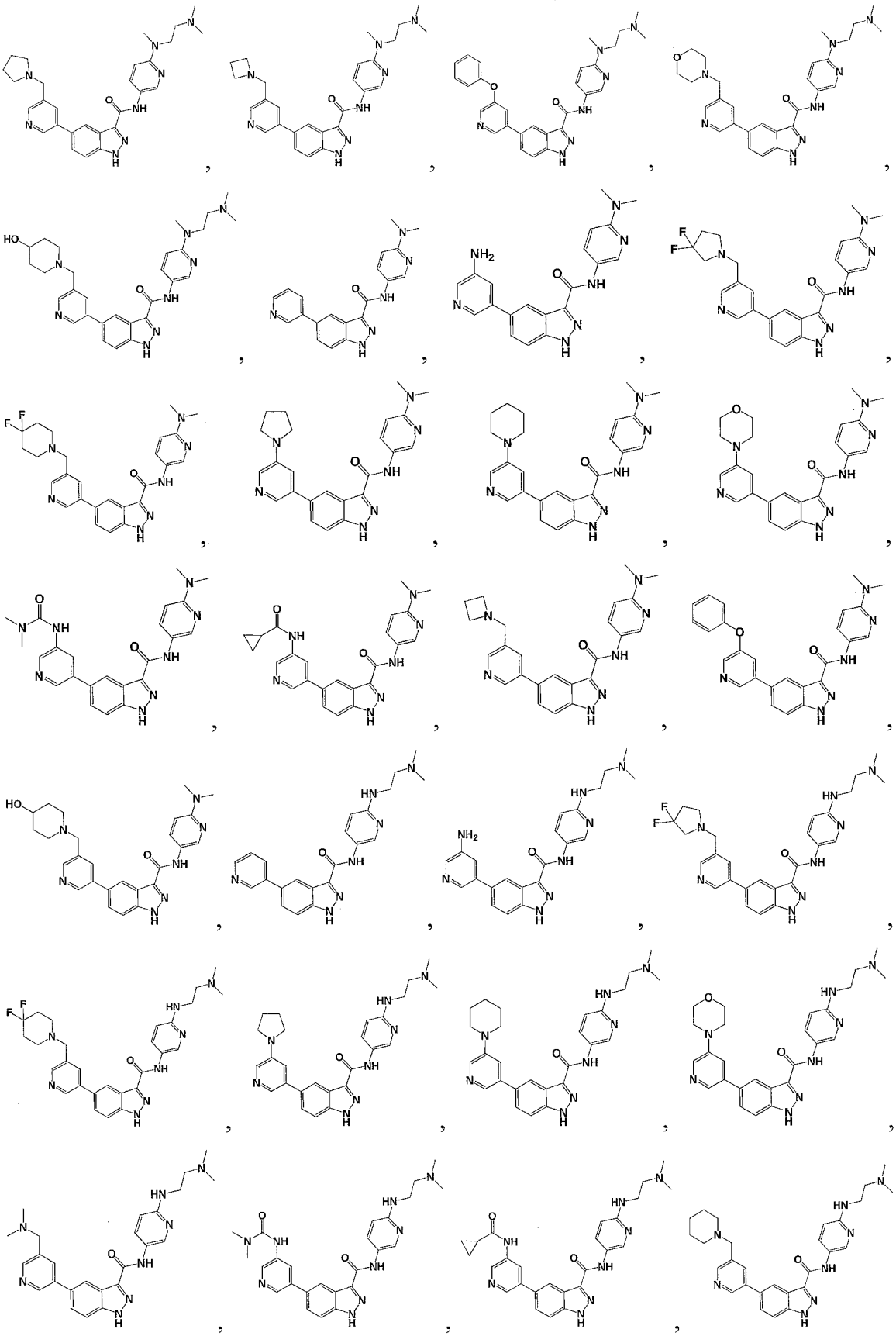

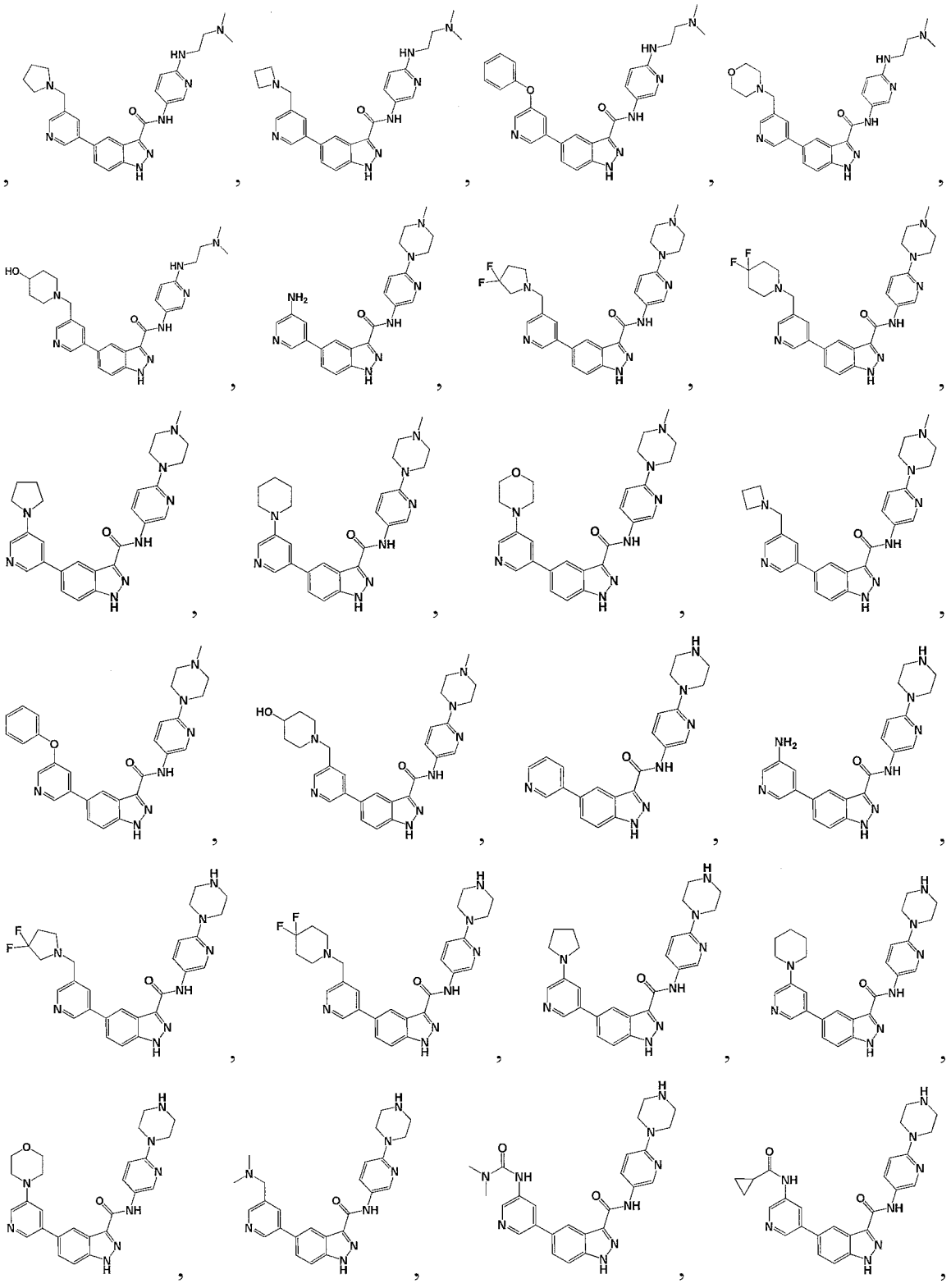

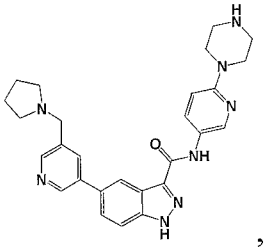
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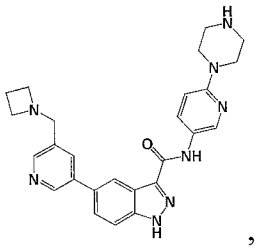
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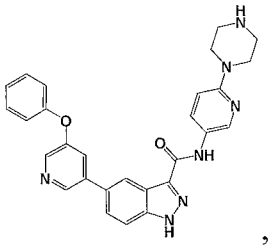
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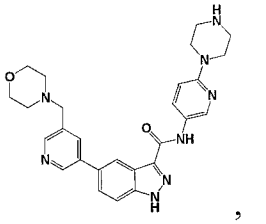
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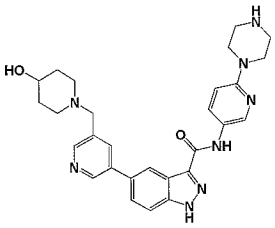
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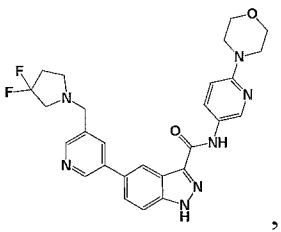
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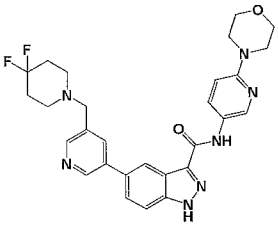
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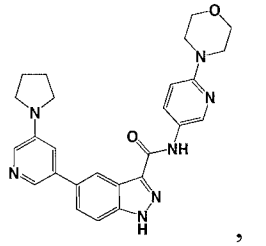
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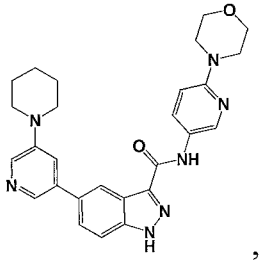
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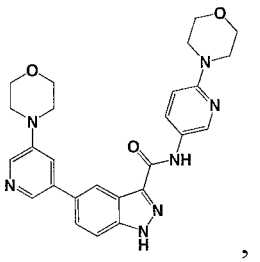
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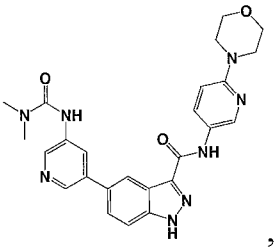
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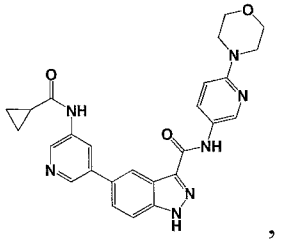
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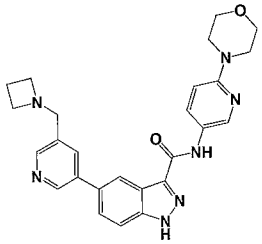
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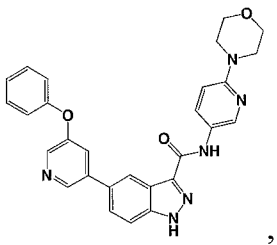
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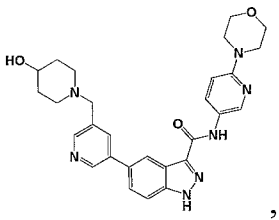
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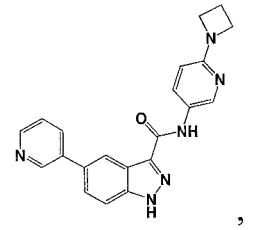
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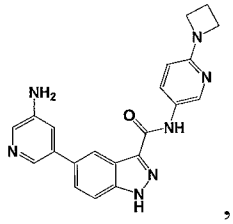
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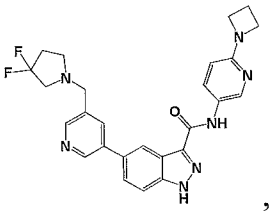
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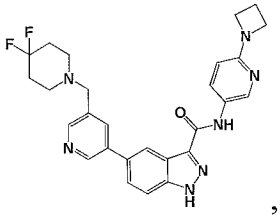
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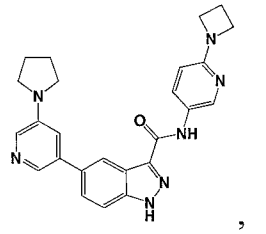
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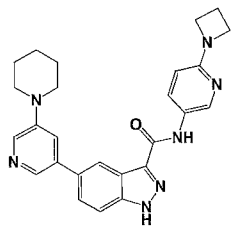
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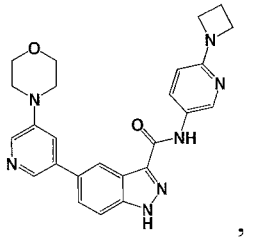
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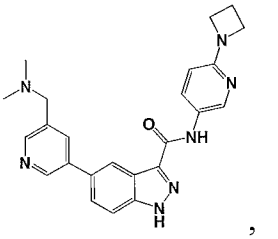
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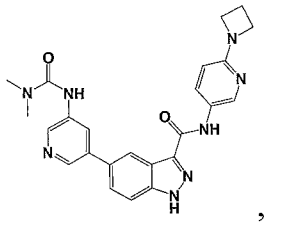
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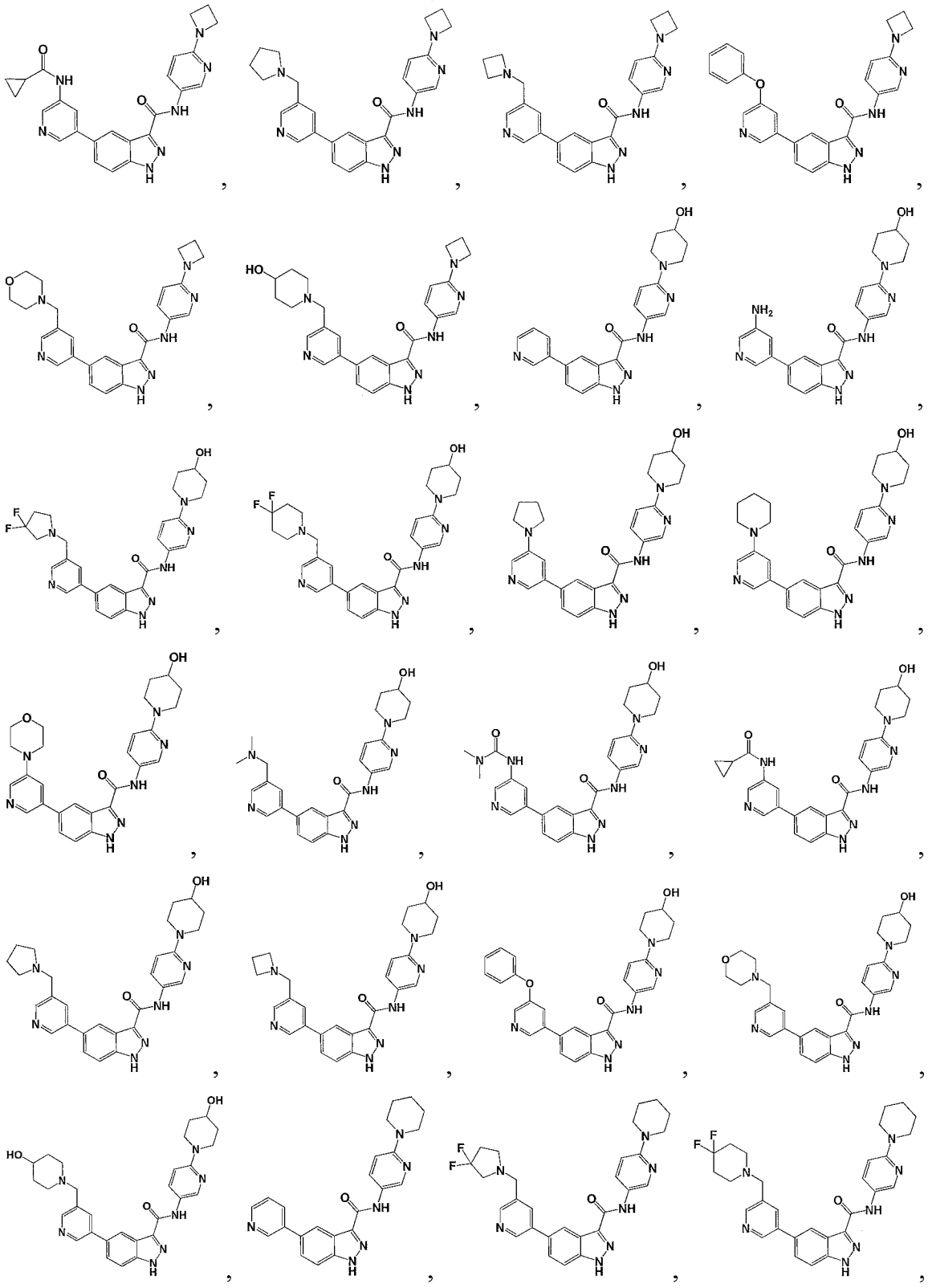

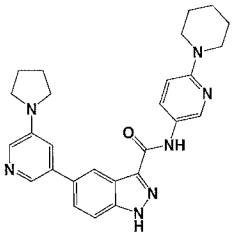
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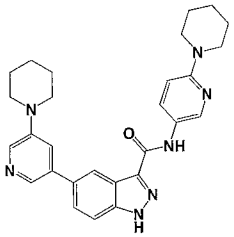
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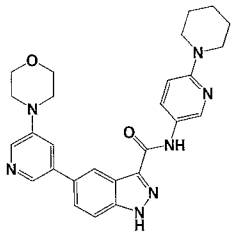
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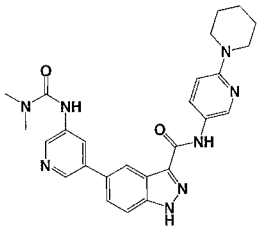
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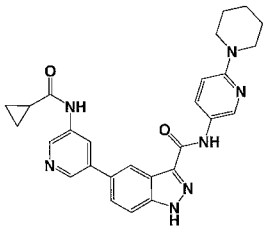
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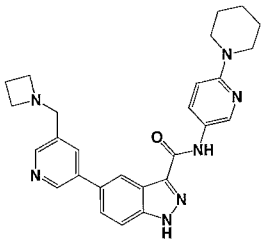
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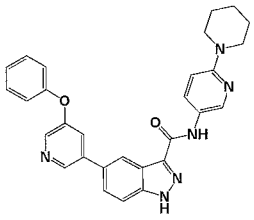
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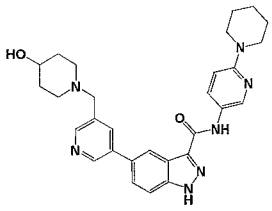
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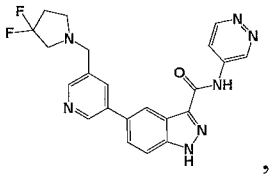
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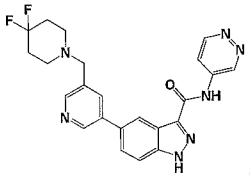
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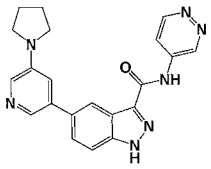
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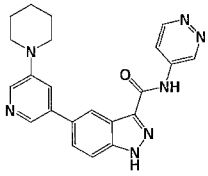
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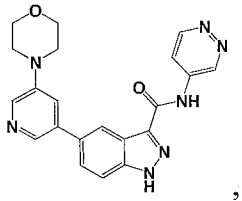
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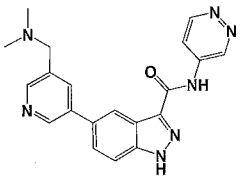
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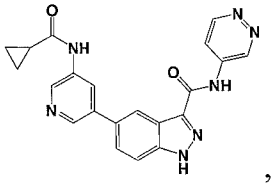
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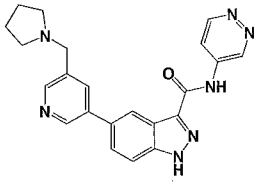
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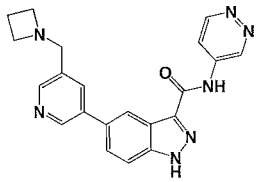
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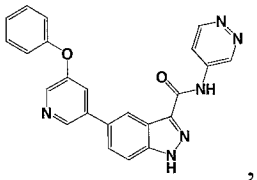
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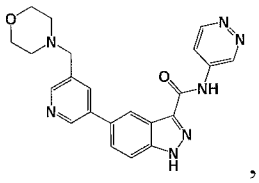
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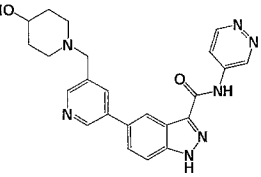
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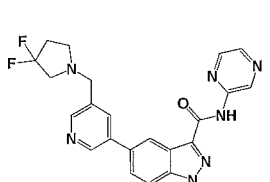
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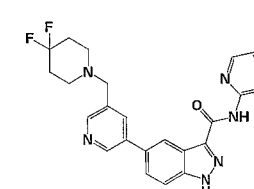
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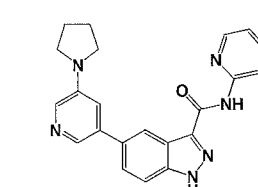
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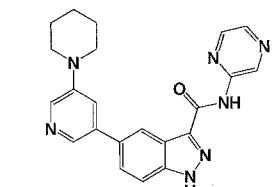
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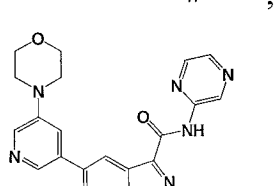
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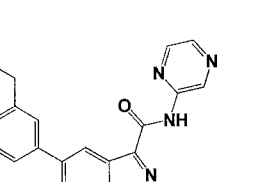
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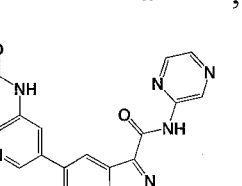
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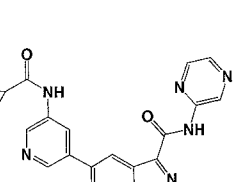
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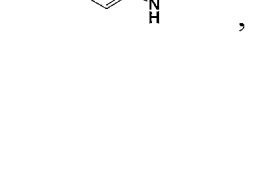
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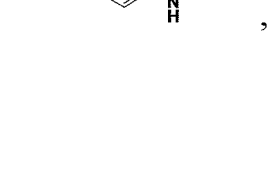
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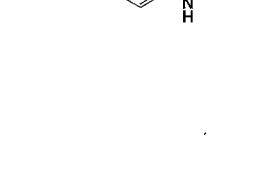
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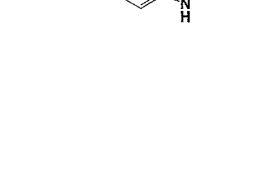
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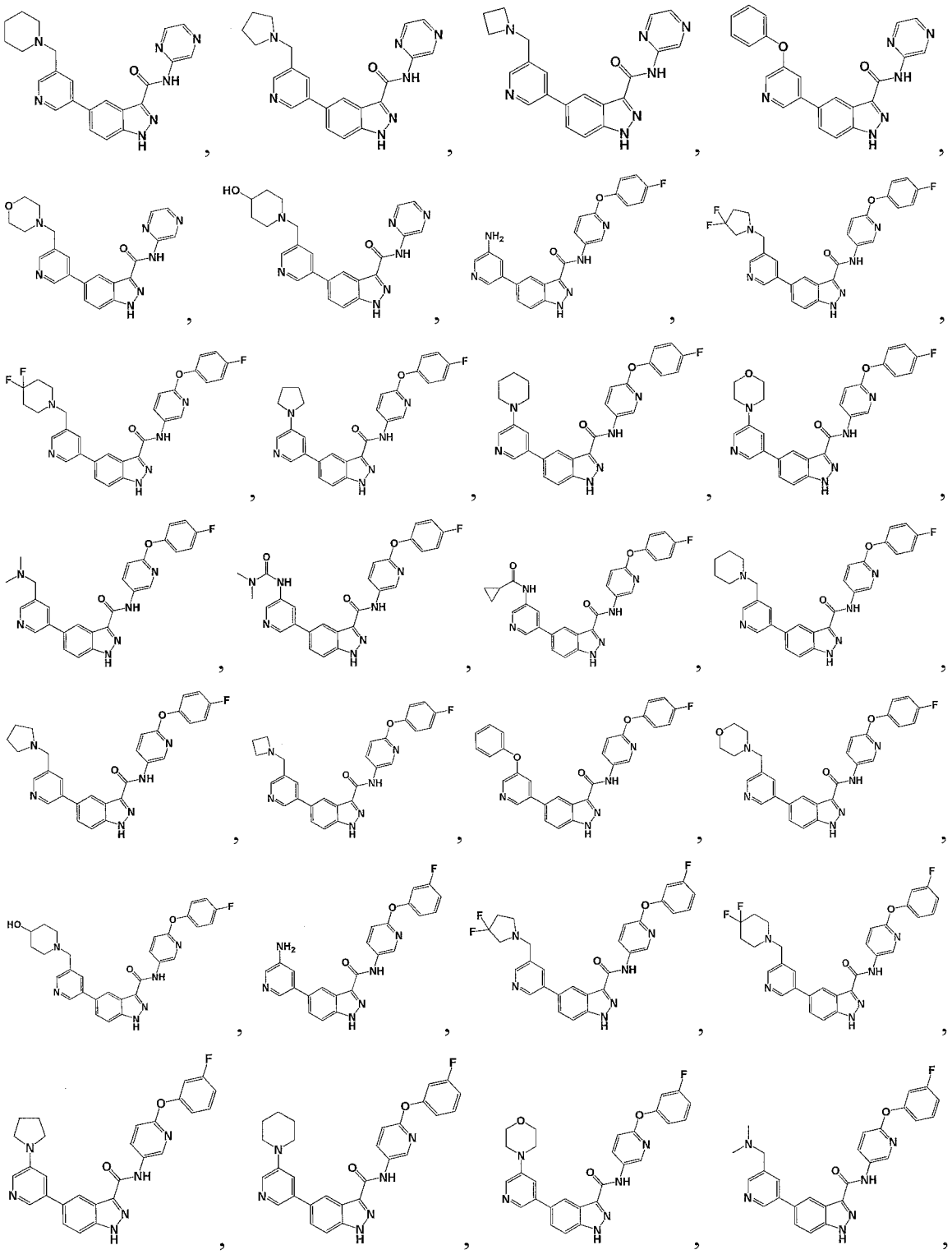

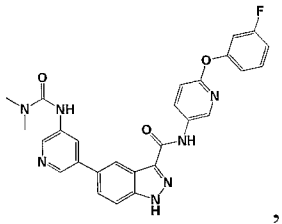
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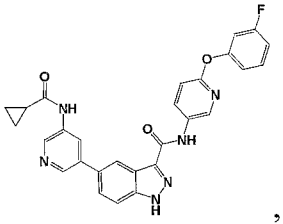
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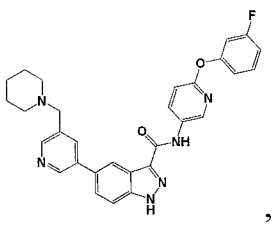
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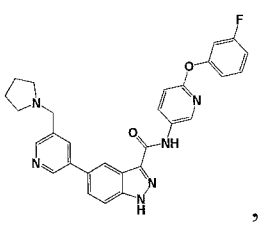
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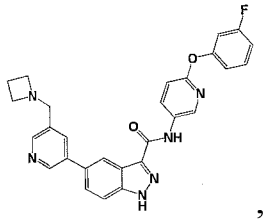
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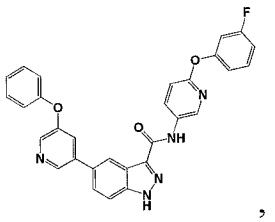
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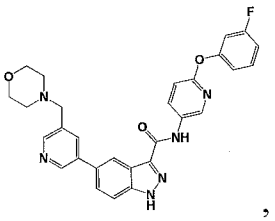
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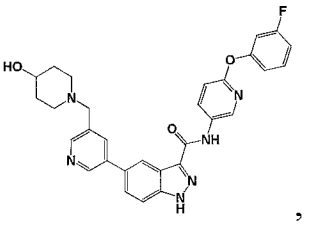
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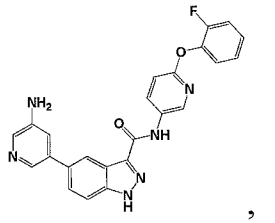
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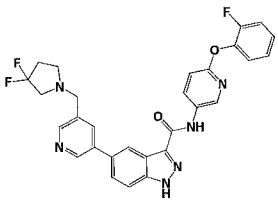
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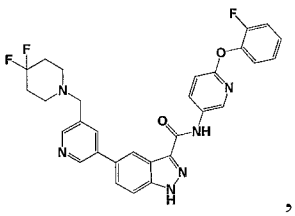
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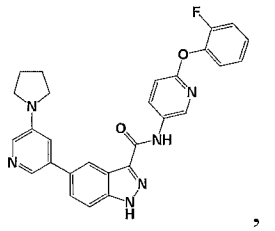
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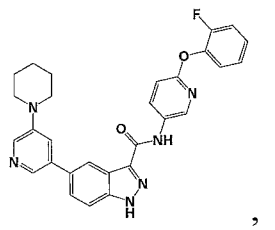
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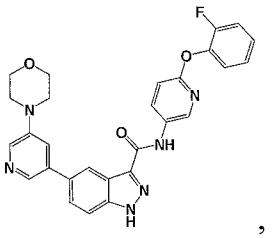
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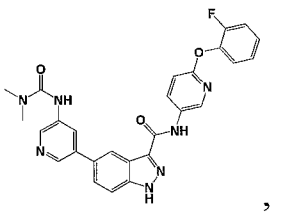
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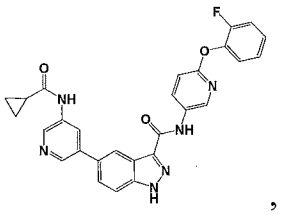
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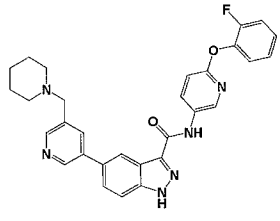
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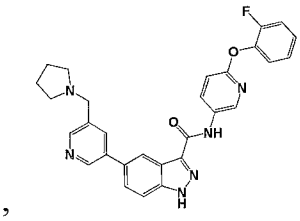
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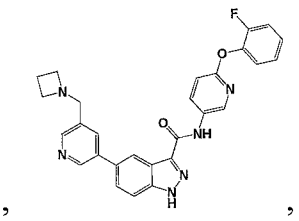
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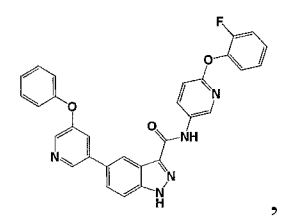
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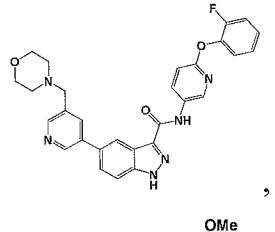
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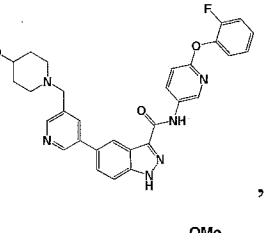
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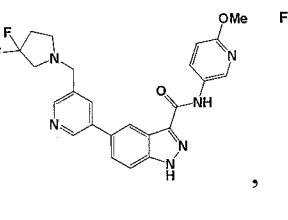
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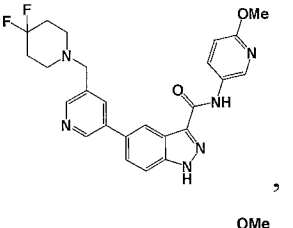
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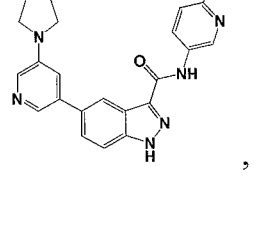
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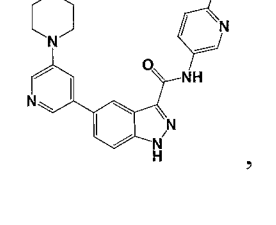
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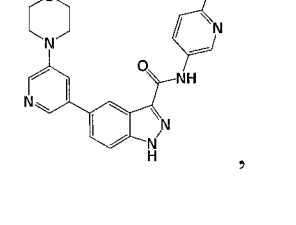
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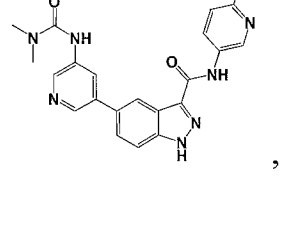
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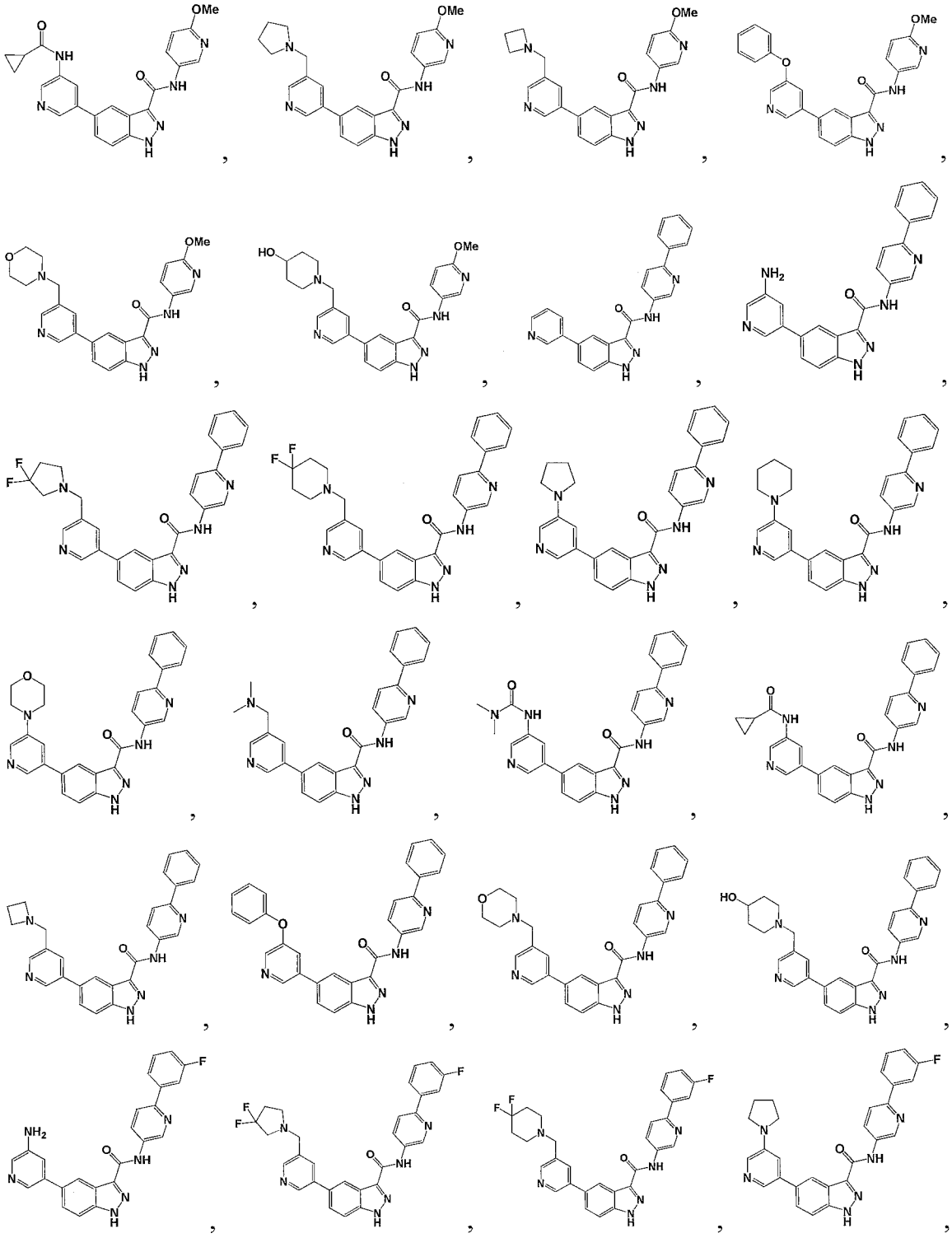

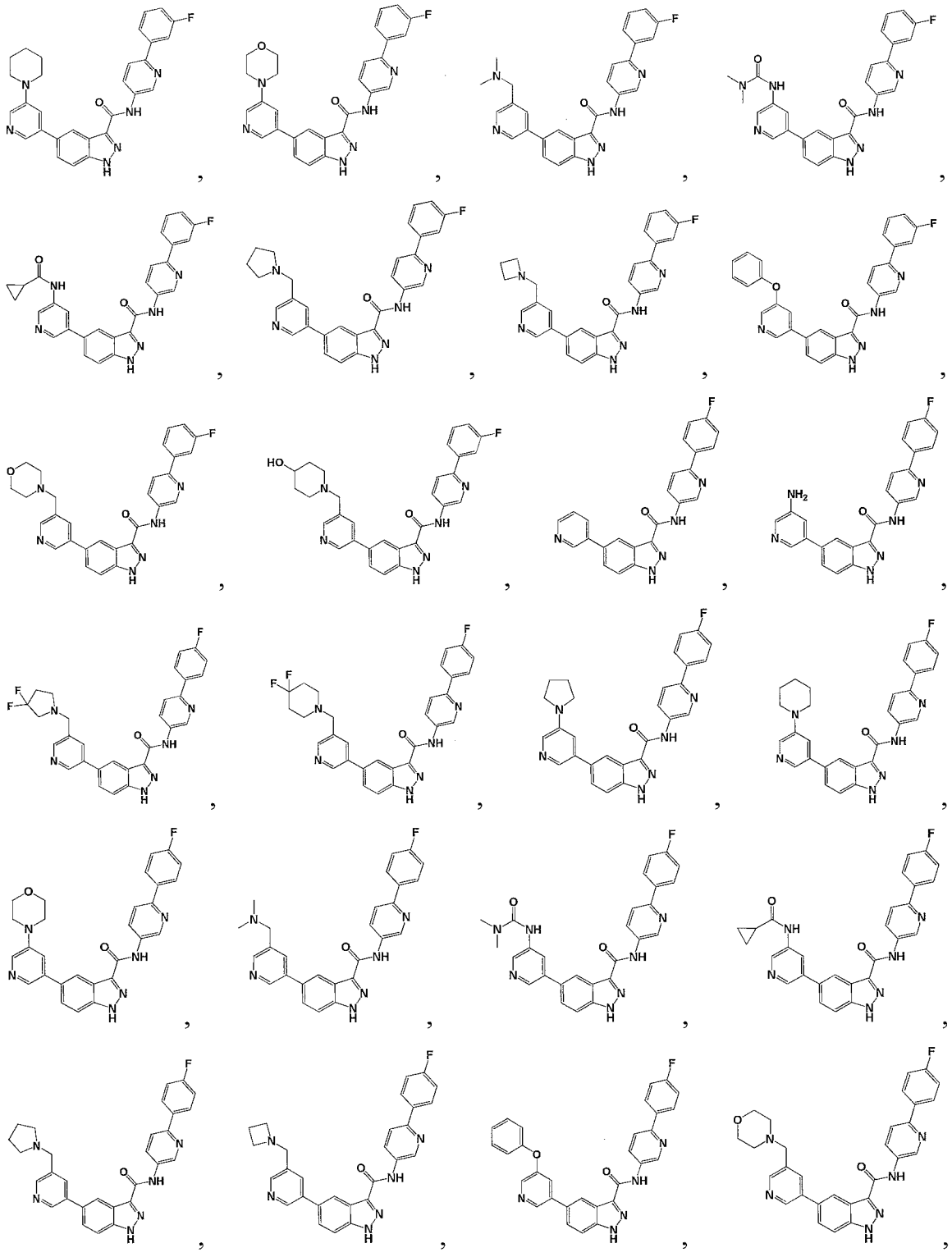

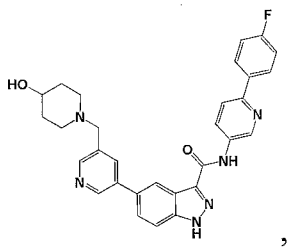
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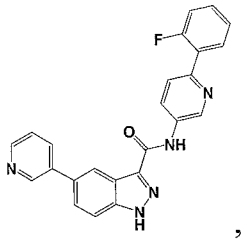
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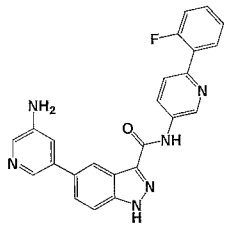
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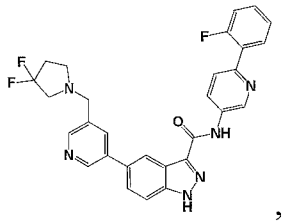
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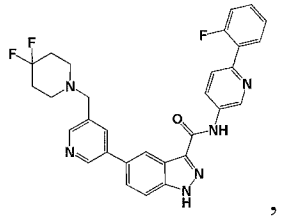
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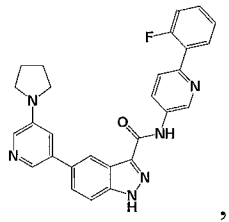
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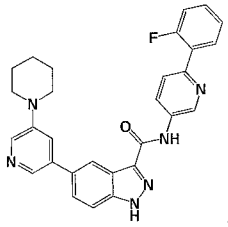
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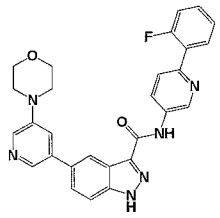
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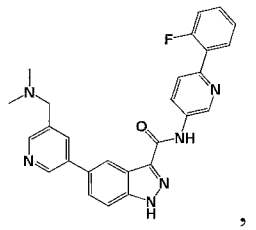
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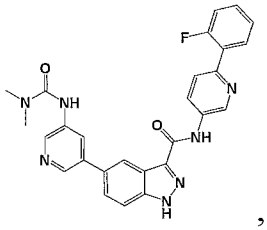
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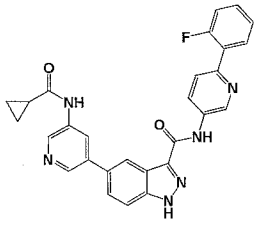
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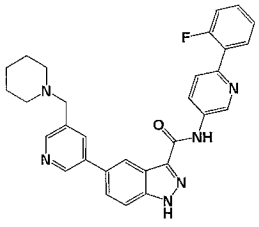
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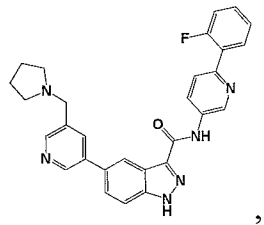
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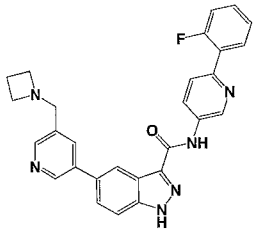
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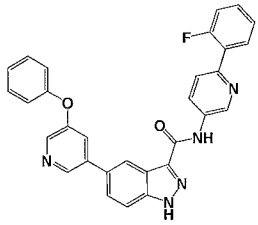
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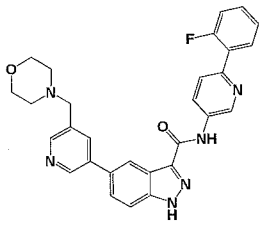
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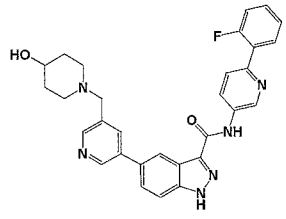
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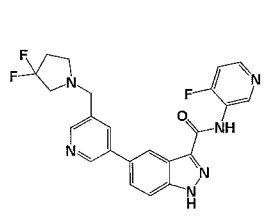
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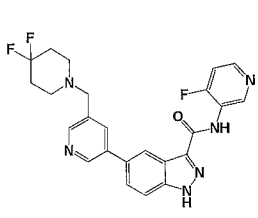
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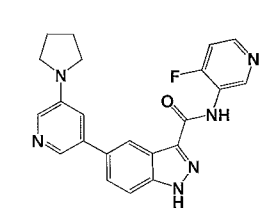
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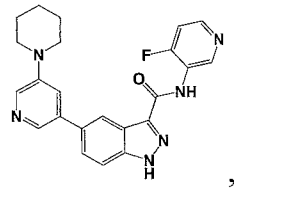
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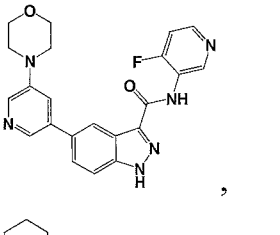
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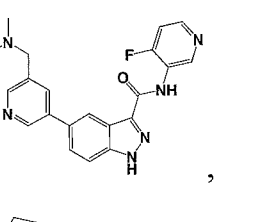
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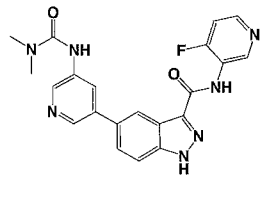
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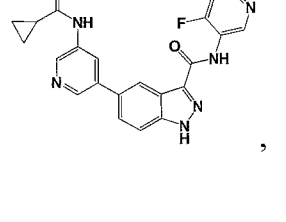
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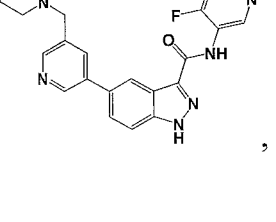
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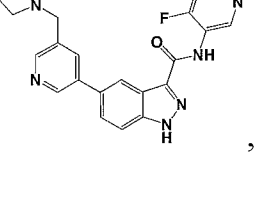
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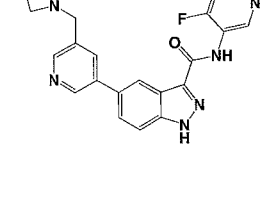
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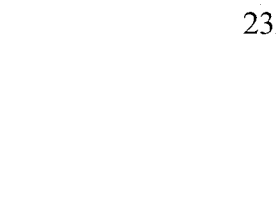
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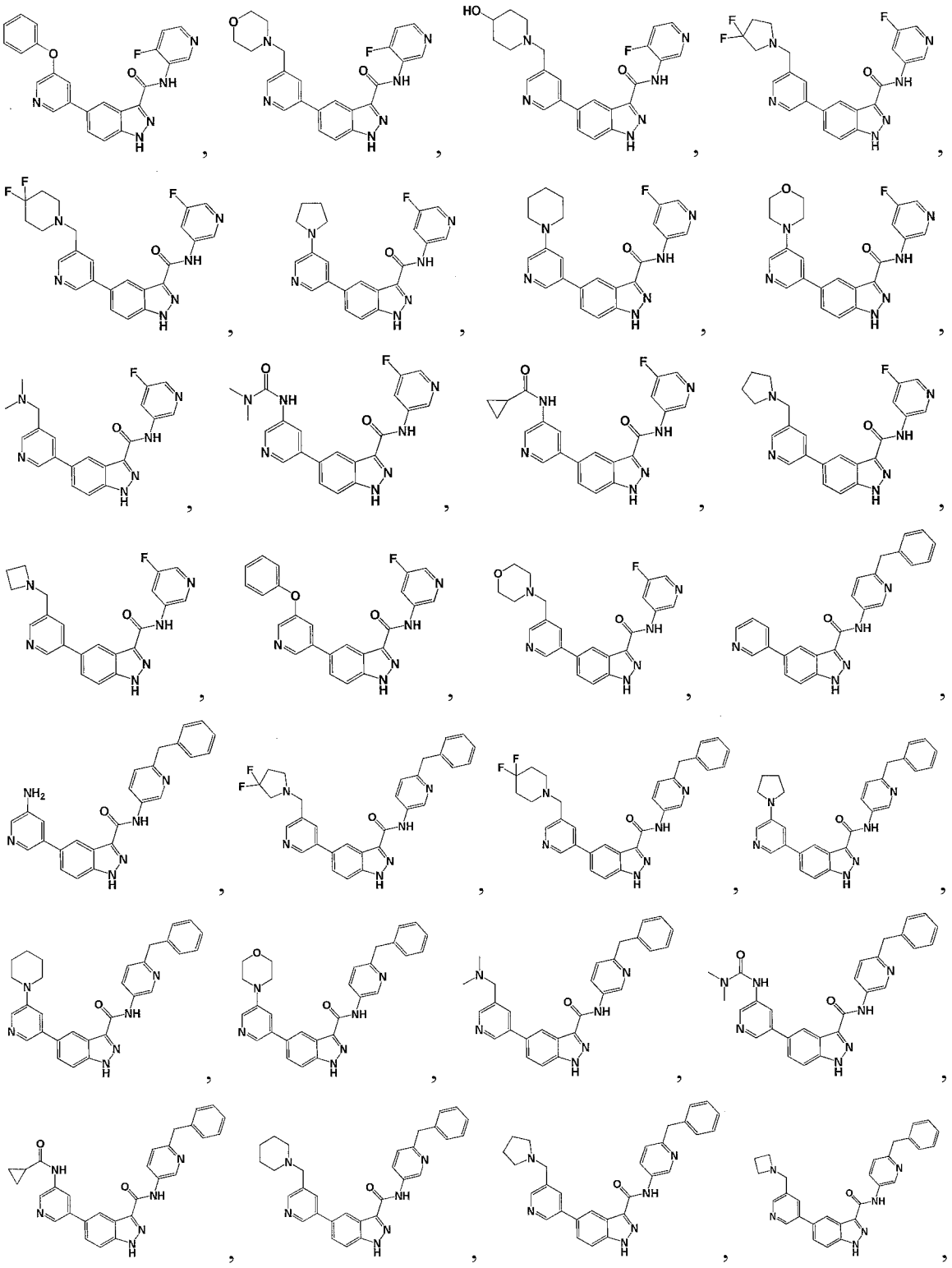

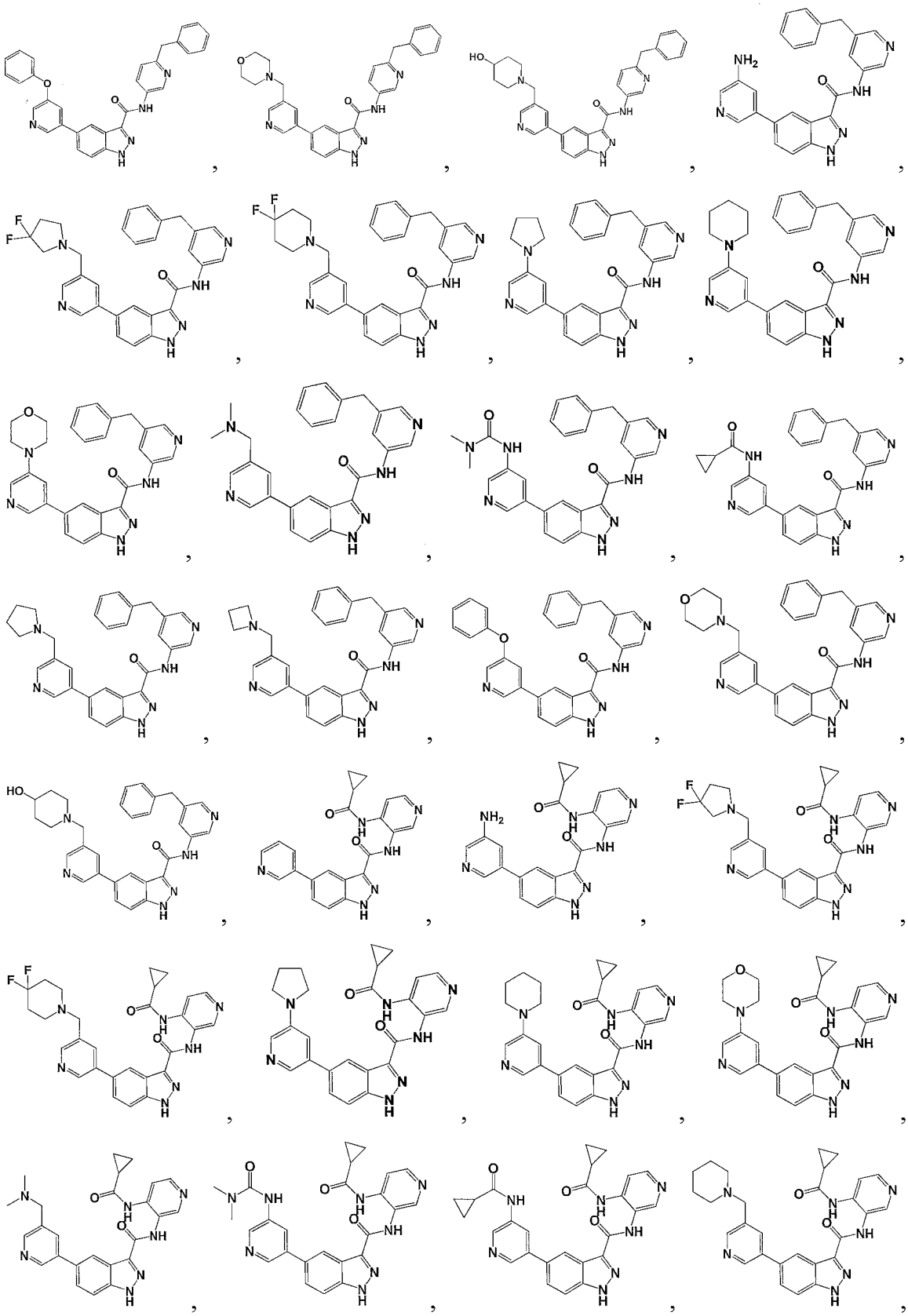

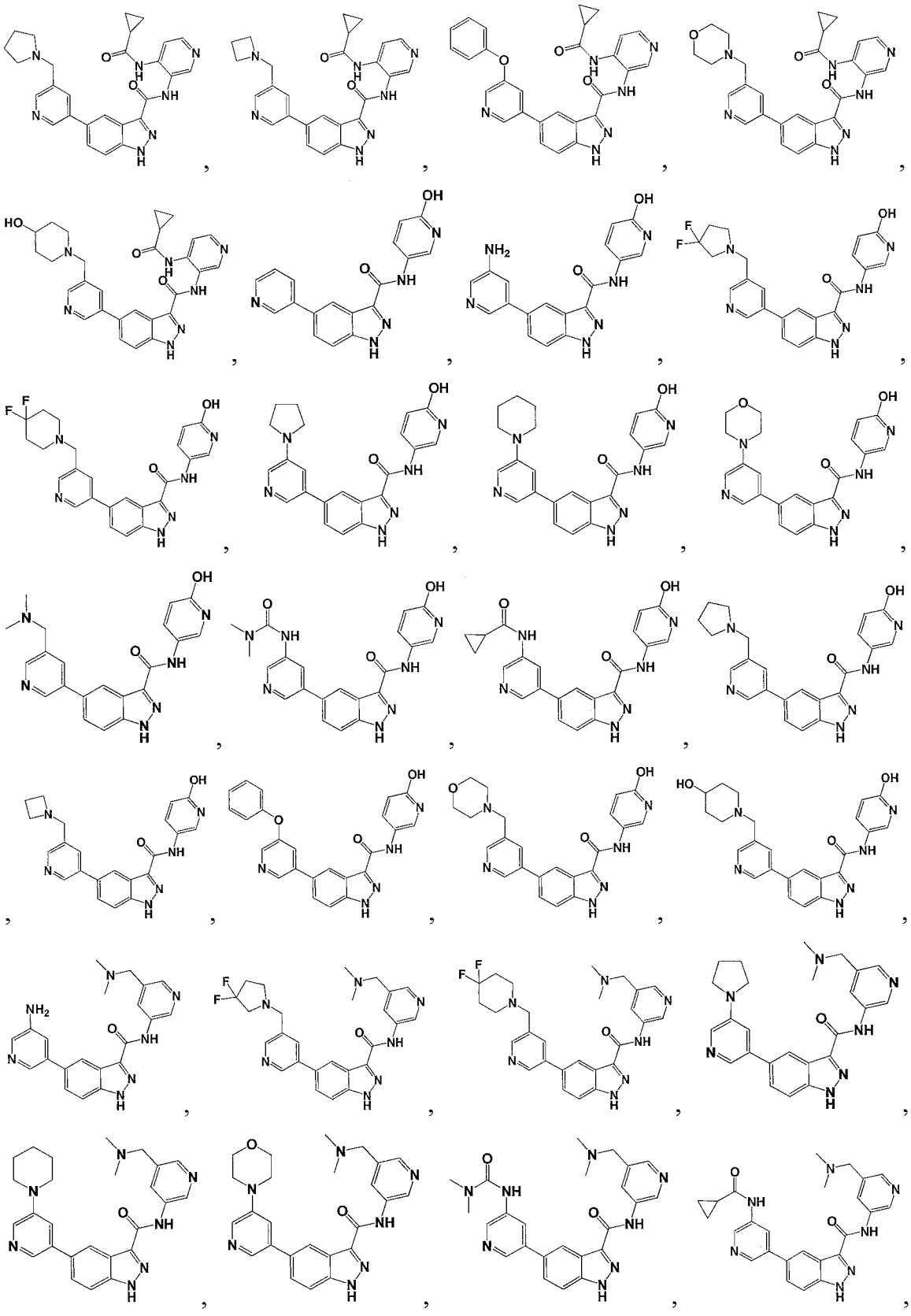

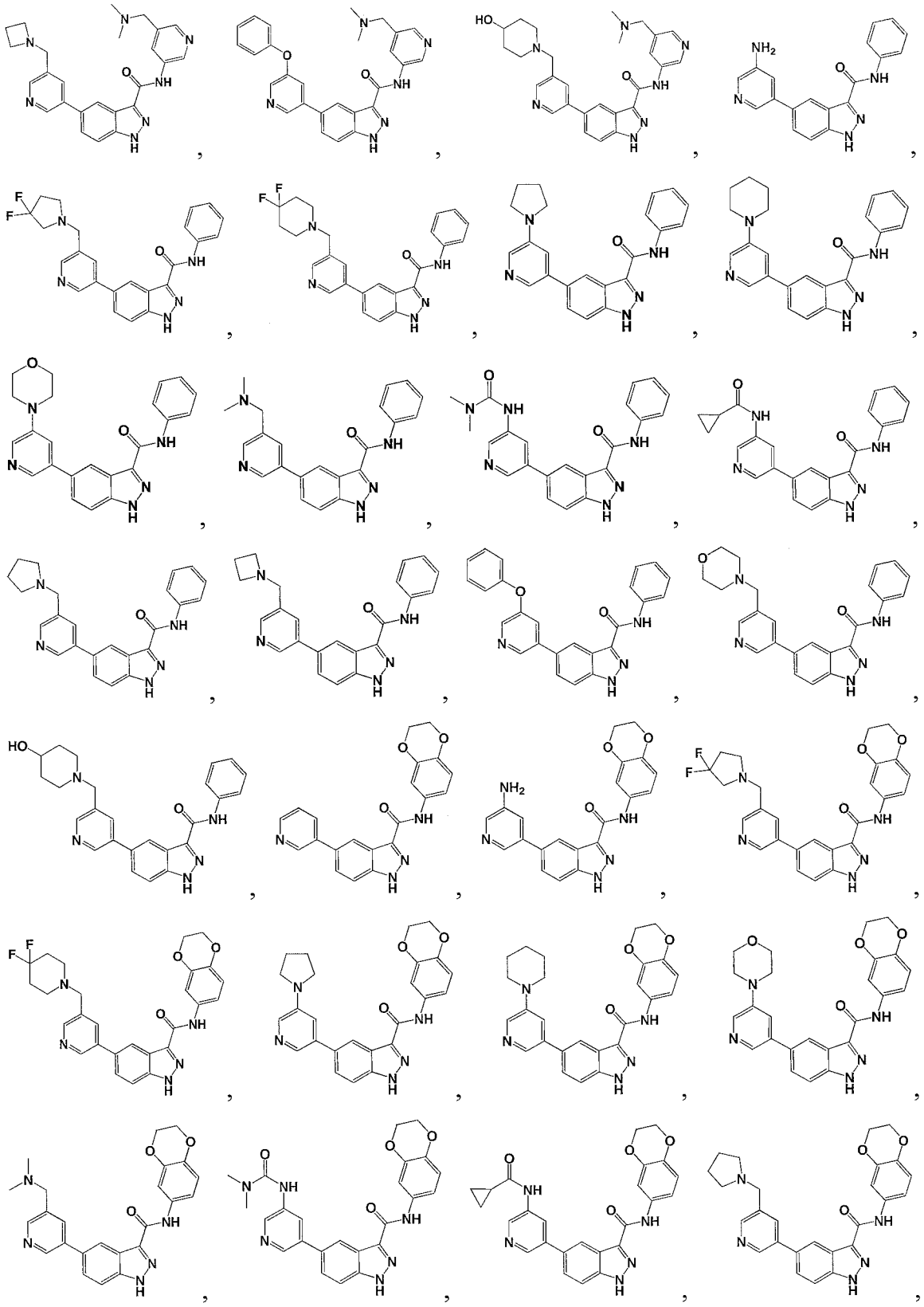

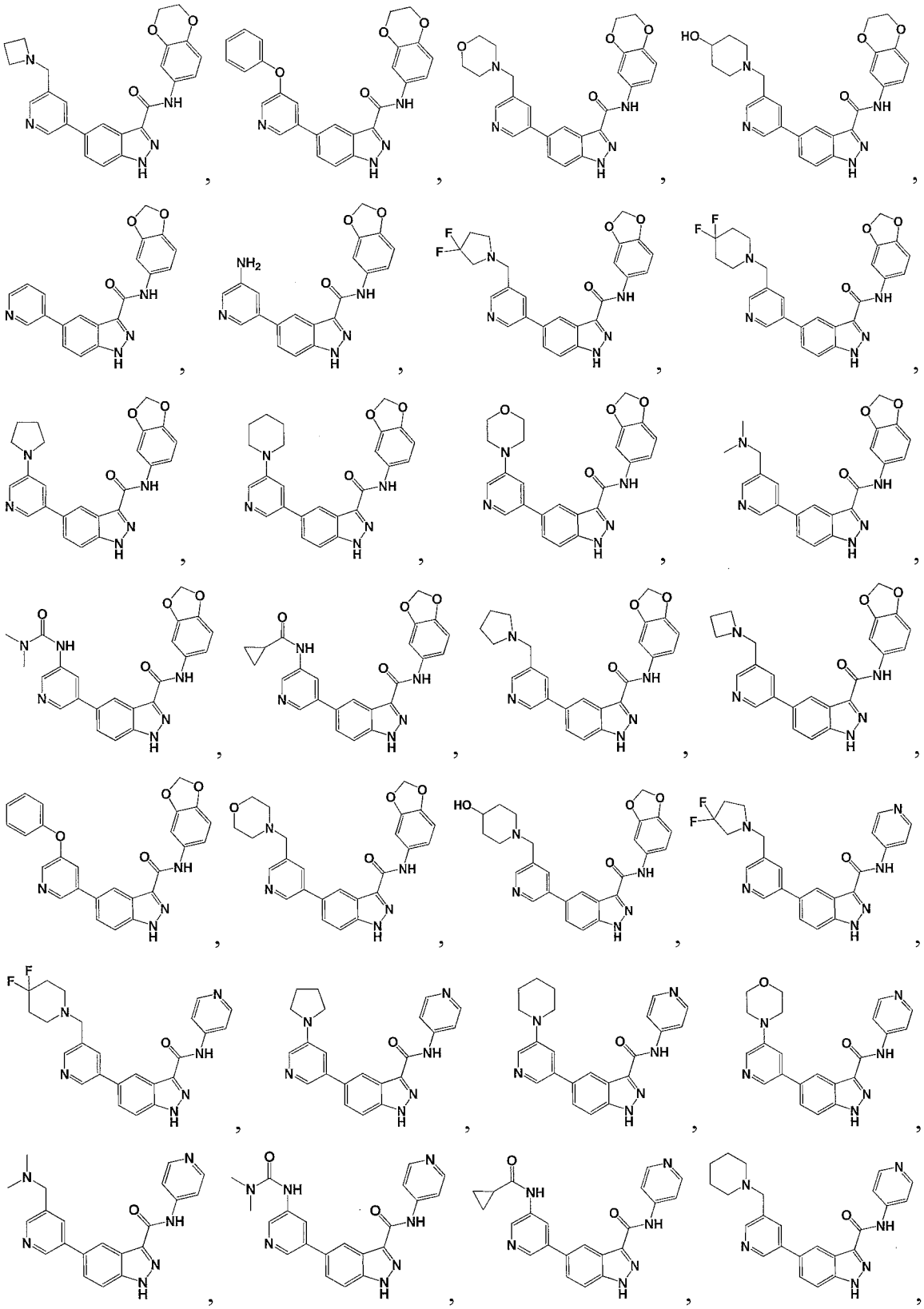

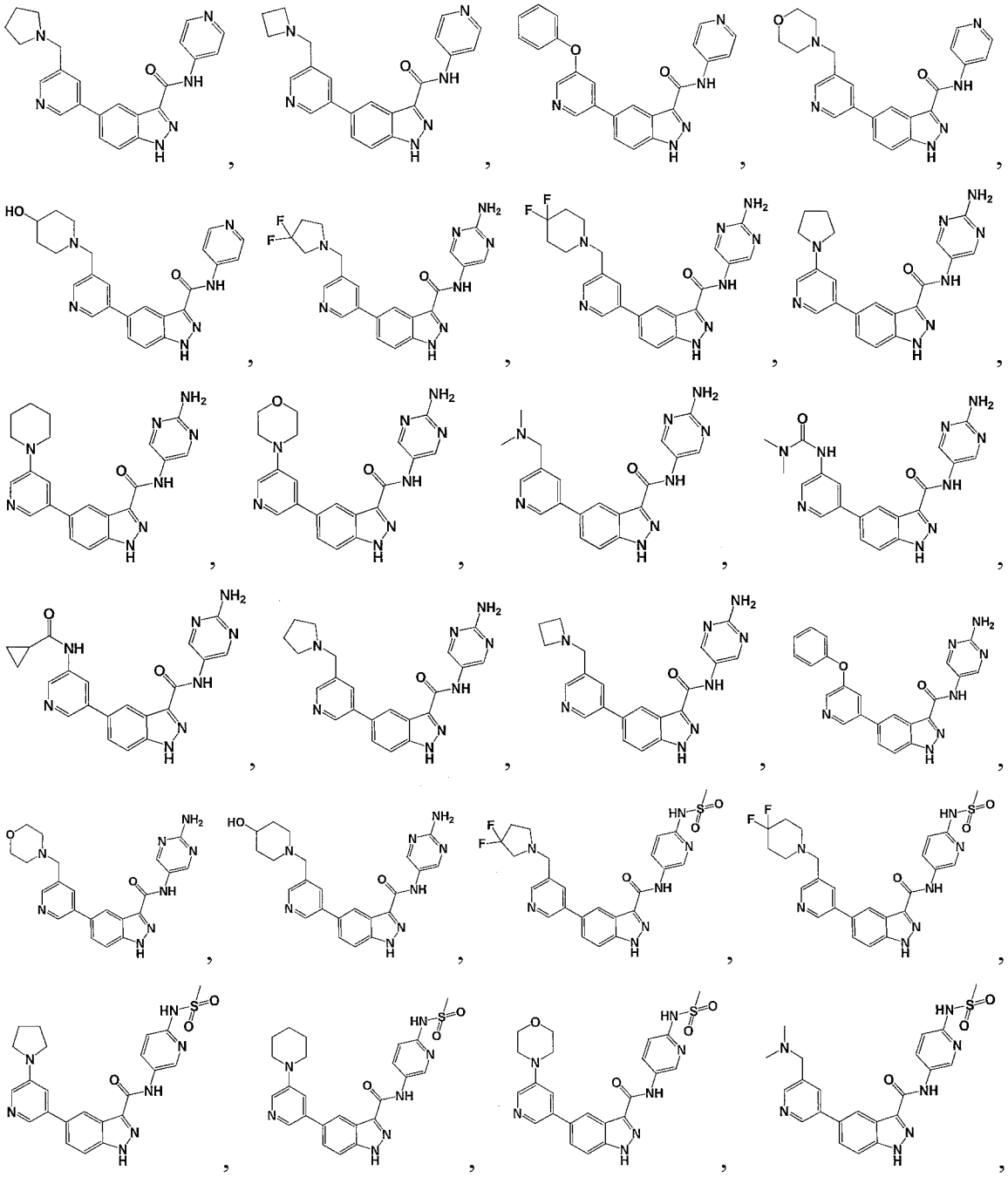

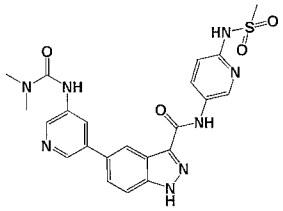
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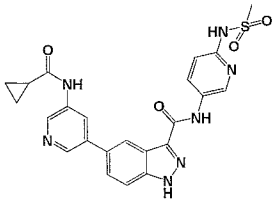
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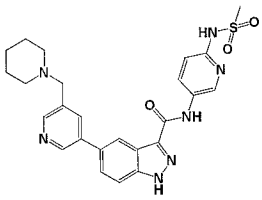
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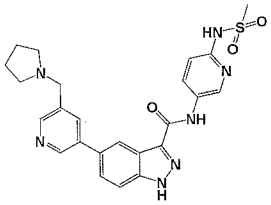
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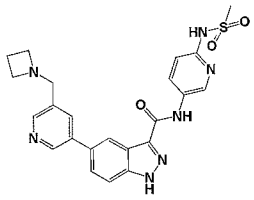
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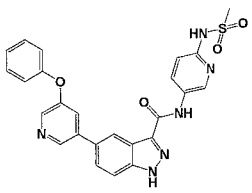
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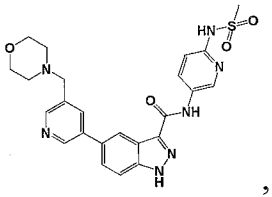
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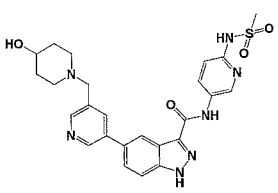
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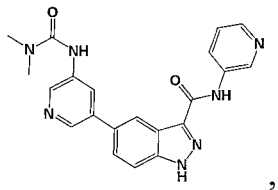
18. The compound of claim 17 having a structure selected from the group consisting of: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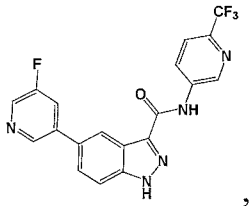
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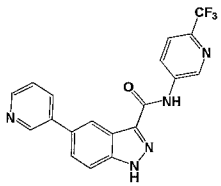
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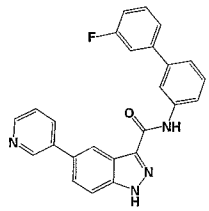
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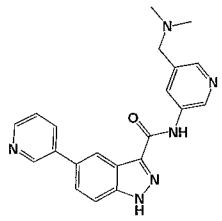
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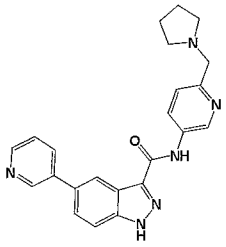
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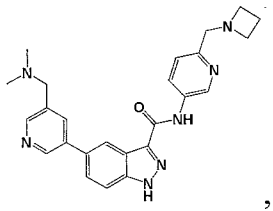
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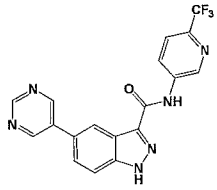
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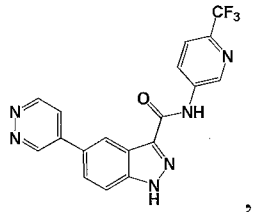
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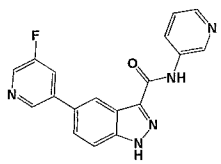
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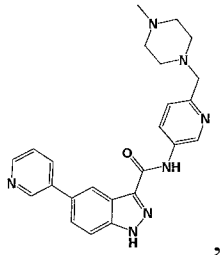
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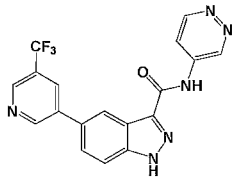
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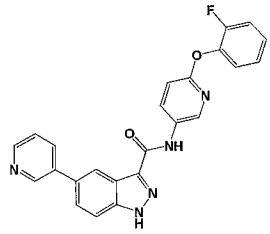
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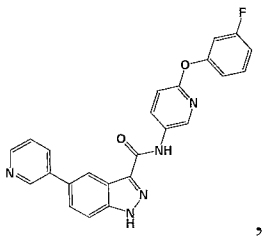
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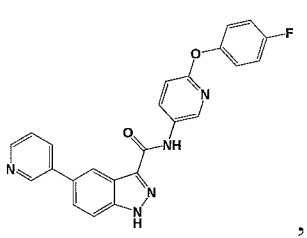
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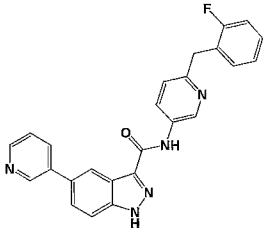
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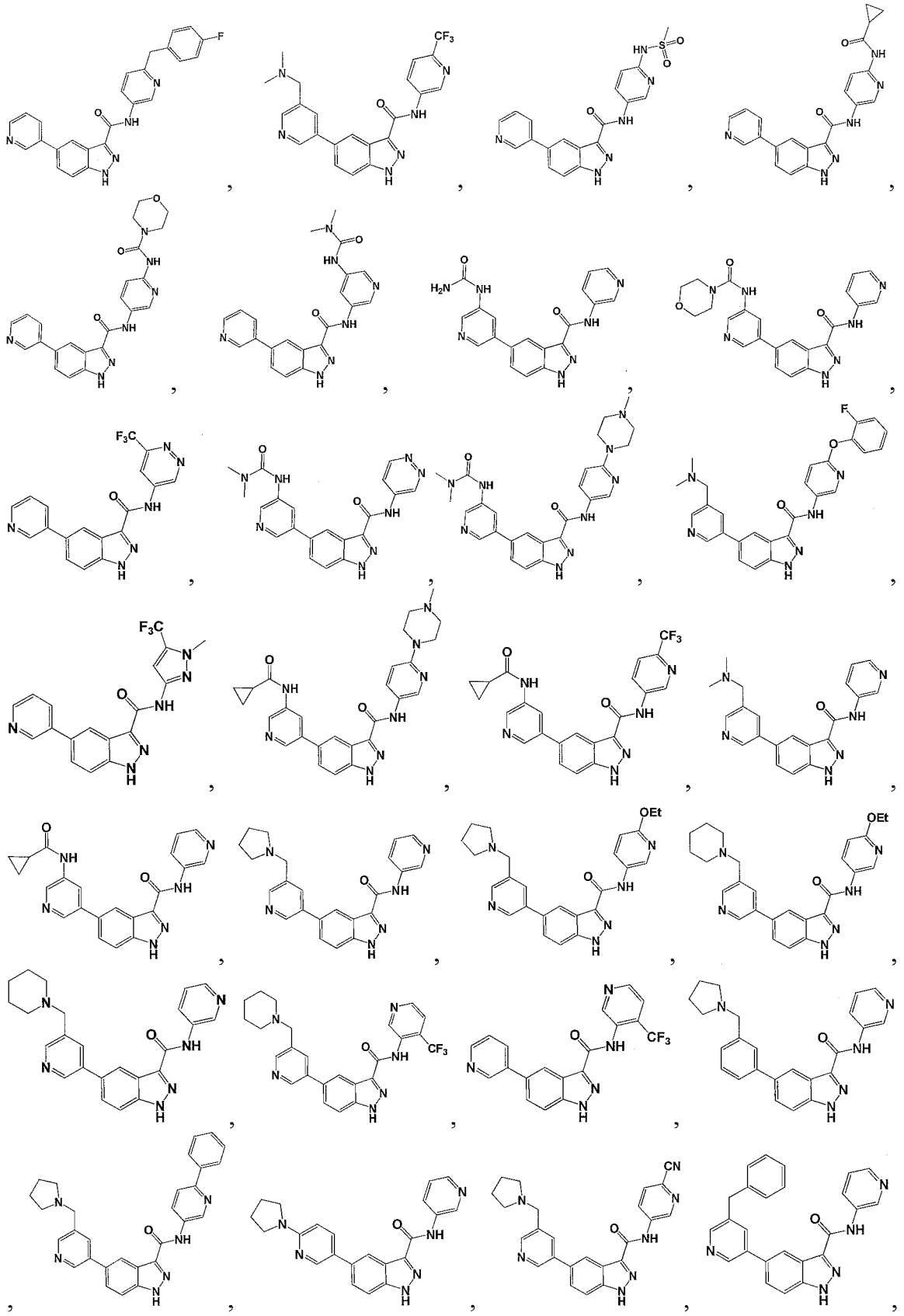

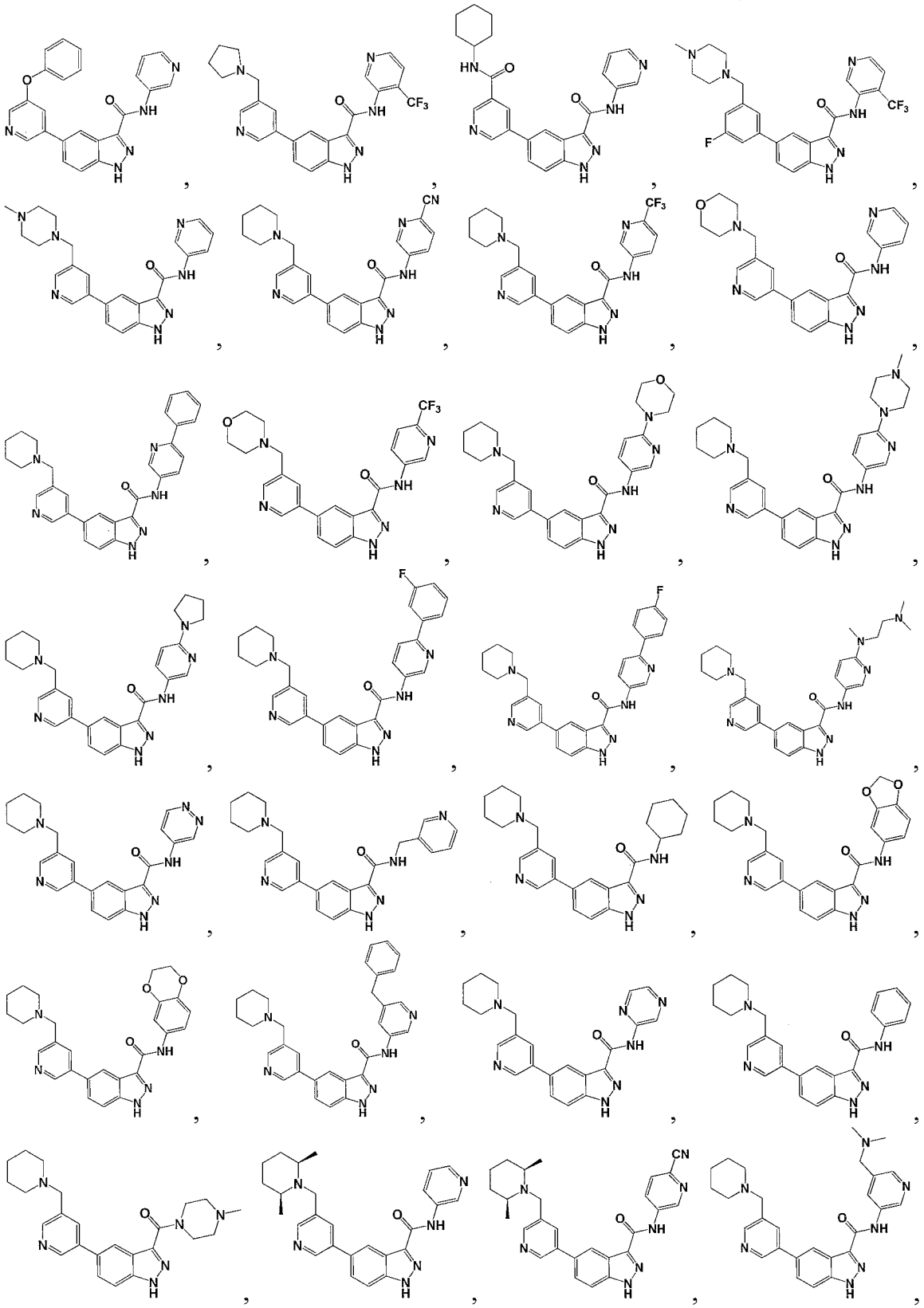

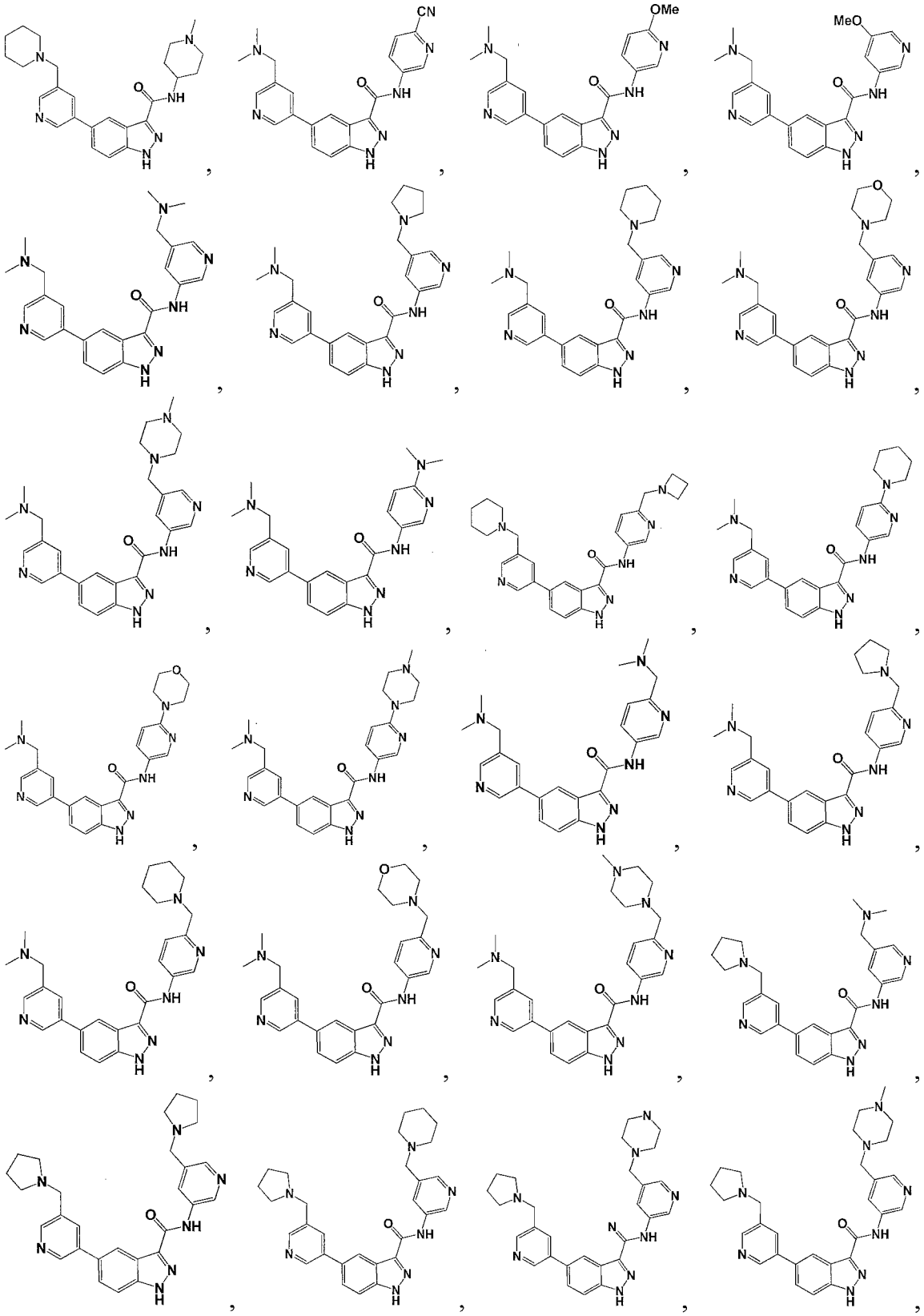

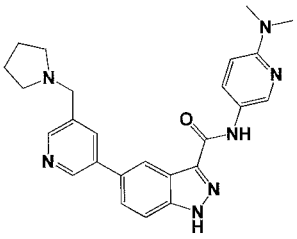
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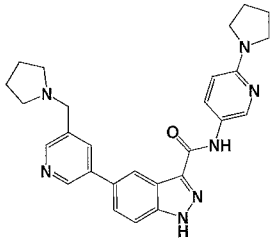
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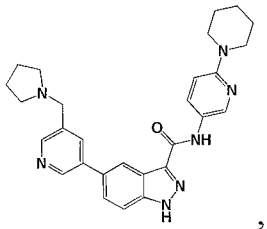
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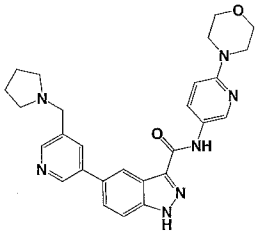
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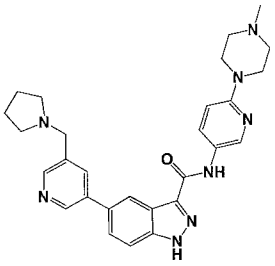
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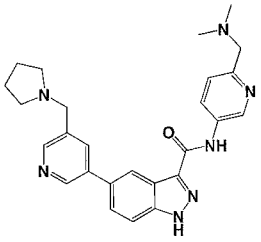
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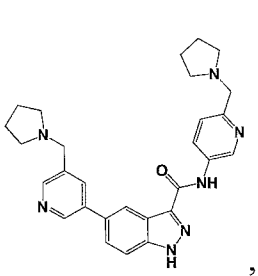
19. The compound of claim 17 having a structure selected from the group consisting of: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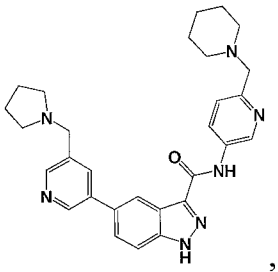
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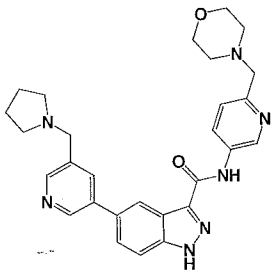
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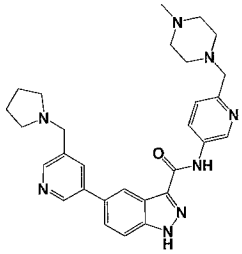
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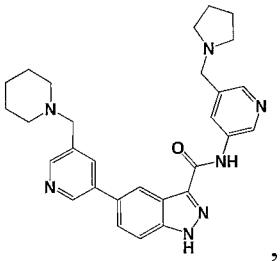
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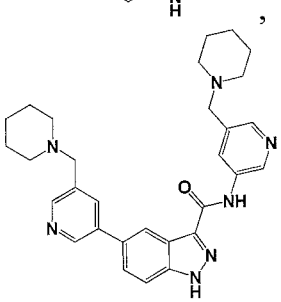
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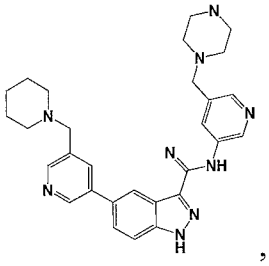
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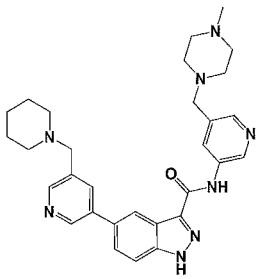
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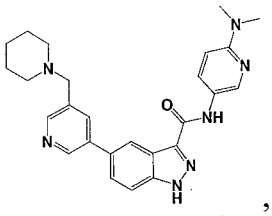
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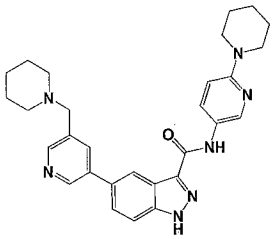
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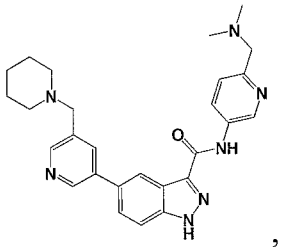
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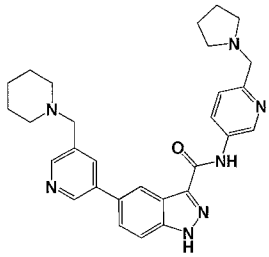
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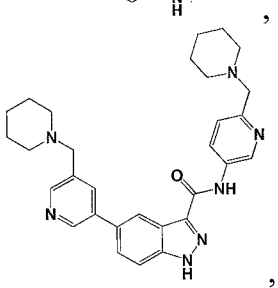
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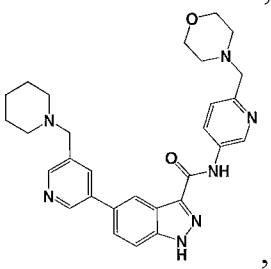
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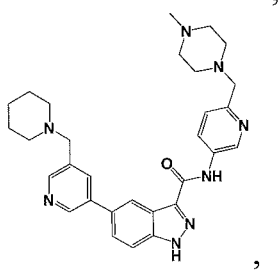
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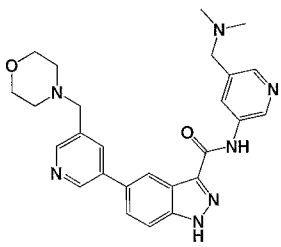
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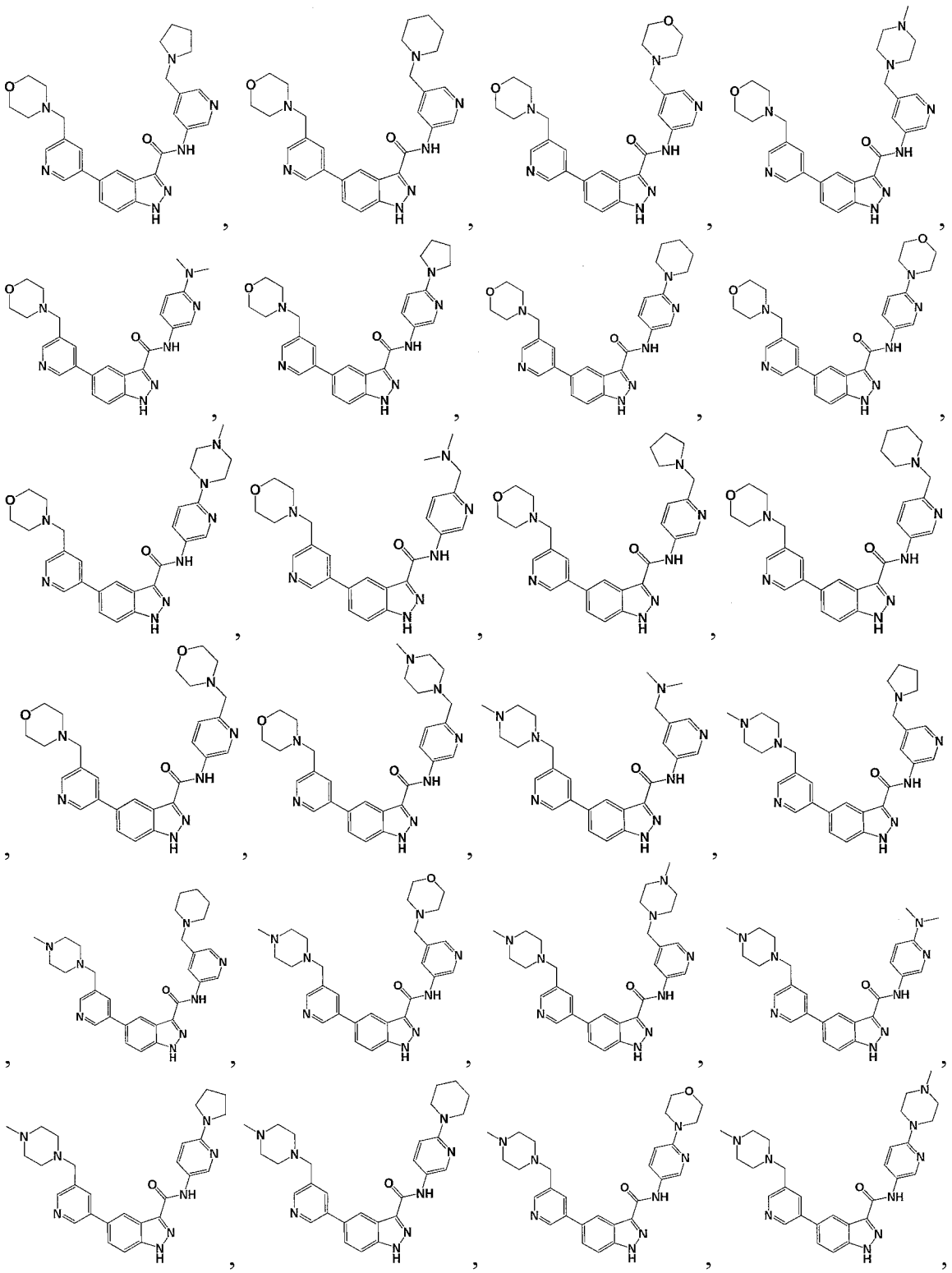

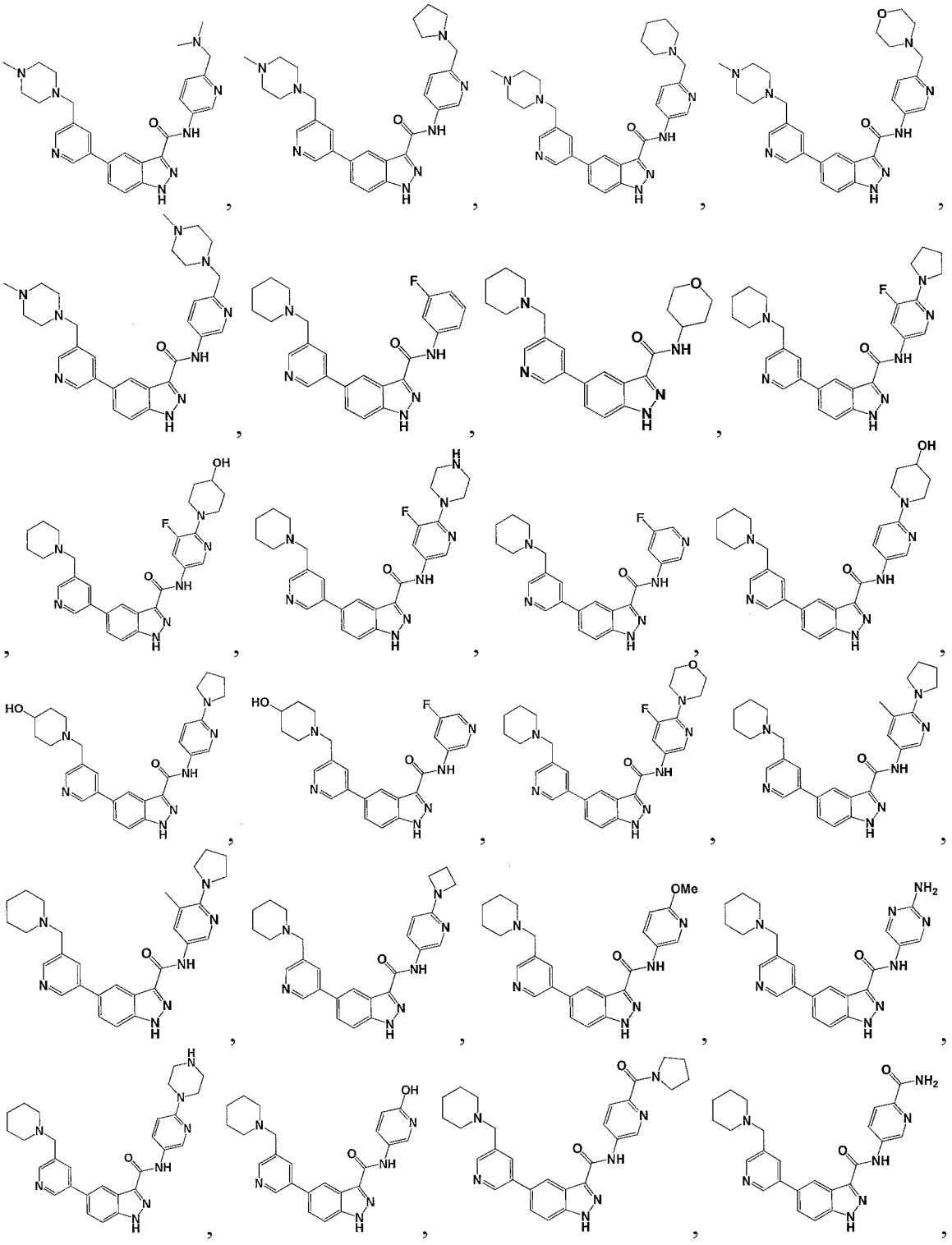

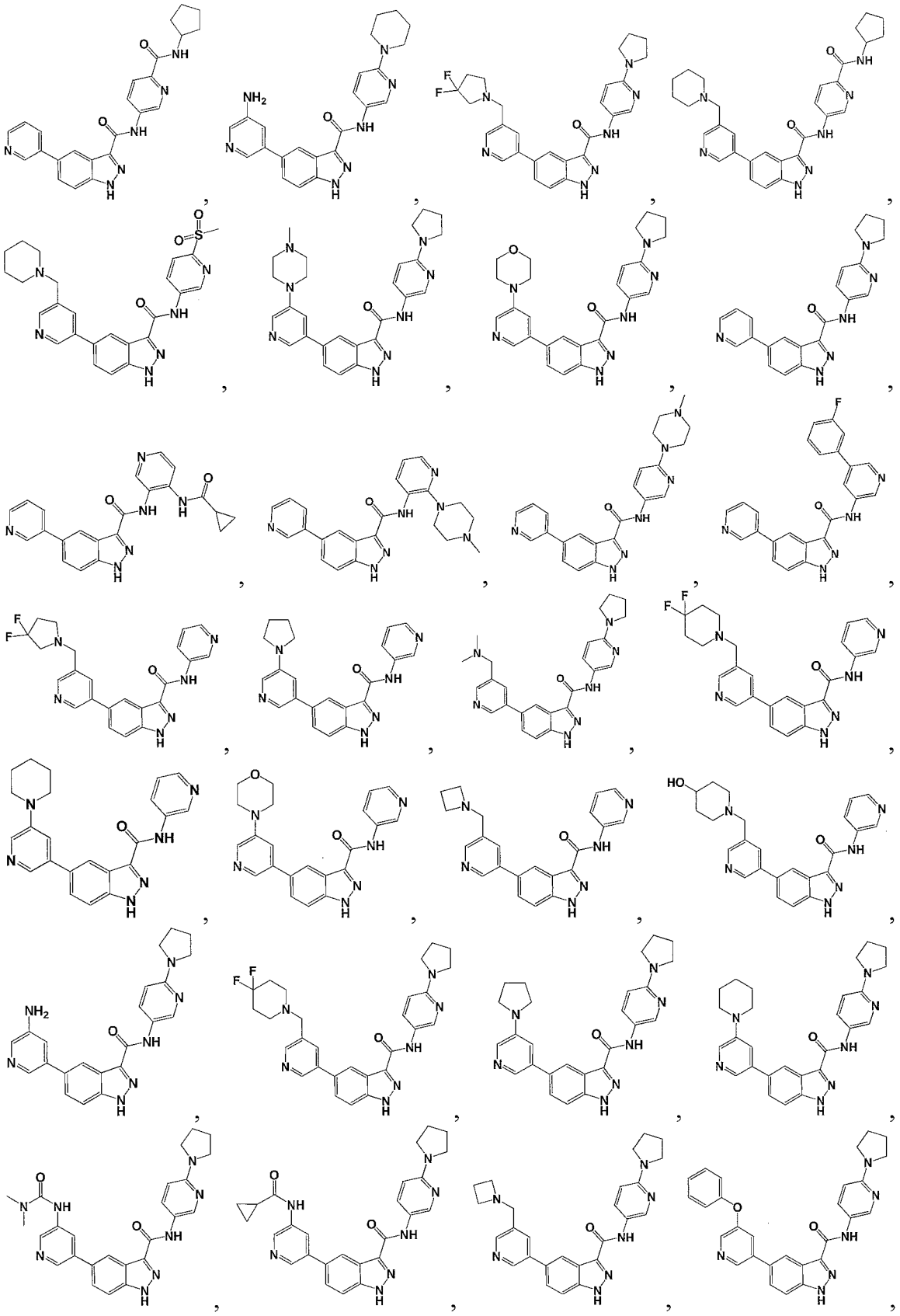

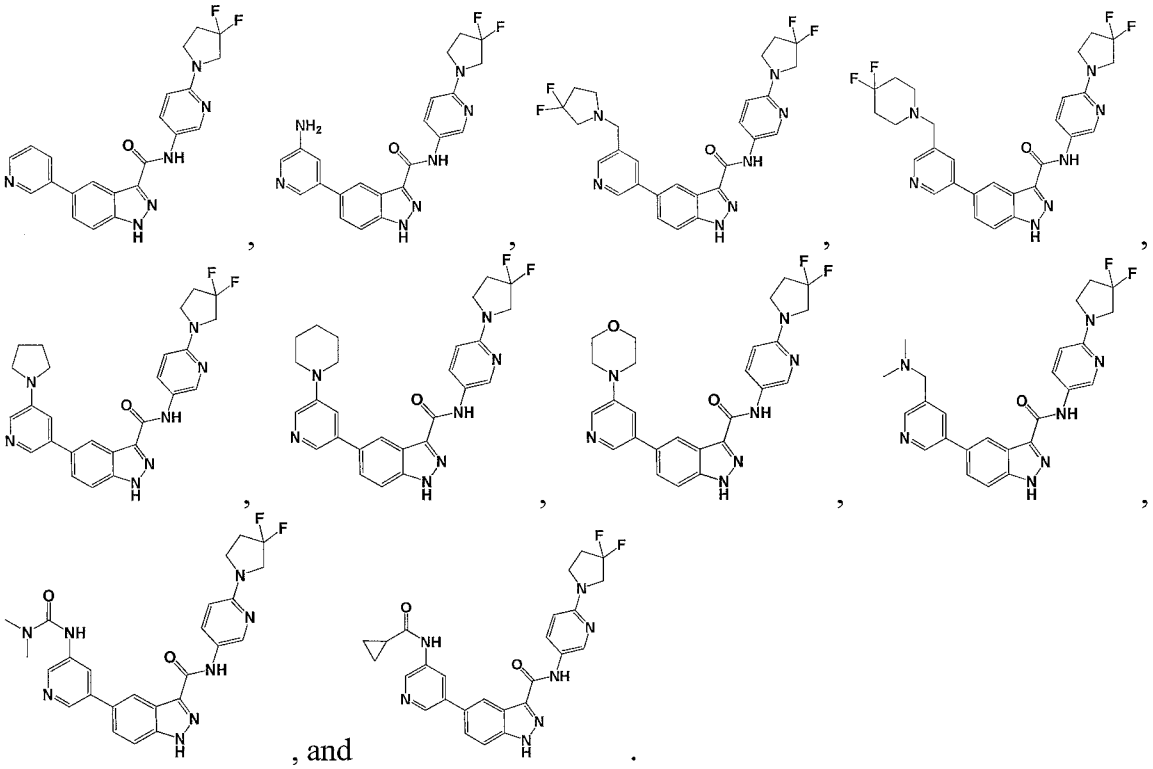

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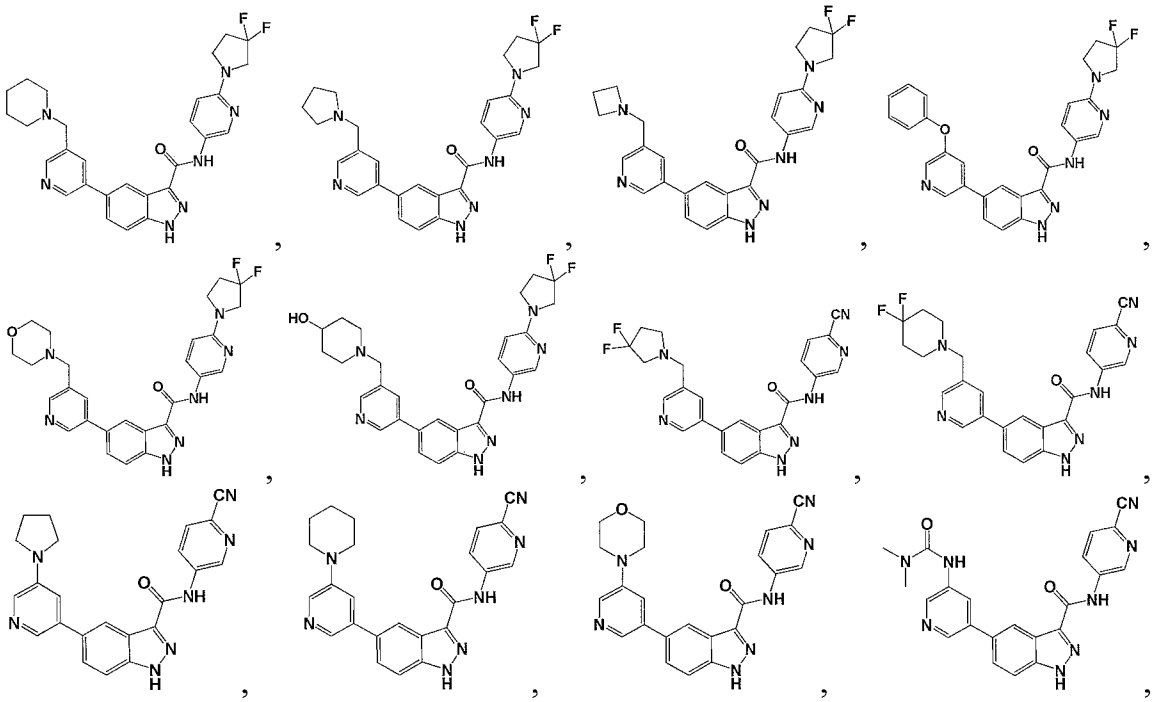
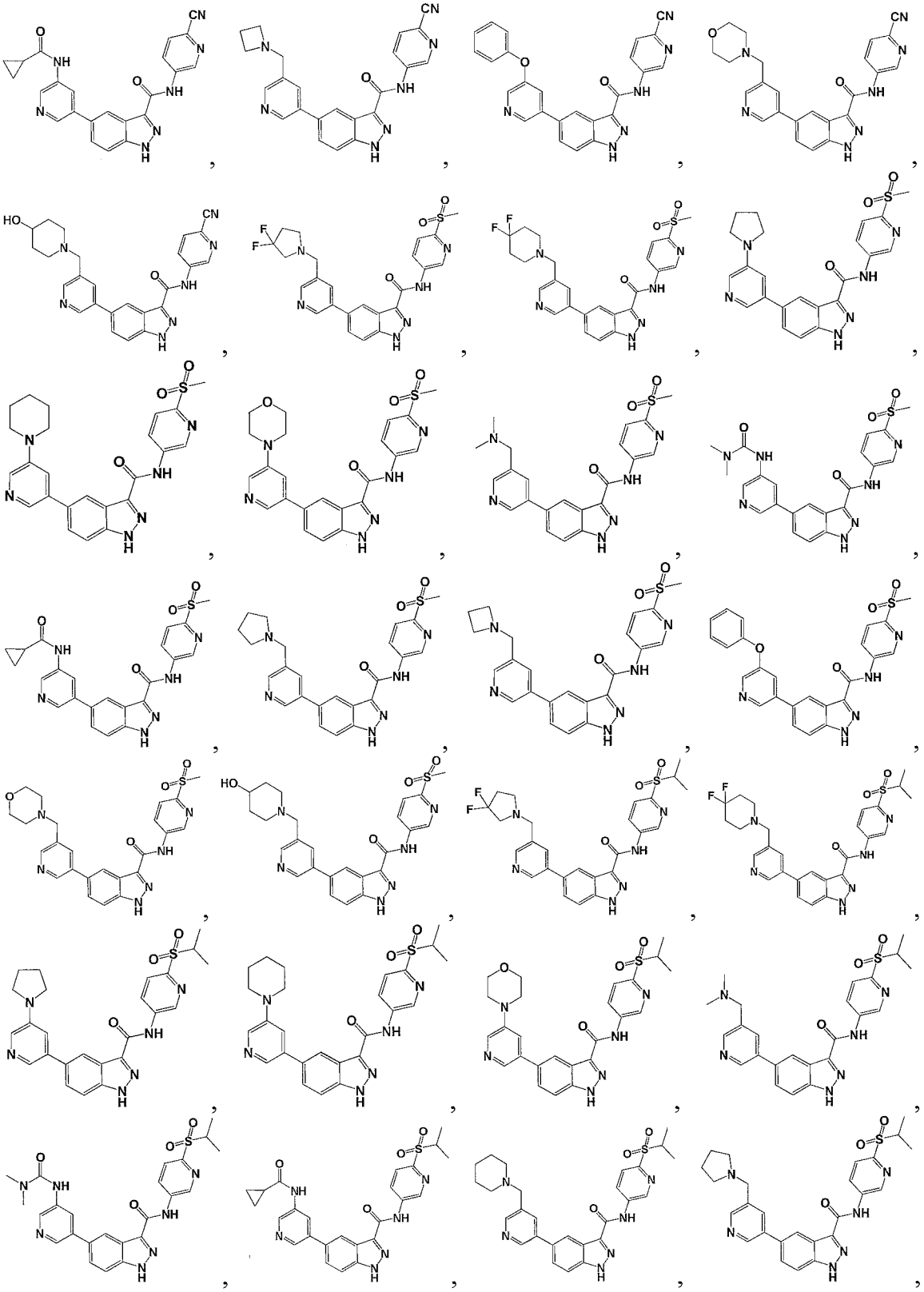
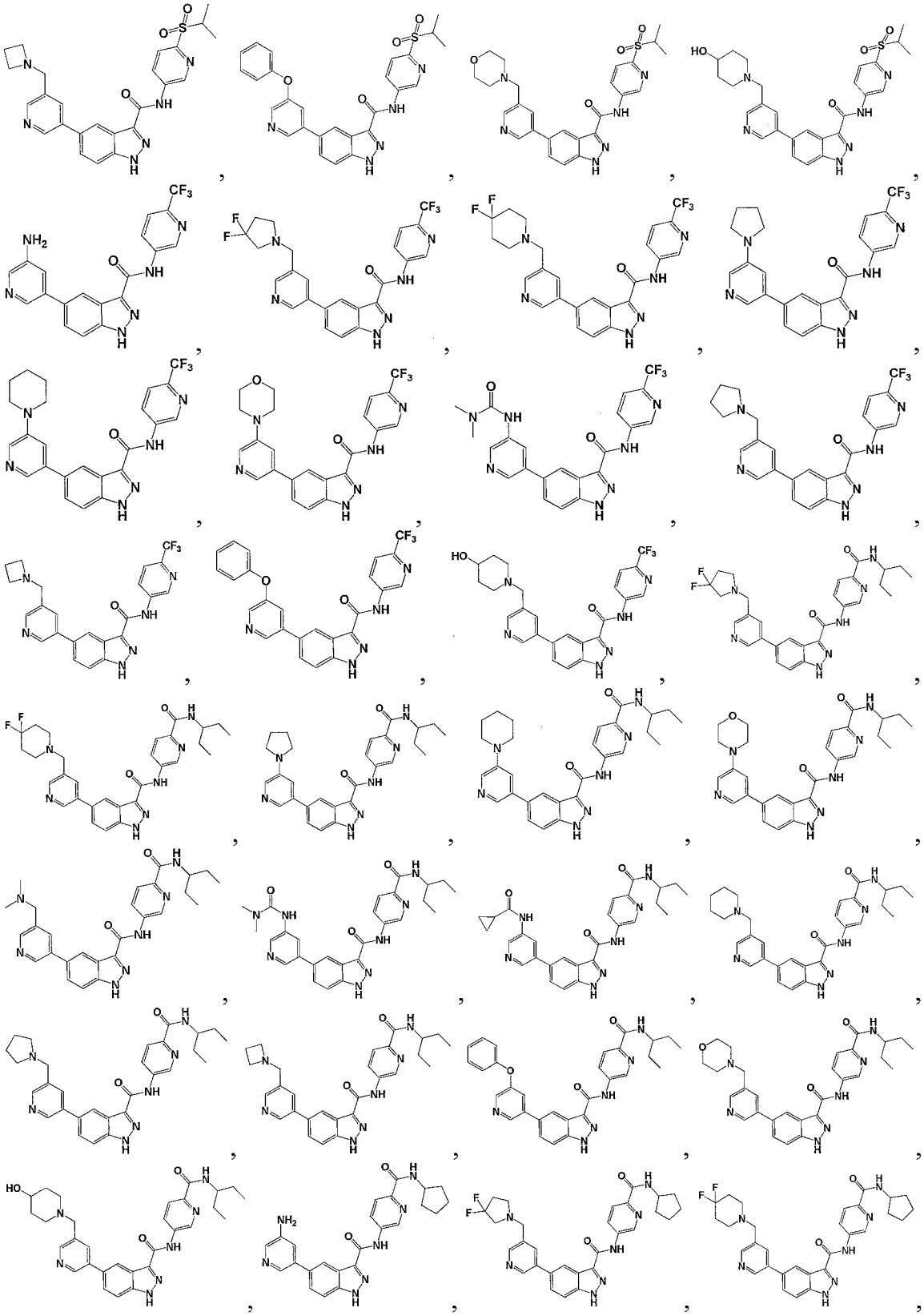
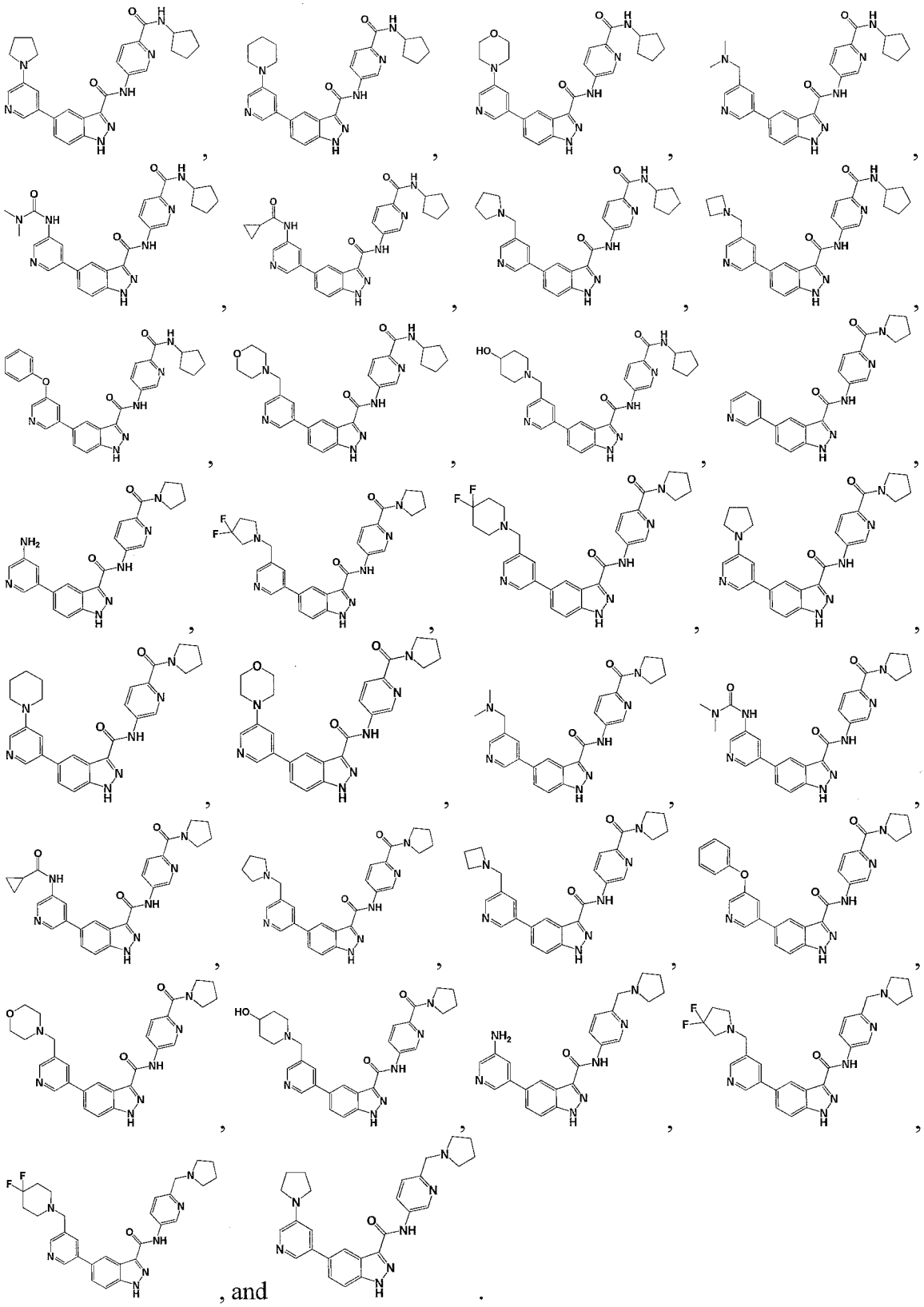
20. The compound of claim 17 having a structure selected from the group consisting of:









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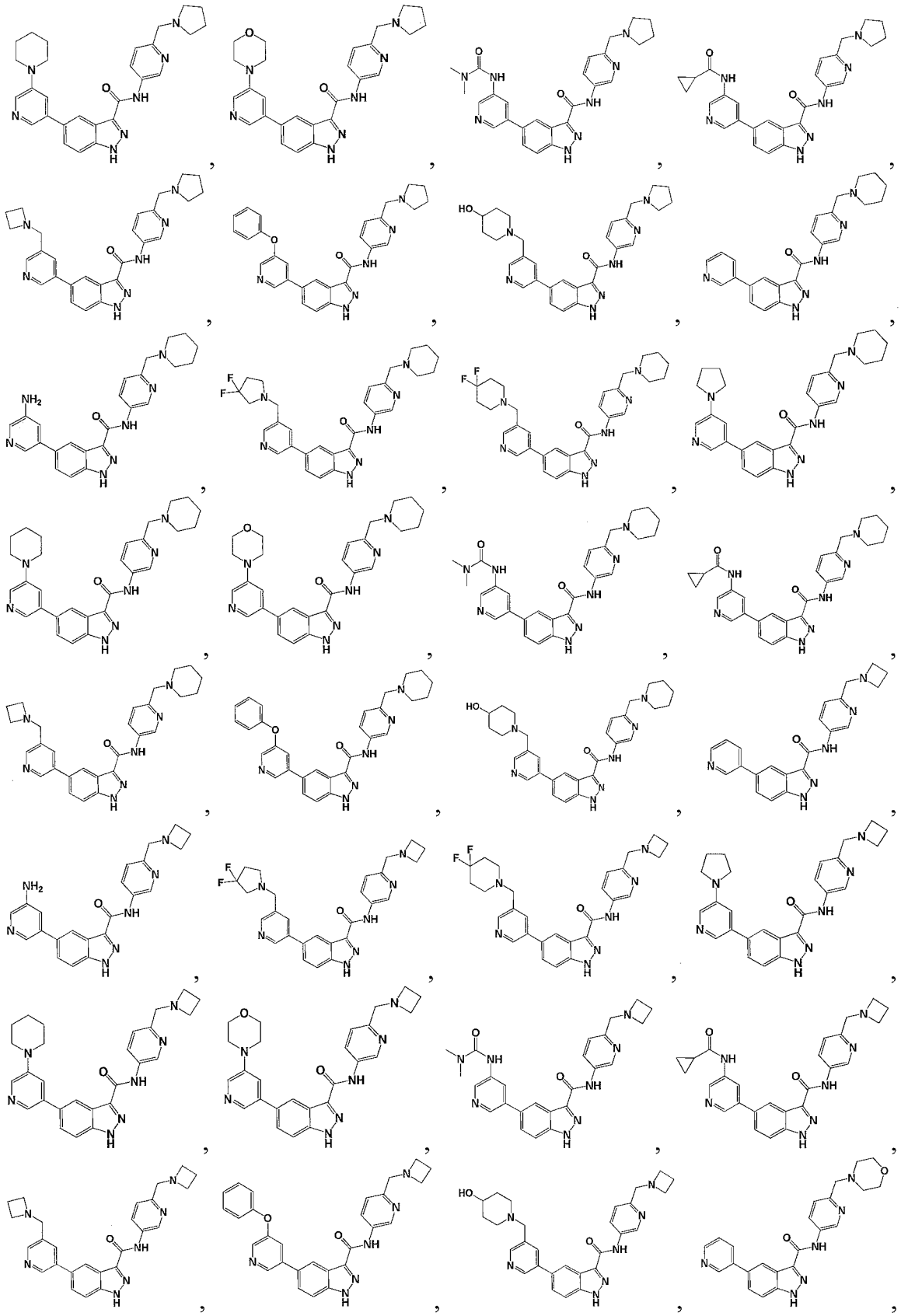
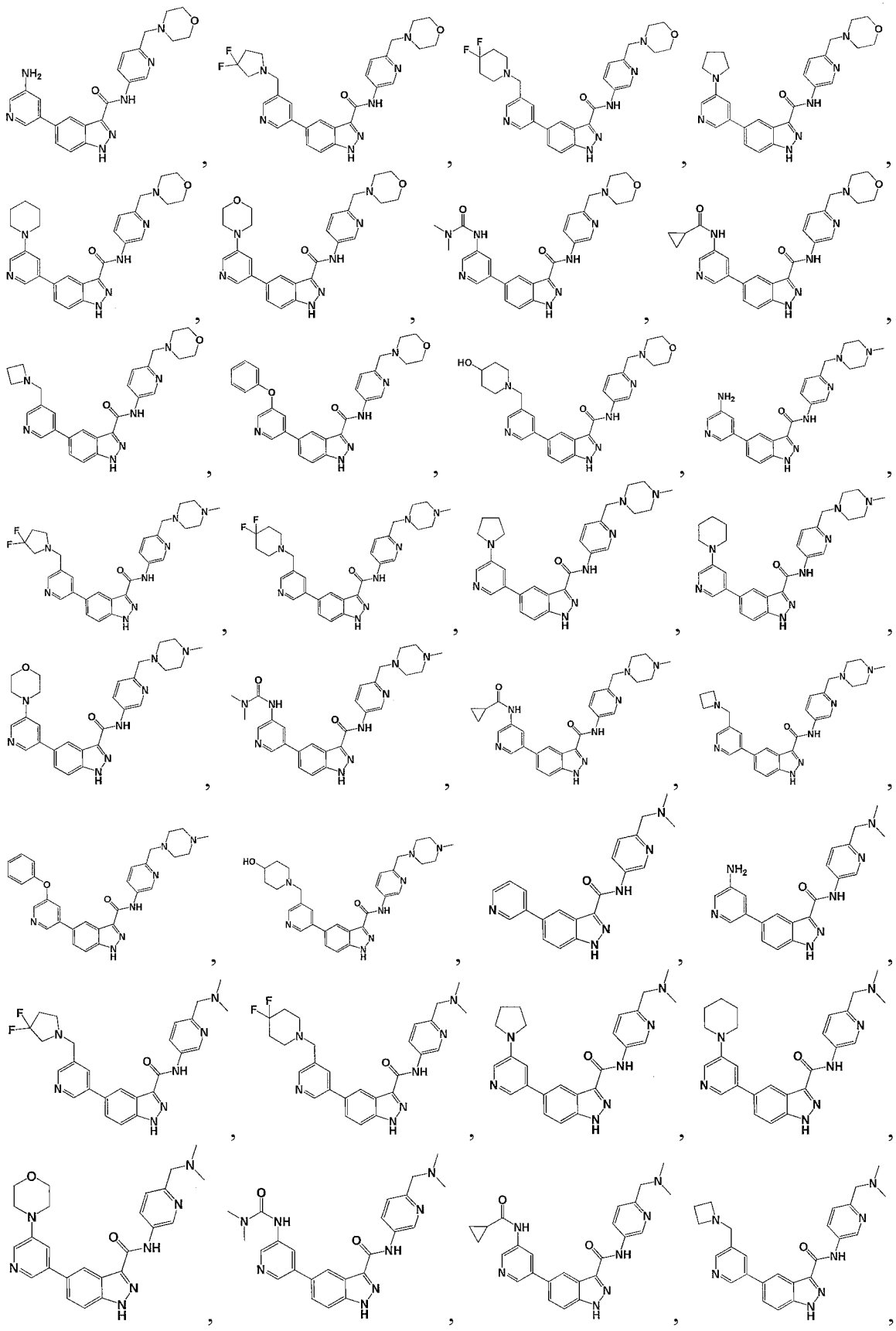
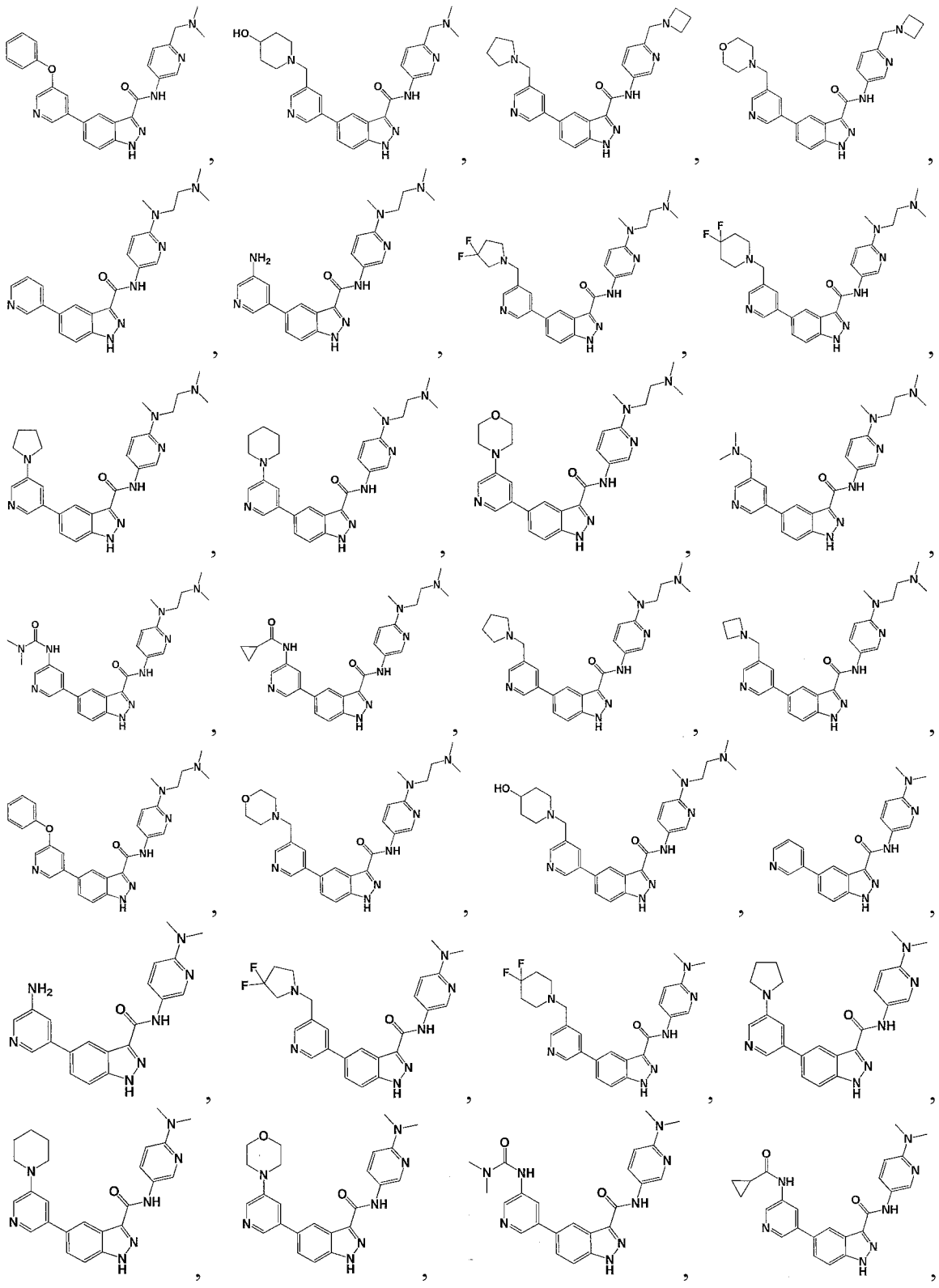
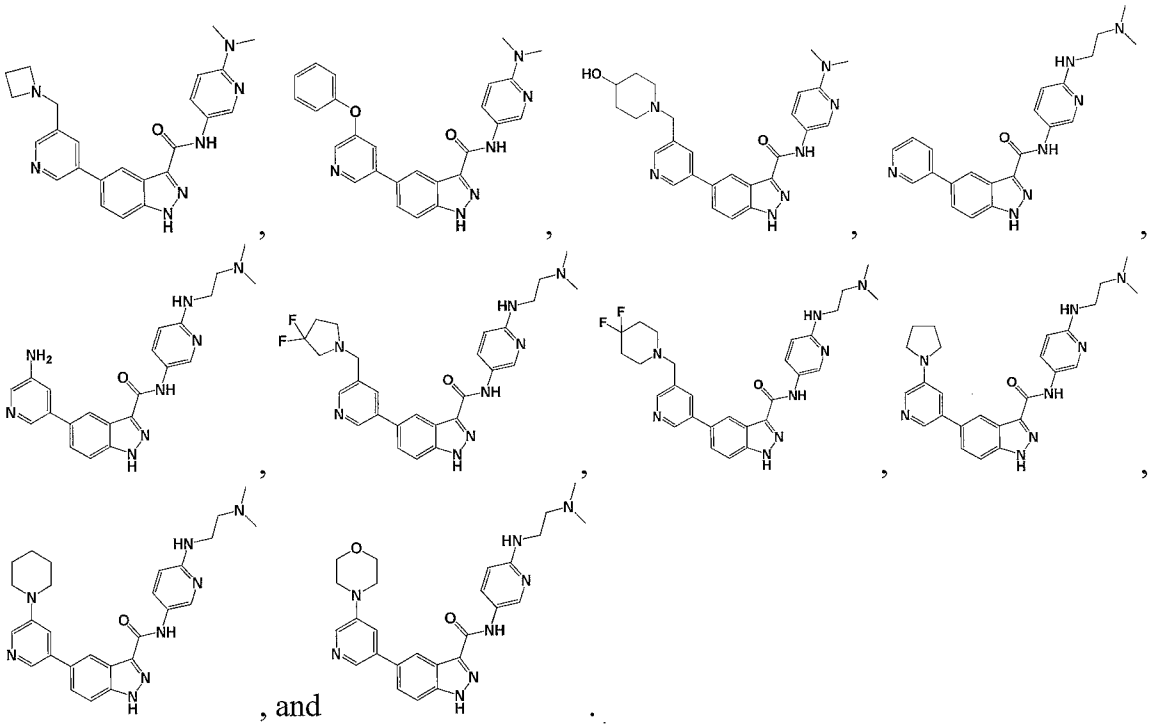
21. The compound of claim 17 having a structure selected from the group consisting of:









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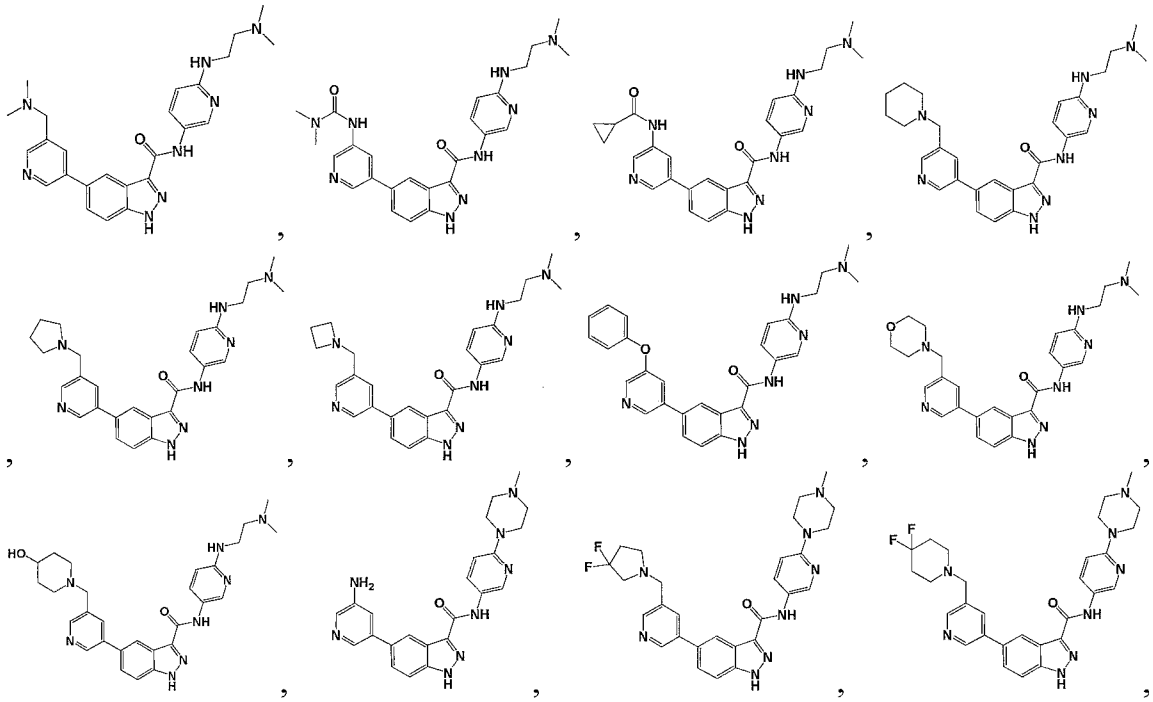

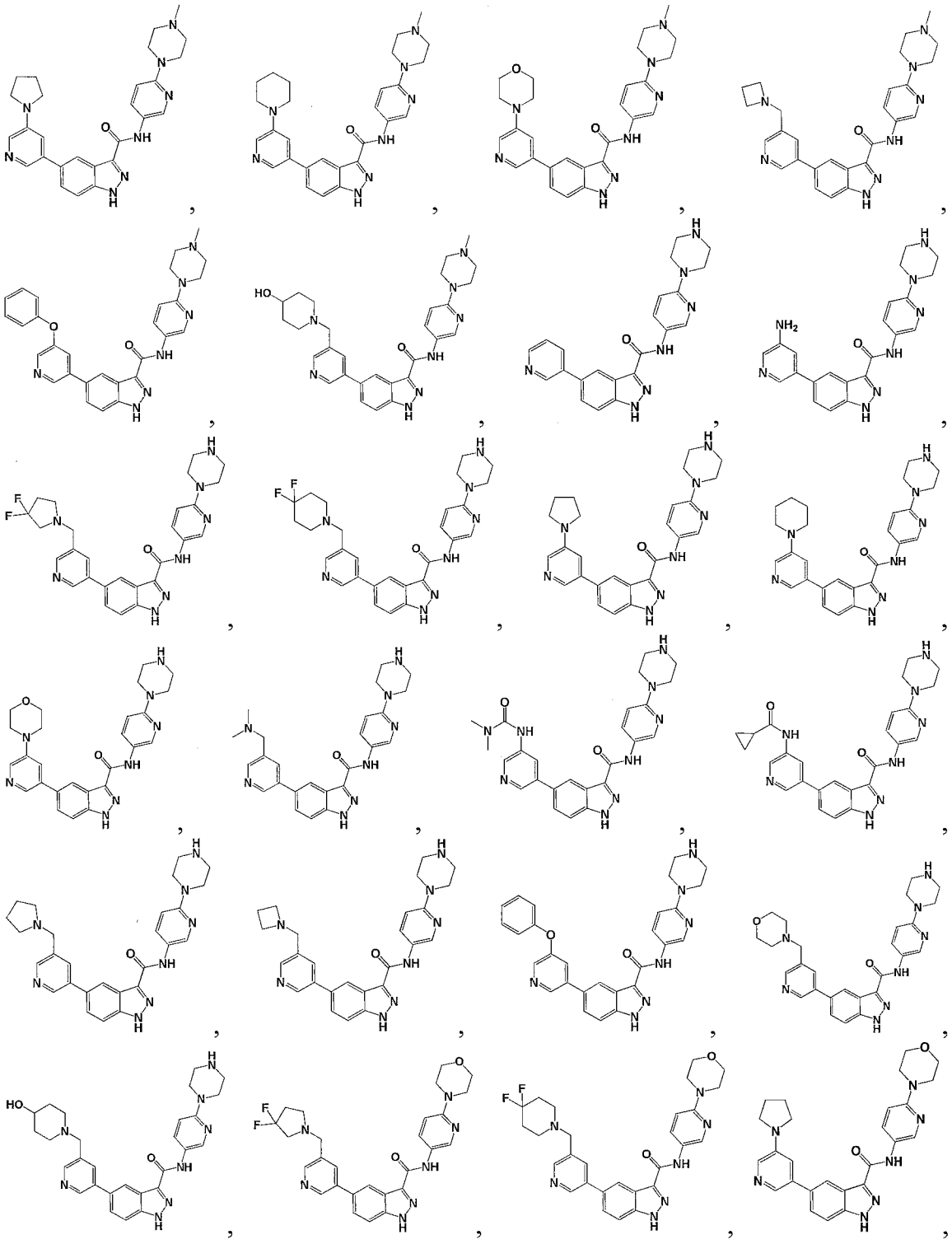

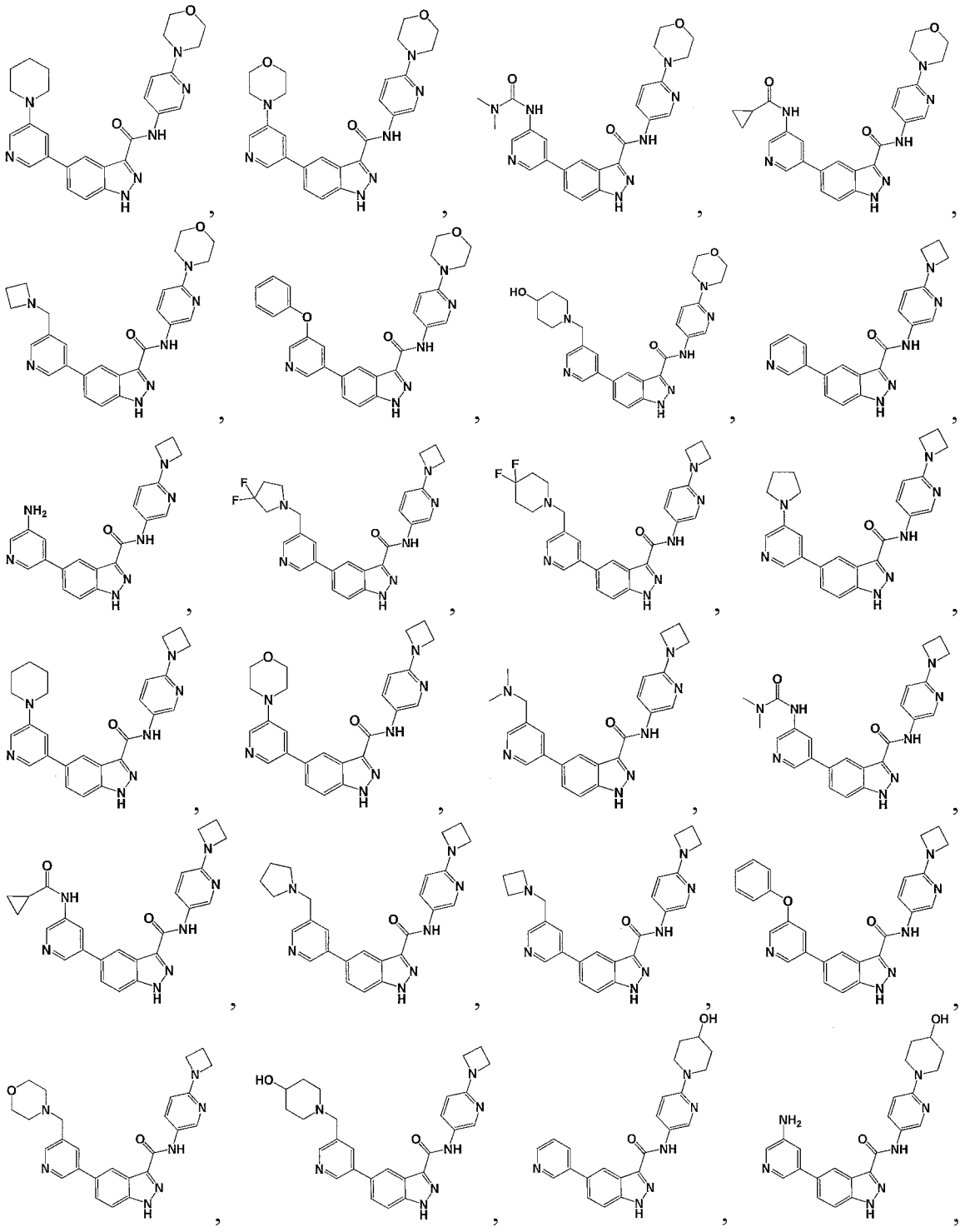

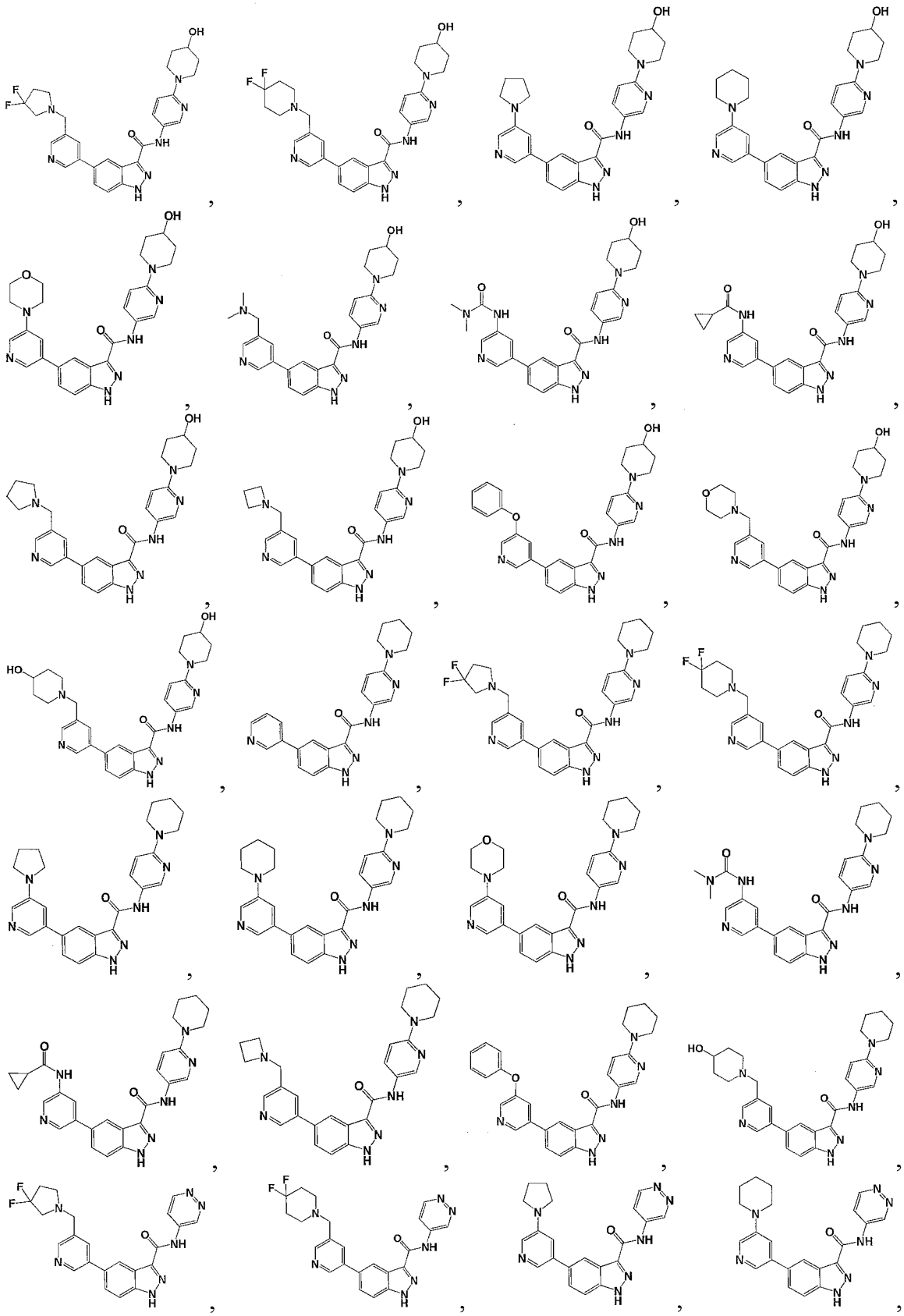

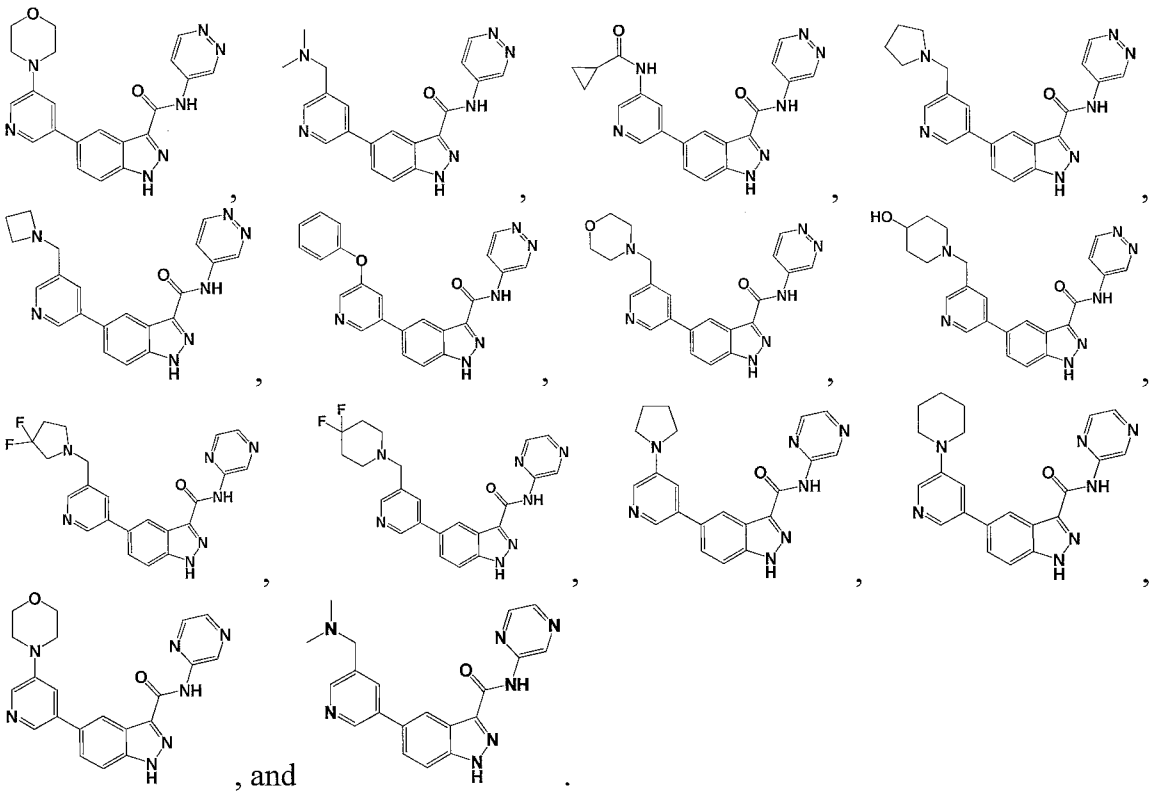

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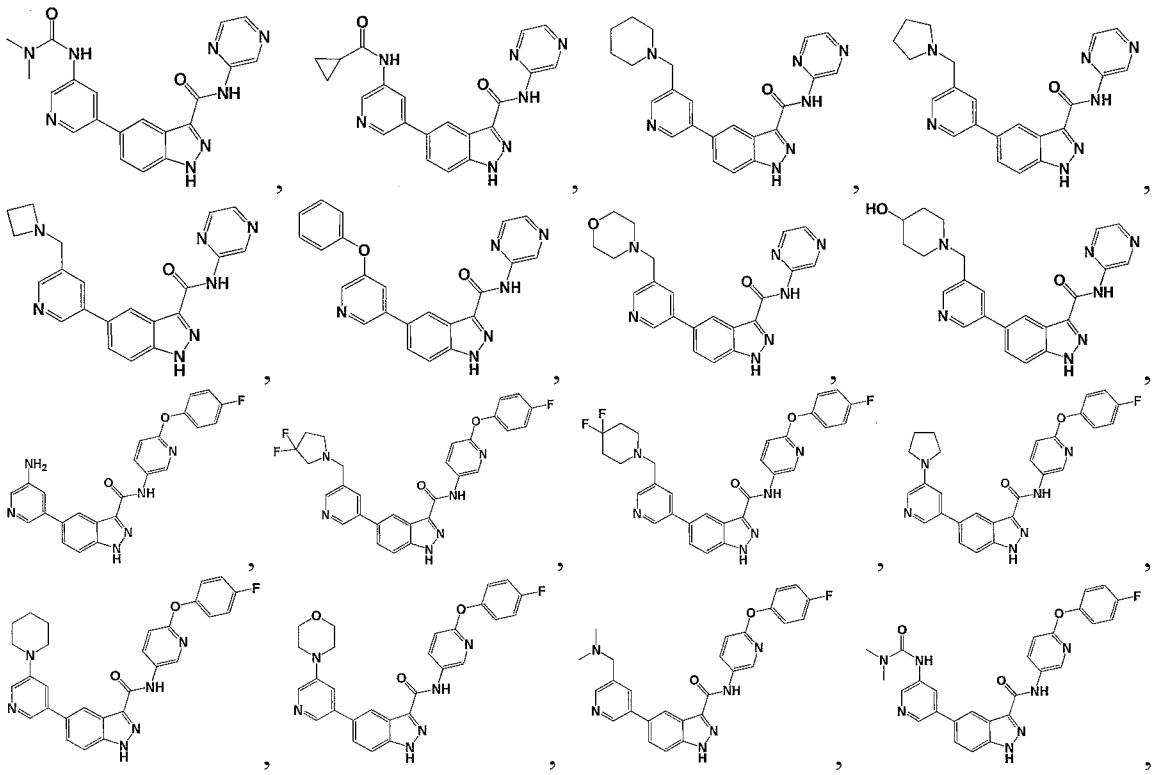

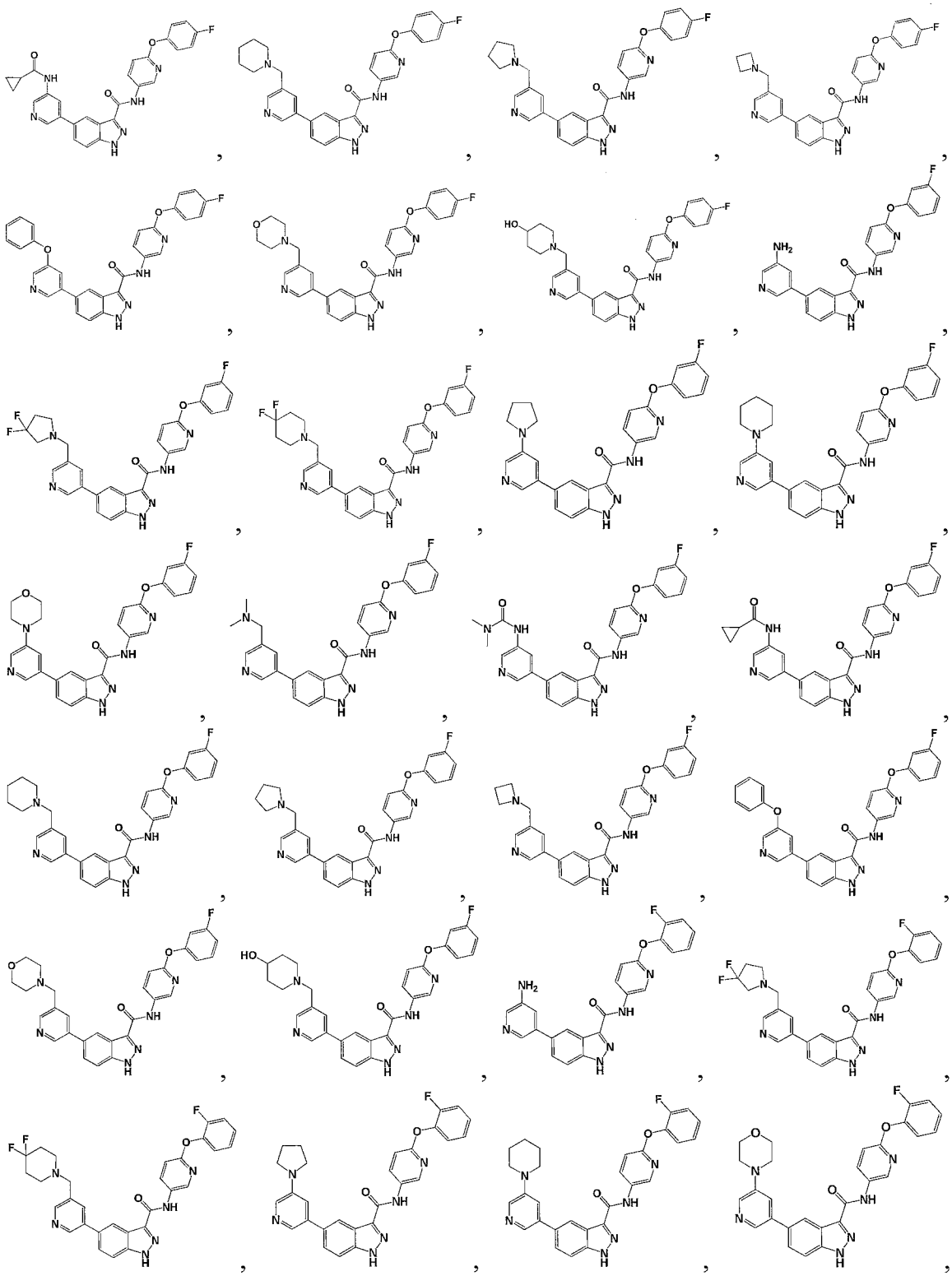

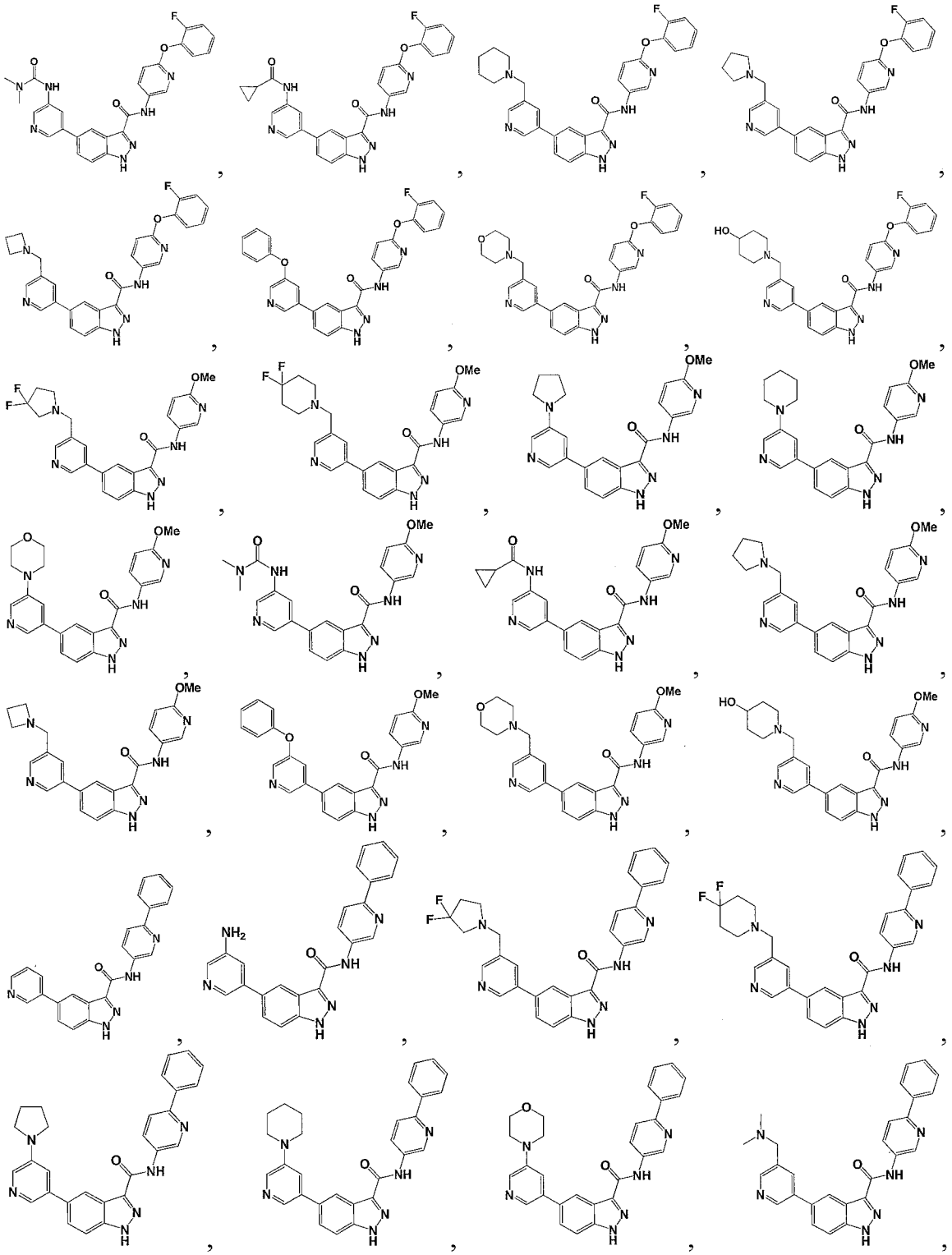

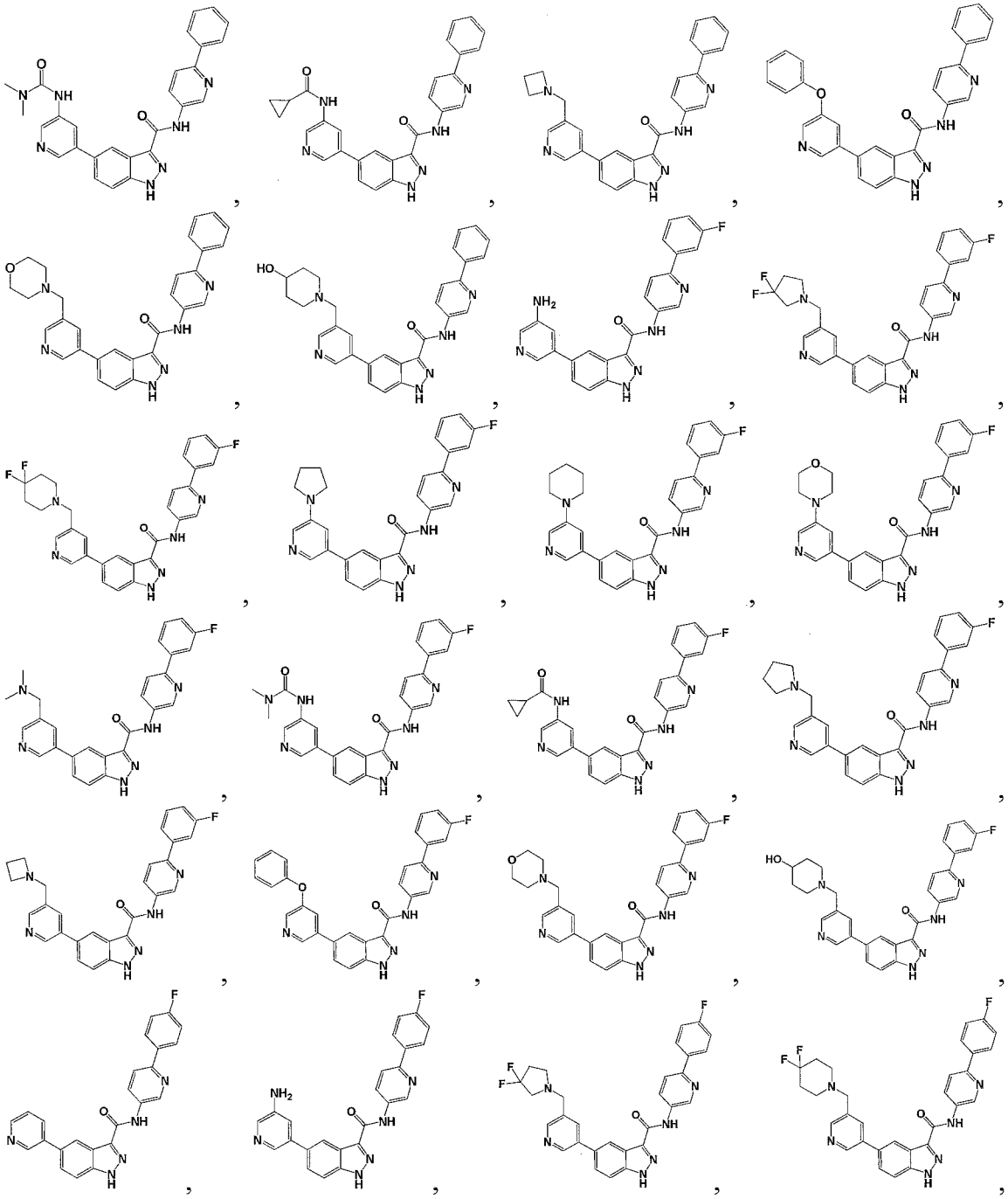

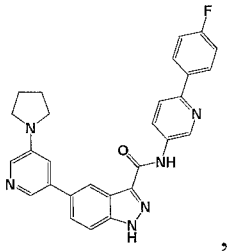
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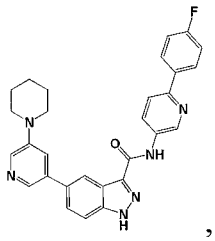
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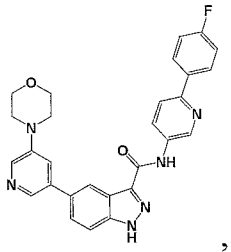
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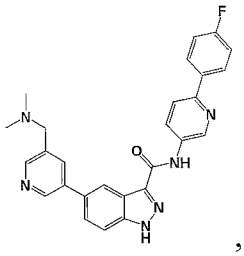
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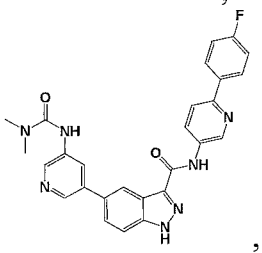
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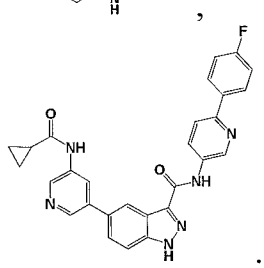
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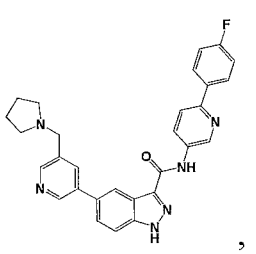
24. The compound of claim 17 having a structure selected from the group consisting of: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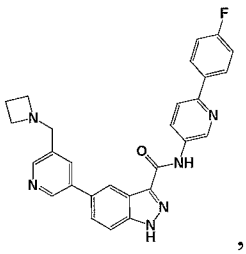
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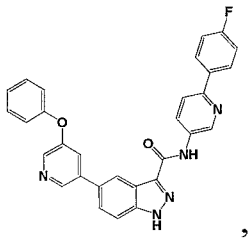
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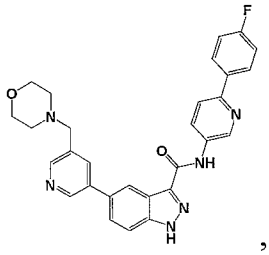
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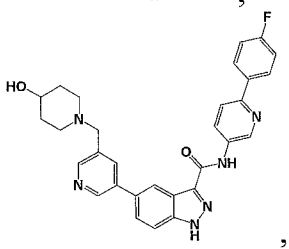
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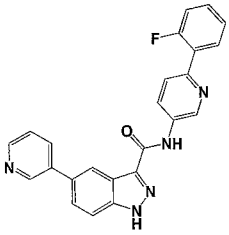
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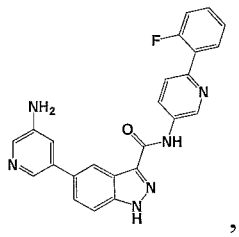
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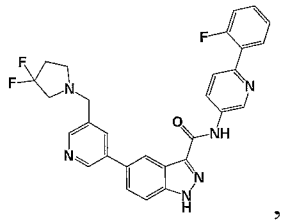
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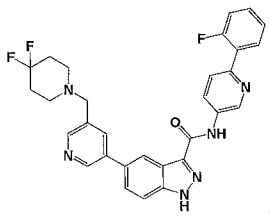
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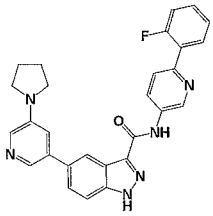
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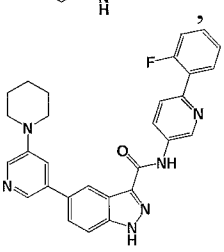
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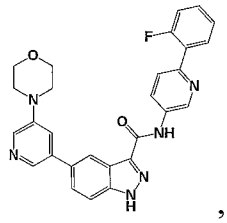
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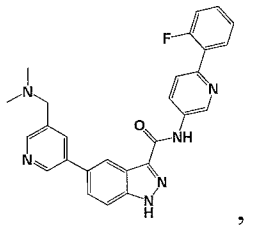
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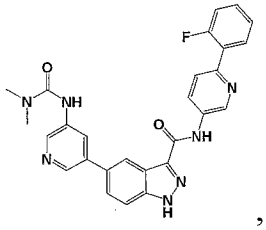
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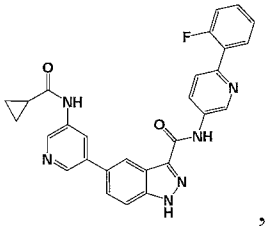
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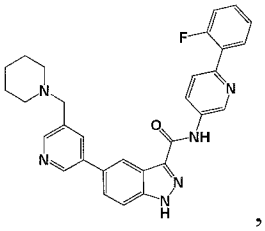
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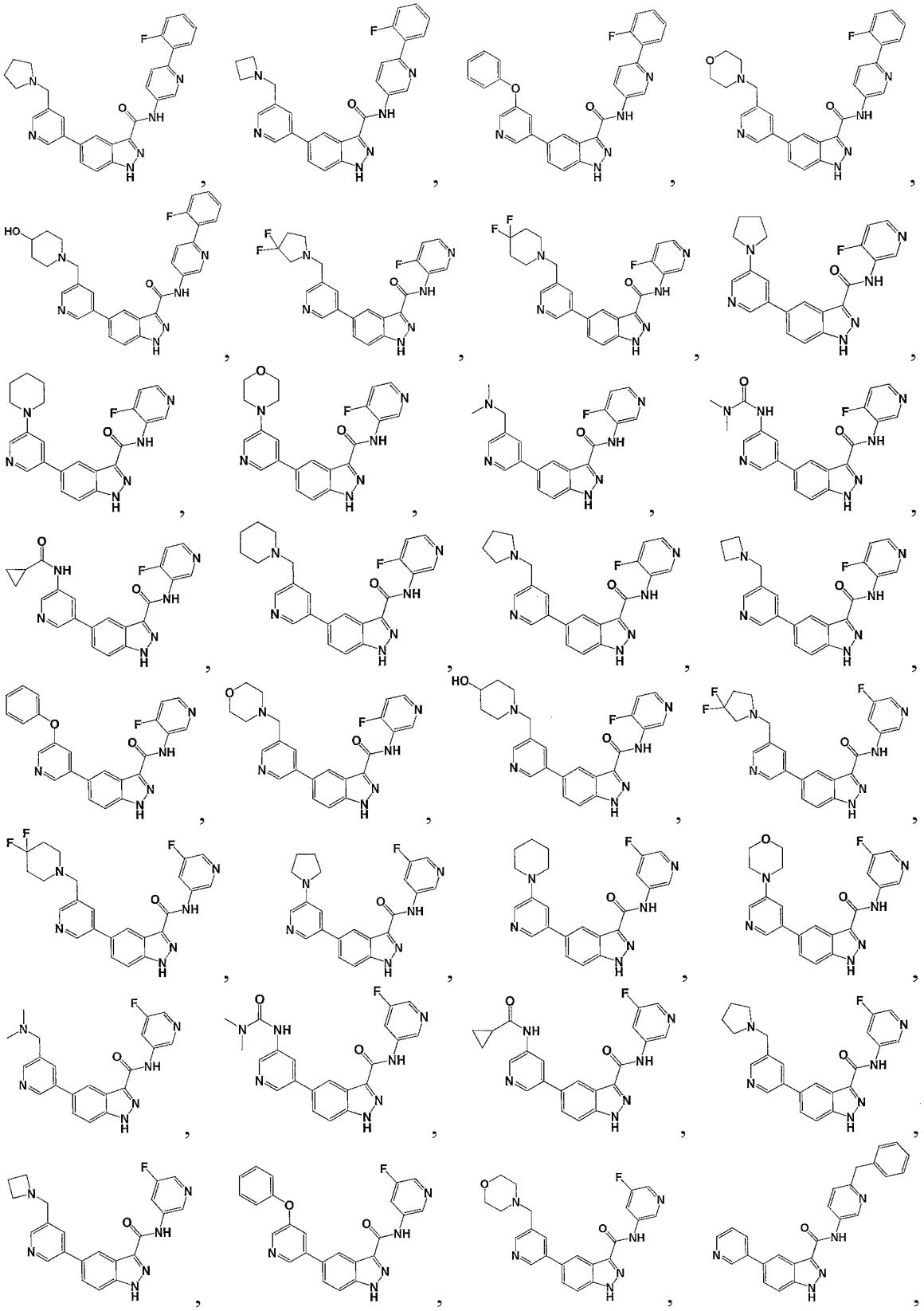

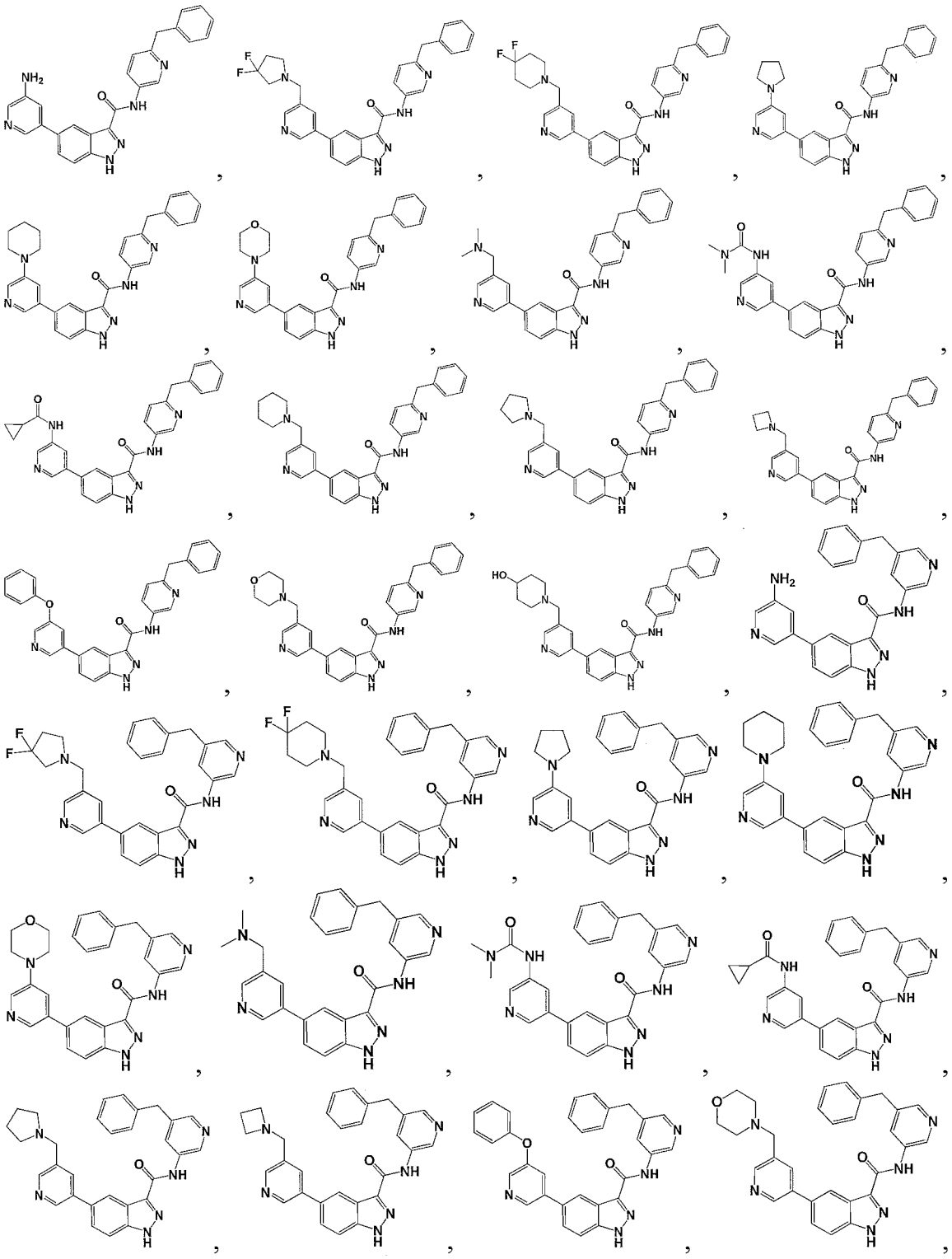

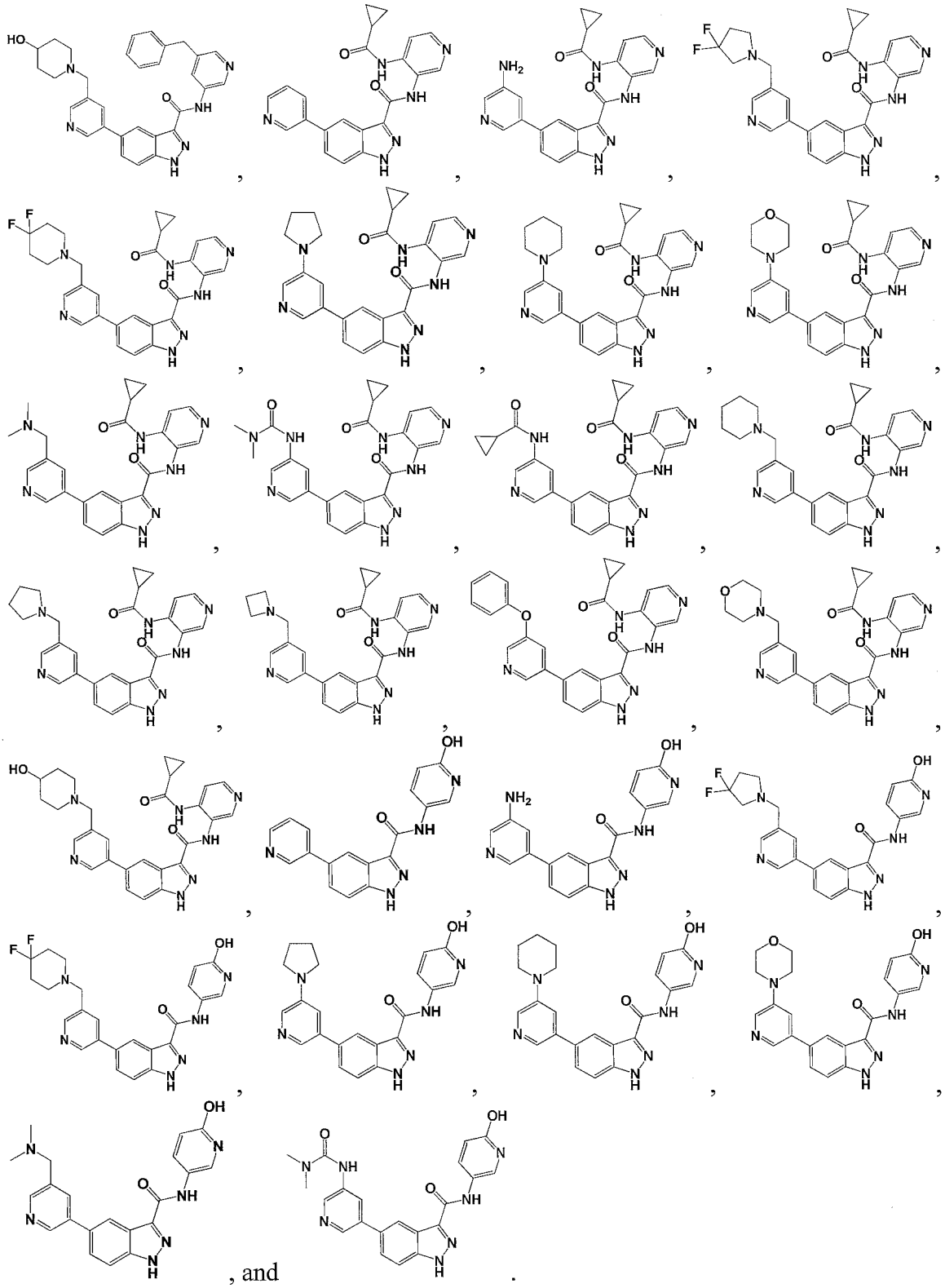

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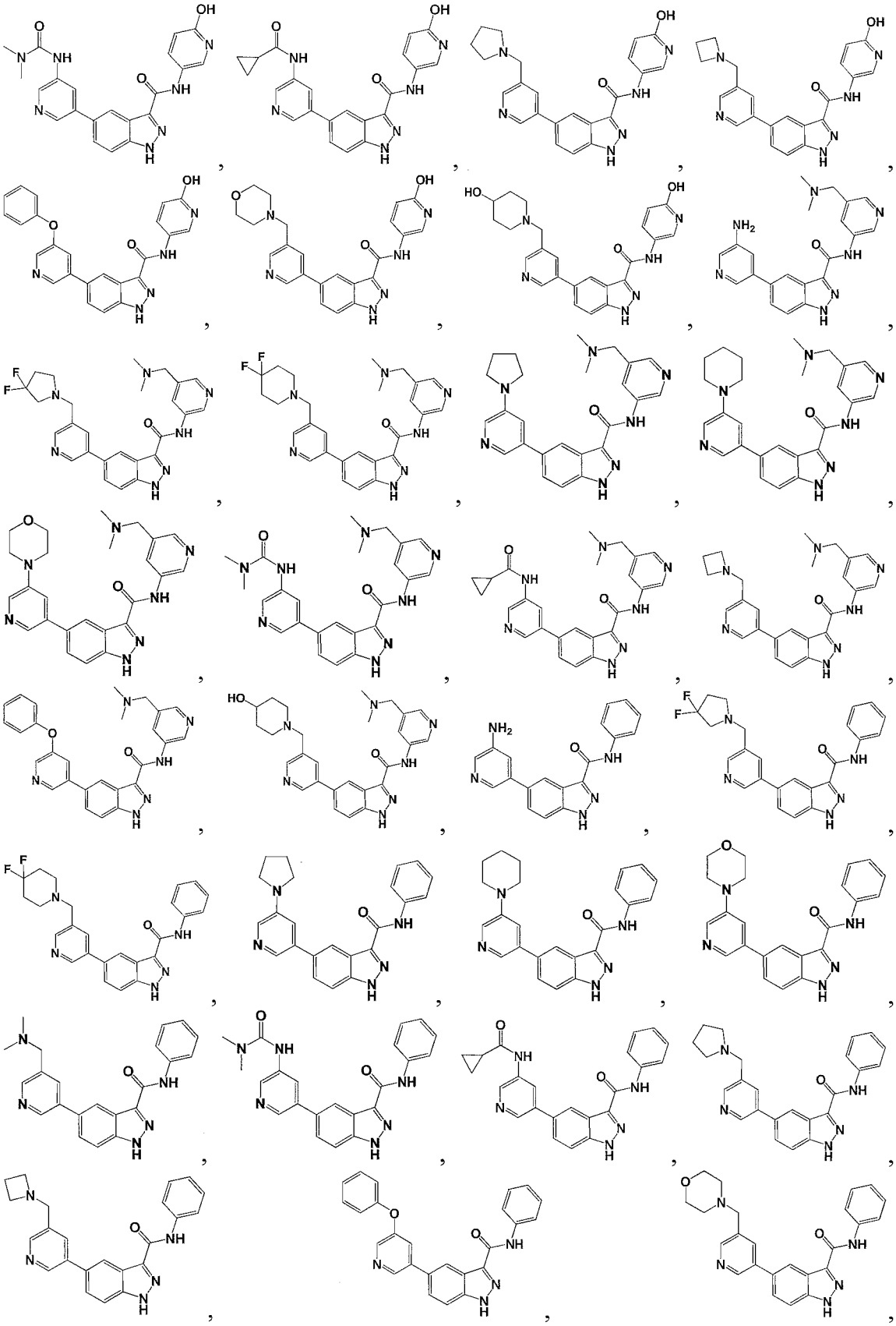
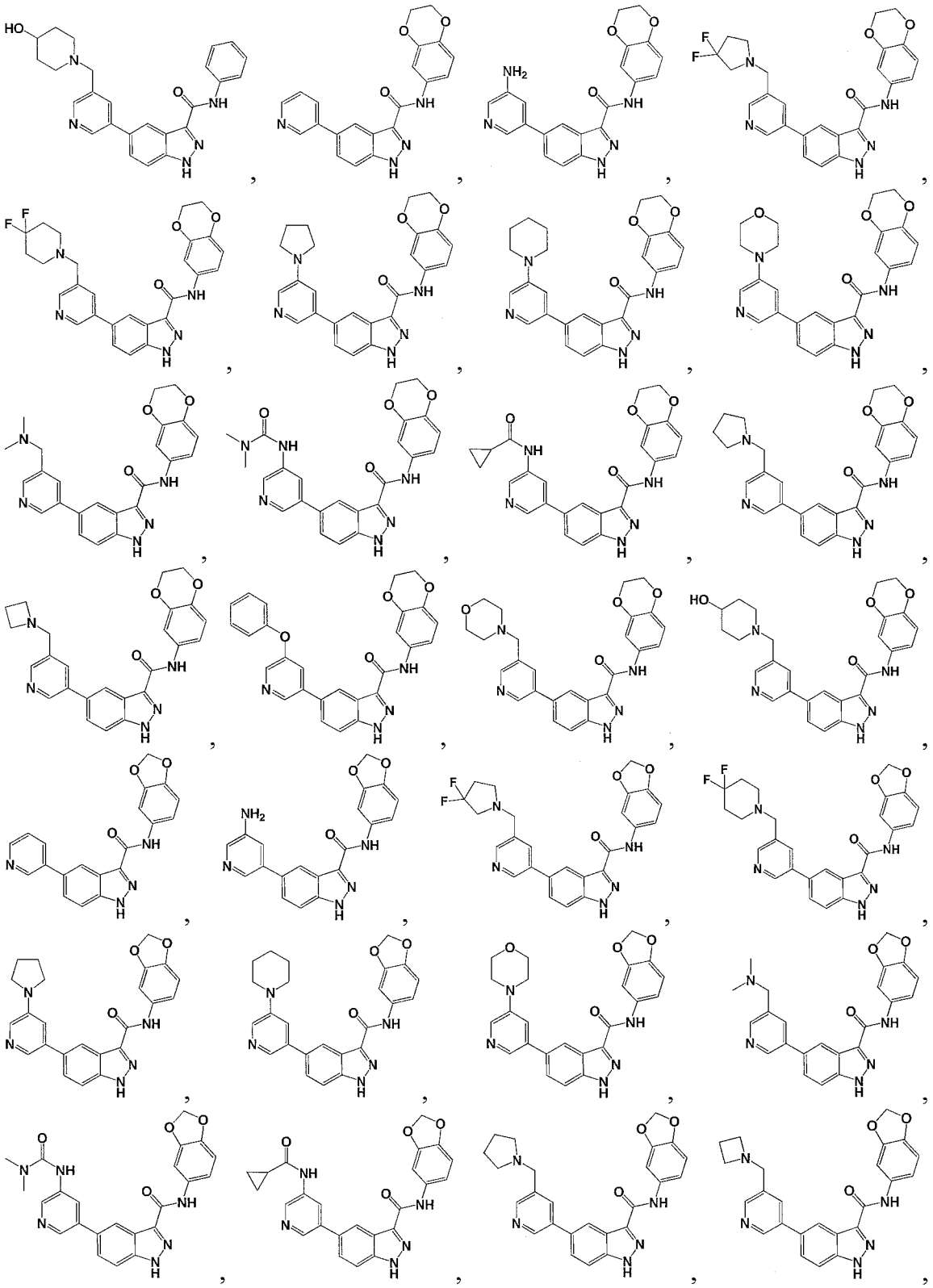
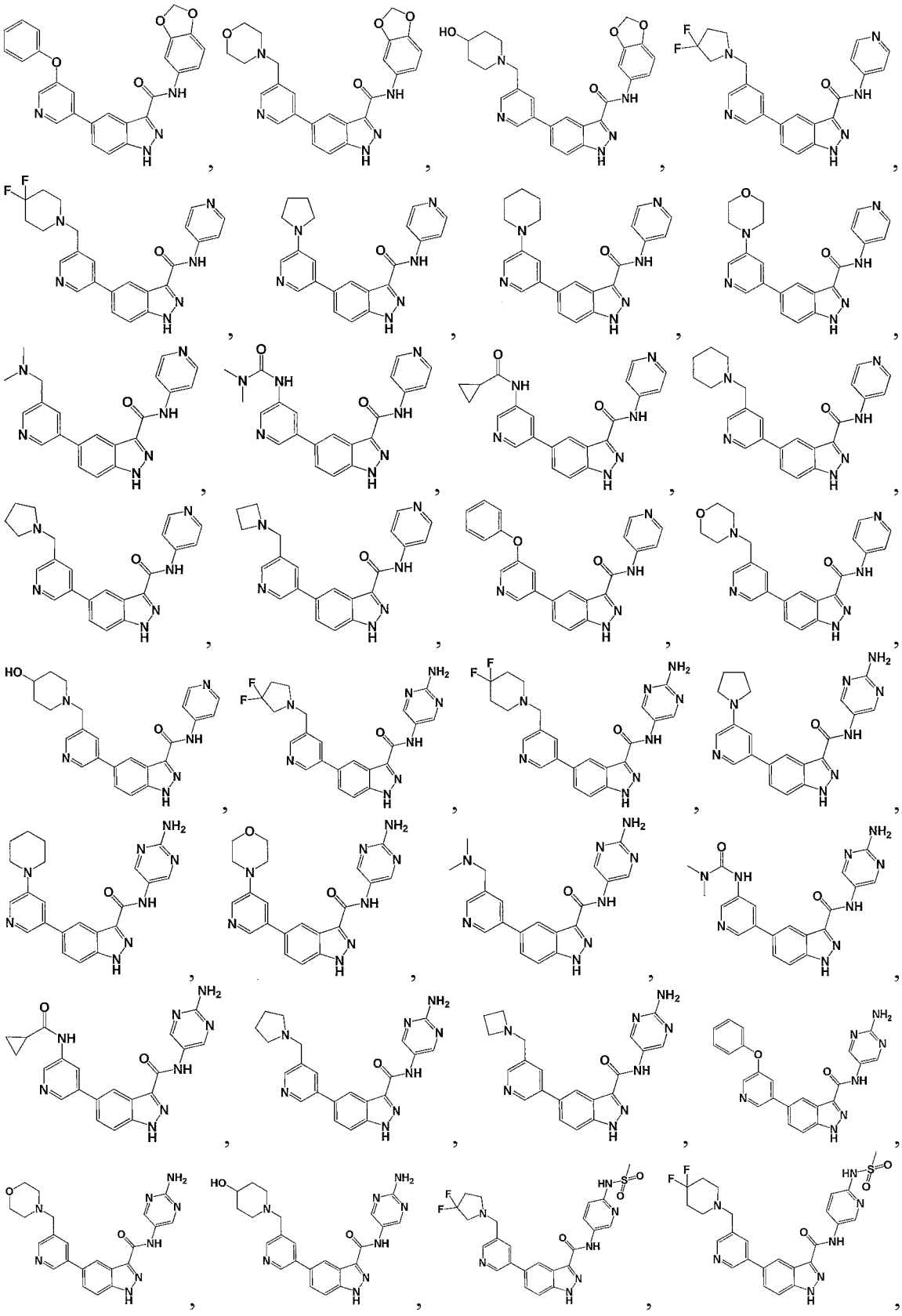
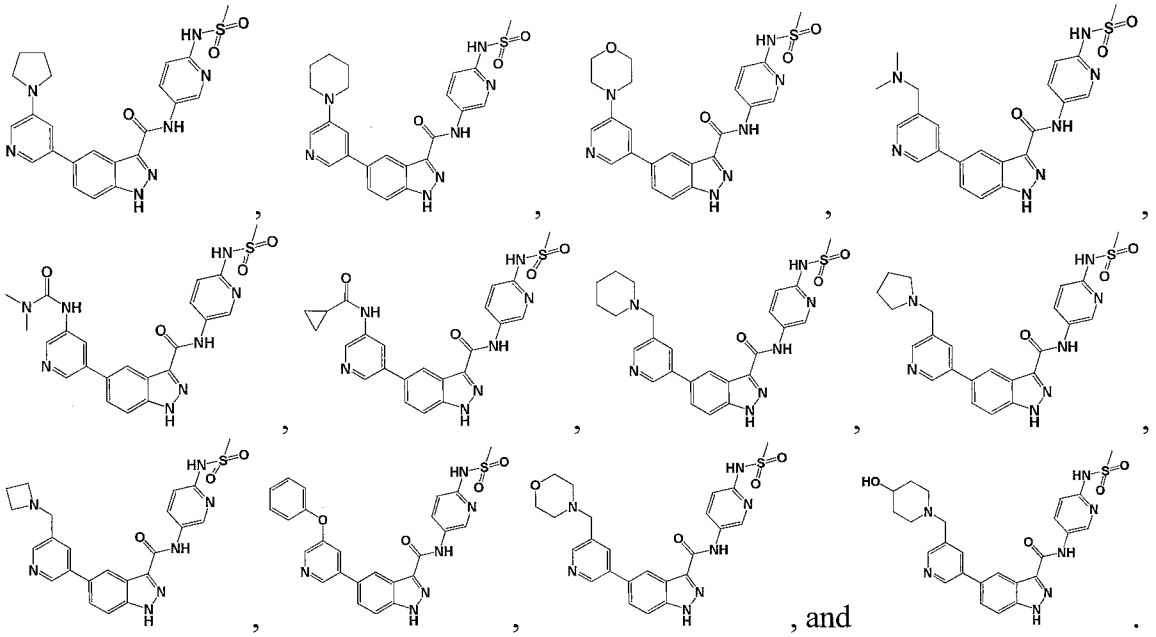
25. The compound of claim 17 having a structure selected from the group consisting of:

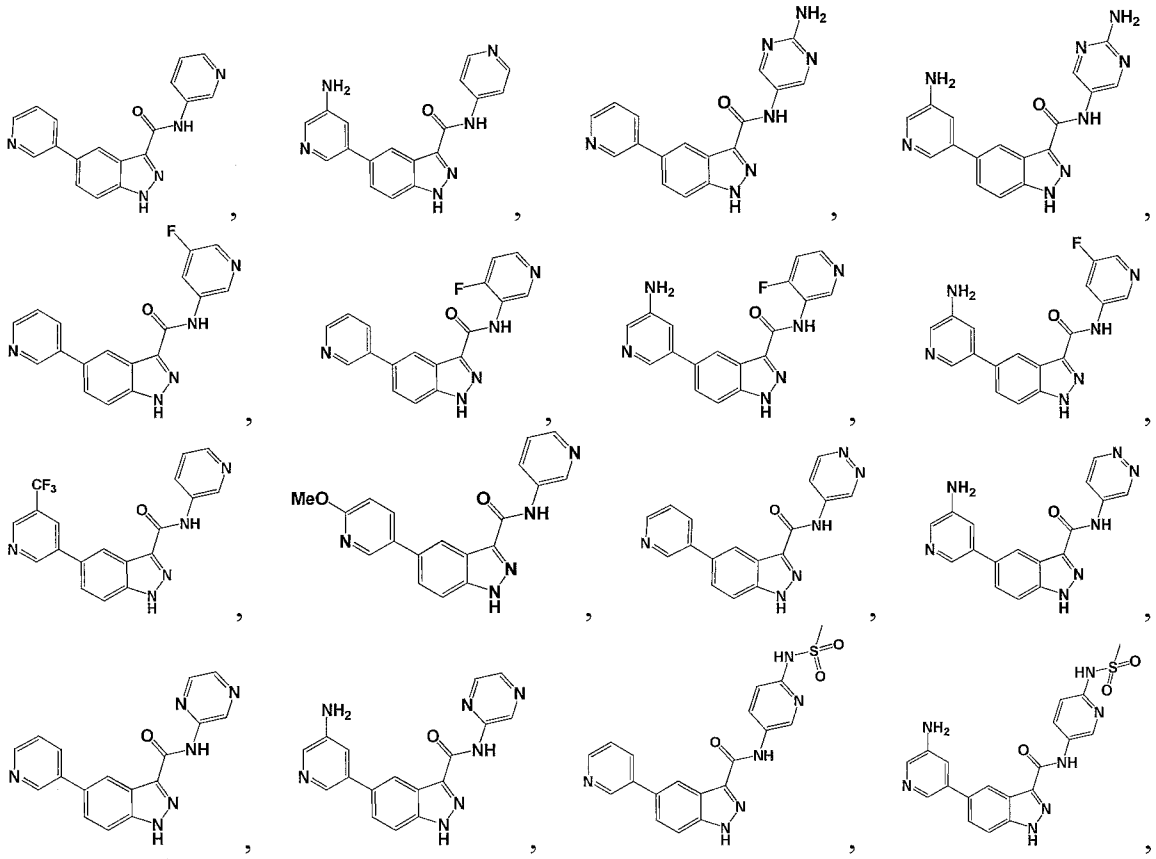


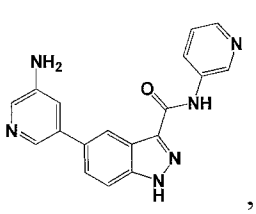






26. The compound of claim 1 having a structure selected from the group consisting of:

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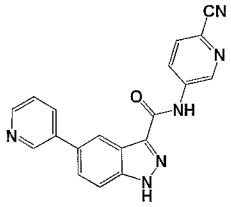
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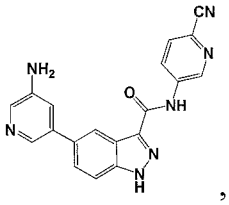
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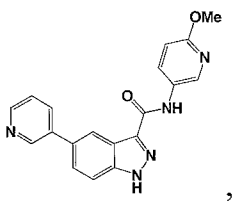
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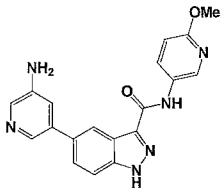
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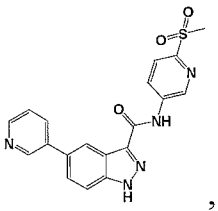
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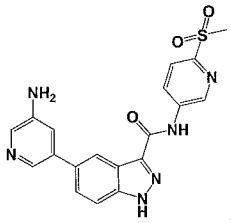
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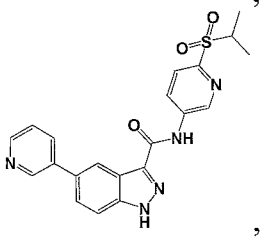
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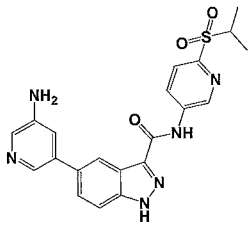
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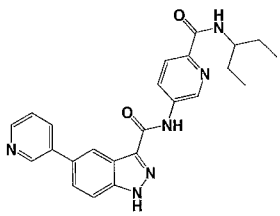
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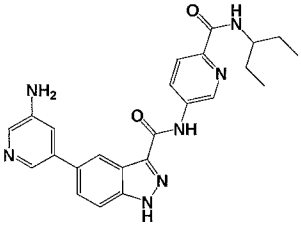
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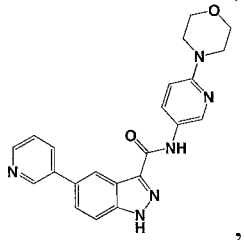
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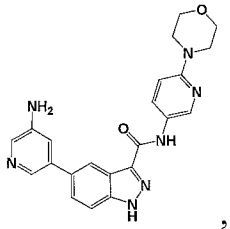
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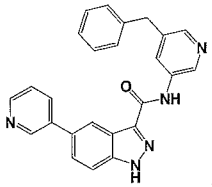
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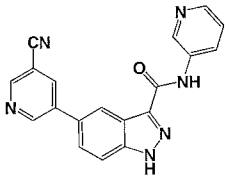
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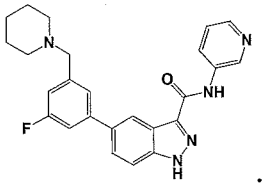
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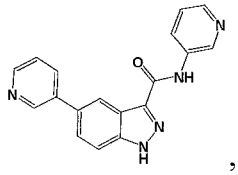
27. The compound of claim 26 having a structure selected from the group consisting of: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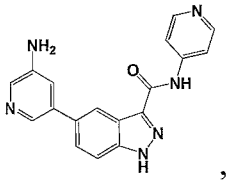
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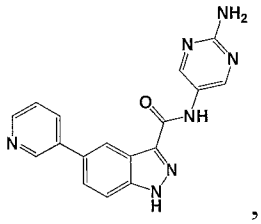
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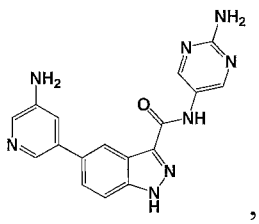
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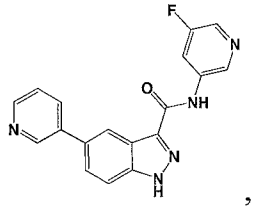
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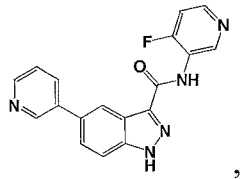
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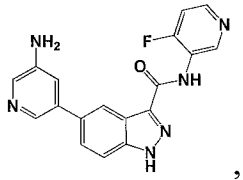
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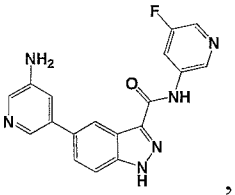
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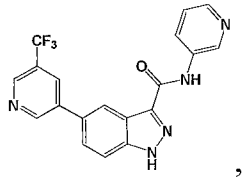
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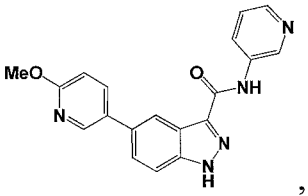
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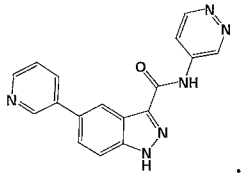
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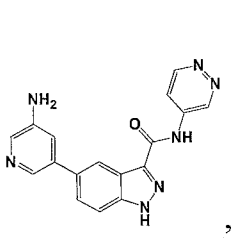
28. The compound of claim 26 having a structure selected from the group consisting of: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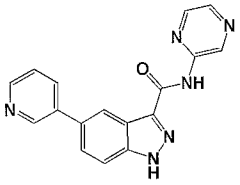
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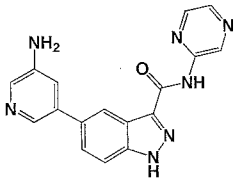
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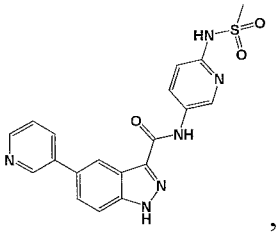
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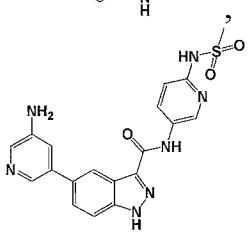
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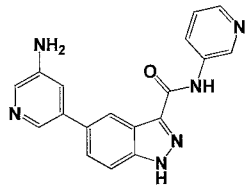
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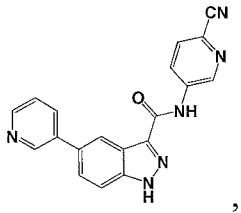
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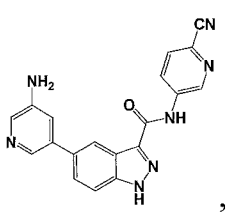
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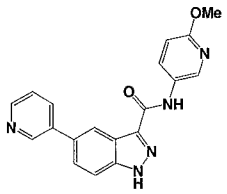
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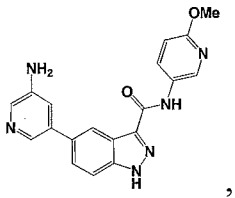
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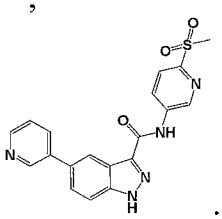
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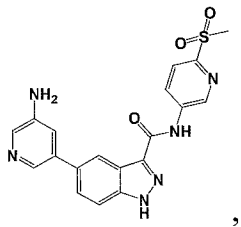
29. The compound of claim 26 having a structure selected from the group consisting of: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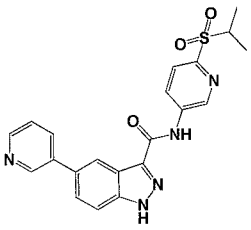
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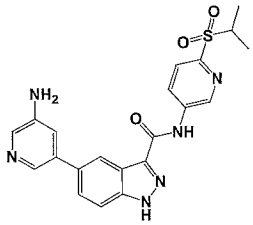
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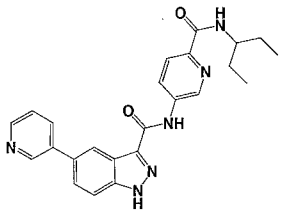
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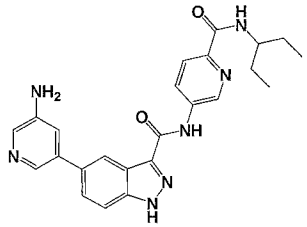
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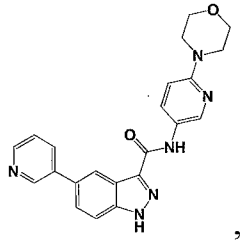
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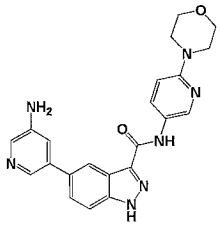
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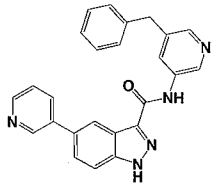
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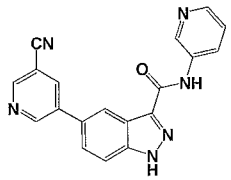
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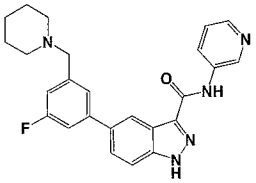
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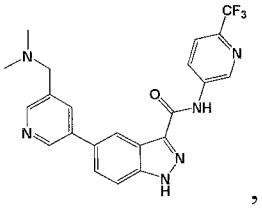
30. The compound of claim 1 having a structure selected from the group consisting of: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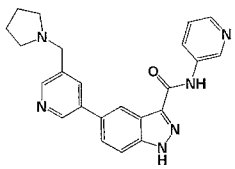
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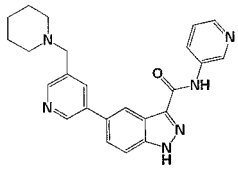
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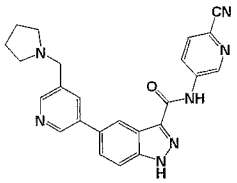
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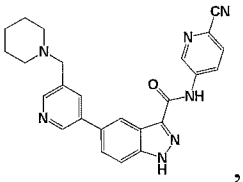
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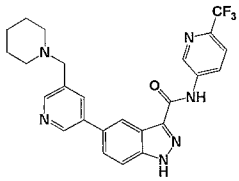
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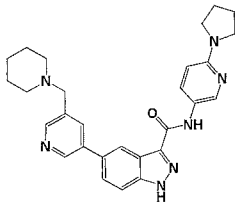
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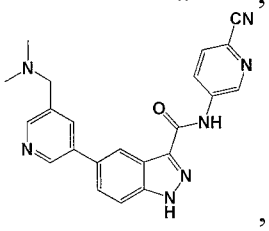
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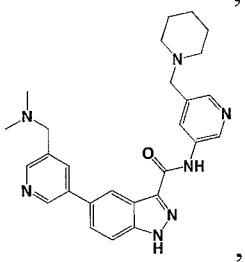
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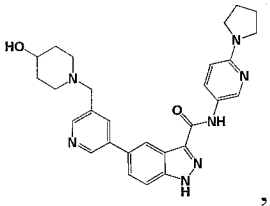
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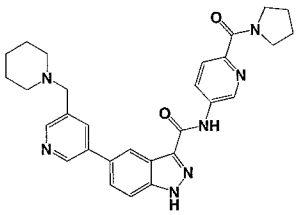
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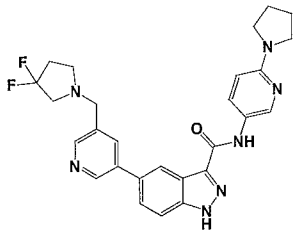
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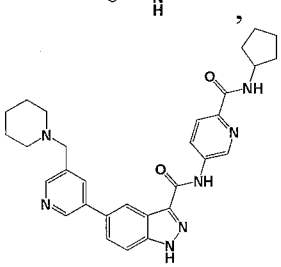
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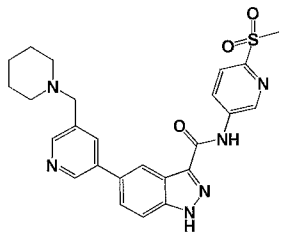
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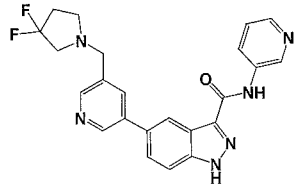
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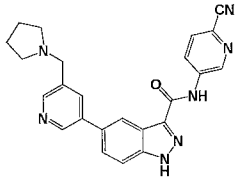
31. The compound of claim 30 having a structure selected from the group consisting of: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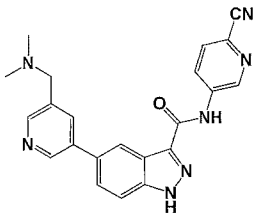
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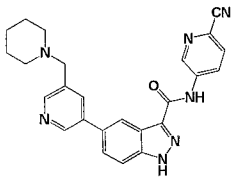
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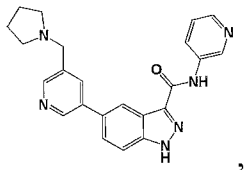
32. The compound of claim 30 having a structure selected from the group consisting of: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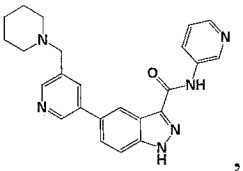
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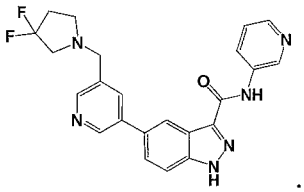
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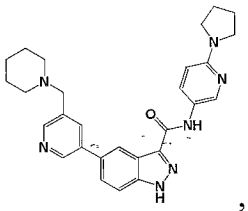
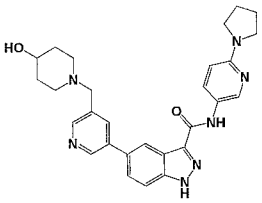
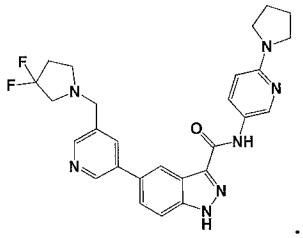
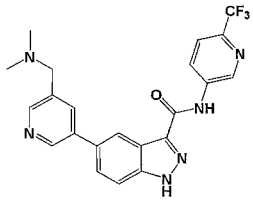
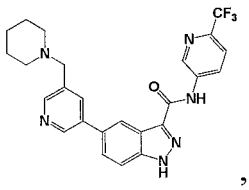
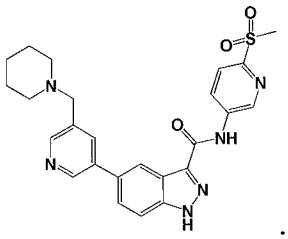
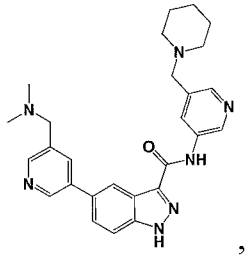
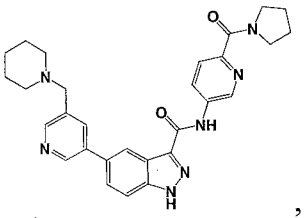
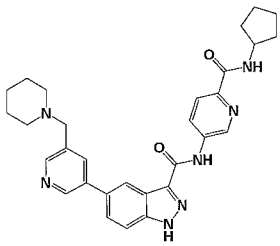
33. The compound of claim 30 having a structure selected from the group consisting of:

 ,  , and  .

34. The compound of claim 30 having a structure selected from the group consisting of:

 ,  , and  .

35. The compound of claim 30 having a structure selected from the group consisting of:

 ,  , and  .

36. A pharmaceutical composition comprising a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable excipient.

37. A method of treating a disorder or disease in which aberrant Wnt signaling is implicated in a patient, the method comprising administering to the patient a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

38. A method of claim 37, wherein the disorder or disease is cancer.

39. A method of claim 37, wherein the disorder or disease is diabetic retinopathy.

40. A method of claim 37, wherein the disorder or disease is rheumatoid arthritis.

41. A method of claim 37, wherein the disorder or disease is a mycotic or viral infection.

42. A method of claim 37, wherein the disorder or disease is a bone or cartilage disease.

43. A method of claim 37, wherein the disorder or disease is a neurological condition, disorder or disease, wherein the neurological condition/disorder/disease is selected from: Alzheimer's disease, frontotemporal dementias, dementia with lewy bodies, prion diseases, Parkinson's disease, Huntington's disease, progressive supranuclear palsy, corticobasal degeneration, mutiple system atrophy, amyotrophic lateral sclerosis (ALS), inclusion body myositis, autism, degenerative myopathies, diabetic neuropathy, other metabolic neuropathies, endocrine neuropathies, orthostatic hypotension, multiple sclerosis and Charcot-Marie-Tooth disease.

44. A method of claim 37, wherein the disorder or disease is lung disease.

45. A method of claim 37, wherein the disorder or disease is osteoarthritis.

46. A method of claim 37, wherein the disorder or disease is a genetic disease caused by mutations in Wnt signaling components, wherein the genetic disease is selected from: polyposis coli, osteoporosis-pseudoglioma syndrome, familial exudative vitreoretinopathy, retinal angiogenesis, early coronary disease, tetra-amelia syndrome, Müllerian-duct regression and virilization, SERKAL syndrome, diabetes mellitus type 2, Fuhrmann syndrome, Al-Awadi/Raas-Rothschild/Schinzel phocomelia syndrome, odonto-onycho-dermal dysplasia, obesity, split-hand/foot malformation, caudal duplication syndrome, tooth agenesis, Wilms tumor, skeletal dysplasia, focal dermal hypoplasia, autosomal recessive anonychia, neural tube defects, alpha-thalassemia (ATRX) syndrome, fragile X syndrome, ICF syndrome, Angelman syndrome, Prader-Willi syndrome, Beckwith-Wiedemann Syndrome, Norrie disease and Rett syndrome.

47. A method of claim 37, wherein the disorder or disease is a fibrotic disorder, wherein the fibrotic disorder is selected from: skin fibrosis; scleroderma; progressive systemic fibrosis; lung fibrosis; muscle fibrosis; kidney fibrosis; glomerulosclerosis; glomerulonephritis; hypertrophic scar formation; uterine fibrosis; renal fibrosis; cirrhosis of the liver, liver fibrosis; adhesions, such as those occurring in the abdomen, pelvis, spine or tendons; chronic obstructive pulmonary disease; fibrosis following myocardial infarction; pulmonary fibrosis; fibrosis and scarring associated with diffuse/interstitial lung disease; central nervous system fibrosis, such as fibrosis following stroke; fibrosis

associated with neuro-degenerative disorders such as Alzheimer's Disease or multiple sclerosis; fibrosis associated with proliferative vitreoretinopathy (PVR); restenosis; endometriosis; ischemic disease and radiation fibrosis.

48. The method of claim 37, wherein the patient is a human.

49. The method of claim 38, wherein the cancer is chosen from: hepatocellular carcinoma, colon cancer, breast cancer, pancreatic cancer, chronic myeloid leukemia (CML), chronic myelomonocytic leukemia, chronic lymphocytic leukemia (CLL), acute myeloid leukemia, acute lymphocytic leukemia, Hodgkin lymphoma, lymphoma, sarcoma and ovarian cancer.

50. The method of claim 38, wherein the cancer is chosen from: lung cancer - non-small cell, lung cancer - small cell, multiple myeloma, nasopharyngeal cancer, neuroblastoma, osteosarcoma, penile cancer, pituitary tumors, prostate cancer, retinoblastoma, rhabdomyosarcoma, salivary gland cancer, skin cancer - basal and squamous cell, skin cancer – melanoma, small intestine cancer, stomach cancers, testicular cancer, thymus cancer, thyroid cancer, uterine sarcoma, vaginal cancer, vulvar cancer, laryngeal or hypopharyngeal cancer, kidney cancer, Kaposi sarcoma, gestational trophoblastic disease, gastrointestinal stromal tumor, gastrointestinal carcinoid tumor, gallbladder cancer, eye cancer (melanoma and lymphoma), Ewing tumor, esophagus cancer, endometrial cancer, colorectal cancer, cervical cancer, brain or spinal cord tumor, bone metastasis, bone cancer, bladder cancer, bile duct cancer, anal cancer and adrenal cortical cancer.

51. The method of claim 37, wherein the compound inhibits one or more proteins in the Wnt pathway.

52. The method of claim 51, wherein the compound inhibits signaling induced by one or more Wnt proteins.

53. The method of claim 52, wherein the Wnt proteins are chosen from: WNT1, WNT2, WNT2B, WNT3, WNT3A, WNT4. WNT5A, WNT5B, WNT6, WNT7A, WNT7B, WNT8A, WNT8B, WNT9A, WNT9B, WNT10A, WNT10B, WNT11, and WNT16.

54. The method of claim 37, wherein the compound inhibits a kinase activity.

55. A method of treating a disease or disorder mediated by the Wnt pathway in a patient, the method comprising administering to the patient a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

56. The method of claim 55, wherein the compound inhibits one or more Wnt proteins.

57. A method of treating a disease or disorder mediated by kinase activity in a patient, the method comprising administering to the patient a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

58. The method of claim 57, wherein the disease or disorder comprises tumor growth, cell proliferation, or angiogenesis.

59. A method of inhibiting the activity of a protein kinase receptor, the method comprising contacting the receptor with an effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

60. A method of treating a disease or disorder associated with aberrant cellular proliferation in a patient, the method comprising administering to the patient a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

61. A method of preventing or reducing angiogenesis in a patient, the method comprising administering to the patient a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

62. A method of preventing or reducing abnormal cellular proliferation in a patient, the method comprising administering to the patient a therapeutically effective amount of at least one compound according to claim 1, or a pharmaceutically acceptable salt thereof.

63. A method of treating a disease or disorder associated with aberrant cellular proliferation in a patient, the method comprising administering to the patient a pharmaceutical composition comprising one or more of the compounds of claim 1 in combination with a pharmaceutically acceptable carrier and one or more other agents.