AZAINDOLES USEFUL AS INHIBITORS OF JANUS KINASES

TECHNICAL FIELD OF THE INVENTION

[0101] The present invention relates to compounds useful as inhibitors of Janus kinases (JAK). The invention also provides pharmaceutically acceptable compositions comprising the compounds of the invention and methods of using the compositions in the treatment of various disorders.

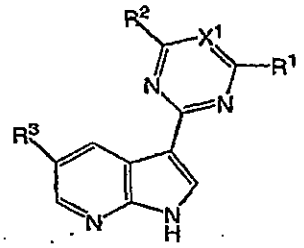
BACKGROUND OF THE INVENTION

[0102] The Janus kinases (JAK) are a family of tyrosine kinases consisting of JAK1, JAK2, JAK3 and TYK2. The JAKs play a critical role in cytokine signaling. The down-stream substrates of the JAK family of kinases include the signal transducer and activator of transcription (STAT) proteins. JAK/STAT signaling has been implicated in the mediation of many abnormal immune responses such as allergies, asthma, autoimmune diseases such as transplant rejection, rheumatoid arthritis, amyotrophic lateral sclerosis and multiple sclerosis as well as in solid and hematologic malignancies such as leukemias and lymphomas. JAK2 has also been implicated in myeloproliferative disorders, which include polycythemia vera, essential thrombocythemia, chronic idiopathic myelofibrosis, myeloid metaplasia with myelofibrosis, chronic myeloid leukemia, chronic myelomonocytic leukemia, chronic eosinophilic leukemia, hypereosinophilic syndrome and systematic mast cell disease.

[0103] Accordingly, there is a great need to develop compounds useful as inhibitors of protein kinases. In particular, it would be desirable to develop compounds that are useful as inhibitors of JAK family kinases.

SUMMARY OF THE INVENTION

[0104] It has now been found that compounds of this invention, and pharmaceutically acceptable compositions thereof, are effective as inhibitors of protein kinases, particularly the JAK family kinases. These compounds have the general formula I:



I

or a pharmaceutically acceptable salt thereof, wherein X^1, R^1, R^2 and R^3 are as defined herein.

[0105] These compounds, and pharmaceutically acceptable compositions thereof, are useful for treating or lessening the severity of a variety of disorders, including proliferative disorders, cardiac disorders, neurodegenerative disorders, autoimmune disorders, conditions associated with organ transplantation, inflammatory disorders, or immunologically mediated disorders in a patient.

[0106] The compounds and compositions provided by this invention are also useful for the study of JAK kinases in biological and pathological phenomena; the study of intracellular signal transduction pathways mediated by such kinases; and the comparative evaluation of new kinase inhibitors.

DETAILED DESCRIPTION OF THE INVENTION

Definitions and General Terminology

[0107] As used herein, the following definitions shall apply unless otherwise indicated. For purposes of this invention, the chemical elements are identified in accordance with the Periodic Table of the Elements, CAS version, and the Handbook of Chemistry and Physics, 75th Ed. 1994. Additionally, general principles of organic chemistry are described in "Organic Chemistry", Thomas Sorrell, University Science Books, Sausalito: 1999, and "March's Advanced Organic Chemistry", 5th Ed., Smith,

M.B. and March, J., eds. John Wiley & Sons, New York: 2001, the entire contents of which are hereby incorporated by reference.

[0108] As described herein, compounds of the invention may optionally be substituted with one or more substituents, such as are illustrated generally above, or as exemplified by particular classes, subclasses, and species of the invention. It will be appreciated that the phrase "optionally substituted" is used interchangeably with the phrase "substituted or unsubstituted." In general, the term "substituted", whether preceded by the term "optionally" or not, refers to the replacement of one or more hydrogen radicals in a given structure with the radical of a specified substituent. Unless otherwise indicated, an optionally substituted group may have a substituent at each substitutable position of the group. When more than one position in a given structure can be substituted with more than one substituent selected from a specified group, the substituent may be either the same or different at each position.

[0109] As described herein, when the term "optionally substituted" precedes a list, said term refers to all of the subsequent substitutable groups in that list. If a substituent radical or structure is not identified or defined as "optionally substituted", the substituent radical or structure is unsubstituted. For example, if X is halogen; optionally substituted C_{1-3}alkyl or phenyl; X may be either optionally substituted alkyl or optionally substituted phenyl. Likewise, if the term "optionally substituted" follows a list, said term also refers to all of the substitutable groups in the prior list unless otherwise indicated. For example: if X is halogen, C_{1-3}alkyl or phenyl wherein X is optionally substituted by J^X, then both C_{1-3}alkyl and phenyl may be optionally substituted by J^X. As is apparent to one having ordinary skill in the art, groups such as H, halogen, NO_2, CN, NH_2, OH, or OCF_3 would not be included because they are not substitutable groups.

[0110] Combinations of substituents envisioned by this invention are preferably those that result in the formation of stable or chemically feasible compounds. The term "stable", as used herein, refers to compounds that are not substantially altered when subjected to conditions to allow for their production, detection, and, preferably, their recovery, purification, and use for one or more of the purposes disclosed herein. In some embodiments, a stable compound or chemically feasible compound is one that is not substantially altered when kept at a temperature of 40°C or less, in the absence of moisture or other chemically reactive conditions, for at least a week.

[0111] The term "aliphatic" or "aliphatic group", as used herein, means a straight-chain (i.e., unbranched) or branched, substituted or unsubstituted hydrocarbon chain that is completely saturated or that contains one or more units of unsaturation. Unless otherwise specified, aliphatic groups contain 1-20 aliphatic carbon atoms. In some embodiments, aliphatic groups contain 1-10 aliphatic carbon atoms. In other embodiments, aliphatic groups contain 1-8 aliphatic carbon atoms. In still other embodiments, aliphatic groups contain 1-6 aliphatic carbon atoms, and In yet other embodiments, aliphatic groups contain 1-4 aliphatic carbon atoms. Suitable aliphatic groups include, but are not limited to, linear or branched, substituted or unsubstituted alkyl, alkenyl, or alkynyl groups. Further examples of aliphatic groups include methyl; ethyl, propyl, butyl, isopropyl, isobutyl, vinyl, and sec-butyl.

[0112] The term "cycloaliphatic" (or "carbocycle" or "cycloalkyl") refers to a hydrocarbon that is completely saturated or that contains one or more units of unsaturation, but which is not aromatic, that has a single point of attachment to the rest of the molecule, and wherein any individual ring in said bicyclic ring system has 3-7 members. Unless otherwise specified, the term "cycloaliphatic" refers to a monocyclic C_3-C_8 hydrocarbon or bicyclic C_8-C_{12} hydrocarbon. Suitable cycloaliphatic groups include, but are not limited to, cycloalkyl, cycloalkenyl, and cycloalkynyl. Further examples of aliphatic groups include cyclopropyl, cyclobutyl, cyclopentyl, cyclopentenyl, cyclohexyl, cyclohexenyl, cycloheptyl, and cycloheptenyl.

[0113] The term "heterocycle", "heterocyclyl" or "heterocyclic" as used herein refers to a monocyclic, bicyclic, or tricyclic ring system in which one or more ring members are an independently selected heteroatom and that is completely saturated or that contains one or more units of unsaturation, but which is not aromatic, that has a single point of attachment to the rest of the molecule. In some embodiments, the "heterocycle", "heterocyclyl" or "heterocyclic" group has three to fourteen ring members in which one or more ring members is a heteroatom independently selected from oxygen, sulfur, nitrogen, or phosphorus, and each ring in the system contains 3 to 7 ring members.

[0114] Examples of heterocyclic rings include, but are not limited to, the following monocycles: 2-tetrahydrofuranyl, 3-tetrahydrofuranyl, 2-tetrahydrothiophenyl, 3-tetrahydrothiophenyl, 2-morpholino, 3-morpholino, 4-morpholino, 2-thiomorpholino,

3-thiomorpholino, 4-thiomorpholino, 1-pyrrolidinyl, 2-pyrrolidinyl, 3-pyrrolidinyl, 1-tetrahydropiperazinyl, 2-tetrahydropiperazinyl, 3-tetrahydropiperazinyl, 1-piperidinyl, 2-piperidinyl, 3-piperidinyl, 1-pyrazolinyl, 3-pyrazolinyl, 4-pyrazolinyl, 5-pyrazolinyl, 1-piperidinyl, 2-piperidinyl, 3-piperidinyl, 4-piperidinyl, 2-thiazolidinyl, 3-thiazolidinyl, 4-thiazolidinyl, 1-imidazolidinyl, 2-imidazolidinyl, 4-imidazolidinyl, 5-imidazolidinyl; and the following bicycles: 3-1H-benziniidazol-2-one, 3-(1-alkyl)-benzimidazol-2-one, indolinyl, tetrahydroquinolinyl, tetrahydroisoquinolinyl, benzothiolane, benzodithiane, and 1,3-dihydro-imidazol-2-one.

[0115] The term "heteroatom" means one or more of oxygen, sulfur, nitrogen, phosphorus, or silicon, including any oxidized form of nitrogen, sulfur, phosphorus, or silicon, the quaternized form of any basic nitrogen, or a substitutable nitrogen of a heterocyclic ring, for example N (as in 3,4-dihydro-2*H*-pyrrolyl), NH (as in pyrrolidinyl) or NR^+ (as in N-substituted pyrrolidinyl).

[0116] The term "unsaturated", as used herein, means that a moiety has one or more units of unsaturation.

[0117] The term "aryl" used alone or as part of a larger moiety as in "aralkyl", "aralkoxy", or "aryloxyalkyl", refers to monocyclic, bicyclic, and tricyclic carbocyclic ring systems having a total of six to fourteen ring members, wherein at least one ring in the system is aromatic, wherein each ring in the system contains 3 to 7 ring members and that has a single point of attachment to the rest of the molecule. The term "aryl" may be used interchangeably with the term "aryl ring". Examples of aryl rings would include phenyl, naphthyl, and anthracene.

[0118] The term "heteroaryl", used alone or as part of a larger moiety as in "heteroaralkyl" or "heteroarylalkoxy", refers to monocyclic, bicyclic, and tricyclic ring systems having a total of five to fourteen ring members, wherein at least one ring in the system is aromatic, at least one ring in the system contains one or more heteroatoms, wherein each ring in the system contains 3 to 7 ring members and that has a single point of attachment to the rest of the molecule. The term "heteroaryl" may be used interchangeably with the term "heteroaryl ring" or the term "heteroaromatic".

[0119] Further examples of heteroaryl rings include the following monocycles: 2-furanyl, 3-furanyl, N-imidazolyl, 2-imidazolyl, 4-imidazolyl, 5-imidazolyl, 3-isoxazolyl, 4-isoxazolyl, 5-isoxazolyl, 2-oxazolyl, 4-oxazolyl, 5-oxazolyl,

N-pyrrolyl, 2-pyrrolyl, 3-pyrrolyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, 2-pyrimidinyl, 4-pyrimidinyl, 5-pyrimidinyl, pyridazinyl (e.g., 3-pyridazinyl), 2-thiazolyl, 4-thiazolyl, 5-thiazolyl, tetrazolyl (e.g., 5-tetrazolyl), triazolyl (e.g., 2-triazolyl and 5-triazolyl), 2-thienyl, 3-thienyl, pyrazolyl (e.g., 2-pyrazolyl), isothiazolyl, 1,2,3-oxadiazolyl, 1,2,5-oxadiazolyl, 1,2,4-oxadiazolyl, 1,2,3-triazolyl, 1,2,3-thiadiazolyl, 1,3,4-thiadiazolyl, 1,2,5-thiadiazolyl, pyrazinyl, 1,3,5-triazinyl, and the following bicycles: benzimidazolyl, benzofuryl, benzothiophenyl, indolyl (e.g., 2-indolyl), purinyl, quinolinyl (e.g., 2-quinolinyl, 3-quinolinyl, 4-quinolinyl), and isoquinolinyl (e.g., 1-isoquinolinyl, 3-isoquinolinyl, or 4-isoquinolinyl).

[0120] In some embodiments, an aryl (including aralkyl, aralkoxy, aryloxyalkyl and the like) or heteroaryl (including heteroaralkyl and heteroarylalkoxy and the like) group may contain one or more substituents. Suitable substituents on the unsaturated carbon atom of an aryl or heteroaryl group are selected from those listed in the definitions of R^2 and R^4 below. Other suitable substituents include: halogen; -R°; -OR°; -SR°; 1,2-methylenedioxy; 1,2-ethylenedioxy; phenyl (Ph) optionally substituted with R°; -O(Ph) optionally substituted with R°; $-(CH_2)_{1-2}$(Ph), optionally substituted with R°; -CH=CH(Ph), optionally substituted with R°; $-NO_2$; -CN; $-N(R°)_2$; $-NR°C(O)R°$; $-NR°C(S)R°$; $-NR°C(O)N(R°)_2$; $-NR°C(S)N(R°)_2$; $-NR°CO_2R°$; $-NR°NR°C(O)R°$; $-NR°NR°C(O)N(R°)_2$; $-NR°NR°CO_2R°$; $-C(O)C(O)R°$; $-C(O)CH_2C(O)R°$; $-CO_2R°$; $-C(O)R°$; $-C(S)R°$; $-C(O)N(R°)_2$; $-C(S)N(R°)_2$; $-OC(O)N(R°)_2$; $-OC(O)R°$; $-C(O)N(OR°)R°$; $-C(NOR°)R°$; $-S(O)_2R°$; $-S(O)_3R°$; $-SO_2N(R°)_2$; $-S(O)R°$; $-NR°SO_2N(R°)_2$; $-NR°SO_2R°$; $-N(OR°)R°$; $-C(=NH)-N(R°)_2$; or $-(CH_2)_{0-2}NHC(O)R°$; wherein each independent occurrence of R° is selected from hydrogen, optionally substituted C_{1-6} aliphatic, an unsubstituted 5-6 membered heteroaryl or heterocyclic ring, phenyl, -O(Ph), or $-CH_2$(Ph), or, two independent occurrences of R°, on the same substituent or different substituents, taken together with the atom(s) to which each R° group is bound, form a 5-8-membered heterocyclyl, aryl, or heteroaryl ring or a 3-8-membered cycloalkyl ring, wherein said heteroaryl or heterocyclyl ring has 1-3 heteroatoms independently selected from nitrogen, oxygen, or sulfur. Optional substituents on the aliphatic group of R° are selected from NH_2, $NH(C_{1-4}$aliphatic), $N(C_{1-4}$aliphatic$)_2$, halogen, C_{1-4}aliphatic, OH,

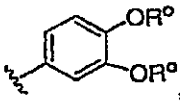
$O(C_{1-4}$aliphatic), NO_2, CN, CO_2H, $CO_2(C_{1-4}$aliphatic), $O(haloC_{1-4}$ aliphatic), or $haloC_{1-4}$aliphatic, wherein each of the foregoing C_{1-4}aliphatic groups of R° is unsubstituted.

[0121] In some embodiments, an aliphatic or heteroaliphatic group, or a non-aromatic heterocyclic ring may contain one or more substituents. Suitable substituents on the saturated carbon of an aliphatic or heteroaliphatic group, or of a non-aromatic heterocyclic ring are selected from those listed above for the unsaturated carbon of an aryl or heteroaryl group and additionally include the following: =O, =S, $=NNHR^*$, $=NN(R^*)_2$, $=NNHC(O)R^*$, $=NNHCO_2$(alkyl), $=NNHSO_2$(alkyl), or $=NR^*$, where each R^* is independently selected from hydrogen or an optionally substituted C_{1-6} aliphatic. Optional substituents on the aliphatic group of R^* are selected from NH_2, $NH(C_{1-4}$ aliphatic), $N(C_{1-4}$ aliphatic)$_2$, halogen, C_{1-4} aliphatic, OH, $O(C_{1-4}$ aliphatic), NO_2, CN, CO_2H, $CO_2(C_{1-4}$ aliphatic), O(halo C_{1-4} aliphatic), or halo(C_{1-4} aliphatic), wherein each of the foregoing C_{1-4}aliphatic groups of R^* is unsubstituted.

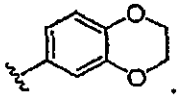
[0122] In some embodiments, optional substituents on the nitrogen of a non-aromatic heterocyclic ring include $-R^+$, $-N(R^+)_2$, $-C(O)R^+$, $-CO_2R^+$, $-C(O)C(O)R^+$, $-C(O)CH_2C(O)R^+$, $-SO_2R^+$, $-SO_2N(R^+)_2$, $-C(=S)N(R^+)_2$, $-C(=NH)-N(R^+)_2$, or $-NR^+SO_2R^+$; wherein R^+ is hydrogen, an optionally substituted C_{1-6} aliphatic, optionally substituted phenyl, optionally substituted -O(Ph), optionally substituted $-CH_2$(Ph), optionally substituted $-(CH_2)_{1-2}$(Ph); optionally substituted -CH=CH(Ph); or an unsubstituted 5-6 membered heteroaryl or heterocyclic ring having one to four heteroatoms independently selected from oxygen, nitrogen, or sulfur, or, two independent occurrences of R^+, on the same substituent or different substituents, taken together with the atom(s) to which each R^+ group is bound, form a 5-8-membered heterocyclyl, aryl, or heteroaryl ring or a 3-8-membered cycloalkyl ring, wherein said heteroaryl or heterocyclyl ring has 1-3 heteroatoms independently selected from nitrogen, oxygen, or sulfur. Optional substituents on the aliphatic group or the phenyl ring of R^+ are selected from NH_2, $NH(C_{1-4}$ aliphatic), $N(C_{1-4}$ aliphatic)$_2$, halogen, C_{1-4} aliphatic, OH, $O(C_{1-4}$ aliphatic), NO_2, CN, CO_2H, $CO_2(C_{1-4}$ aliphatic), O(halo C_{1-4} aliphatic), or halo(C_{1-4} aliphatic), wherein each of the foregoing C_{1-4}aliphatic groups of R^+ is unsubstituted.

[0123] As detailed above, in some embodiments, two independent occurrences of R° (or R^+, or any other variable similarly defined herein), may be taken together with the atom(s) to which each variable is bound to form a 5-8-membered

heterocyclyl, aryl, or heteroaryl ring or a 3-8-membered cycloalkyl ring. Exemplary rings that are formed when two independent occurrences of R° (or R^+, or any other variable similarly defined herein) are taken together with the atom(s) to which each variable is bound include, but are not limited to the following: a) two independent occurrences of R° (or R^+, or any other variable similarly defined herein) that are bound to the same atom and are taken together with that atom to form a ring, for example, $N(R^\circ)_2$, where both occurrences of R° are taken together with the nitrogen atom to form a piperidin-1-yl, piperazin-1-yl, or morpholin-4-yl group; and b) two independent occurrences of R° (or R^+, or any other variable similarly defined herein) that are bound to different atoms and are taken together with both of those atoms to form a ring, for example where a phenyl group is substituted with two occurrences of OR°



, these two occurrences of R° are taken together with the oxygen atoms to which they are bound to form a fused 6-membered oxygen containing ring:



. It will be appreciated that a variety of other rings can be formed when two independent occurrences of R° (or R^+, or any other variable similarly defined herein) are taken together with the atom(s) to which each variable is bound and that the examples detailed above are not intended to be limiting.

[0124] In some embodiments, an alkyl or aliphatic chain can be optionally interrupted with another atom or group. This means that a methylene unit of the alkyl or aliphatic chain is optionally replaced with said other atom or group. Examples of such atoms or groups would include, but are not limited to, -NR-, -O-, -S-, $-CO_2-$, -OC(O)-, -C(O)CO-, -C(O)-, -C(O)NR-, -C(=N-CN), -NRCO-, -NRC(O)O-, $-SO_2NR-$, $-NRSO_2-$, -NRC(O)NR-, -OC(O)NR-, $-NRSO_2NR-$, -SO-, or $-SO_2-$, wherein R is defined herein. Unless otherwise specified, the optional replacements form a chemically stable compound. Optional interruptions can occur both within the chain and at either end of the chain; i.e. both at the point of attachment and/or also at the terminal end. Two optional replacements can also be adjacent to each other within a chain so long as it results in a chemically stable compound. Unless otherwise specified, if the replacement or interruption occurs at the terminal end, the replacement atom is bound to an H on the

terminal end. For example, if $-CH_2CH_2CH_3$ were optionally interrupted with -O-, the resulting compound could be $-OCH_2CH_3$, $-CH_2OCH_3$, or $-CH_2CH_2OH$.

[0125] As described herein, a bond drawn from a substituent to the center of one ring within a multiple-ring system (as shown below), represents substitution of the substituent at any substitutable position in any of the rings within the multiple ring system. For example, Figure a represents possible substitution in any of the positions shown in Figure b.

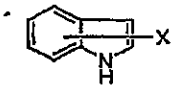


Figure a

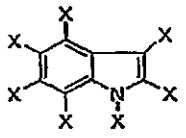


Figure b

[0126] This also applies to multiple ring systems fused to optional ring systems (which would be represented by dotted lines). For example, in Figure c, X is an optional substituent both for ring A and ring B.



Figure c

[0127] If, however, two rings in a multiple ring system each have different substituents drawn from the center of each ring, then, unless otherwise specified, each substituent only represents substitution on the ring to which it is attached. For example, in Figure d, Y is an optionally substituent for ring A only, and X is an optional substituent for ring B only.

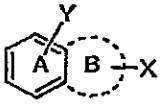


Figure d

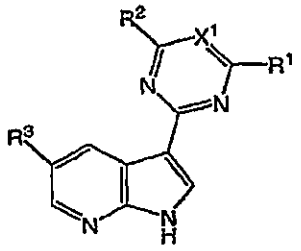
[0128] Unless otherwise stated, structures depicted herein are also meant to include all isomeric (e.g., enantiomeric, diastereomeric, and geometric (or conformational)) forms of the structure; for example, the R and S configurations for each asymmetric center, (Z) and (E) double bond isomers, and (Z) and (E) conformational isomers. Therefore, single stereochemical isomers as well as enantiomeric,

diastereomeric, and geometric (or conformational) mixtures of the present compounds are within the scope of the invention.

[0129] Unless otherwise stated, all tautomeric forms of the compounds of the invention are within the scope of the invention. Additionally, unless otherwise stated, structures depicted herein are also meant to include compounds that differ only in the presence of one or more isotopically enriched atoms. For example, compounds having the present structures except for the replacement of hydrogen by deuterium or tritium, or the replacement of a carbon by a ^{13}C- or ^{14}C-enriched carbon are within the scope of this invention. Such compounds are useful, for example, as analytical tools or probes in biological assays.

Description of Compounds of the Invention

[0130] The present invention relates to a compound of formula I:



I

or a pharmaceutically acceptable salt thereof, wherein

R^3 is H, Cl or F;

X^1 is N or CR^4;

R^2 is H, F, R', OH, OR', COR', COOH, COOR', $CONH_2$, CONHR', $CON(R')_2$, or CN;

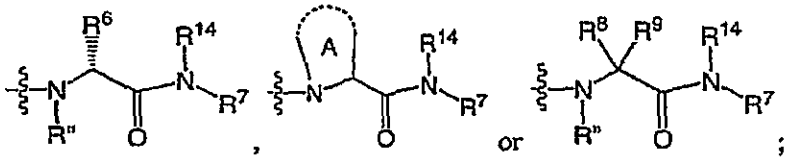
R^4 is H, F, R', OH, OR', COR', COOH, COOR', $CONH_2$, CONHR', $CON(R')_2$, or CN;

or R^2 and R^4, taken together, form a 5-7 membered aryl or heteroaryl ring optionally substituted with 1-4 occurrences of R^{10};

R' is a C_{1-3} aliphatic optionally substituted with 1-4 occurrences of R^5;

each R^5 is independently selected from halogen, CF_3, OCH_3, OH, SH, NO_2, NH_2, SCH_3, NCH_3, CN or unsubstituted C_{1-2} aliphatic, or two R^5 groups, together with the carbon to which they are attached, form a cyclopropyl ring or C=O;

each R^{10} is independently selected from halogen, OCH_3, OH, NO_2, NH_2, SH, SCH_3, NCH_3, CN or unsubstituted C_{1-2}aliphatic;

R^1 is  ;

R" is H or is a -C_{1-2} aliphatic optionally substituted with 1-3 occurrences of R^{11};

each R^{11} is independently selected from halogen, OCH_3, OH, SH, NO_2, NH_2, SCH_3, NCH_3, CN, $CON(R^{15})_2$ or unsubstituted C_{1-2} aliphatic, or two R^{11} groups, together with the carbon to which they are attached, form a cyclopropyl ring or C=O;

R^6 is a C_{1-4} aliphatic optionally substituted with 1-5 occurrences of R^{12};

each R^{12} is independently selected from halogen, OCH_3, OH, NO_2, NH_2, SH, SCH_3, NCH_3, CN or unsubstituted C_{1-2}aliphatic, or two R^{12} groups, together with the carbon to which they are attached, form a cyclopropyl ring;

Ring A is a 4-8 membered saturated nitrogen-containing ring comprising up to two additional heteroatoms selected from N, O or S and optionally substituted with 1-4 occurrences of R^{13};

each R^{13} is independently selected from halogen, R', NH_2, NHR', $N(R')_2$, SH, SR', OH, OR', NO_2, CN, CF_3, COOR', COOH, COR', OC(O)H, OC(O)R', $CONH_2$, CONHR', $CON(R')_2$, NHC(O)R' or NR'C(O)R'; or any two R^{13} groups, on the same substituent or different substituents, together with the atom(s) to which each R^{13} group is bound, form a 3-7 membered saturated, unsaturated, or partially saturated carbocyclic or heterocyclic ring optionally substituted with 1-3 occurrences of R^5;

R^8 is C_{1-4} aliphatic optionally substituted with 1-5 occurrences of R^{12};

R^9 is C_{1-2} alkyl; or

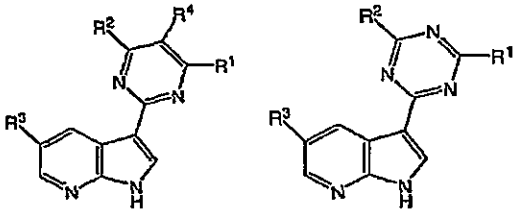
R^8 and R^9 are taken together to form a 3-7 membered carbocyclic or heterocyclic saturated ring optionally substituted with 1-5 occurrences of R^{12};

R^{14} is H or unsubstituted C_{1-2} alkyl;

R^{15} is H or unsubstituted C_{1-2} alkyl; and

R^7 is a C_{2-3} aliphatic or cycloaliphatic optionally substituted with up to 6 occurrences of F.

[0131] In one embodiment, a compound of the invention has one of formulae I-A or I-B:



I-A I-B.

[0132] In one embodiment, R^3 is H or Cl. In a further embodiment, R^3 is Cl. In a further embodiment, R^3 is H.

[0133] In one embodiment, R^2 is H, F, R', OH or OR'. In a further embodiment, R^2 is H or F.

[0134] In one embodiment, the compound is of formula I-A and R^4 is H, F, R', OH or OR'. In another embodiment, R^4 is H or F. In a further embodiment, R^4 is F and R^2 is H. In another embodiment, R^2 is F and R^4 is H. In another embodiment, R^2 and R^4 are both H. In a further embodiment, R^3 is Cl. In an alternative embodiment, R^3 is H.

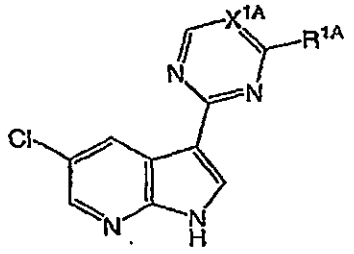
[0135] In another embodiment, the compound is of formula I-A and R^2 and R^4 are taken together to form a 6-membered aryl ring. In a further embodiment, R^3 is Cl. In an alternative embodiment, R^3 is H.

[0136] In another embodiment, R^7 is CH_2CH_3, CH_2CF_3, CH_2CHF_2, CH_2CH_2F, $CH_2CH_2CH_3$, $CH_2CH_2CF_3$, $CH_2CH_2CH_2F$ or $CH_2CH_2CHF_2$. In a further embodiment, R^7 is CH_2CH_3, CH_2CF_3, $CH_2CH_2CH_3$ or $CH_2CH_2CF_3$. In yet a further embodiment, R^7 is CH_2CF_3.

[0137] In another embodiment, R" is H or CH_3. In a further embodiment, R" is H.

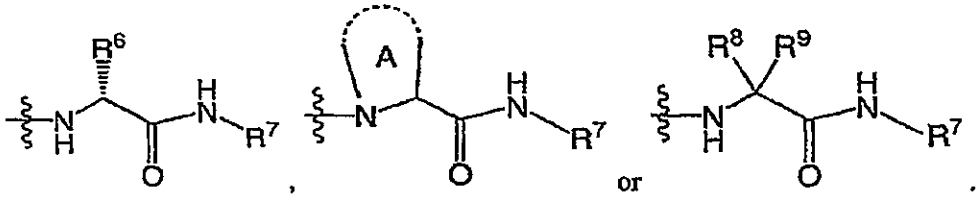
[0138] In another embodiment, R^{14} is H. In yet another embodiment, R^{15}, if present, is H. In another embodiment, R^{15} is absent.

[0139] In another embodiment, the invention provides a compound of formula II:



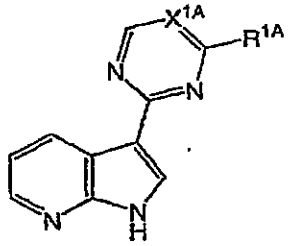
II

wherein X^{1A} is N, CH or CF and R^{1A} is



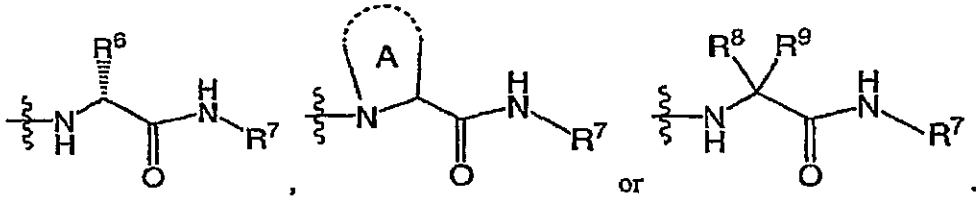
. In a further embodiment, R^7 is CH_2CH_3, CH_2CF_3, $CH_2CH_2CH_3$ or $CH_2CH_2CF_3$. In yet a further embodiment, R^7 is CH_2CF_3.

[0140] In another embodiment, the invention provides a compound of formula III:



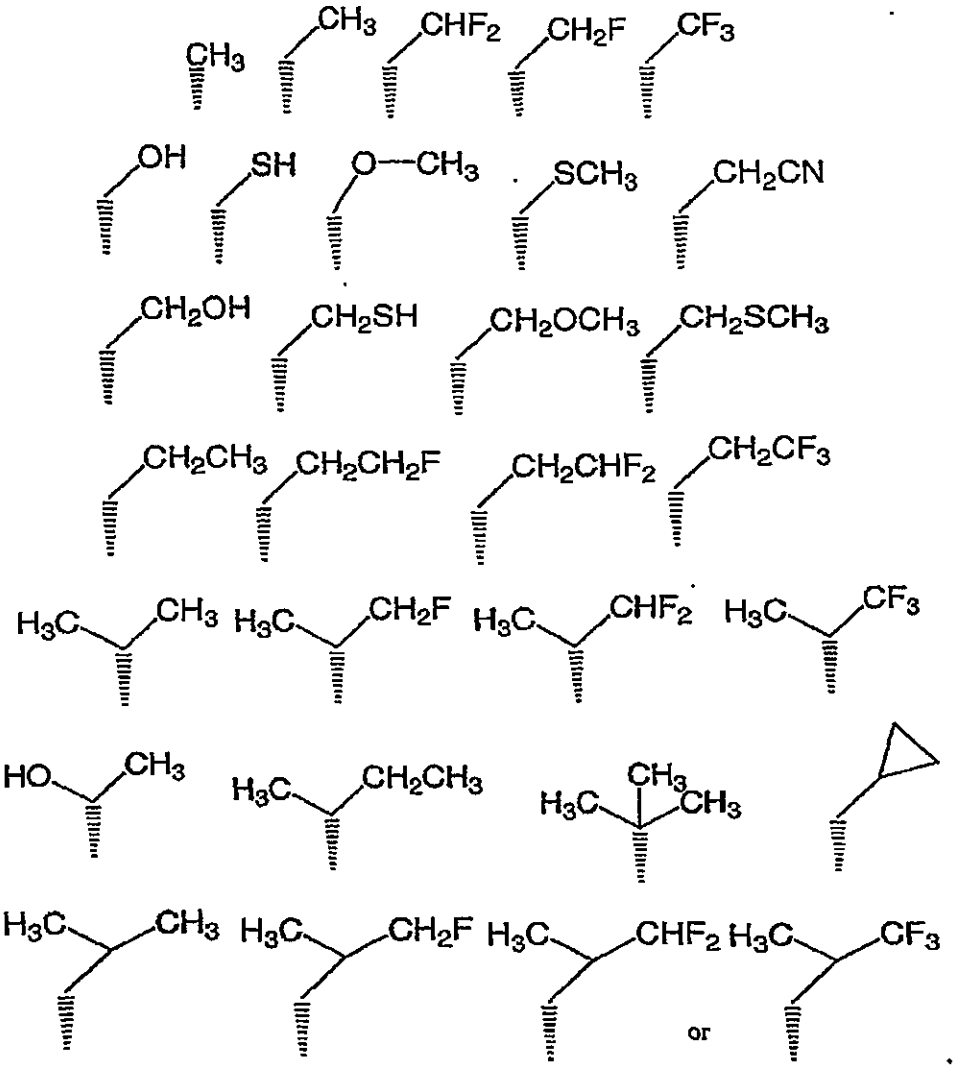
III

wherein X^{1A} is N, CH or CF and R^{1A} is

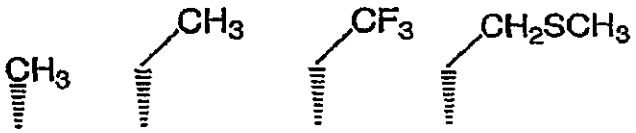


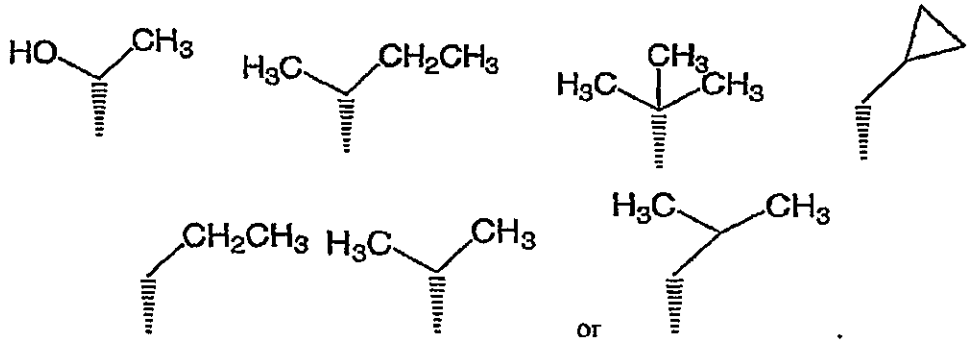
. In a further embodiment, R^7 is CH_2CH_3, CH_2CF_3, $CH_2CH_2CH_3$ or $CH_2CH_2CF_3$. In yet a further embodiment, R^7 is CH_2CF_3.

[0141] In another embodiment of any of formulae I, II or III, R^6 is selected from



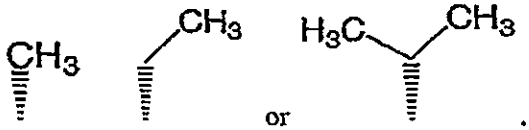
[0142] In a further embodiment, R^6 is selected from





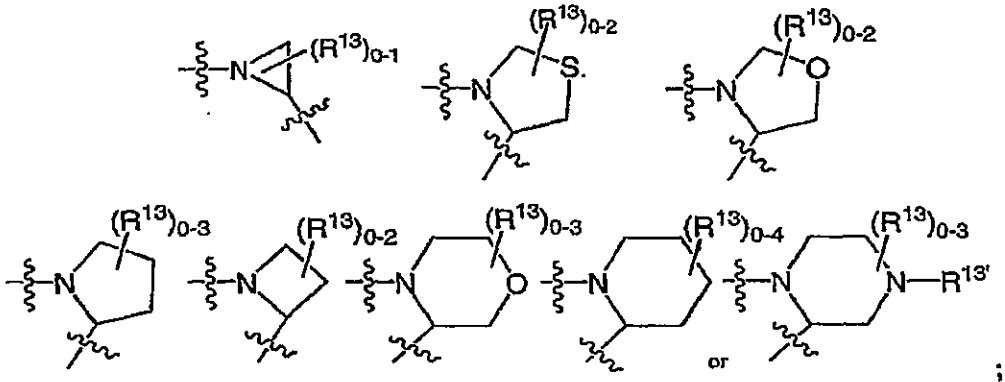
or

[0143] In yet a further embodiment, R^6 is selected from



or

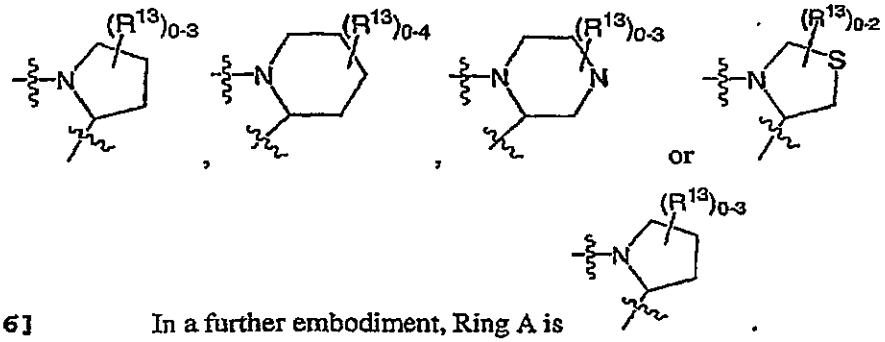
[0144] In another embodiment of any of formulae **I, II** or **III**, Ring A is



; and

$R^{13'}$ is H or R^{13}.

[0145] In a further embodiment, Ring A is

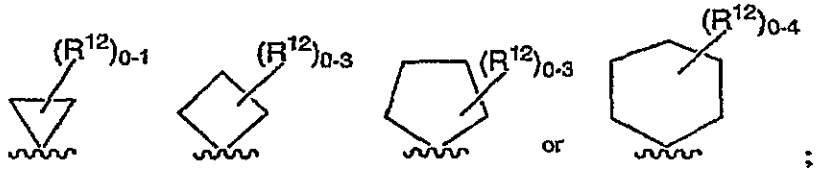


[0146] In a further embodiment, Ring A is

[0147] In one embodiment, each R^{13} is independently selected from halogen, R', NH_2, NHR', $N(R')_2$, SH, SR', OH, OR', NO_2, CN, CF_3, COOR', COOH, COR', OC(O)R' or NHC(O)R'; or any two R^{13} groups, on the same substituent or different substituents, together with the atom(s) to which each R^{13} group is bound, form a 3-7 membered saturated, unsaturated, or partially saturated carbocyclic or heterocyclic ring optionally substituted with 1-3 occurrences of R^5.

[0148] In one embodiment of this invention, R^{13} is absent. In another embodiment, Ring A is substituted with one occurrence of R^{13}. In a further embodiment, the one occurrence of R^{13} is OH, CH_3, F, OR' or NHR'. In yet a further embodiment, R' is C_{1-2} alkyl or C_{2-3} alkenyl. In another embodiment, R^{13} is OH.

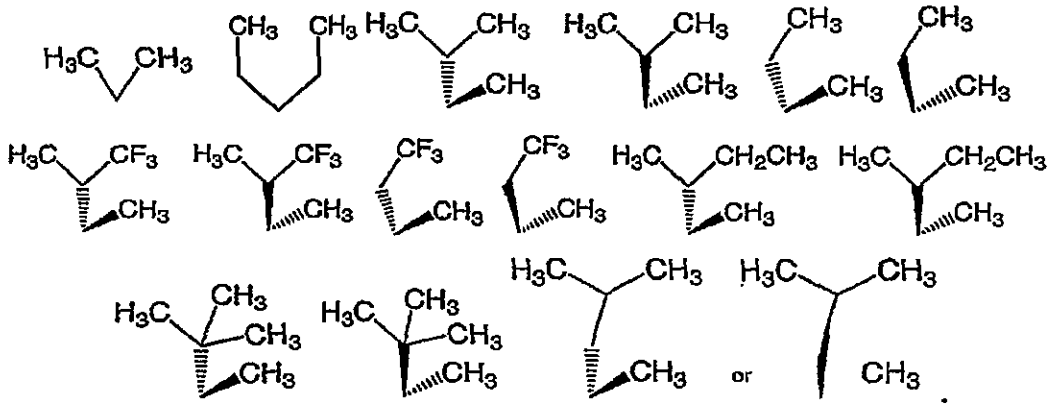
[0149] In another embodiment of any of formulae I, II or III, R^8 and R^9 are taken together to form a ring selected from



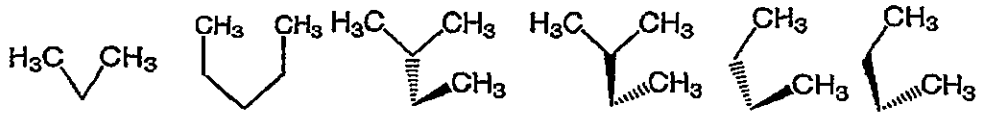
;

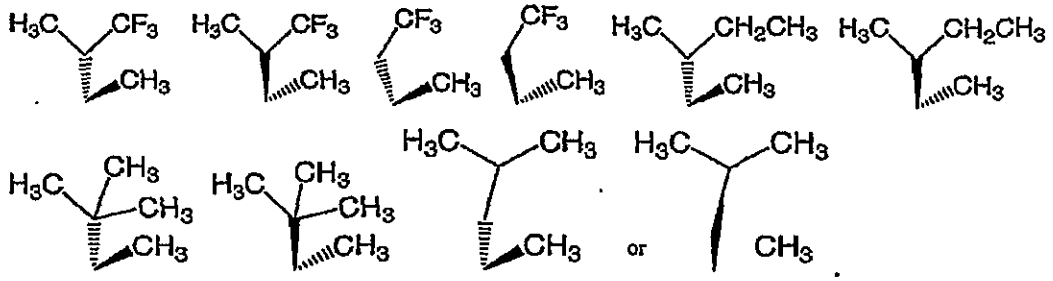
wherein one or more carbon atoms in of said ring are optionally and independently replaced by N, O or S.

[0150] In another embodiment of any of formulae I, II or III, R^8 and R^9 are

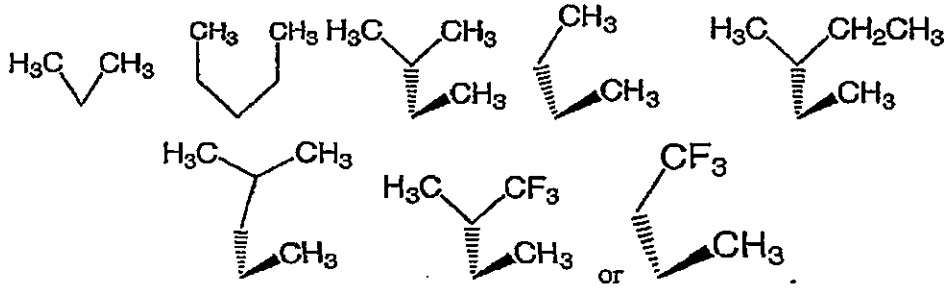


[0151] In a further embodiment, R^8 and R^9 are

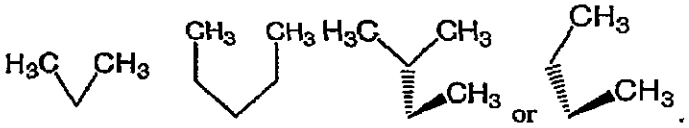




[0152] In yet a further embodiment, R^8 and R^9 are



[0153] In still a further embodiment, R^8 and R^9 are



[0154] In another embodiment, the invention provides a compound of formulae I, IA, IB, II or III, wherein said compound inhibits a JAK kinase with a lower K_i (i.e., is more potent) than said compounds inhibits one or more kinases selected from Aurora-1 (AUR-B), Aurora-2 (AUR-A), Src, CDK2, Flt-3 or c-Kit. In another embodiment, the invention provides a compound of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 with a lower K_i than said compound inhibits one or more kinases selected from JAK2, Aurora-1, Aurora-2, Src, CDK2, Flt-3 or c-Kit.

[0155] In another embodiment, the invention provides a compound of any of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 with a K_i of less than 0.1 μM. In a further embodiment, the invention provides a compound of any of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 with a K_i of less than 0.01 μM. In another embodiment, the invention provides a compound of any of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 with a K_i of less than 0.01 μM and inhibits Aurora-2 with a K_i that is at least 5-fold higher than the K_i of JAK3. In a further

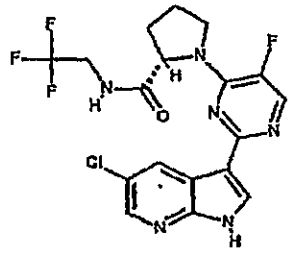
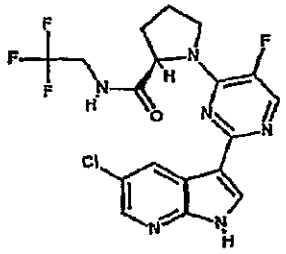
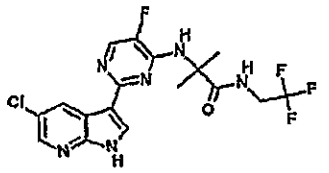
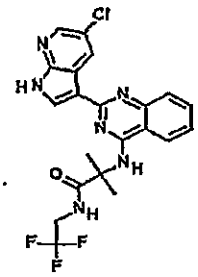
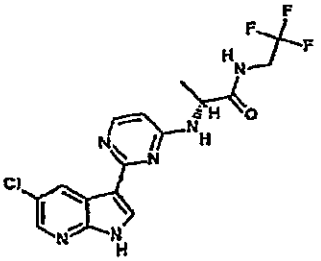
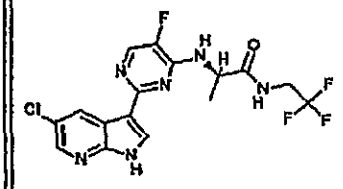
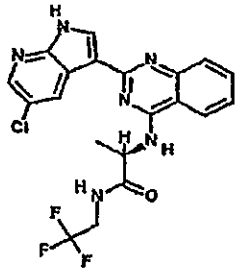
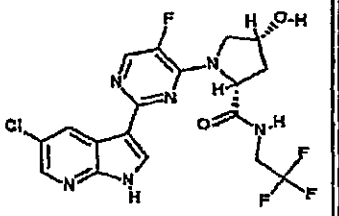
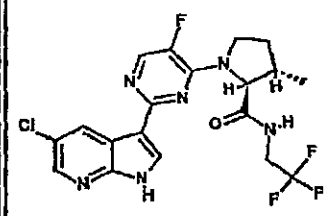
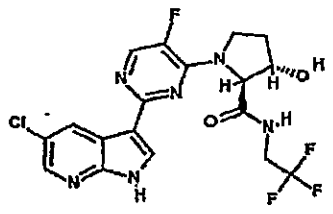
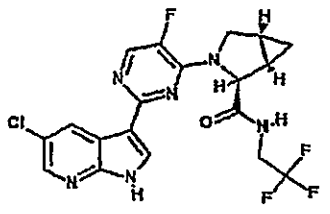
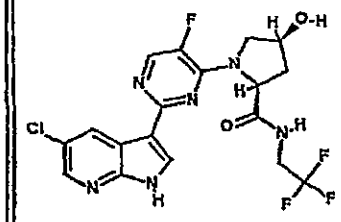
embodiment, the the invention provides a compound of any of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 with a K_i of less than 0.01 μM and inhibits Aurora-2 with a K_i that is at least 10-fold higher than the K_i of JAK3.

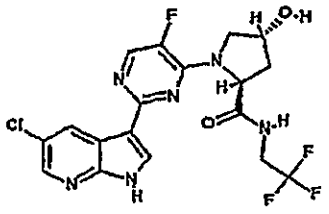
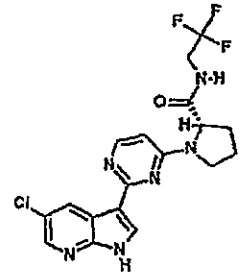
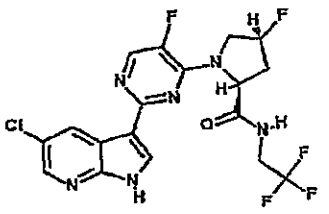
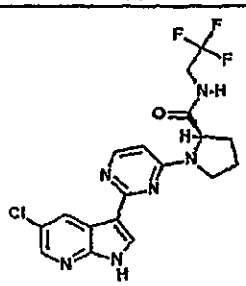
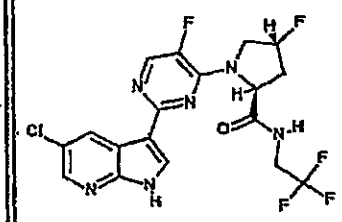
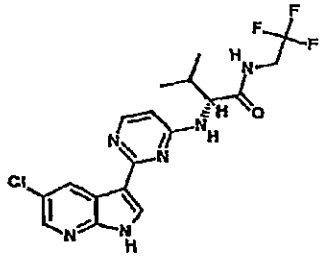
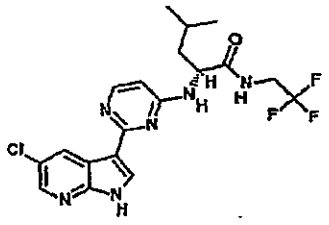
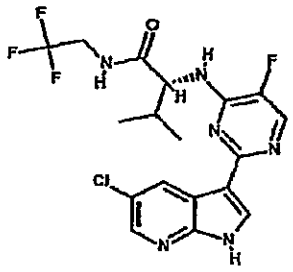
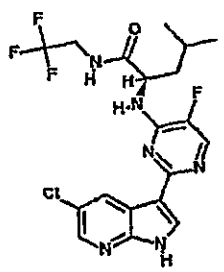
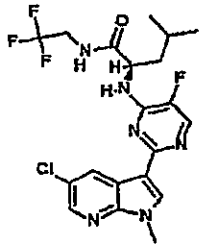
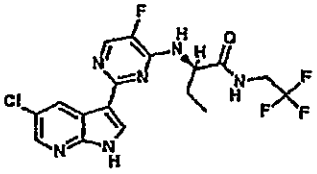
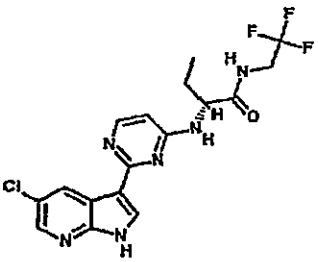
[0156] In another embodiment, the invention provides a compound of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 5 μM. In a further embodiment, said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 1 μM.

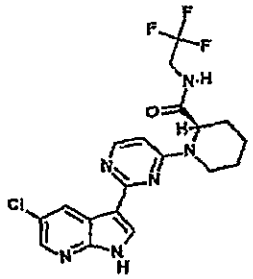
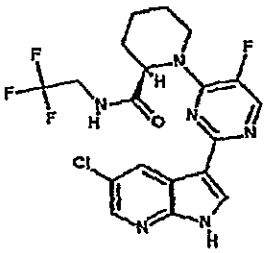
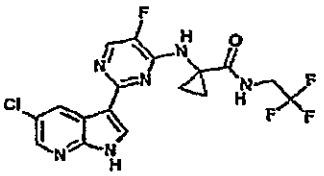
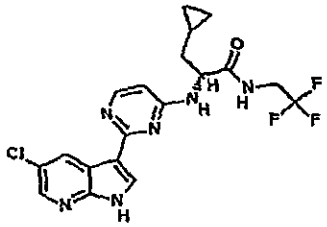
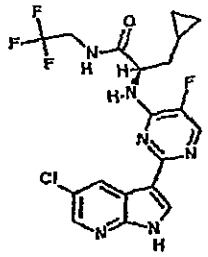
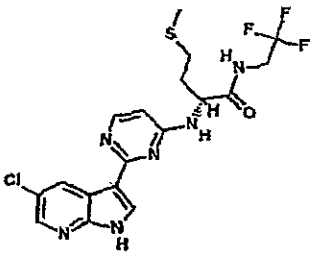
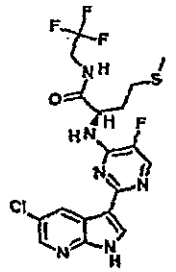
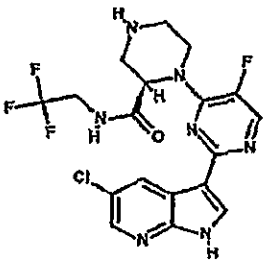
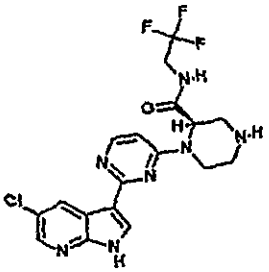
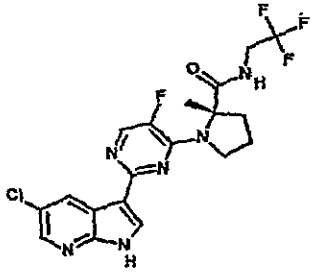
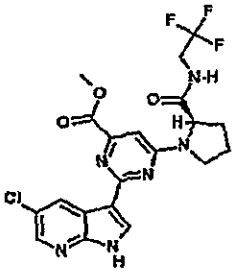
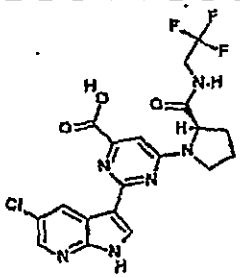
[0157] In another embodiment, said compound inhibits JAK3 in a cellular assay with an IC_{50} that is at least 5-fold less than said compound inhibits one or more kinases selected from JAK2, Aurora-1, Aurora-2, Src, CDK2, Flt-3 or c-Kit in a cellular assay. In another embodiment, the invention provides a compound of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 5 μM, wherein the IC_{50} of JAK2 is at least 5-fold higher than the IC_{50} of JAK3. In a further embodiment, said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 1 μM, wherein the IC_{50} of JAK2 is at least 5-fold higher than the IC_{50} of JAK3. In a further embodiment, said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 5 μM, wherein the IC_{50} of JAK2 is at least 10-fold higher than the IC_{50} of JAK3. In a further embodiment, said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 1 μM, wherein the IC_{50} of JAK2 is at least 10-fold higher than the IC_{50} of JAK3. In yet a further embodiment, the invention provides a compound of formulae I, IA, IB, II or III, wherein said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 1 μM, wherein the IC_{50} of JAK2 is at least 5-fold higher than the IC_{50} of JAK3, and wherein said compound inhibits JAK3 with a K_i of less than 0.01 μM and inhibits Aurora-2 with a K_i that is at least 5-fold higher than the K_i of JAK3. In yet a further embodiment, said compound inhibits JAK3 in a cellular assay with an IC_{50} of less than 1 μM, wherein the IC_{50} of JAK2 is at least 10-fold higher than the IC_{50} of JAK3, and wherein said compound inhibits JAK3 with a K_i of less than 0.01 μM and inhibits Aurora-2 with a K_i that is at least 10-fold higher than the K_i of JAK3.

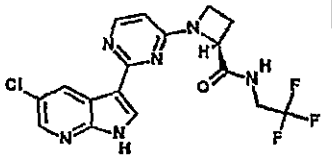
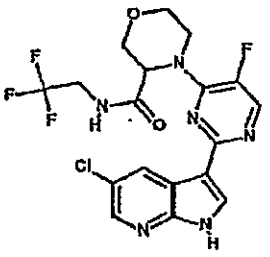
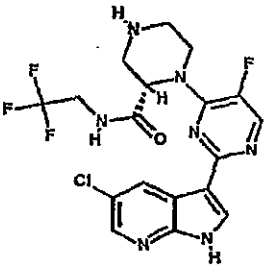
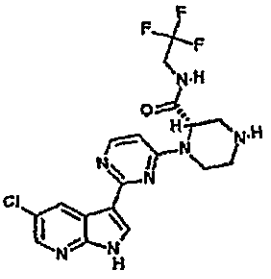
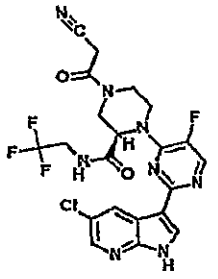
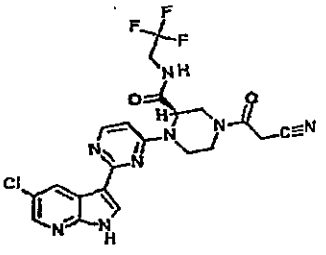
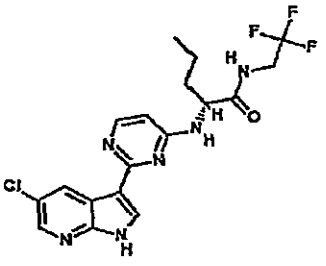
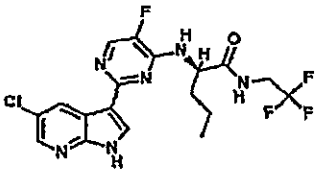
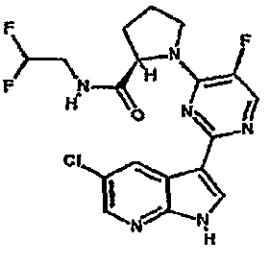
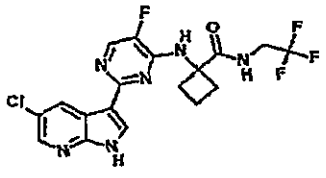
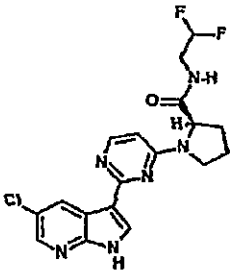
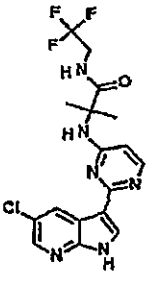
[0158] In another embodiment, the invention provides a compound of Table 1, Table 2 or Table 3:

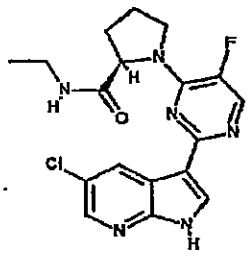
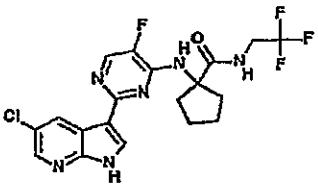
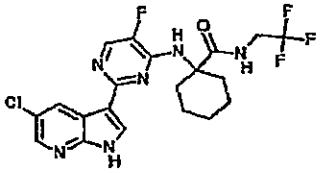
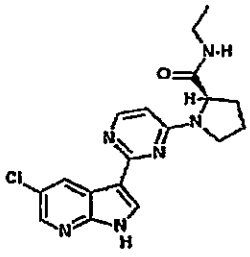
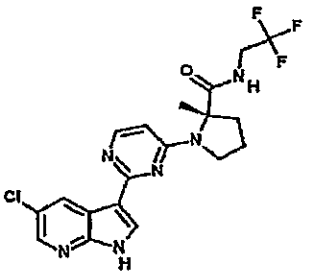
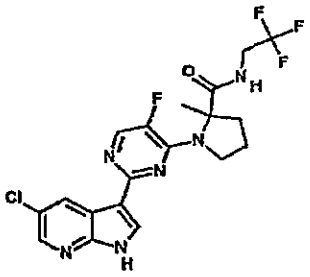
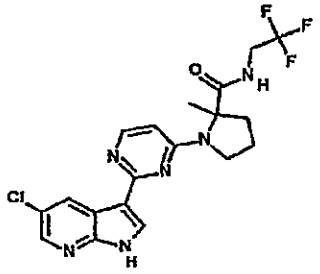
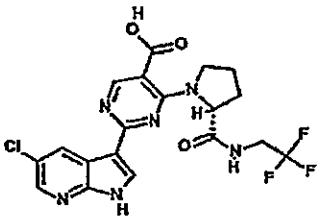
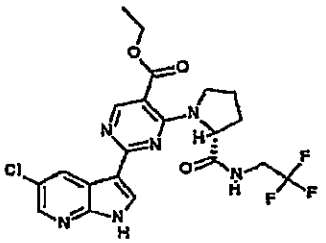
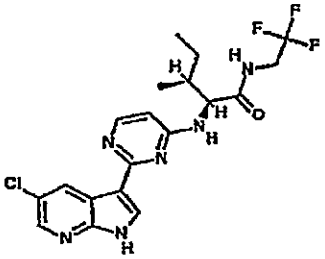
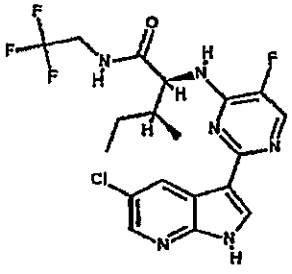
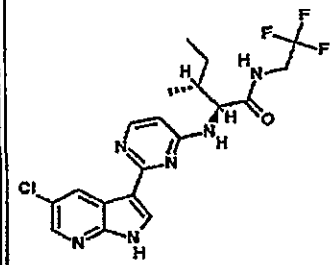
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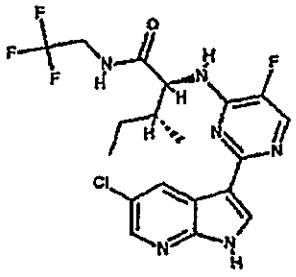
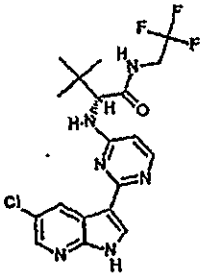
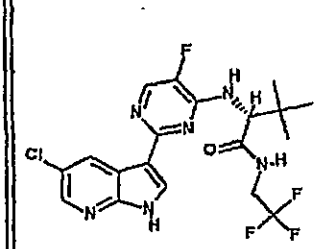
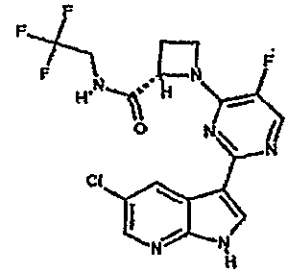
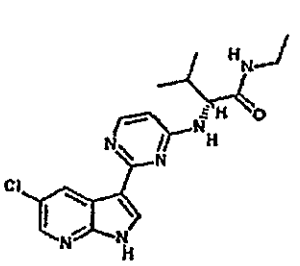
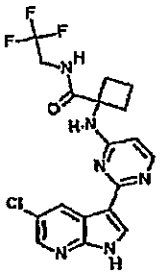
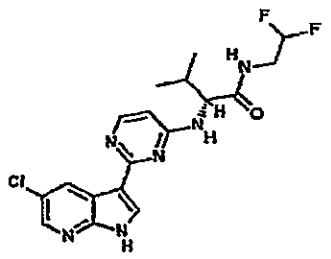
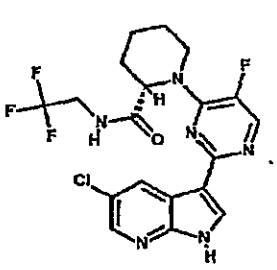
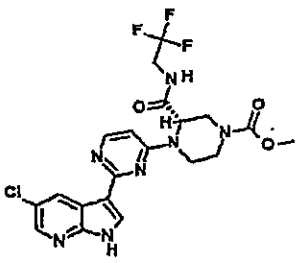
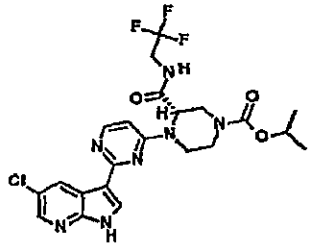
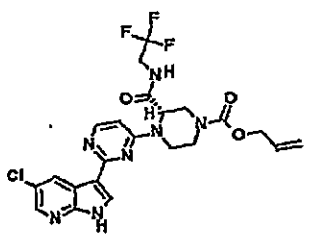
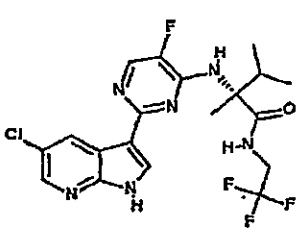
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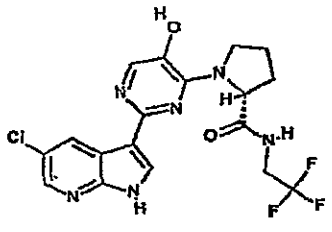
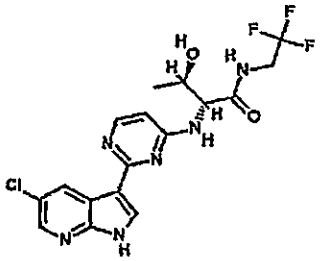
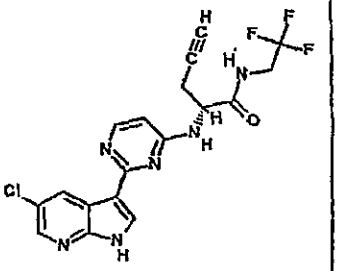
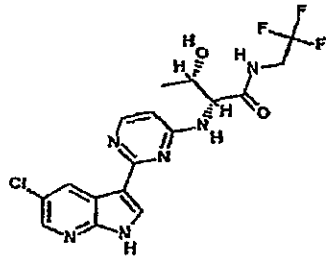
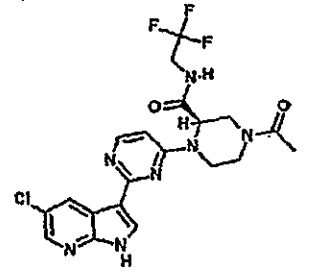
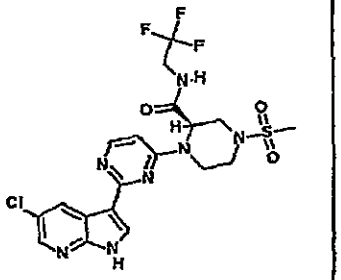
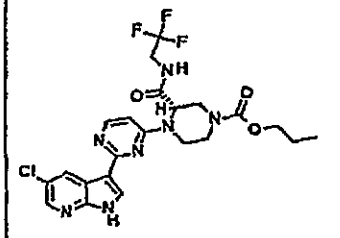
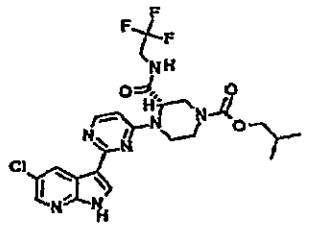
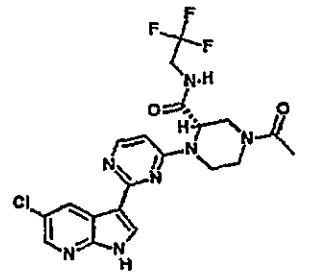
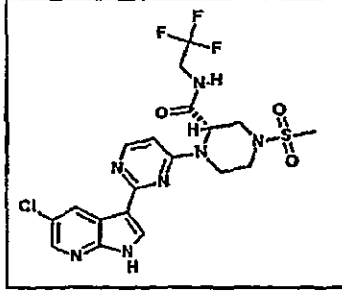
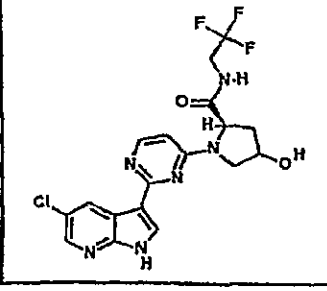
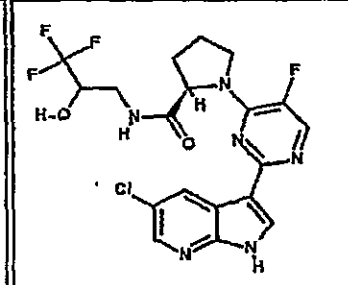
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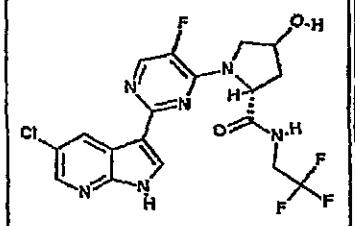
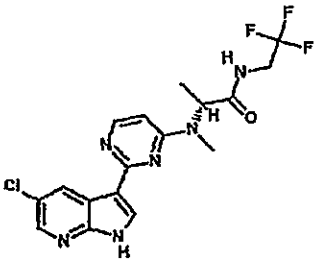
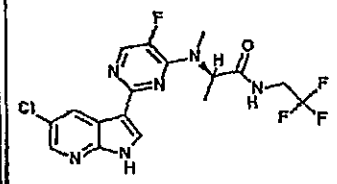
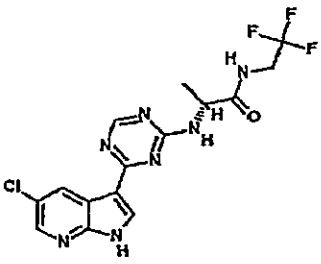
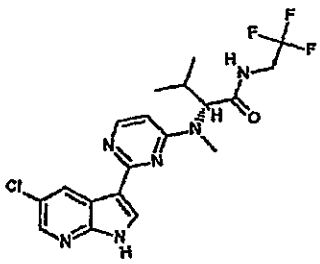
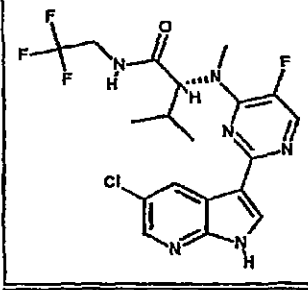
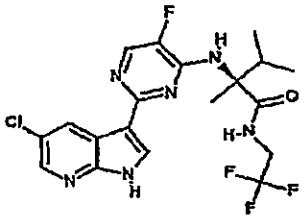
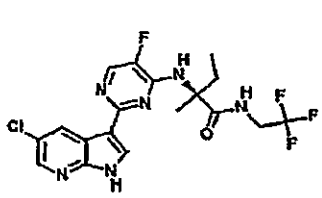
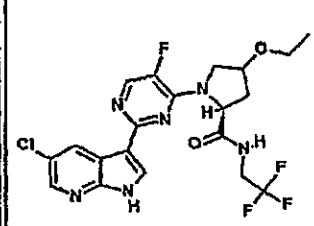
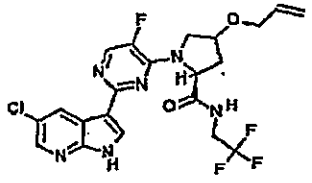
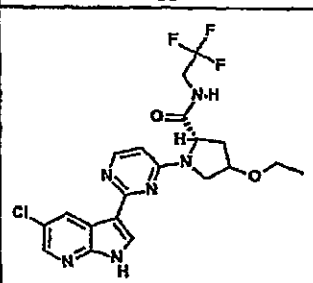
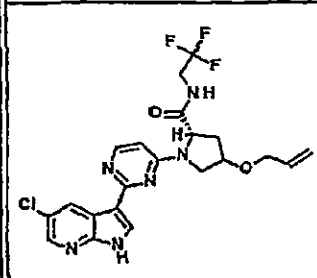
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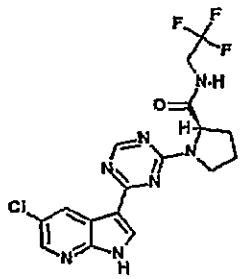
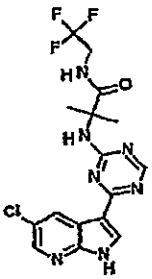
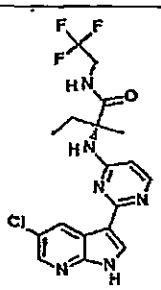
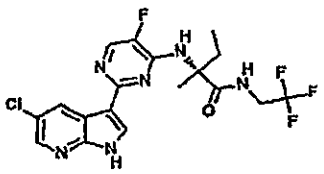
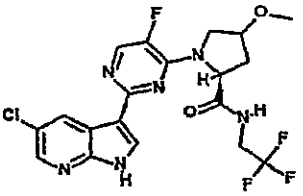
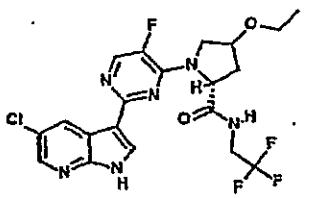
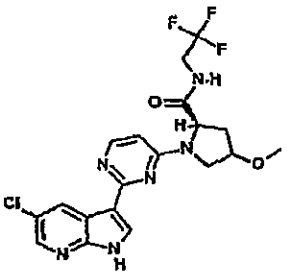
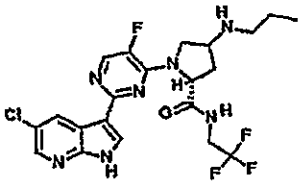
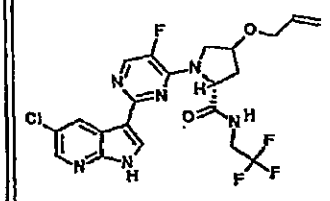
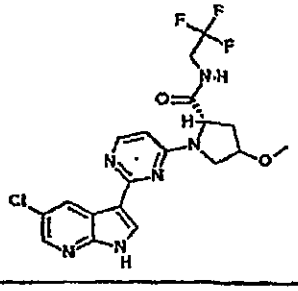
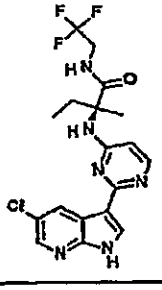
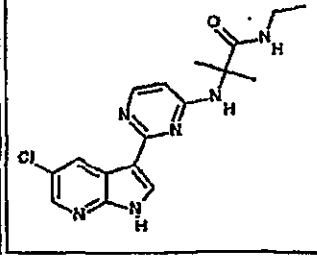
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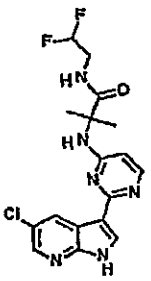
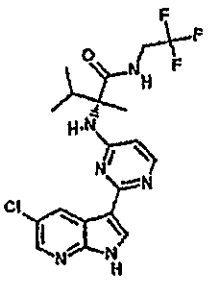
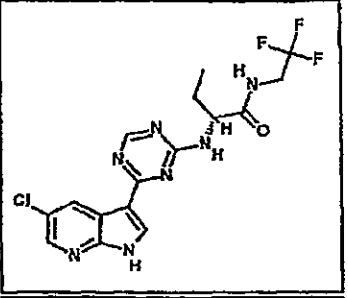
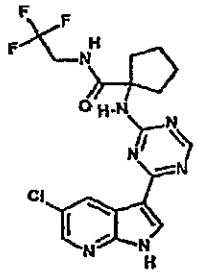
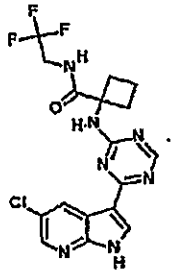
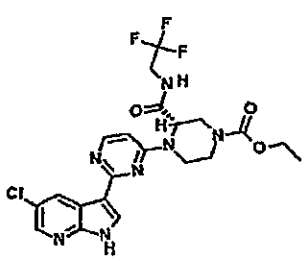
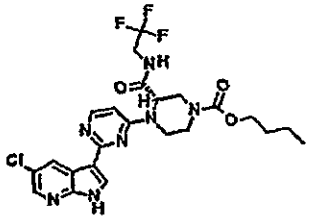
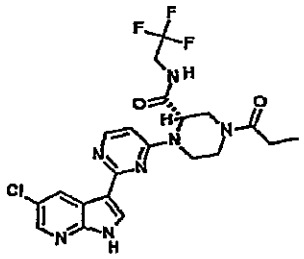
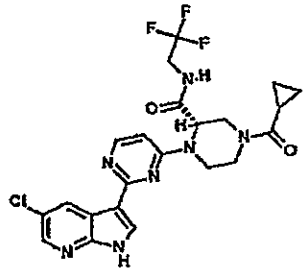
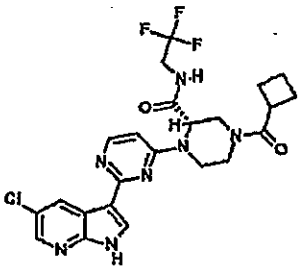
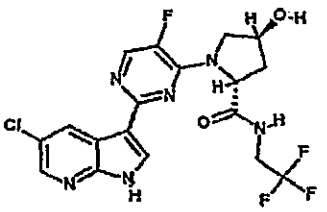
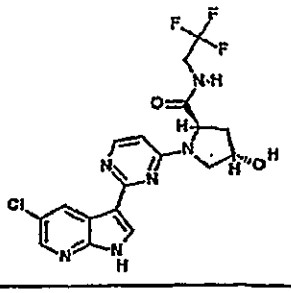
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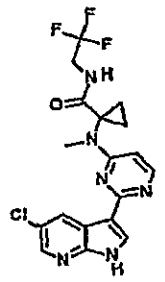
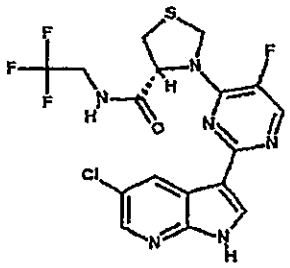
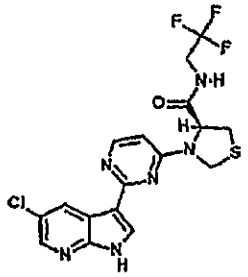
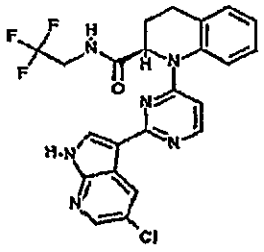
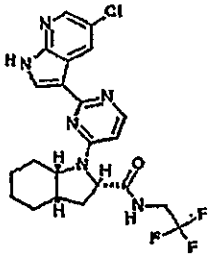
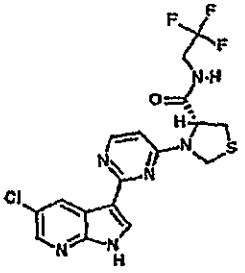
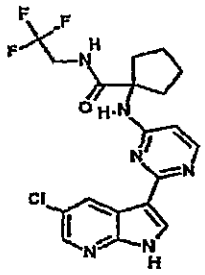
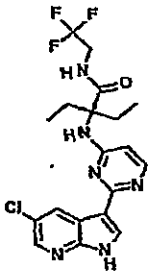
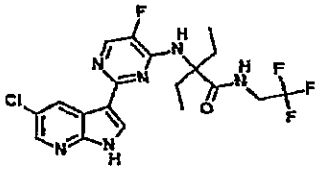
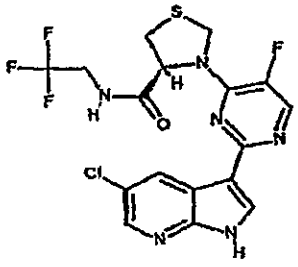
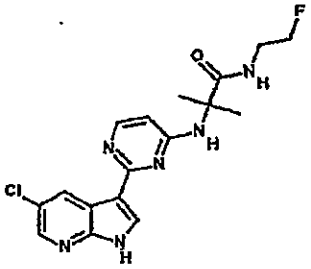
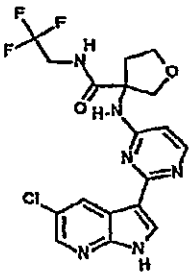
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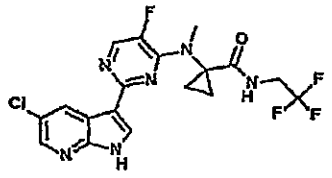
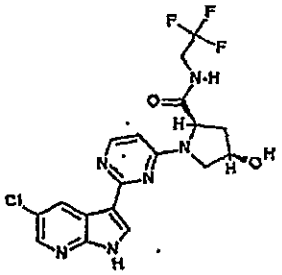
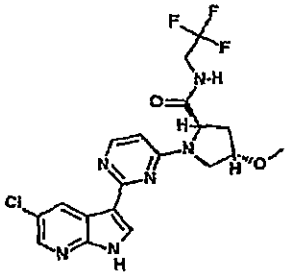
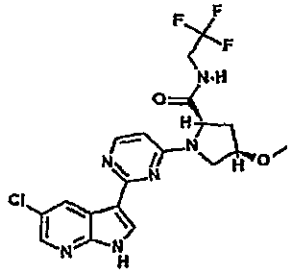
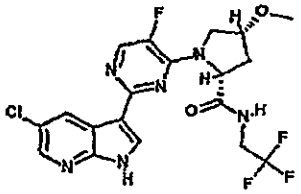
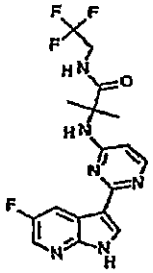
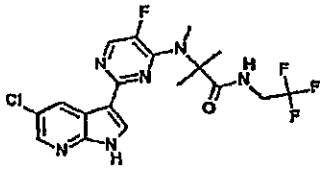
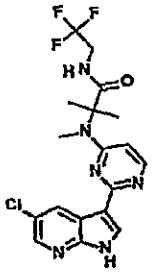
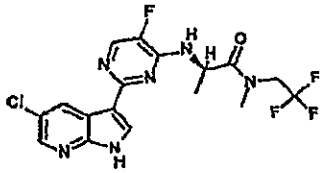
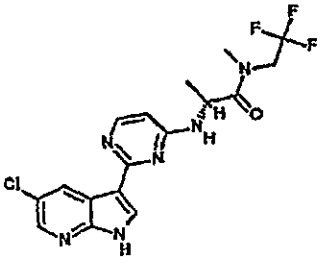
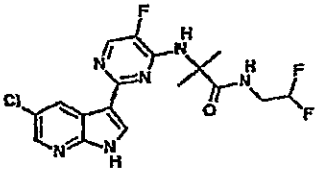
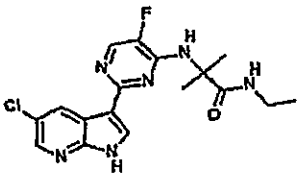
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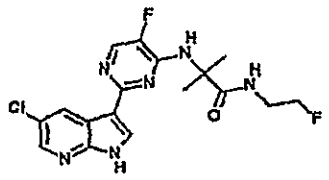
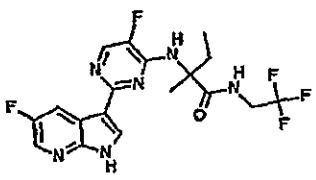
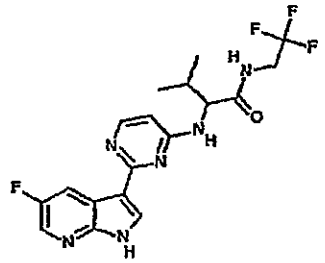
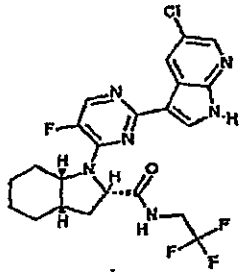
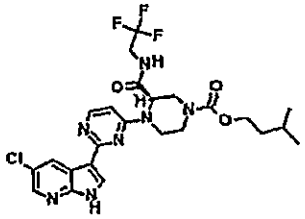
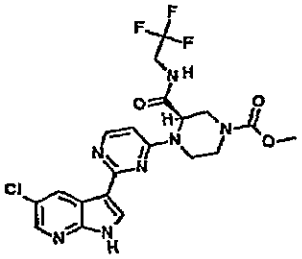
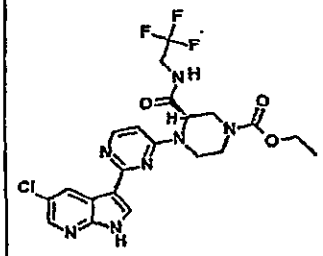
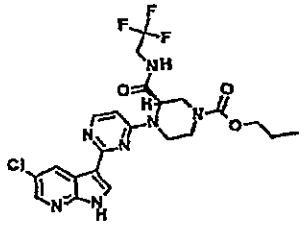
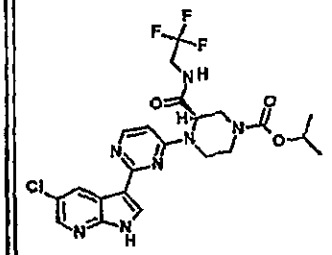
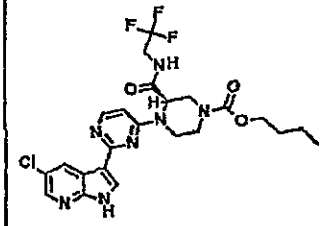
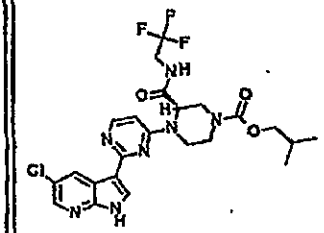
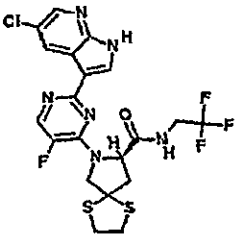
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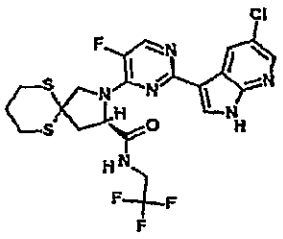
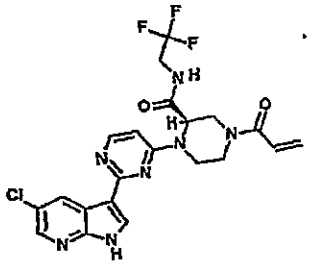
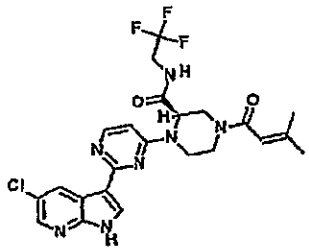
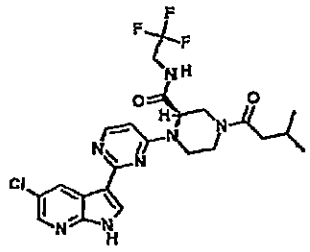
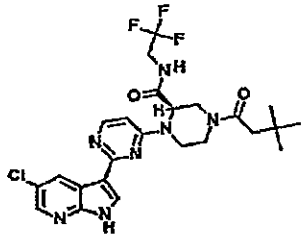
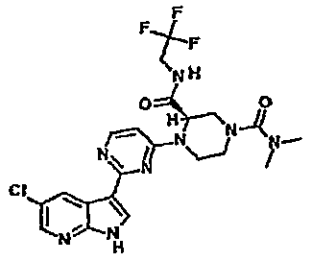
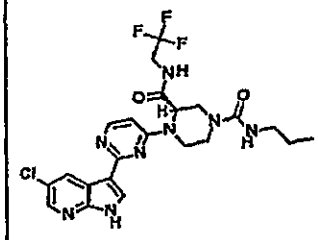
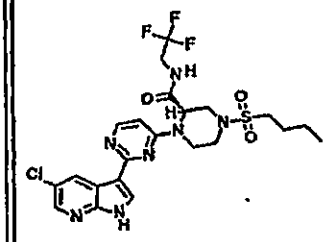
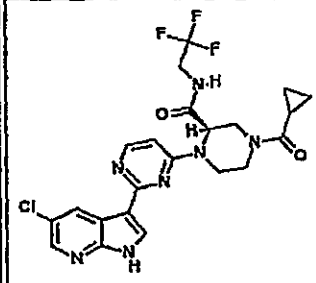
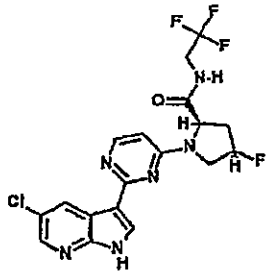
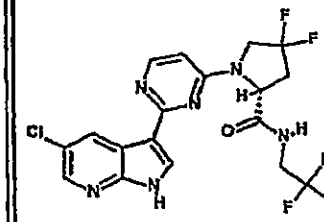
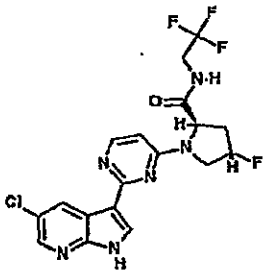
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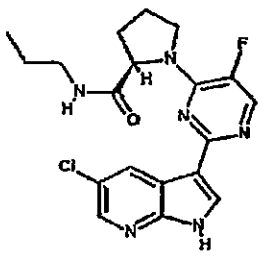
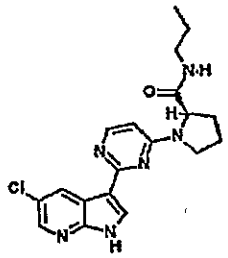
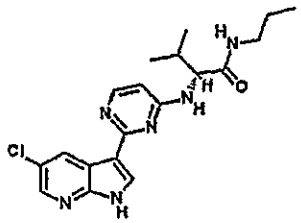
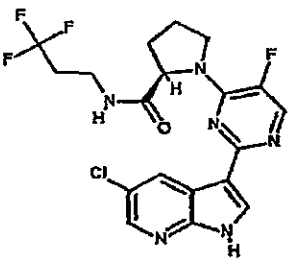
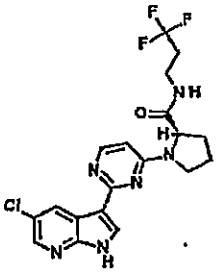
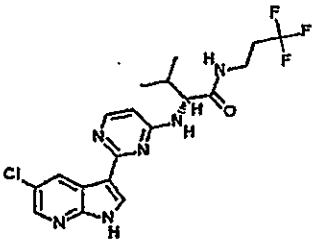
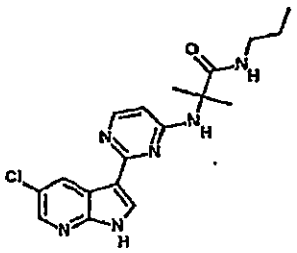
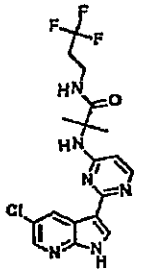
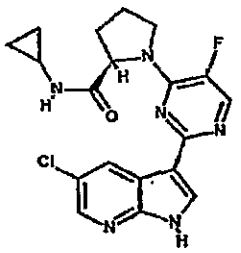
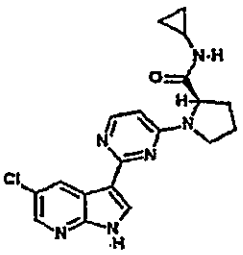
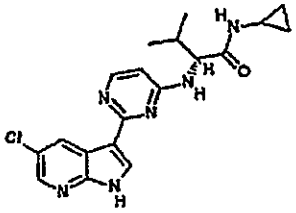
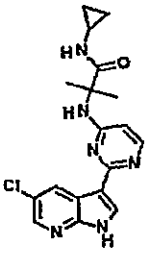
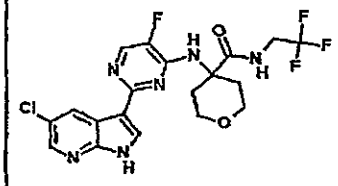
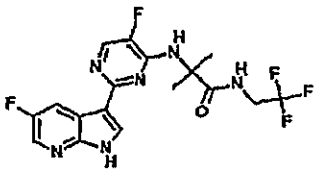
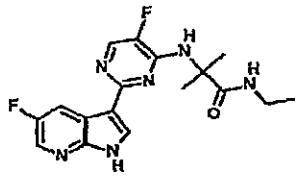
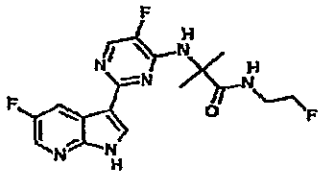
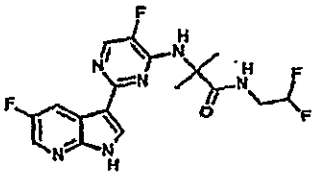
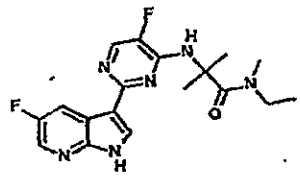
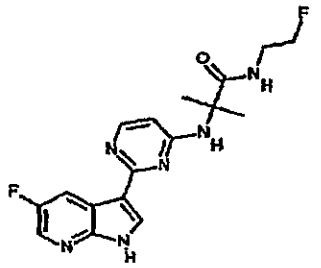
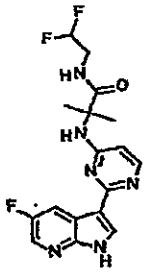
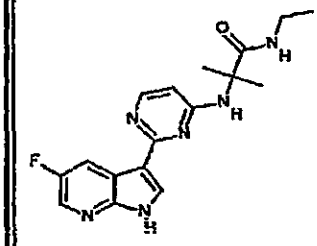
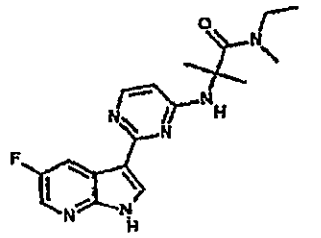
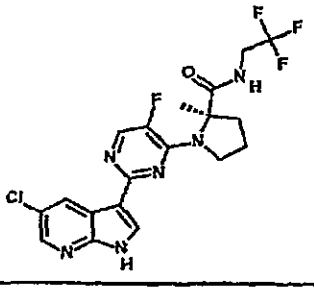
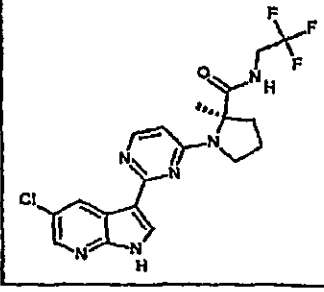
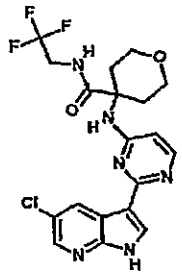
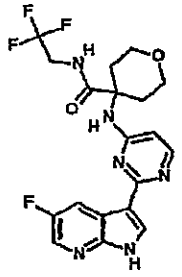
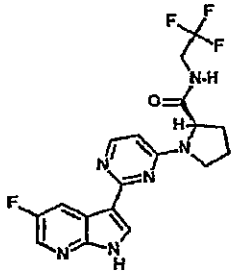
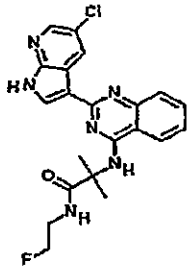
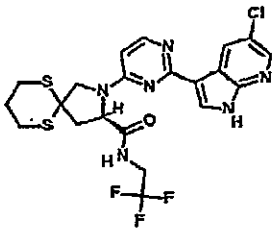
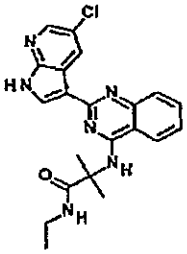
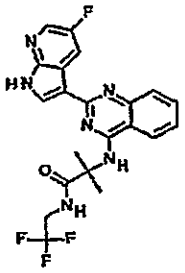
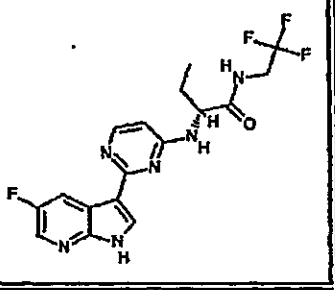
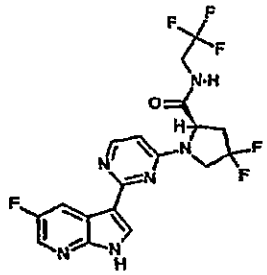
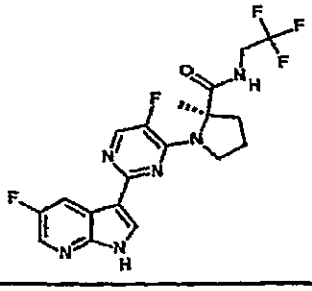
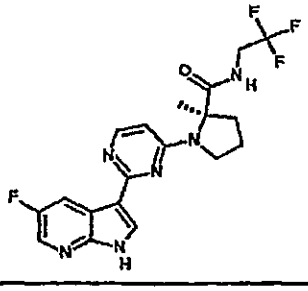
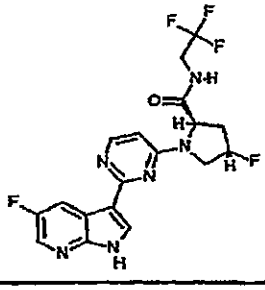
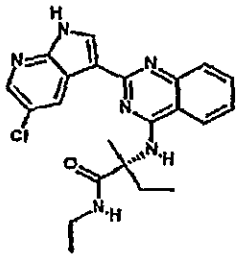
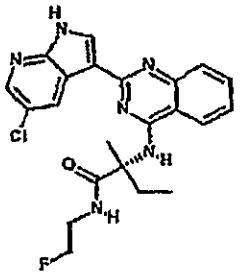
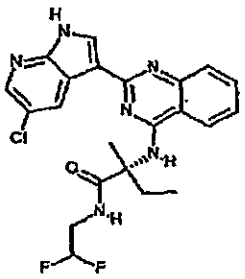
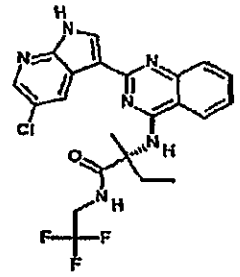
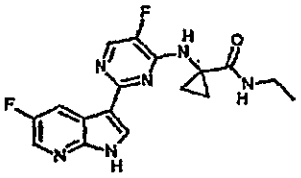
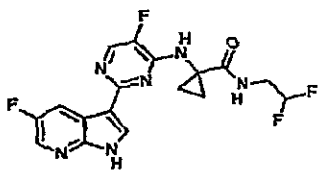
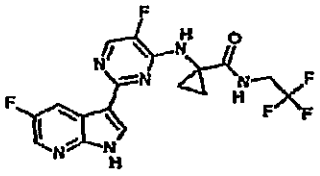
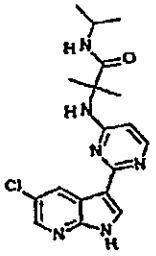
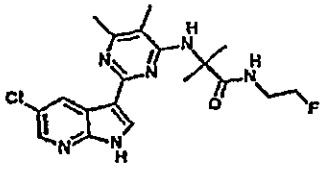
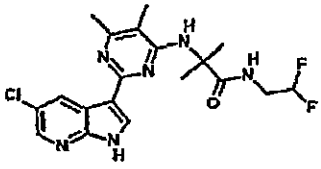
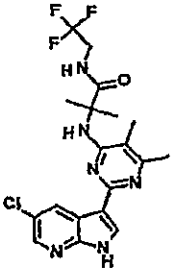
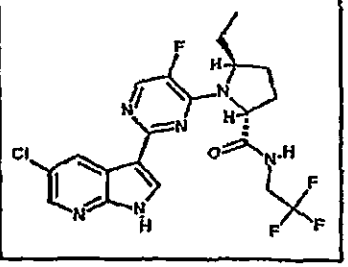
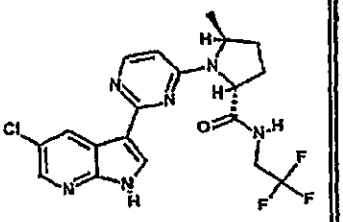
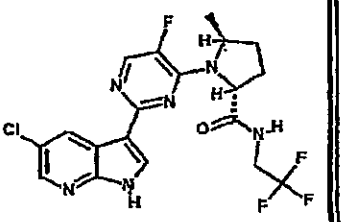
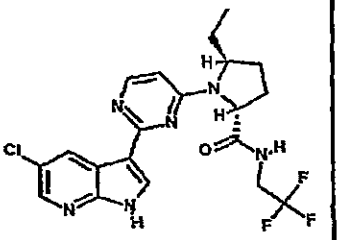
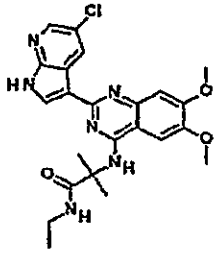
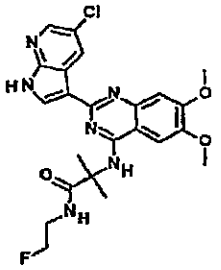
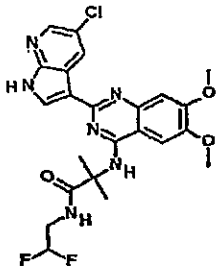
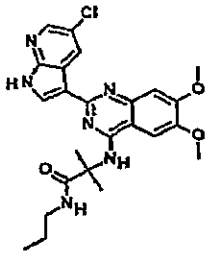
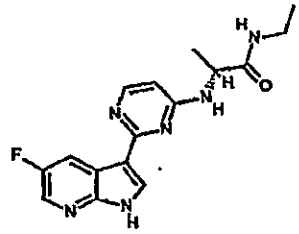
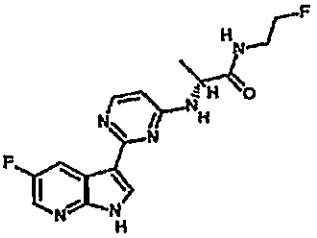
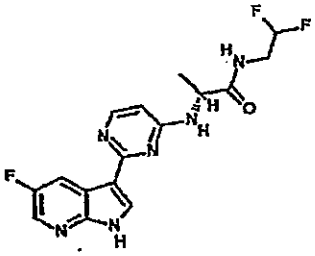
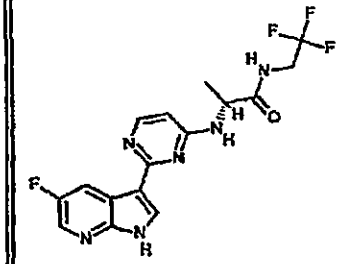
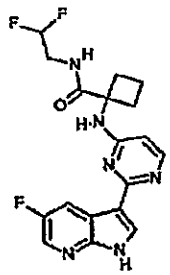
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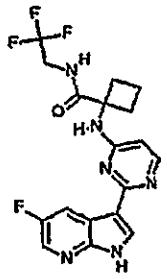
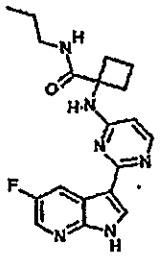
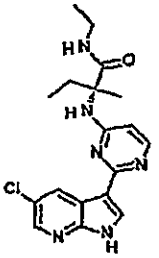
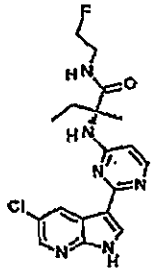
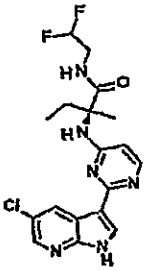
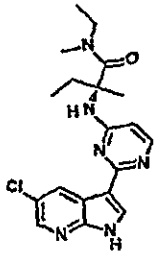
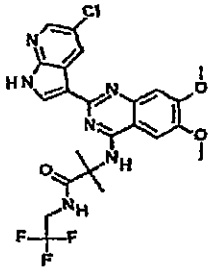
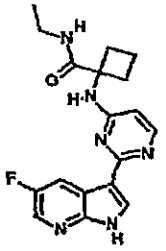
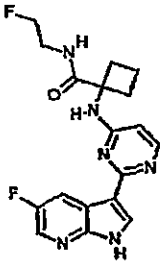
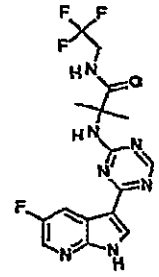
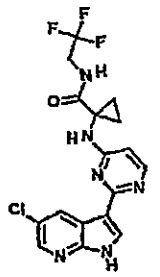
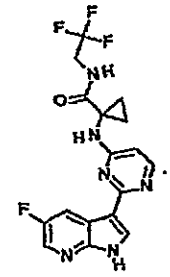
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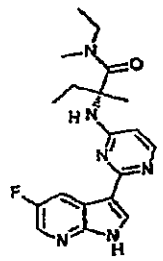
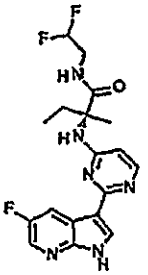
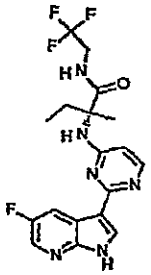
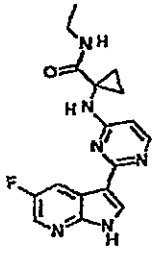
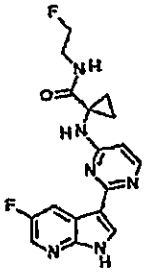
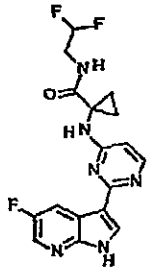
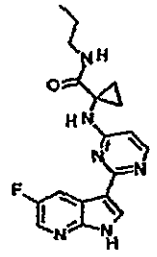
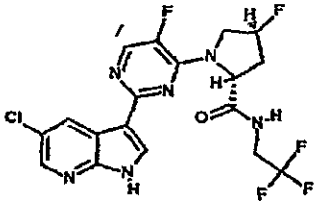
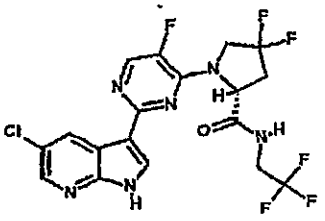
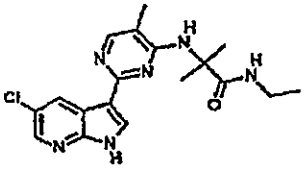
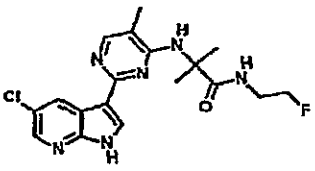
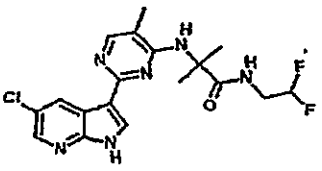
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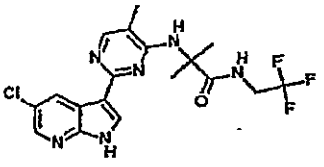
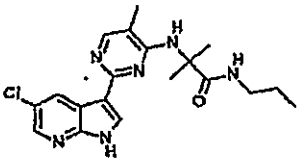
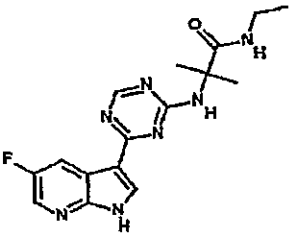
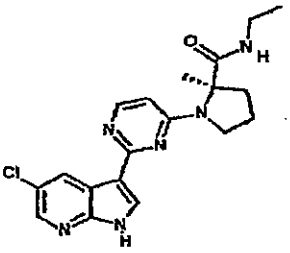
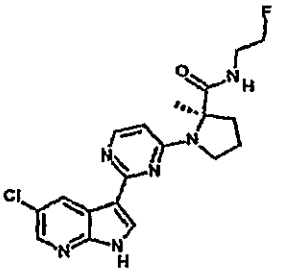
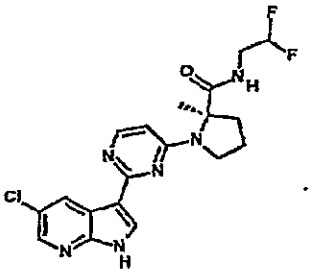
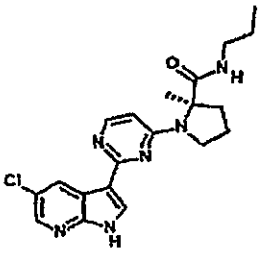
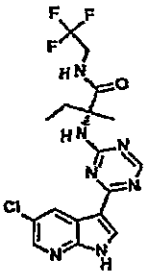
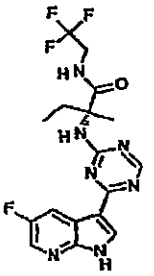
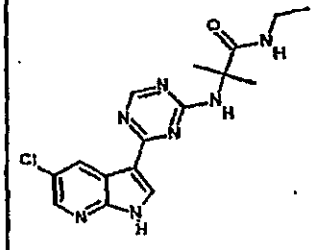
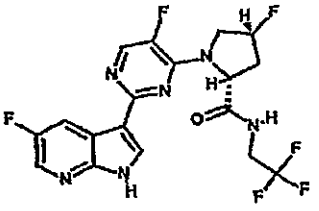
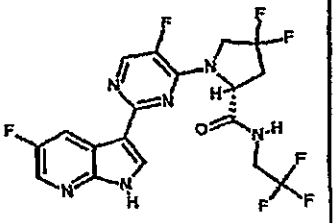
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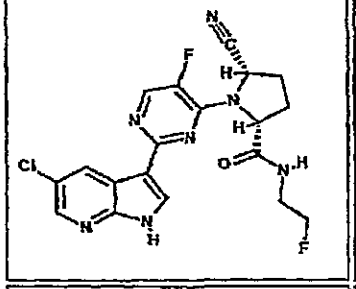
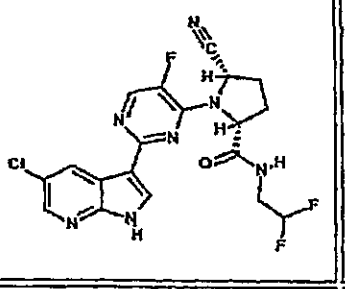
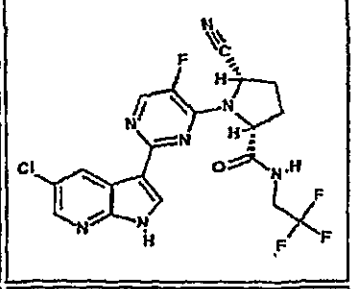
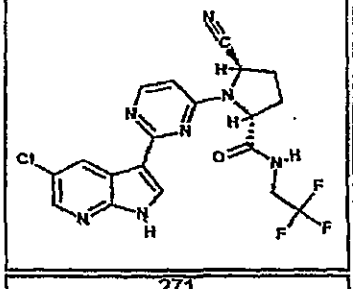
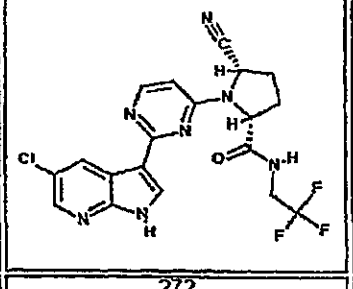
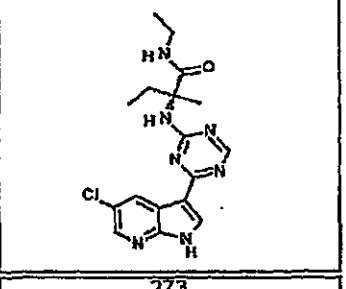
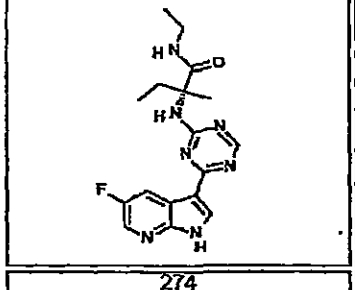
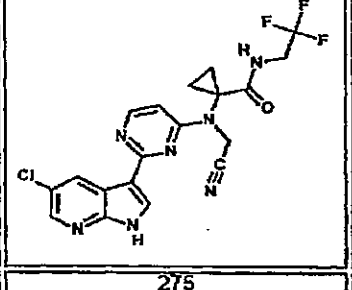
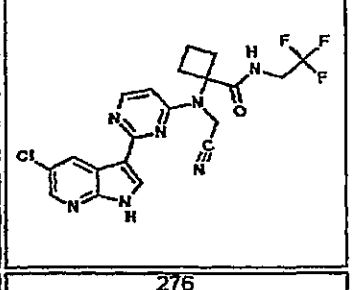
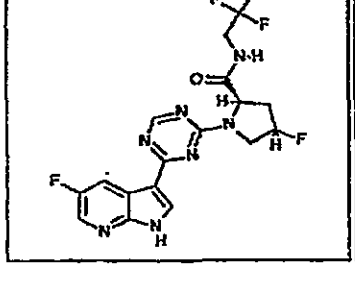
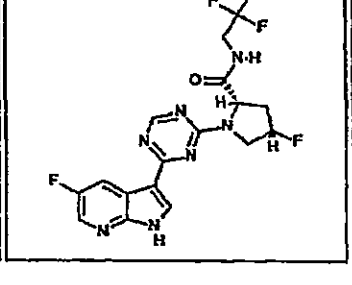
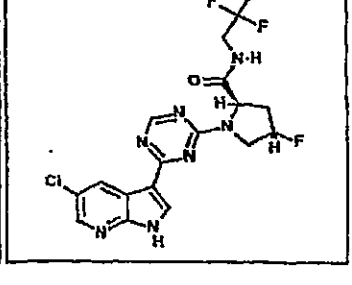
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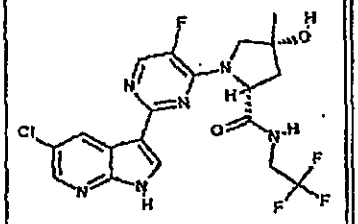
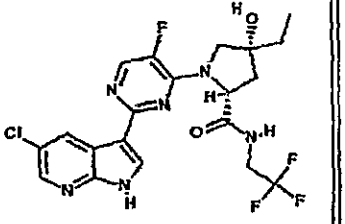
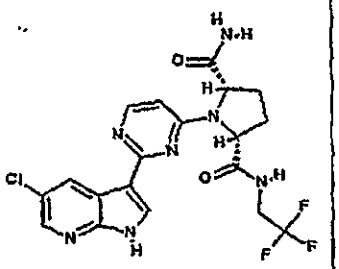
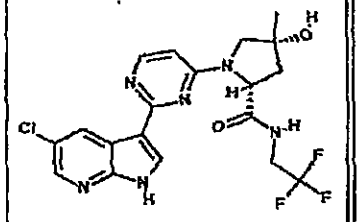
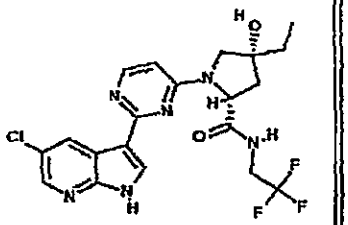
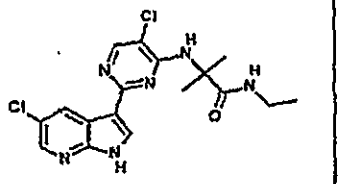
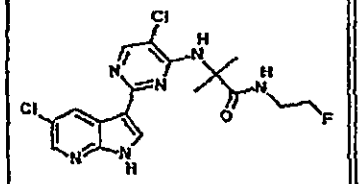
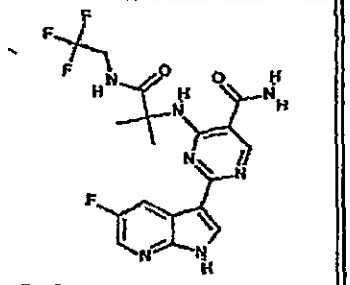
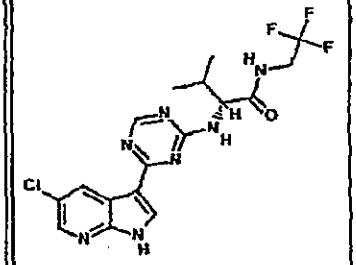
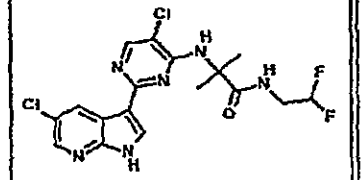
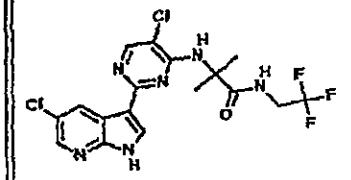
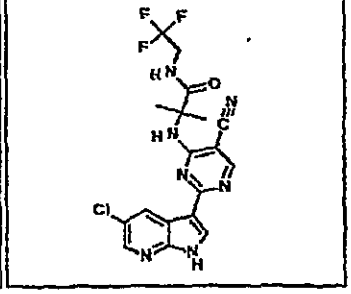
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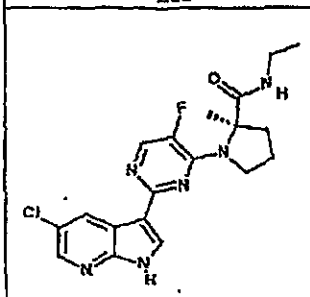
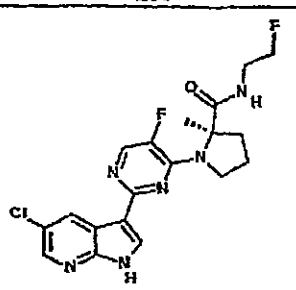
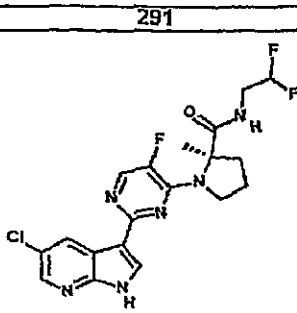
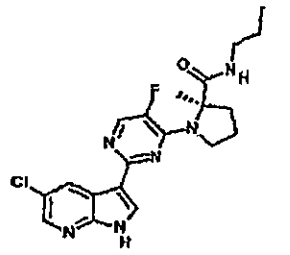
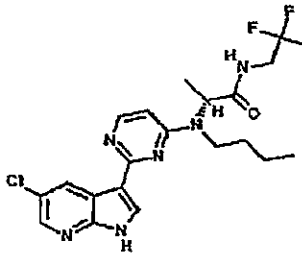
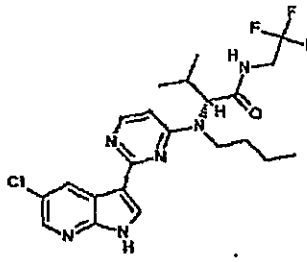
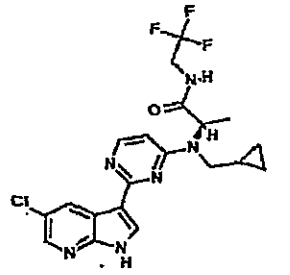
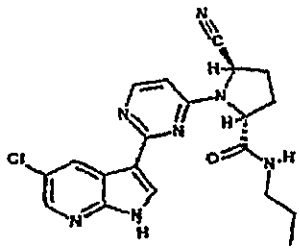
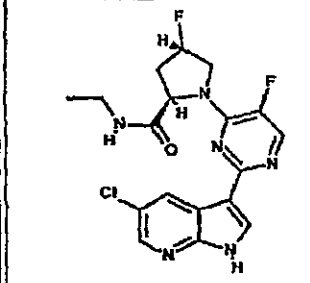
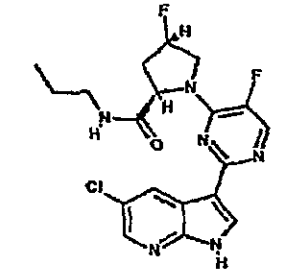
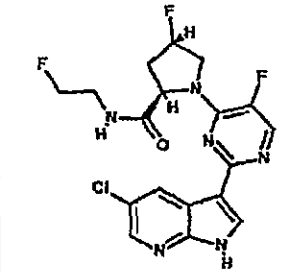
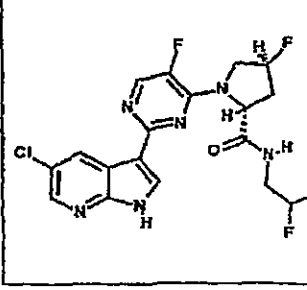
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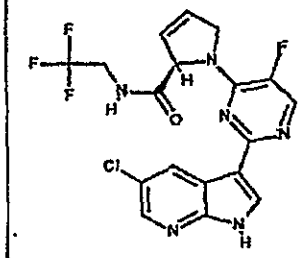
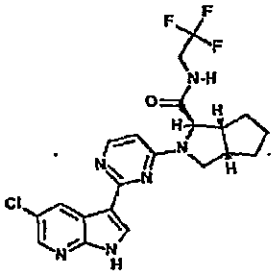
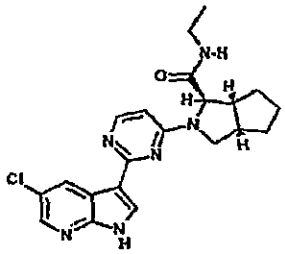
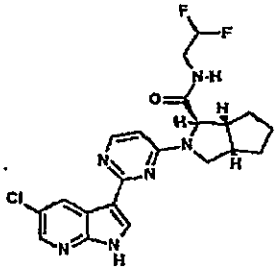
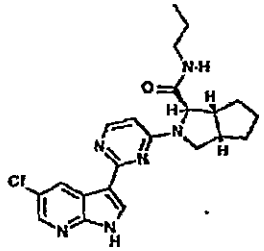
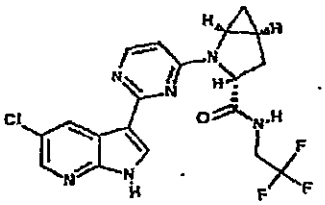
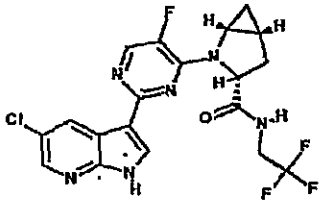
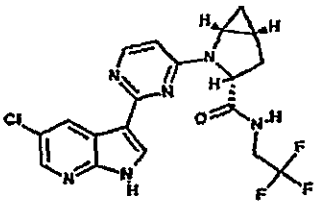
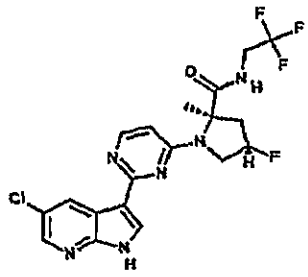
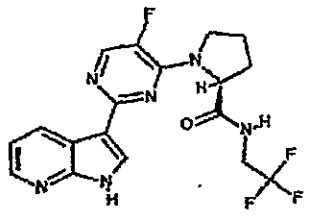
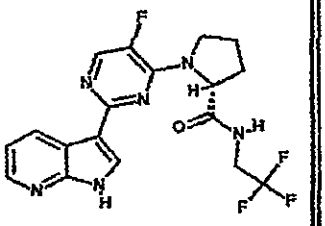
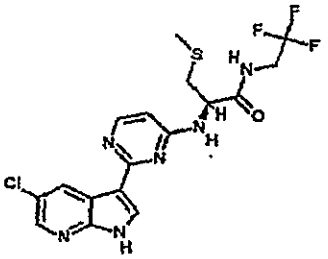
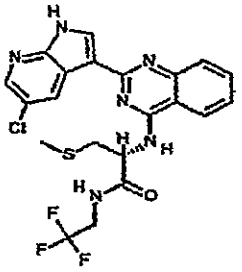
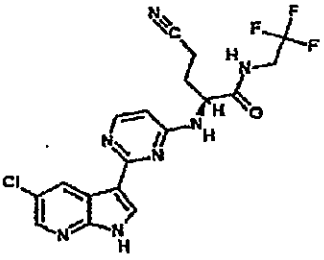
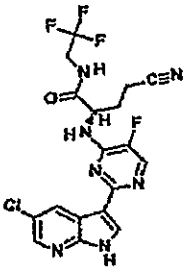
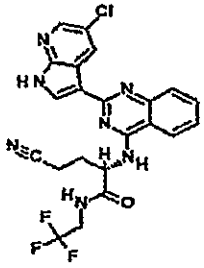
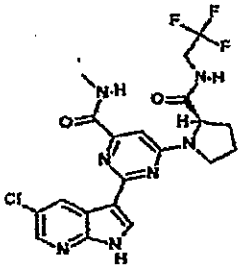
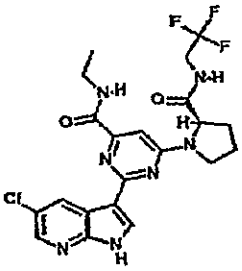
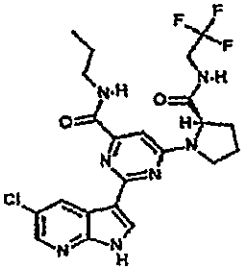
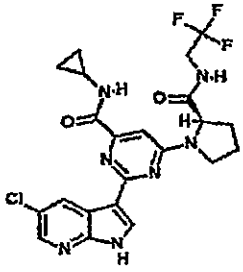
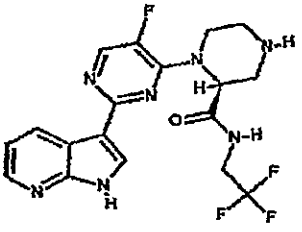
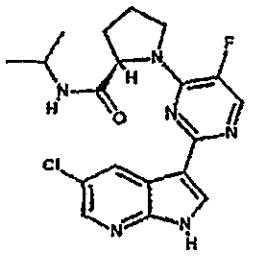
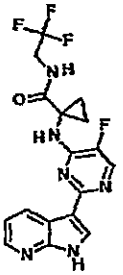
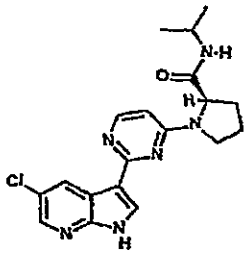
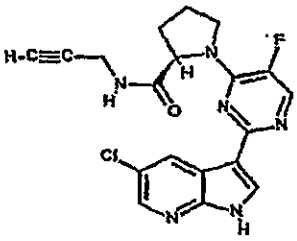
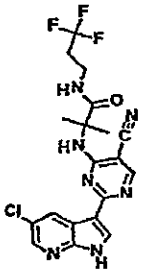
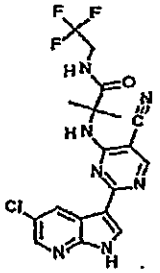
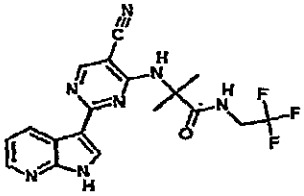
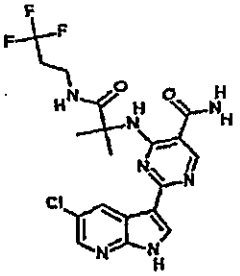
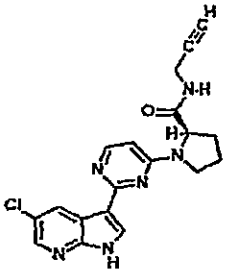
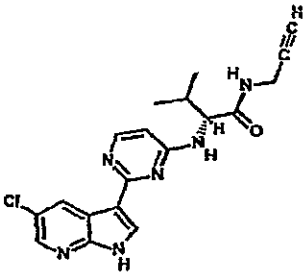
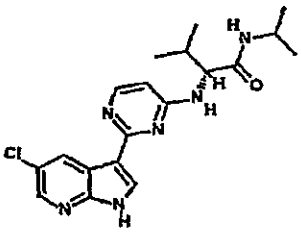
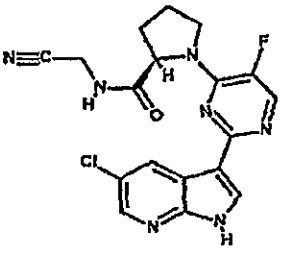
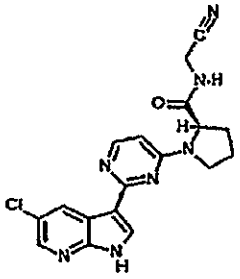
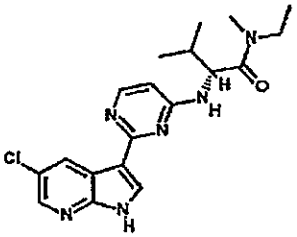
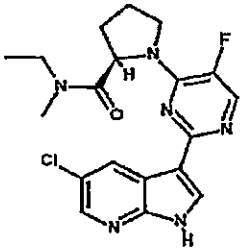
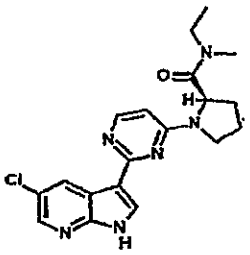
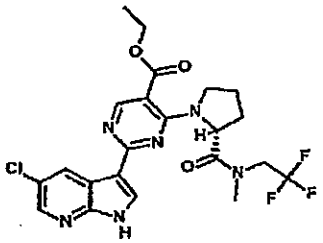
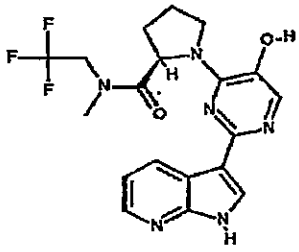
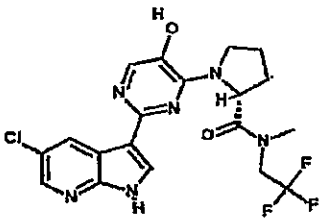
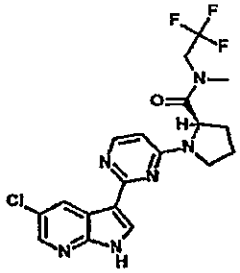
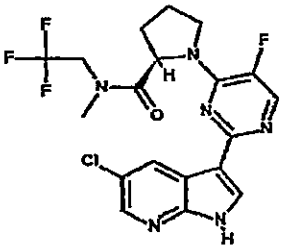
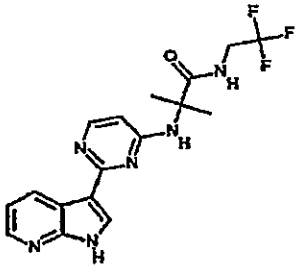
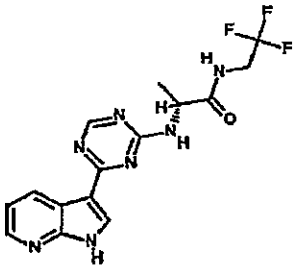
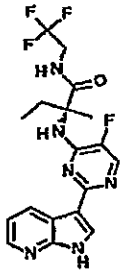
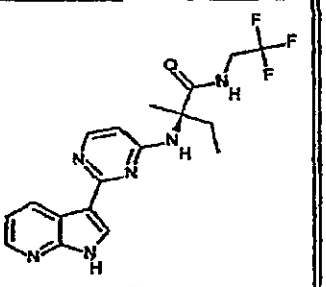
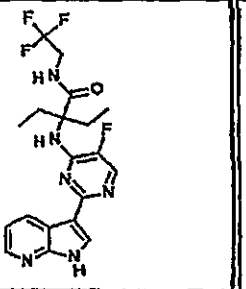
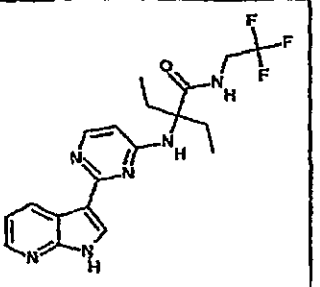
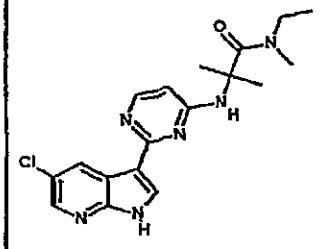
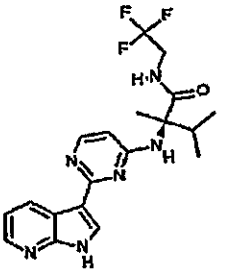
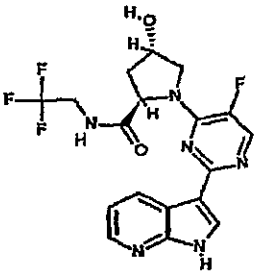
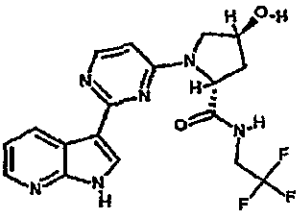
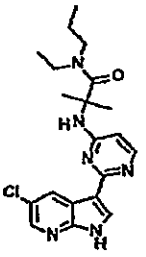
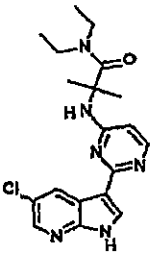
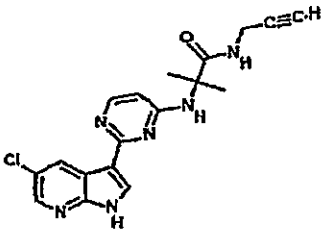
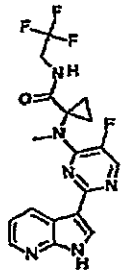
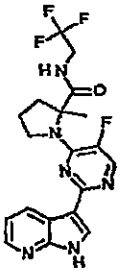
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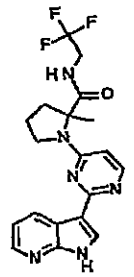
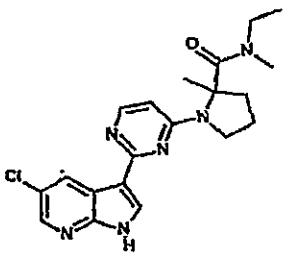
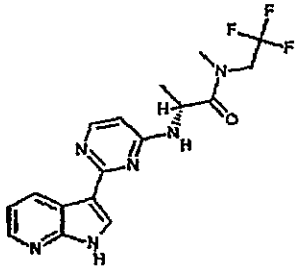
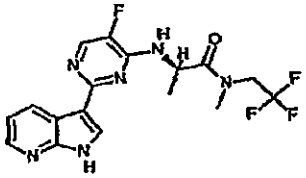
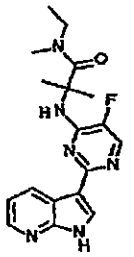
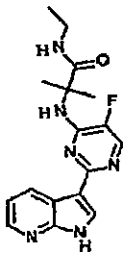
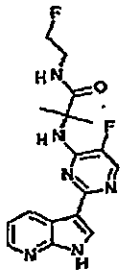
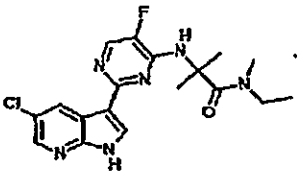
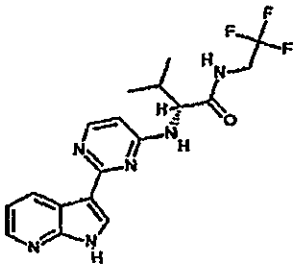
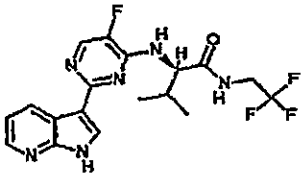
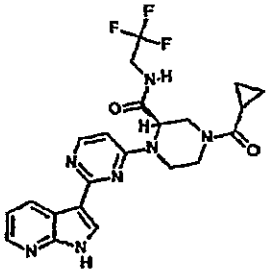
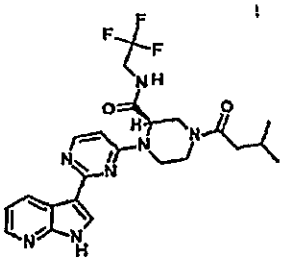
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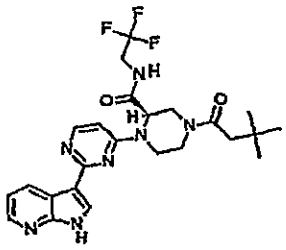
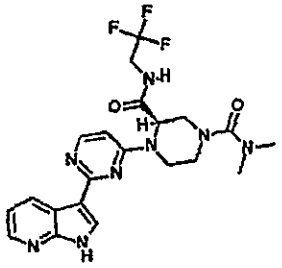
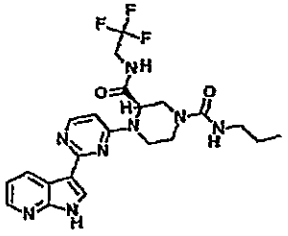
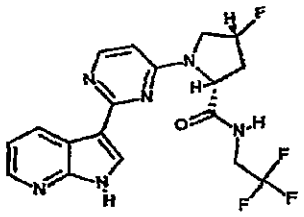
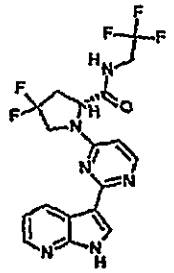
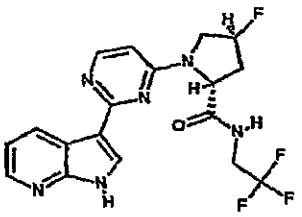
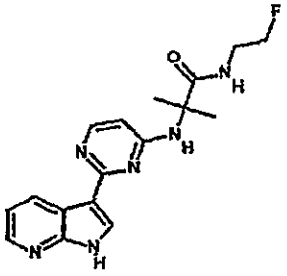
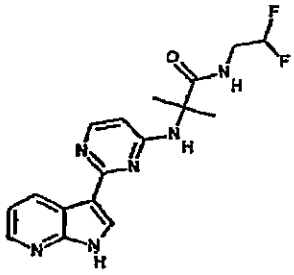
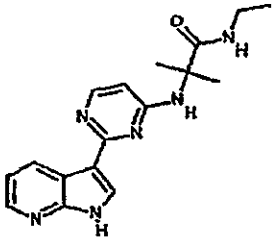
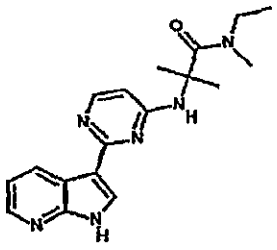
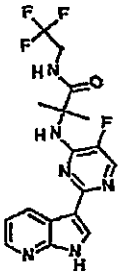
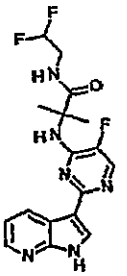
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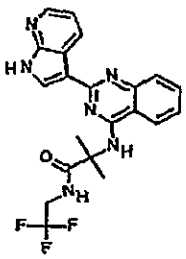
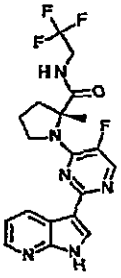
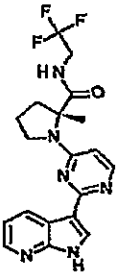
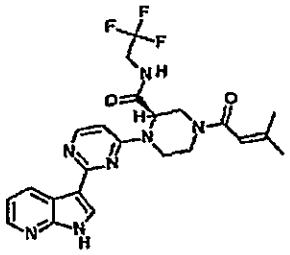
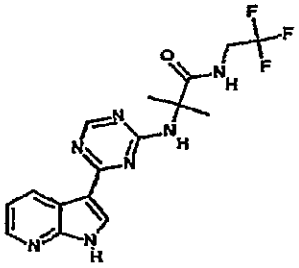
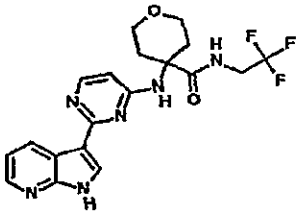
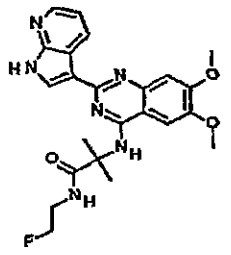
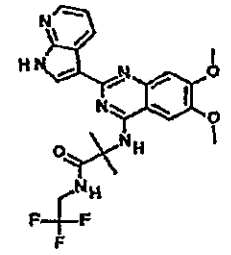
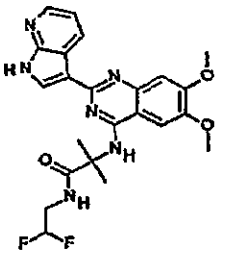
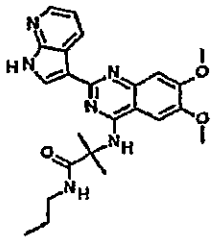
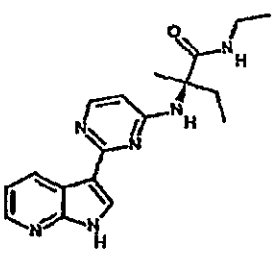
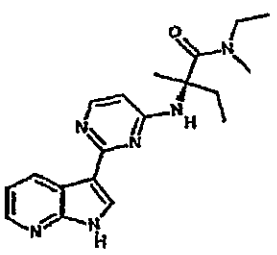
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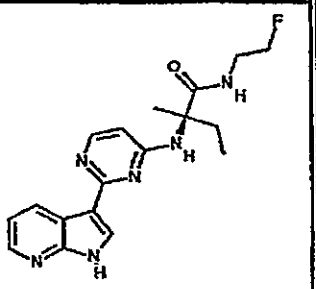
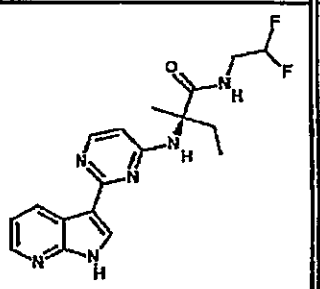
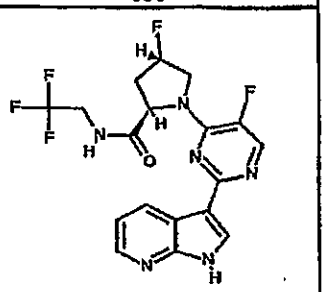
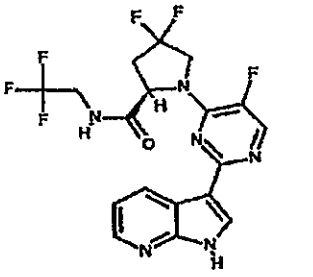
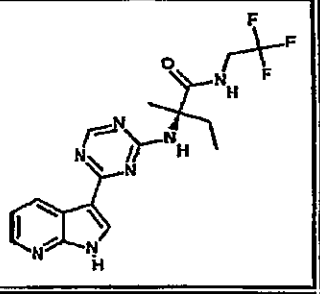
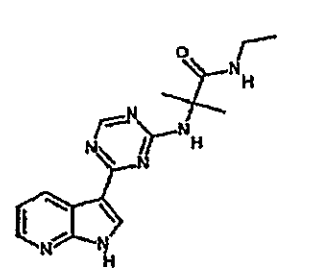
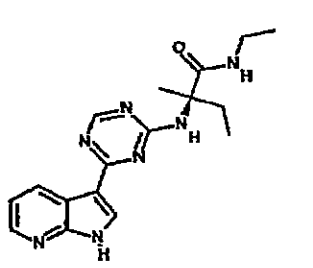
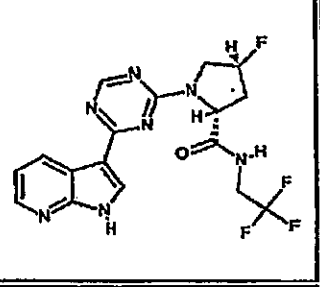
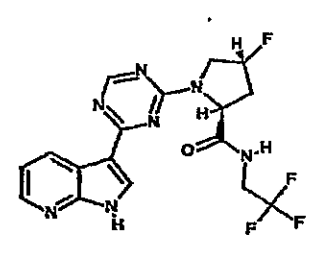
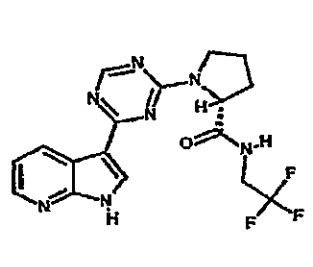
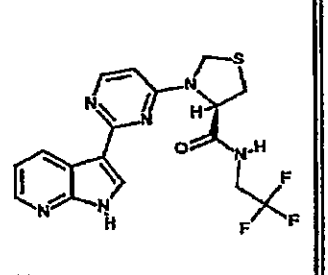
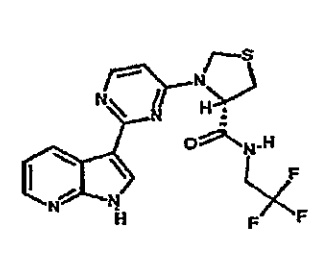
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Uses, Formulation and Administration

Pharmaceutically acceptable compositions

[0159] In another embodiment, the invention provides a pharmaceutical composition comprising a compound of formulae I, IA, IB, II or III.

[0160] In a further embodiment, the composition additionally comprising a therapeutic agent selected from a chemotherapeutic or anti-proliferative agent, an anti-inflammatory agent, an immunomodulatory or immunosuppressive agent, a neurotrophic factor, an agent for treating cardiovascular disease, an agent for treating destructive bone disorders, an agent for treating liver disease, an anti-viral agent, an agent for treating blood disorders, an agent for treating diabetes, or an agent for treating immunodeficiency disorders.

[0161] According to another embodiment, the invention provides a composition comprising a compound of this invention or a pharmaceutically acceptable derivative thereof and a pharmaceutically acceptable carrier, adjuvant, or vehicle. The amount of compound in the compositions of this invention is such that is effective to measurably inhibit a protein kinase, particularly a JAK family kinase, in a biological sample or in a patient. Preferably the composition of this invention is formulated for administration to a patient in need of such composition. Most preferably, the composition of this invention is formulated for oral administration to a patient.

[0162] The term "patient", as used herein, means an animal, preferably a mammal, and most preferably a human.

[0163] Accordingly, in another aspect of the present invention, pharmaceutically acceptable compositions are provided, wherein these compositions comprise any of the compounds as described herein, and optionally comprise a pharmaceutically acceptable carrier, adjuvant or vehicle. In certain embodiments, these compositions optionally further comprise one or more additional therapeutic agents.

[0164] It will also be appreciated that certain of the compounds of present invention can exist in free form for treatment, or where appropriate, as a pharmaceutically acceptable derivative thereof. According to the present invention, a pharmaceutically acceptable derivative includes, but is not limited to, pharmaceutically acceptable prodrugs, salts, esters, salts of such esters, or any other adduct or derivative which upon administration to a patient in need is capable of providing, directly or

indirectly, a compound as otherwise described herein, or a metabolite or residue thereof. As used herein, the term "inhibitorily active metabolite or residue thereof" means that a metabolite or residue thereof is also an inhibitor of a JAK family kinase.

[0165] As used herein, the term "pharmaceutically acceptable salt" refers to those salts which are, within the scope of sound medical judgement, suitable for use in contact with the tissues of humans and lower animals without undue toxicity, irritation, allergic response and the like.

[0166] Pharmaceutically acceptable salts are well known in the art. For example, S. M. Berge *et al.*, describe pharmaceutically acceptable salts in detail in *J. Pharmaceutical Sciences*, 1977, *66*, 1-19, incorporated herein by reference. Pharmaceutically acceptable salts of the compounds of this invention include those derived from suitable inorganic and organic acids and bases. Examples of pharmaceutically acceptable, nontoxic acid addition salts are salts of an amino group formed with inorganic acids such as hydrochloric acid, hydrobromic acid, phosphoric acid, sulfuric acid and perchloric acid or with organic acids such as acetic acid, oxalic acid, maleic acid, tartaric acid, citric acid, succinic acid or malonic acid or by using other methods used in the art such as ion exchange. Other pharmaceutically acceptable salts include adipate, alginate, ascorbate, aspartate, benzenesulfonate, benzoate, bisulfate, borate, butyrate, camphorate, camphorsulfonate, citrate, cyclopentanepropionate, digluconate, dodecylsulfate, ethanesulfonate, formate, fumarate, glucoheptonate, glycerophosphate, gluconate, hemisulfate, heptanoate, hexanoate, hydroiodide, 2-hydroxy-ethanesulfonate, lactobionate, lactate, laurate, lauryl sulfate, malate, maleate, malonate, methanesulfonate, 2-naphthalenesulfonate, nicotinate, nitrate, oleate, oxalate, palmitate, pamoate, pectinate, persulfate, 3-phenylpropionate, phosphate, picrate, pivalate, propionate, stearate, succinate, sulfate, tartrate, thiocyanate, p-toluenesulfonate, undecanoate, valerate salts, and the like. Salts derived from appropriate bases include alkali metal, alkaline earth metal, ammonium and $N^+(C_{1-4}alkyl)_4$ salts. This invention also envisions the quaternization of any basic nitrogen-containing groups of the compounds disclosed herein. Water or oil-soluble or dispersable products may be obtained by such quaternization. Representative alkali or alkaline earth metal salts include sodium, lithium, potassium, calcium, magnesium, and the like. Further pharmaceutically acceptable salts include, when appropriate, nontoxic ammonium,

quaternary ammonium, and amine cations formed using counterions such as halide, hydroxide, carboxylate, sulfate, phosphate, nitrate, loweralkyl sulfonate and aryl sulfonate.

[0167] As described above, the pharmaceutically acceptable compositions of the present invention additionally comprise a pharmaceutically acceptable carrier, adjuvant, or vehicle, which, as used herein, includes any and all solvents, diluents, or other liquid vehicle, dispersion or suspension aids, surface active agents, isotonic agents, thickening or emulsifying agents, preservatives, solid binders, lubricants and the like, as suited to the particular dosage form desired. Remington's Pharmaceutical Sciences, Sixteenth Edition, E. W. Martin (Mack Publishing Co., Easton, Pa., 1980) discloses various carriers used in formulating pharmaceutically acceptable compositions and known techniques for the preparation thereof. Except insofar as any conventional carrier medium is incompatible with the compounds of the invention, such as by producing any undesirable biological effect or otherwise interacting in a deleterious manner with any other component(s) of the pharmaceutically acceptable composition, its use is contemplated to be within the scope of this invention.

[0168] Some examples of materials which can serve as pharmaceutically acceptable carriers include, but are not limited to, ion exchangers, alumina, aluminum stearate, lecithin, serum proteins, such as human serum albumin, buffer substances such as phosphates, glycine, sorbic acid, or 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, polyacrylates, waxes, polyethylene-polyoxypropylene-block polymers, wool fat, sugars such as lactose, glucose and sucrose; starches such as corn starch and potato starch; cellulose and its derivatives such as sodium carboxymethyl cellulose, ethyl cellulose and cellulose acetate; powdered tragacanth; malt; gelatin; talc; excipients such as cocoa butter and suppository waxes; oils such as peanut oil, cottonseed oil; safflower oil; sesame oil; olive oil; corn oil and soybean oil; glycols; such a propylene glycol or polyethylene glycol; esters such as ethyl oleate and ethyl laurate; agar; buffering agents such as magnesium hydroxide and aluminum hydroxide; alginic acid; pyrogen-free water; isotonic saline; Ringer's solution; ethyl alcohol, and phosphate buffer solutions, as well as other non-

toxic compatible lubricants such as sodium lauryl sulfate and magnesium stearate, as well as coloring agents, releasing agents, coating agents, sweetening, flavoring and perfuming agents, preservatives and antioxidants can also be present in the composition, according to the judgment of the formulator.

[0169] The term "measurably inhibit", as used herein means a measurable change in kinase activity, particularly JAK kinase activity, between a sample comprising a compound of this invention and a JAK kinase and an equivalent sample comprising JAK kinase in the absence of said compound.

[0170] The compositions of the present invention may be administered orally, parenterally, by inhalation spray, topically, rectally, nasally, buccally, vaginally or via an implanted reservoir. The term "parenteral" as used herein includes subcutaneous, intravenous, intramuscular, intra-articular, intra-synovial, intrasternal, intrathecal, intraocular, intrahepatic, intralesional and intracranial injection or infusion techniques. Preferably, the compositions are administered orally, intraperitoneally or intravenously. Sterile injectable forms of the compositions of this invention may be aqueous or oleaginous suspension. These suspensions may be formulated according to techniques known in the art using suitable dispersing or wetting agents and suspending agents. The sterile injectable preparation may also be a sterile injectable solution or suspension in a non-toxic parenterally-acceptable diluent or solvent, for example as a solution in 1,3-butanediol. Among the acceptable vehicles and solvents that may be employed are water, Ringer's solution and isotonic sodium chloride solution. In addition, sterile, fixed oils are conventionally employed as a solvent or suspending medium.

[0171] For this purpose, any bland fixed oil may be employed including synthetic mono- or di-glycerides. Fatty acids, such as oleic acid and its glyceride derivatives are useful in the preparation of injectables, as are natural pharmaceutically-acceptable oils, such as olive oil or castor oil, especially in their polyoxyethylated versions. These oil solutions or suspensions may also contain a long-chain alcohol diluent or dispersant, such as carboxymethyl cellulose or similar dispersing agents that are commonly used in the formulation of pharmaceutically acceptable dosage forms including emulsions and suspensions. Other commonly used surfactants, such as Tweens, Spans and other emulsifying agents or bioavailability enhancers which are

commonly used in the manufacture of pharmaceutically acceptable solid, liquid, or other dosage forms may also be used for the purposes of formulation.

[0172] The pharmaceutically acceptable compositions of this invention may be orally administered in any orally acceptable dosage form including, but not limited to, capsules, tablets, aqueous suspensions or solutions. In the case of tablets for oral use, carriers commonly used include lactose and corn starch. Lubricating agents, such as magnesium stearate, are also typically added. For oral administration in a capsule form, useful diluents include lactose and dried cornstarch. When aqueous suspensions are required for oral use, the active ingredient is combined with emulsifying and suspending agents. If desired, certain sweetening, flavoring or coloring agents may also be added.

[0173] Alternatively, the pharmaceutically acceptable compositions of this invention may be administered in the form of suppositories for rectal administration. These can be prepared by mixing the agent with a suitable non-irritating excipient that is solid at room temperature but liquid at rectal temperature and therefore will melt in the rectum to release the drug. Such materials include cocoa butter, beeswax and polyethylene glycols.

[0174] The pharmaceutically acceptable compositions of this invention may also be administered topically, especially when the target of treatment includes areas or organs readily accessible by topical application, including diseases of the eye, the skin, or the lower intestinal tract. Suitable topical formulations are readily prepared for each of these areas or organs.

[0175] Topical application for the lower intestinal tract can be effected in a rectal suppository formulation (see above) or in a suitable enema formulation. Topically-transdermal patches may also be used.

[0176] For topical applications, the pharmaceutically acceptable compositions may be formulated in a suitable ointment containing the active component suspended or dissolved in one or more carriers. Carriers for topical administration of the compounds of this invention include, but are not limited to, mineral oil, liquid petrolatum, white petrolatum, propylene glycol, polyoxyethylene, polyoxypropylene compound, emulsifying wax and water. Alternatively, the pharmaceutically acceptable compositions can be formulated in a suitable lotion or cream containing the active components suspended or dissolved in one or more pharmaceutically acceptable carriers.

Suitable carriers include, but are not limited to, mineral oil, sorbitan monostearate, polysorbate 60, cetyl esters wax, cetearyl alcohol, 2-octyldodecanol, benzyl alcohol and water.

[0177] For ophthalmic use, the pharmaceutically acceptable compositions may be formulated, e.g., as micronized suspensions in isotonic, pH adjusted sterile saline or other aqueous solution, or, preferably, as solutions in isotonic, pH adjusted sterile saline or other aqueous solution, either with or without a preservative such as benzylalkonium chloride. Alternatively, for ophthalmic uses, the pharmaceutically acceptable compositions may be formulated in an ointment such as petrolatum. The pharmaceutically acceptable compositions of this invention may also be administered by nasal aerosol or inhalation. Such compositions are prepared according to techniques well-known in the art of pharmaceutical formulation and may be prepared as solutions in saline, employing benzyl alcohol or other suitable preservatives, absorption promoters to enhance bioavailability, fluorocarbons, and/or other conventional solubilizing or dispersing agents.

[0178] Most preferably, the pharmaceutically acceptable compositions of this invention are formulated for oral administration.

[0179] Liquid dosage forms for oral administration include, but are not limited to, pharmaceutically acceptable emulsions, microemulsions, solutions, suspensions, syrups and elixirs. In addition to the active compounds, the liquid dosage forms may contain inert diluents commonly used in the art such as, for example, water or other solvents, solubilizing agents and emulsifiers such as ethyl alcohol, isopropyl alcohol, ethyl carbonate, ethyl acetate, benzyl alcohol, benzyl benzoate, propylene glycol, 1,3-butylene glycol, dimethylformamide, oils (in particular, cottonseed, groundnut, corn, germ, olive, castor, and sesame oils), glycerol, tetrahydrofurfuryl alcohol, polyethylene glycols and fatty acid esters of sorbitan, and mixtures thereof. Besides inert diluents, the oral compositions can also include adjuvants such as wetting agents, emulsifying and suspending agents, sweetening, flavoring, and perfuming agents.

[0180] Injectable preparations, for example, sterile injectable aqueous or oleaginous suspensions may be formulated according to the known art using suitable dispersing or wetting agents and suspending agents. The sterile injectable preparation may also be a sterile injectable solution, suspension or emulsion in a nontoxic

parenterally acceptable diluent or solvent, for example, as a solution in 1,3-butanediol. Among the acceptable vehicles and solvents that may be employed are water, Ringer's solution, U.S.P. and isotonic sodium chloride solution. In addition, sterile, fixed oils are conventionally employed as a solvent or suspending medium. For this purpose any bland fixed oil can be employed including synthetic mono- or diglycerides. In addition, fatty acids such as oleic acid are used in the preparation of injectables.

[0181] The injectable formulations can be sterilized, for example, by filtration through a bacterial-retaining filter, or by incorporating sterilizing agents in the form of sterile solid compositions which can be dissolved or dispersed in sterile water or other sterile injectable medium prior to use.

[0182] In order to prolong the effect of a compound of the present invention, it is often desirable to slow the absorption of the compound from subcutaneous or intramuscular injection. This may be accomplished by the use of a liquid suspension of crystalline or amorphous material with poor water solubility. The rate of absorption of the compound then depends upon its rate of dissolution that, in turn, may depend upon crystal size and crystalline form. Alternatively, delayed absorption of a parenterally administered compound form is accomplished by dissolving or suspending the compound in an oil vehicle. Injectable depot forms are made by forming microencapsule matrices of the compound in biodegradable polymers such as polylactide-polyglycolide. Depending upon the ratio of compound to polymer and the nature of the particular polymer employed, the rate of compound release can be controlled. Examples of other biodegradable polymers include poly(orthoesters) and poly(anhydrides). Depot injectable formulations are also prepared by entrapping the compound in liposomes or microemulsions that are compatible with body tissues.

[0183] Compositions for rectal or vaginal administration are preferably suppositories which can be prepared by mixing the compounds of this invention with suitable non-irritating excipients or carriers such as cocoa butter, polyethylene glycol or a suppository wax which are solid at ambient temperature but liquid at body temperature and therefore melt in the rectum or vaginal cavity and release the active compound.

[0184] Solid dosage forms for oral administration include capsules, tablets, pills, powders, and granules. In such solid dosage forms, the active compound is mixed with at least one inert, pharmaceutically acceptable excipient or carrier such as sodium

citrate or dicalcium phosphate and/or a) fillers or extenders such as starches, lactose, sucrose, glucose, mannitol, and silicic acid, b) binders such as, for example, carboxymethylcellulose, alginates, gelatin, polyvinylpyrrolidinone, sucrose, and acacia, c) humectants such as glycerol, d) disintegrating agents such as agar--agar, calcium carbonate, potato or tapioca starch, alginic acid, certain silicates, and sodium carbonate, e) solution retarding agents such as paraffin, f) absorption accelerators such as quaternary ammonium compounds, g) wetting agents such as, for example, cetyl alcohol and glycerol monostearate, h) absorbents such as kaolin and bentonite clay, and i) lubricants such as talc, calcium stearate, magnesium stearate, solid polyethylene glycols, sodium lauryl sulfate, and mixtures thereof. In the case of capsules, tablets and pills, the dosage form may also comprise buffering agents.

[0185] Solid compositions of a similar type may also be employed as fillers in soft and hard-filled gelatin capsules using such excipients as lactose or milk sugar as well as high molecular weight polyethylene glycols and the like. The solid dosage forms of tablets, dragees, capsules, pills, and granules can be prepared with coatings and shells such as enteric coatings and other coatings well known in the pharmaceutical formulating art. They may optionally contain opacifying agents and can also be of a composition that they release the active ingredient(s) only, or preferentially, in a certain part of the intestinal tract, optionally, in a delayed manner. Examples of embedding compositions that can be used include polymeric substances and waxes. Solid compositions of a similar type may also be employed as fillers in soft and hard-filled gelatin capsules using such excipients as lactose or milk sugar as well as high molecular weight polethylene glycols and the like.

[0186] The active compounds can also be in micro-encapsulated form with one or more excipients as noted above. The solid dosage forms of tablets, dragees, capsules, pills, and granules can be prepared with coatings and shells such as enteric coatings, release controlling coatings and other coatings well known in the pharmaceutical formulating art. In such solid dosage forms the active compound may be admixed with at least one inert diluent such as sucrose, lactose or starch. Such dosage forms may also comprise, as is normal practice, additional substances other than inert diluents, e.g., tableting lubricants and other tableting aids such a magnesium stearate and microcrystalline cellulose. In the case of capsules, tablets and pills, the dosage forms

may also comprise buffering agents. They may optionally contain opacifying agents and can also be of a composition that they release the active ingredient(s) only, or preferentially, in a certain part of the intestinal tract, optionally, in a delayed manner. Examples of embedding compositions that can be used include polymeric substances and waxes.

[0187] Dosage forms for topical or transdermal administration of a compound of this invention include ointments, pastes, creams, lotions, gels, powders, solutions, sprays, inhalants or patches. The active component is admixed under sterile conditions with a pharmaceutically acceptable carrier and any needed preservatives or buffers as may be required. Ophthalmic formulation, ear drops, and eye drops are also contemplated as being within the scope of this invention. Additionally, the present invention contemplates the use of transdermal patches, which have the added advantage of providing controlled delivery of a compound to the body. Such dosage forms can be made by dissolving or dispensing the compound in the proper medium. Absorption enhancers can also be used to increase the flux of the compound across the skin. The rate can be controlled by either providing a rate controlling membrane or by dispersing the compound in a polymer matrix or gel.

[0188] The compounds of the invention are preferably formulated in dosage unit form for ease of administration and uniformity of dosage. The expression "dosage unit form" as used herein refers to a physically discrete unit of agent appropriate for the patient to be treated. It will be understood, however, that the total daily usage of the compounds and compositions of the present invention will be decided by the attending physician within the scope of sound medical judgment. The specific effective dose level for any particular patient or organism will depend upon a variety of factors including the disorder being treated and the severity of the disorder; the activity of the specific compound employed; the specific composition employed; the age, body weight, general health, sex and diet of the patient; the time of administration, route of administration, and rate of excretion of the specific compound employed; the duration of the treatment; drugs used in combination or coincidental with the specific compound employed, and like factors well known in the medical arts.

[0189] The amount of the compounds of the present invention that may be combined with the carrier materials to produce a composition in a single dosage form

will vary depending upon the host treated, the particular mode of administration. Preferably, the compositions should be formulated so that a dosage of between 0.01 - 100 mg/kg body weight/day of the inhibitor can be administered to a patient receiving these compositions.

[0190] Depending upon the particular condition, or disease, to be treated or prevented, additional therapeutic agents, which are normally administered to treat or prevent that condition, may also be present in the compositions of this invention. As used herein, additional therapeutic agents that are normally administered to treat or prevent a particular disease, or condition, are known as "appropriate for the disease, or condition, being treated".

[0191] For example, chemotherapeutic agents or other anti-proliferative agents may be combined with the compounds of this invention to treat proliferative diseases and cancer. Examples of known chemotherapeutic agents include, but are not limited to, Gleevec™, adriamycin, dexamethasone, vincristine, cyclophosphamide, fluorouracil, topotecan, taxol, interferons, and platinum derivatives.

[0192] Other examples of agents the inhibitors of this invention may also be combined with include, without limitation: treatments for Alzheimer's Disease such as Aricept® and Excelon®; treatments for Parkinson's Disease such as L-DOPA/carbidopa, entacapone, ropinrole, pramipexole, bromocriptine, pergolide, trihexephendyl, and amantadine; agents for treating Multiple Sclerosis (MS) such as beta interferon (e.g., Avonex® and Rebif®), Copaxone®, and mitoxantrone; treatments for asthma such as albuterol and Singulair®; agents for treating schizophrenia such as zyprexa, risperdal, seroquel, and haloperidol; anti-inflammatory agents such as corticosteroids, TNF blockers, IL-1 RA, azathioprine, cyclophosphamide, and sulfasalazine; immunomodulatory and immunosuppressive agents such as cyclosporin, tacrolimus, rapamycin, mycophenolate mofetil, interferons, corticosteroids, cyclophophamide, azathioprine, and sulfasalazine; neurotrophic factors such as acetylcholinesterase inhibitors, MAO inhibitors, interferons, anti-convulsants, ion channel blockers, riluzole, and anti-Parkinsonian agents; agents for treating cardiovascular disease such as beta-blockers, ACE inhibitors, diuretics, nitrates, calcium channel blockers, and statins; agents for treating liver disease such as corticosteroids, cholestyramine, interferons, and anti-viral agents; agents for treating blood disorders such as corticosteroids, anti-

leukemic agents, and growth factors; and agents for treating immunodeficiency disorders such as gamma globulin.

[0193] The amount of additional therapeutic agent present in the compositions of this invention will be no more than the amount that would normally be administered in a composition comprising that therapeutic agent as the only active agent. Preferably the amount of additional therapeutic agent in the presently disclosed compositions will range from about 50% to 100% of the amount normally present in a composition comprising that agent as the only therapeutically active agent.

Uses of the Compounds and Compositions

[0194] In one embodiment, the invention provides a method of inhibiting JAK kinase activity in a patient, comprising administering to said patient a compound or composition of the invention.

[0195] In another embodiment, the invention comprises a method of treating or lessening the severity of a JAK-mediated condition or disease in a patient. The term "JAK-mediated disease", as used herein means any disease or other deleterious condition in which a JAK family kinase, in particular JAK2 or JAK3, is known to play a role. In a further embodiment, the invention comprises a method of treating a JAK3-mediated disease. Such conditions include, without limitation, immune responses such as allergic or type I hypersensitivity reactions, asthma, autoimmune diseases such as transplant rejection, graft versus host disease, rheumatoid arthritis, amyotrophic lateral sclerosis, and multiple sclerosis, neurodegenerative disorders such as familial amyotrophic lateral sclerosis (FALS), as well as in solid and hematologic malignancies such as leukemias and lymphomas.

[0196] In another embodiment, the invention provides a method of treating or lessening the severity of a disease of condition selected from a proliferative disorder, a cardiac disorder, a neurodegenerative disorder, an autoimmune disorder, a condition associated with organ transplant, an inflammatory disorder, an immune disorder or an immunologically mediated disorder, comprising administering to said patient a compound or composition of the invention.

[0197] In a further embodiment, the method comprises the additional step of administering to said patient an additional therapeutic agent selected from a chemotherapeutic or anti-proliferative agent, an anti-inflammatory agent, an

immunomodulatory or immunosuppressive agent, a neurotrophic factor, an agent for treating cardiovascular disease, an agent for treating diabetes, or an agent for treating immunodeficiency disorders, wherein said additional therapeutic agent is appropriate for the disease being treated and said additional therapeutic agent is administered together with said composition as a single dosage form or separately from said composition as part of a multiple dosage form.

[0198] In one embodiment, the disease or disorder is allergic or type I hypersensitivity reactions, asthma, diabetes, Alzheimer's disease, Huntington's disease, Parkinson's disease, AIDS-associated dementia, amyotrophic lateral sclerosis (ALS, Lou Gehrig's disease), multiple sclerosis (MS), schizophrenia, cardiomyocyte hypertrophy, reperfusion/ischemia, stroke, baldness, transplant rejection, graft versus host disease, rheumatoid arthritis, amyotrophic lateral sclerosis, and multiple sclerosis, and solid and hematologic malignancies such as leukemias and lymphomas. In a further embodiment, said disease or disorder is asthma. In another embodiment, said disease or disorder is transplant rejection. In another embodiment, said disease or disorder is rheumatoid arthritis.

[0199] In another embodiment, a compound or composition of this invention may be used to treat a myeloproliferative disorder. In one embodiment, the myeloproliferative disorder is polycythemia vera, essential thrombocythemia, or chronic idiopathic myelofibrosis. In another embodiment, the myeloproliferative disorder is myeloid metaplasia with myelofibrosis, chronic myeloid leukemia (CML), chronic myelomonocytic leukemia, chronic eosinophilic leukemia, hypereosinophilic syndrome, systematic mast cell disease, atypical CML or juvenile myelomonocytic leukemia.

[0200] In another embodiment, the invention provides for the use of a compound of formulae I, IA, IB, II or III to treat a JAK-mediated disease. In a further embodiment, the invention provides for the use of said compound to treat any of the diseases discussed above. In another embodiment, the invention provides for the use of a compound of formulae I, IA, IB, II or III for the manufacture of a medicament for treating a JAK-mediated disease. In a further embodiment, the invention provides for the use of said compound for the manufacture of a medicament for treating any of the diseases discussed above.

[0201] In another embodiment, the invention provides a method of inhibiting JAK kinase activity in a biological sample, comprising contacting said biological sample with a compound or composition of the invention.

[0202] The term "biological sample", as used herein, means an *ex vivo* sample, and includes, without limitation, cell cultures or extracts thereof; tissue or organ samples or extracts thereof; biopsied material obtained from a mammal or extracts thereof; and blood, saliva, urine, feces, semen, tears, or other body fluids or extracts thereof.

[0203] Inhibition of kinase activity, particularly JAK kinase activity, in a biological sample is useful for a variety of purposes that are known to one of skill in the art. Examples of such purposes include, but are not limited to, blood transfusion, organ-transplantation, biological specimen storage, and biological assays.

[0204] In certain embodiments of the present invention an "effective amount" of the compound or pharmaceutically acceptable composition is that amount effective for treating or lessening the severity of one or more of the aforementioned disorders. The compounds and compositions, according to the method of the present invention, may be administered using any amount and any route of administration effective for treating or lessening the severity of the disorder or disease. The exact amount required will vary from subject to subject, depending on the species, age, and general condition of the subject, the severity of the infection, the particular agent, its mode of administration, and the like.

[0205] In an alternate embodiment, the methods of this invention comprise the additional step of separately administering to said patient an additional therapeutic agent. When these additional therapeutic agents are administered separately they may be administered to the patient prior to, sequentially with or following administration of the compositions of this invention.

[0206] The compounds of this invention or pharmaceutical compositions thereof may also be used for coating an implantable medical device, such as prostheses, artificial valves, vascular grafts, stents and catheters. Vascular stents, for example, have been used to overcome restenosis (re-narrowing of the vessel wall after injury). However, patients using stents or other implantable devices risk clot formation or platelet activation. These unwanted effects may be prevented or mitigated by pre-coating the

device with a pharmaceutically acceptable composition comprising a compound of this invention.

[0207] Suitable coatings and the general preparation of coated implantable devices are described in US Patents 6,099,562; 5,886,026; and 5,304,121. The coatings are typically biocompatible polymeric materials such as a hydrogel polymer, polymethyldisiloxane, polycaprolactone, polyethylene glycol, polylactic acid, ethylene vinyl acetate, and mixtures thereof. The coatings may optionally be further covered by a suitable topcoat of fluorosilicone, polysaccarides, polyethylene glycol, phospholipids or combinations thereof to impart controlled release characteristics in the composition. Implantable devices coated with a compound of this invention are another embodiment of the present invention. The compounds may also be coated on implantable medical devices, such as beads, or co-formulated with a polymer or other molecule, to provide a "drug depot", thus permitting the drug to be released over a longer time period than administration of an aqueous solution of the drug.

Methodology for Synthesis and Characterization of Compounds

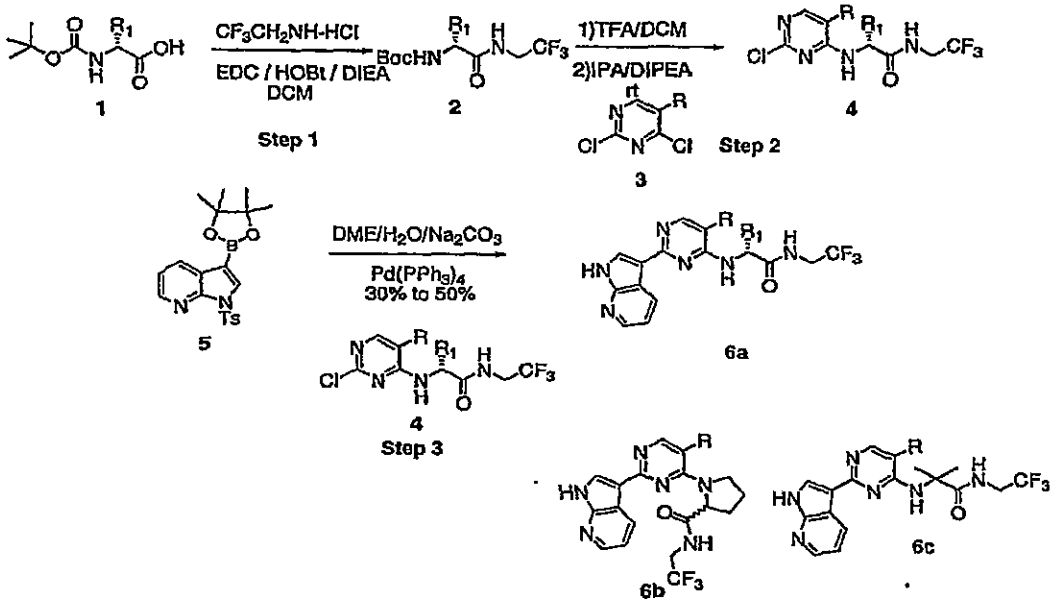
[0208] The compounds of this invention may be prepared in general by methods known to those skilled in the art for analogous compounds or by those methods depicted in the Examples below. See, e.g., the examples described in WO 2005/095400, which is herein incorporated by reference in its entirety.

[0209] All references provided in the Examples are herein incorporated by reference. As used herein, all abbreviations, symbols and conventions are consistent with those used in the contemporary scientific literature. See, e.g., Janet S. Dodd, ed., *The ACS Style Guide: A Manual for Authors and Editors*, 2nd Ed., Washington, D.C.: American Chemical Society, 1997, herein incorporated in its entirety by reference.

EXAMPLES

Example 1: Preparation of Compounds of the Invention

General Synthetic Scheme



Step 1

[0210] To a stirred solution of Boc-valine (1; R_1 is Me; 3.8 g, 0.02 mol), EDC (4.63 g, 0.024 mol), HOBt (4.0 g, 0.026 mol), DIEA (10.5 mL, 0.06 mol) in 100 mL of DCM is added trifluoroethylamine HCl (2.92 g, 0.022 mol). The reaction mixture is stirred for 16 h. It is concentrated to dryness and redissolved in EtOAc, washed successively with 0.5N HCl, saturated aqueous solution of $NaHCO_3$ and brine. The organic layer is dried (Na_2SO_4) and concentrated *in vacuo* to give 5.4g (98%) of 2 as a white solid.

Step 2

[0211] Compound 2 (5.32 g, 0.0197 mol) is deprotected with a 1:1 mixture of DCM/TFA at rt for 45 min. Concentration to dryness gives the intermediate amine that is used directly for the next step. A mixture of 5-fluoro-2,4-dichloropyrimidine (3; R is F; 3.28 g, 0.0197 mol), the crude amine TFA salt (5.25 g, 0.0197 mol) and DIEA (10.27 mL, 0.059 mol) are stirred in isopropanol at rt for 16 h. The reaction mixture is concentrated *in vacuo* and redissolved in EtOAc, washed successively with 0.5N HCl, saturated aqueous solution of $NaHCO_3$ and brine. The organic layer is dried (Na_2SO_4) and concentrated *in vacuo* to give a crude oil that is subjected to chromatography (50% EtOAc / 50% hexanes) to yield the desired compound 4.

Step 3

[0212] A mixture of **5** (30 mg, 0.075 mmol; prepared according to WO 2005/095400), **4** (23 mg, 0.075 mmol), Pd $(Ph_3P)_4$ (9 mg, 0.0078 mmol) and sodium carbonate 2M (115 uL, 0.23 mmol) in 1 mL of DME is microwaved at 150°C for 10 minutes. The reaction mixture is filtered through a short pad of silica gel with 30% EtOAc-70% hexanes as eluent to provide, after concentration to dryness, the crude intermediate that is used directly for the next step.

[0213] The crude intermediate is dissolved in 1 mL of dry methanol and 200 uL of sodium methoxide in methanol 25% was added. The reaction mixture is stirred at 60°C for 1 h and quenched with 6N HCl (154 uL). The mixture is dried under a flow of nitrogen and purified by reverse phase HPLC (10-60 MeCN/ water w/0.5% TFA) to provide the desired material of formula **6a**.

[0214] Compounds of formulae **6b** and **6c** may be prepared in an analogous manner using the appropriate starting reagents. For instance, a compound of formula **6b** may generally be made by substituting *tert*-butyl 2-(2,2,2-trifluoroethylcarbamoyl) pyrrolidine-1-carboxylate for compound **1**, while a compound of formula **6c** may generally be made by substituting *tert*-butyl 2-(2,2,2-trifluoroethylcarbamoyl)propan-2-ylcarbamate for compound **1**.

Example 2: Analytical Results

[0215] Tables 4, 5 and 6 below depicts exemplary ^{1}H-NMR data (NMR) and liquid chromatographic mass spectral data, reported as mass plus proton (M+H), as determined by electrospray, and retention time (RT) for certain compounds of the present invention, wherein compound numbers in Tables 4, 5 and 6 correspond to the compounds depicted in Tables 1, 2 and 3, respectively (empty cells indicate that the test was not performed):

Table 4

Cmpd #	M+H	RT	NMR
1	442.90	2.20	DMSO-d6: 12.4 (br s, 1H); 8.7 (dd, 1H); 8.65 (s, 1H); 8.25 (m, 2H); 8.2 (m, 1H); 4.8 (d, 1H); 4.0-3.8 (m, 4H); 2.3 (m, 1H); 2.05-1.9 (m, 3H)
2	442.90	2.20	DMSO-d6: 12.4 (br s, 1H); 8.7 (dd, 1H); 8.65 (s, 1H); 8.25

Cmpd #	M+H	RT	NMR
			(m, 2H); 8.2 (m, 1H); 4.8 (d, 1H); 4.0-3.8 (m, 4H); 2.3 (m, 1H); 2.05-1.9 (m, 3H)
3	430.90	2.50	(CD3OD) 1.7 (s, 6H), 3.8 (m, 2H), 8.15 (s, 1H), 8.2 (d, 1H), 8.25 (m, 1H), 8.5 (t, 1H), 8.85 (d, 1H)
4	463.00	1.90	(CD3OD) 1.9 (s, 6H), 3.8 (m, 2H), 7.75 (t, 1H), 7.9 (d, 1H), 8.05 (t, 1H), 8.35 (d, 1H), 8.55 (d+t, 2H), 8.7 (s, 1H), 8.85 (d, 1H)
5	399.00	1.70	DMSO-d6: 8.92 (m , 1H); 8.60 (m, 2H); 8.32 (s, 1H); 8.18 (m, 1H); 6.65 (m, 1H); 6.72 (m, 1H); 4.80 (m, 1H); 4.00 (m, 2H); 1.42 9d, 3H)
6	417.00	2.40	DMSO-d6: 8.70 (dd, 1H); 8.65 *s, 1H); 8.28 (m, 2H); 8.20 (m, 1H); 7.90 (m, 1H); 4.62 (m, 1H); 3.88 (m, 2H); 1.41 (d, 3H)
7	449.00	2.10	DMSO-d6: 8.86 (m, 1H); 8.76(m, 1H); 8.55 (m, 1H); 8.40 (m, 1H); 7.96 (m, 1H); 7.85 (m, 1H); 7.70 (m, 1H); 5.00 (m, 1H); 3.98 (m, 2H); 1.58 (d, 3H)
8	459.30	1.70	DMSO-d6: 12.3 (br s, 1H); 8.7 (s, 1H); 8.6 (t, 1H); 8.3 (m, 2H); 8.2 (m, 1H); 4.75 (m, 1H); 4.4 (m, 1H); 4.05-3.7 (m, 5H); 1.9 (m, 1H)
9	457.30	2.20	DMSO-d6: 12.3 (br s, 1H); 8.8 (m, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.2 (m, 1H); 4.3 (m, 1H); 4.05-3.8 (m, 4H); 2.25 (m, 1H); 2.1 (m, 1H); 1.7 (m, 1H); 1.15 (m, 3H)
10	459.30	1.80	DMSO-d6: 12.35 (br s, 1H); 8.8 (m, 1H); 8.65 (s, 1H); 8.25 (m, 2H); 8.15 (m, 1H); 4.6 (m, 1H); 4.3 (m, 1H); 4.05 (m, 1H); 3.9-3.8 (m, 3H); 1.95 (m, 2H)
11	455.30	2.10	DMSO-d6: 12.35 (br s, 1H); 8.95 (m, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.2 (m, 1H); 4.9 (m, 1H); 4.1-3.9 (m, 4H); 1.8-1.6 (m, 2H); 0.75 (m, 1H); 0.4 (m, 1H)
12	459.30	1.70	DMSO-d6: 12.3 (br s, 1H); 8.7 (s, 1H); 8.6 (t, 1H); 8.25 (m, 2H); 8.15 (m, 1H); 4.75 (m, 1H); 4.4 (m, 1H); 4.05-3.65 (m, 5H); 1.9 (m, 1H)
13	459.30	1.70	DMSO-d6: 12.3 (br s, 1H); 8.8 (m, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.2 (m, 1H); 4.8 (m, 1H); 4.45 (m, 1H); 4.05-3.65 (m, 4H); 2.25 (m, 1H);1.9 (m, 1H)
14	425.00	1.70	DMSO-d6: 12.9 (br s, 1H); 8.9 (m, 1H); 8.6 (m, 2H); 8.4 (s, 1H); 8.35 (m, 1H); 6.7 (m, 1H); 4.9 (m, 1H); 4.1-3.9 (m, 2H); 3.8 (m, 1H); 3.65 (m, 1H); 2.4 (m, 1H); 2.15-1.95 (m, 3H)
15	461.30	2.10	
16	425.00	1.70	DMSO-d6: 12.9 (br s, 1H); 8.85 (m, 1H); 8.6 (m, 2H); 8.35 (s, 1H); 8.3 (m, 1H); 6.7 (m, 1H); 4.9 (m, 1H); 4.1-3.9 (m, 2H); 3.75 (m, 1H); 3.6 (m, 1H); 2.4 (m, 1H); 2.15-1.95 (m, 3H)
17	461.30	2.20	
18	427.20	1.90	DMSO d6: 13.0 ppm (bs, 1H), 9.0 (t, 1H), 8.7 (s, 1H), 8.6 (s, 1H), 8.4 (s, 1H), 8.2 (d, 1H), 6.8 (bs, 1H), 4.8 (t, 1H),

Cmpd #	M+H	RT	NMR
			4.1 (m, 1H), 3.8 (m, 2H), 2.3 (m, 1H), 1.05 (d, 3H), 1.0 (d, 3H)
19	441.20	2.00	DMSO d6: 13.0 ppm (bs, 1H), 9.0 (t, 1H), 8.7 (s, 2H), 8.4 (s, 1H), 8.1 (d, 1H), 6.6 (d, 1H), 4.8 (t, 1H), 3.8-4.2 (m, 4H), 1.7 (bs, 2H), 1.0 (d, 3H), 0.9 (d, 3H)
20	445.20	2.90	DMSO d6: 12.4 ppm (bs, 1H), 8.8 (t, 1H), 8.7 (s, 1H), 8.3 (s, 1H), 8.2 (d, 2H), 7.6 (d, 1H), 4.5 (t, 1H), 3.9-4.1 (m, 2H), 2.2 (m, 1H), 1.0 (d, 3H), 0.9 (d, 3H)
21	459.20	3.00	DMSO d6: 12.4 ppm (bs, 1H), 8.8 (t, 1H), 8.7 (s, 1H), 8.3 (m, 3H), 7.8 (d, 1H), 4.7 (t, 1H), 3.9 (m, 2H), 1.9 (m, 1H), 1.8 (m, 1H), 1.6 (m, 1H), 1.0 (d, 3H), 0.9 (d, 3H)
22	473.20	3.40	DMSO d6: 8.7 ppm (t, 1H), 8.6 (s, 1H), 8.4 (s, 1H), 8.35 (s, 1H), 8.3 (s, 1H), 7.9 (d, 1H), 4.7 (t, 1H), 4.0 (m, 2H), 3.9 (s, 3H), 1.9 (m, 1H), 1.8 (m, 1H), 1.7 (m, 1H), 1.0 (d, 3H), 0.9 (d, 3H)
23	431.10	2.50	DMSO d6: 12.4 (bs, 1H), 8.8 (t, 1H), 8.7 (s, 1H), 8.3 (s, 1H), 8.25 (dd, 2H), 7.7 (bs, 1H), 4.5 (q, 1H), 3.8-4.0 (m, 2H), 1.9 (q, 2H), 1.0 (t, 3H)
24	413.10	1.80	DMSO d6: 12.9 ppm (bs, 1H), 9.0 (t, 2H), 8.65 (s, 1H), 8.6 (s, 1H), 8.4 (s, 1H), 8.1 (d, 1H), 6.7 (bs, 1H), 4.7 (m, 1H), 3.8-4.2 (m, 2H), 1.9 (m, 2H), 1.0 (t, 3H)
25	439.20	2.00	1H NMR (CD3OD, 500 MHz): 1.53-2.05 (m, 6H), 2.45-2.53 (m, 1H), 3.46-3.59 (m, 1H), 3.83-4.32 (m, 3H), 7.06 (s, br., 1H), 8.18 (d, 1H), 8.38 (d, 1H), 8.42 (s, 1H), 8.83 (s, br., 1H)
26	457.10	3.20	1H NMR (CD3OD, 500 MHz): 1.57-2.03 (m, 6H), 2.37-2.44 (m, 1H), 3.50-3.57 (m, 1H), 3.90-4.09 (m, 2H), 4.49-4.57 (m, 1H), 5.38 (s, br., 1H), 8.26 (s, 1H), 8.28 (d, 1H), 8.31 (d, 1H), 8.60 (d, 1H)
27	429.30	2.30	(CD3OD) 1.3 (m, 2H), 1.8 (m, 2H), 3.9 (m, 2H), 8.25 (m, 3H), 8.6 (t, 1H), 8.8 (d,1H)
28	439.20	1.90	DMSO d6: 13.0 ppm (bs, 1H), 9.0 (s, 1H), 8.7 (s, 1H), 8.6 (s, 1H), 8.4 (s, 1H), 8.2 (d, 1H), 6.7 (s, 1H), 4.9 (d, 1H), 3.9-4.1 (m, 3H), 1.9 (q, 1H), 1.6 (q, 1H), 0.9 (bs, 1H), 0.5 (m, 2H), 0.2 (m, 2H)
29	457.10	2.80	DMSO d6: 12.4 ppm (bs, 1H), 8.8 (t, 1H), 8.7 (s, 1H), 8.3 (s, 1H), 8.25 (m, 2H), 7.8 (bs, 1H), 4.7 (q, 1H), 3.8-4.0 (m, 3H), 1.9 (m, 1H), 1.6 (m, 1H), 0.9 (m, 1H), 0.4 (m, 2H), 0.2 (m, 2H)
30	459.10	1.90	DMSO d6: 12.9 ppm (bs, 1H), 9.0 (s, 1H), 8.7 (s, 1H), 8.6 (s, 1H), 8.4 (s, 1H), 8.2 (d, 1H), 6.7 (s, 1H), 4.9 (s, 1H), 3.9-4.1 (m, 2H), 2.5-2.7 (m, 2H), 2.1 (m, 3H), 2.0 (s, 3H)
31	477.10	2.70	DMSO d6: 12.4 ppm (bs, 1H), 8.8 (t, 1H), 8.7 (s, 1H), 8.3 (s, 2H), 8.25 (s, 1H), 7.9 (s, 1H), 4.8 (q, 1H), 3.8-4.0 (m, 2H), 2.5-2.7 (m, 2H), 2.2 (m, 2H), 2.1 (s, 3H)
32	458.10	1.90	(d4-methanol) 8.71 (s, 1H), 8.24 (d, 1H), 8.20 (s, 1H), 8.15

Cmpd #	M+H	RT	NMR
			(s, 1H), 5.11 (br s, 1H), 4.32 (d, 1H), 4.01-3.55 (m, 4 H), 3.17 (dd, 1H), 3.11-2.95 (m, 2H)
33	440.10	1.40	(d4-methanol) 8.72 (d, 1H), 8.28 (d, 1H), 8.22 (s, 1H), 8.21 (d, 1H), 6.65 (d, 1H), 5.25 (br s, 1H), 4.12-3.87 (m, 3 H), 3.57 (d, 1H), 3.44 (dd, 1H), 3.14-2.82 (m, 3 H)
34	457.00	3.00	DMSO-d6: 12.4 (s, 1H); 8.65 (s, 1H); 8.35-8.25 (m, 3H); 8.1 (s, 1H); 3.95-3.8 (m, 2H); 3.7 (m, 2H); 2.05 (m, 4H); 1.65 (s, 3H).
35	483.10	2.80	
36	469.10	2.50	DMSO d6 12.5 (bs, 1H); 9.0 (m, 1H); 8.7 (m, 3H); 8.3 (m, 1H); 4.8 (bs, 1H); 4.0-3.5 (m, 4); 2.3 (m, 1H); 2.0 (m, 3H)
37	411.10	2.10	1H NMR (CD3OD, 500 MHz): 2.42-2.52 (m, 1H), 2.80-2.93 (m, 1H), 3.89-4.14 (m, 2H), 4.27-4.37 (m, 2H), 5.09-5.16 (m, 1H), 7.34 (d, 1H), 8.18 (d, 1H), 8.30 (s, 1H), 8.50 (s, 1H), 8.66 (s, 1H)
38	459.10	2.90	1H NMR (CD3OD, 500 MHz): 3.46-3.69 (m, 2H), 3.88-4.04 (m, 3H), 4.13-4.52 (m, 3H), 4.83-4.90 (m, 1H), 6.47 (d, 1H), 7.44 (d, 1H), 8.00 (d, 1H), 8.14 (d, 1H), 8.27-8.35 (m, 2H), 8.68 (s, 1H)
39	458.10	1.80	(d4-methanol) 8.74 (d, 1H), 8.42 (d, 1H), 8.25 (s, 1H), 8.23 (d, 1H), 5.62 (br s, 1H), 4.62 (d, 1H), 4.04-3.95 (m, 3H), 3.66 (ddd, 1H), 3.46 (dd, 1H), 3.41-3.34 (m, 2H)
40	440.10	1.40	(d4-methanol) 8.72 (d, 1H), 8.28 (d, 1H), 8.22 (s, 1H), 8.21 (d, 1H), 6.65 (d, 1H), 5.26 (br s, 1H), 4.10-2.84 (m, 8H)
41	525.10	2.70	(d4-methanol) 8.72 & 8.70 (2d, 1H), 8.31 & 8.27 (2d, 1H), 8.21 (d, 1H), 8.18 & 8.14 (2s, 1H), 7.35, 7.24 (2d, 1H), 5.36 (br s, 1H), 4.51-3.52 (m, 10 H)
42	508.10	1.80	(d4-methanol) 8.73 & 8.70 (2d, 1H), 8.36 & 8.33 (2d, 1H), 8.25 (s, 1H), 8.22 (d, 1H), 6.73, 6.61 (2d, 1H), 5.50, 5.22 (2 br s, 1H), 4.51-3.51 (m, 10 H)
43	427.10	1.90	DMSO d6: 13.0 ppm (bs, 1H), 9.0 (s, 1H), 8.6 (d, 2H), 8.4 (s, 1H), 8.2 (d, 1H), 6.7 (s, 1H), 4.8 (s, 1H), 3.8-4.2 (m, 3H), 1.9 (m, 2H), 1.4-1.5 (m, 2H), 0.9 (t, 3H)
44	445.10	2.70	DMSO d6: 12.4 ppm (s, 1H), 8.8 (t, 1H), 8.7 (s, 1H), 8.3 (m, 3H), 7.8 (bs, 1H), 4.6 (q, 1H), 3.8-4.0 (m, 2H), 1.8 (m, 2H), 1.3-1.5 (m, 2H), 0.9 (t, 3H)
45	425.10	2.20	DMSO-d6: 12.45 (s, 1H); 8.65 (s, 1H); 8.5 (m, 1H); 8.3 (m, 2H); 8.2 (m, 1H); 5.9 (t, 1H); 4.8 (d, 1H); 4.0 (m, 1H); 3.85 (m, 1H); 3.6-3.4 (m, 2H); 2.25 (m, 1H); 2.0 (m, 3H)
46	443.10	2.50	DMSO 1.9 (m, 2H), 2.3 (q, 2H), 2.75 (bq, 2H), 3.8 (m, 2H), 8(d, 1H), 8.15 (overlap bt, bs, 2H), 8.25 (s, 1H), 8.3 (d, 1H), 8.7 (s, 1H), 12.3 (bs, 1H)
47	407.10	1.60	DMSO-d6: 13.0 (br s, 1H); 8.7-8.6 (m, 3H); 8.4 (m, 1H); 8.3 (m, 1H); 6.75 (d, 0.7H); 6.3 (d, 0.3H); 5.9 (t, 1H); 4.9 (d, 0.7H); 4.65 (0.3H); 4.05-3.6 (m, 2H); 2.35 (m, 1H); 2.05 (m, 3H).

Cmpd #	M+H	RT	NMR
48	413.10	1.70	(CD3OD) 1.75 (s, 6H), 3.85 (m, 2H), 6.75 (d, 1H), 8.05 (d, 1H), 8.3 (d, 1H), 8.5 (d, 1H), 8.65 (bt, 1H), 8.8 (s, 1H)
49	389.10	2.00	DMSO-d6: 12.4 (br s, 1H); 8.65 (s, 1H); 8.3 (m, 2H); 8.25 (m, 1H); 8.05 (m, 1H); 4.7 (d, 1H); 3.95 (m, 1H); 3.8 (m, 1H); 3.5 (m, 1H); 3.1 (m, 1H); 2.25 (m, 1H); 2.0 (m, 3H); 0.95 (m, 3H)
50	457.10	2.70	H NMR (500 MHz, Methanol-d4) 8.76 (d, J = 2.3 Hz, 1H), 8.48 (t, J = 6.2 Hz, 1H), 8.31 - 8.29 (m, 3H), 3.82 (m, 2H), 3.31 (qn, Methanol-d4), 2.55 - 2.53 (m, 2H), 2.27 - 2.24 (m, 2H), 1.88 (m, 4H)
51	471.10	3.07	
52	371.20	1.50	DMSO-d6: 13.0 (s, 1H); 8.75-8.6 (m, 2H); 8.4 (m, 1H); 8.3 (m, 1H); 8.2 (m, 1H); 6.75 (d, 0.7H) 6.35 (d, 0.3H); 4.85 (d, 0.7H); 4.55 (d, 0.3H); 3.8-3.6 (m, 2H); 3.2-3.0 (m, 2H); 2.35 (m, 1H); 2.05 (m, 3H); 1.05 (dd, 0.7H); 0.95 (dd, 2.3H)
53	439.20	1.80	DMSO-d6: 12.85 (br s, 1H); 8.7 (s, 1H); 8.5 (s, 1H); 8.4-8.35 (m, 2h); 8.3 (d, 1H); 6.7 (m, 1h); 3.95-3.7 (m, 4H); 2.15 (m, 4H); 1.7 (s, 3H)
54	456.80	2.95	DMSO-d6: 12.25 (br s, 1H); 8.7 (s, 1H); 8.3 (m, 3H); 8.0 (m, 1H); 4.1-3.7 (m, 4H); 2.05 (m, 4H); 1.6 (s, 3H)
55	439.20	1.80	DMSO-d6: 12.85 (br s, 1H); 8.7 (s, 1H); 8.5 (s, 1H); 8.4-8.35 (m, 2h); 8.3 (d, 1H); 6.7 (m, 1h); 3.95-3.7 (m, 4H); 2.15 (m, 4H); 1.7 (s, 3H)
56	469.10	2.00	DMSO-d6: 9.30 (m, 1H); 8.70 (s, 1H); 8.35 (m, 1H); 8.28 (m, 2H); 4.75 (m, 1H); 3.40 (m, 2H); 2.25 (m, 2H); 2.00 (m, 4H)
57	497.10	2.70	DMSO-d6: 8.80 (m, 2H); 8.55 (s, 1h); 8.28 (m, 2H); 4.80 (m, 1H); 4.24 (m, 2H); 3.80 (m, 4H); 2.20 (m, 1H); 1.90 (m, 23H); 1.20 (t, 2H)
58	441.10	2.00	H NMR (500 MHz, DMSO-d6) 12.9 (bs, 1H), 9.00 (s, 1H), 8.66 (s, 1H), 8.63 (s, 1H), 8.41 (d, J = 2.0 Hz, 1H), 8.16 (d, J = 6.2 Hz, 1H), 6.80 (s, 1H), 4.81 (s, 1H), 4.11 - 4.06 (m, 1H), 3.87 (m, 2H), 2.00 (s, 1H), 1.66 (s, 1H), 1.27 - 1.21 (m, 1H), 0.98 (d, J = 6.4 Hz, 3H), 0.92 (t, J = 7.2 Hz, 3H)
59	459.10	3.10	H NMR (500 MHz, DMSO-d6) 12.40 (s, 1H), 8.80 (t, J = 6.3 Hz, 1H), 8.71 (d, J = 2.4 Hz, 1H), 8.34 (d, J = 2.8 Hz, 1H), 8.29 (s, 1H), 8.27 (d, 1H), 7.58 (d, J = 6.2 Hz, 1H), 4.57 (t, J = 8.0 Hz, 1H), 4.04 - 3.98 (m, 1H), 3.89 - 3.83 (m, 1H), 2.05 - 1.99 (m, 1H), 1.65 - 1.60 (m, 1H), 1.33 - 1.23 (m, 1H), 0.96 (d, 3H), 0.88 (t, 3H)
60	441.10	2.00	H NMR (500 MHz, DMSO-d6) 13.0 (bs, 1H), 8.98 (s, 1H), 8.66 (s, 1H), 8.62 (s, 1H), 8.41 (d, J = 1.9 Hz, 1H), 8.17 (d, J = 6.3 Hz, 1H), 6.84 (s, 1H), 4.90 (s, 1H), 4.08 - 4.07 (m, 1H), 3.88 (m, 2H), 2.11 - 2.08 (m, 1H), 1.50 (t, J = 6.9 Hz, 1H), 1.27 (m, 1H), 1.00 (d, J = 6.9 Hz, 3H), 0.92 (q, J = 7.5

Cmpd #	M+H	RT	NMR
			Hz, 3H)
61	459.10	3.10	H NMR (500 MHz, DMSO-d6) 12.38 (s, 1H), 8.76 (t, J = 6.3 Hz, 1H), 8.70 (d, J = 2.4 Hz, 1H), 8.28 (m, J = 4.2 Hz, 3H), 8.28 (s, 1H), 7.36 (d, J = 5.7 Hz, 1H), 4.72 (t, 1H), 4.02 - 3.85 (m, 2H), 2.05 (q, J = 6.8 Hz, 1H), 1.54 - 1.49 (m, 1H), 1.27 - 1.21 (m, 1H), 0.99 (d, J = 6.8 Hz, 3H), 0.92 (t, J = 7.4 Hz, 3H)
62	441.10	2.00	H NMR (500 MHz, DMSO-d6) 13.01 (s, 1H), 9.05 (s, 1H), 8.78 (s, 1H), 8.64 (s, 1H), 8.42 (d, J = 2.0 Hz, 1H), 8.16 (d, J = 6.4 Hz, 1H), 6.91 (s, 1H), 4.89 (d, J = 8.0 Hz, 1H), 4.15 - 4.07 (m, 1H), 3.82 - 3.85 (m, 1H), 1.08 (s, 9H)
63	459.10	3.30	H NMR (500 MHz, DMSO-d6) 12.41 (s, 1H), 8.85 (t, J = 6.3 Hz, 1H), 8.74 (d, J = 2.4 Hz, 1H), 8.31 (d, 1H), 8.29 (s, 2H), 6.86 (d, J = 7.8 Hz, 1H), 4.77 (d, J = 8.8 Hz, 1H), 4.09 - 4.02 (m, 1H), 3.88 - 3.82 (m, 1H), 1.08 (s, 9H)
64	429.10	2.39	1H NMR (CD3OD, 500 MHz): 2.45-2.52 (m, 1H), 2.91-3.00 (m, 1H), 3.89-4.14 (m, 2H), 4.50-4.61 (m, 2H), 5.25-5.30 (m, 1H), 8.23-8.30 (m, 3H), 8.63 (s, 1H)
65	373.40	1.90	DMSO-d6: 12.9 (br s, 1H); 8.7 (s, 1H); 8.6 (s, 1H); 8.4 (s, 1H); 8.3 (s, 1H); 8.15 (m, 1H); 6.8 (s, 1H); 4.6 (s, 1H); 3.1 (m, 1H); 2.7 (m, 1H); 2.25 (m, 1H); 1.1-0.95 (m, 9H)
66	425.10	2.20	H NMR (500 MHz, Methanol-d4) 8.73 (d, J = 2.0 Hz, 1H), 8.46 (s, 1H), 8.40 (s, 1H), 8.35 (d, J = 2.1 Hz, 1H), 8.10 (d, J = 7.2 Hz, 1H), 6.75 (d, J = 7.2 Hz, 1H), 3.85 (m, 2H), 3.01 - 2.97 (m, 2H), 2.44 - 2.39 (m, 2H), 2.16 (m, 2H)
67	409.20	1.80	DMSO-d6: 13.0 (br s, 1H); 8.75 (m, 1H); 8.65 (s, 1H); 8.6 (s, 1H); 8.4 (s, 1h); 8.15 (d, 1H); 6.8 (m, 1h); 6.05 (t, 1H); 4.75 (m, 1H); 3.75-3.5 (m, 2H); 2.25 (m, 1H); 1.1-0.95 (m, 6H)
68	456.60	3.83	1H NMR (CD3OD, 500 MHz): 1.68-2.00 (m, 6H), 2.26-2.33 (m, 1H), 3.49-3.58 (m, 1H), 3.84-4.02 (m, 2H), 4.45-4.53 (m, 1H), 5.36-5.42 (m, 1H), 6.71 (d, 1H), 8.11-8.39 (m, 4H), 8.86-8.92 (m, 1H)
69	497.80	1.79	1H NMR (CD3OD, 500 MHz): 3.38-4.35 (m, 10H), 4.67 (d, 1H), 5.19-5.54 (m, 1H), 6.80-7.07 (m, 1H), 8.23-8.80 (m, 4H)
70	525.80	2.08	1H NMR (CD3OD, 500 MHz): 1.29 (d, 6H), 3.43-4.30 (m, 7H), 4.68 (d, 1H), 4.86-4.94 (m, 1H), 5.44 (s, br., 1H), 7.01 (s, br., 1H), 8.23-8.58 (m, 4H)
71	523.80	2.05	1H NMR (CD3OD, 500 MHz): 3.40-4.30 (m, 7H), 4.53-4.74 (m, 3H), 5.19-5.54 (m, 3H), 5.92-6.01 (m, 1H), 6.98 (s, br., 1H), 8.24-8.57 (m, 4H)
72	459.50	2.99	10.5 (s, 1H), 8.74 (d, 1H), 8.39 (s, 1H), 8.35 (d, 1H), 8.28 (d, 1H), 7.20 (m, 1H), 6.73 (s, 1H), 4.5-4.8 (s, 6H), 3.98 (m, 1H), 3.68 (m, 1H), 2.32 (m, 1H), 1.70 (s, 3H), 1.08 (dd, 6H) (CD3CN)

Cmpd #	M+H	RT	NMR
73	441.20	1.80	
74	429.10	1.60	H NMR (500 MHz, DMSO-d6) 12.95 (bs, 1H), 8.78 (s, 1H), 8.65 (s, 1H), 8.59 (s, 1H), 8.39 (d, J = 1.8 Hz, 1H), 8.17 (d, J = 4.8 Hz, 1H), 6.90 (s, 1H), 5.30 (s, 1H), 4.74 (s, 1H), 4.21 (s, 1H), 4.04 - 3.80 (m, 2H), 1.21 (d, J = 5.7 Hz, 3H)
75	423.00	1.80	H NMR (500 MHz, DMSO-d6) 12.95 (bs, 1H), 9.07 (s, 1H), 8.63 (s, 1H), 8.60 (s, 1H), 8.40 (d, J = 2.1 Hz, 1H), 8.20 (s, 1H), 6.75 (s, 1H), 4.99 (s, 1H), 4.05 - 3.83 (m, 2H), 2.98 (t, J = 2.4 Hz, 1H), 2.80 (d, J = 7.3 Hz, 2H)
76	429.10	1.60	H NMR (500 MHz, DMSO-d6) 12.96 (s, 1H), 8.79 (s, 1H), 8.65 (s, 1H), 8.61 (s, 1H), 8.40 (d, J = 2.1 Hz, 1H), 8.20 - 8.17 (m, 1H), 6.91 (s, 1H), 5.25 (bs, 1H), 4.75 (s, 1H), 4.21 (s, 1H), 4.04 - 3.88 (m, 2H), 1.22 (d, J = 6.2 Hz, 3H)
77	482.40	1.69	1H NMR (CD3OD, 500 MHz): 2.08 (s, 3H), 3.18-4.97 (m, 9H), 6.87-7.08 (m, 1H), 8.24-8.59 (m, 4H)
78	518.40	1.83	1H NMR (CD3OD, 500 MHz): 2.93 (s, 3H), 3.18-4.97 (m, 9H), 7.00-7.10 (m, 1H), 8.26-8.56 (m, 4H)
79	526.50	2.00	1H NMR (CD3OD, 500 MHz): 0.98 (t, 3H), 1.67-1.74 (m, 2H), 3.18-4.90 (m, 11H), 6.86-7.00 (m, 1H), 8.24-8.59 (m, 4H)
80	540.50	2.12	1H NMR (CD3OD, 500 MHz): 0.97 (d, 6H), 1.91-2.01 (m, 1H), 3.18-4.90 (m, 11H), 6.86-7.00 (m, 1H), 8.24-8.59 (m, 4H)
81	482.50	1.61	1H NMR (CD3OD, 500 MHz): 2.08 (s, 3H), 3.18-4.97 (m, 9H), 6.87-7.08 (m, 1H), 8.24-8.59 (m, 4H)
82	518.40	1.82	1H NMR (CD3OD, 500 MHz): 2.93 (s, 3H), 3.18-4.97 (m, 9H), 7.00-7.10 (m, 1H), 8.26-8.56 (m, 4H)
83	441.20	1.50	DMSO-d6: 12.85 (br s, 1H); 9.05 (s, 0.3H); 8.9 (s, 0.7H); 8.7 (m, 0.3H); 8.65-8.5 (m, 1.7H); 8.4-8.25 (m, 2H); 6.75 (m, 0.7H); 6.2 (m, 0.3H);4.9 (m, 0.7H); 4.7 (m, 0.3H); 4.5 (m, 1H); 4.05-3.5 (m, 5H); 2.05 (m, 1H)
84	473.10	2.20	DMSO-d6: 12.35 (br s, 1H); 8.7 (s, 1H); 8.35-8.1 (m, 4H); 6.4 (m, 1H); 4.7 (dd, 1H); 4.0 (m, 2H); 3.8 (m, 2H); 3.15 (m, 1H); 2.25 (m, 1H); 2.0 (m, 3H)
85	459.10	2.00	DMSO-d6: 12.3 (br s, 1H); 8.8 (s, 1H); 8.7 (m, 1H); 8.3 (m, 2H); 8.15 (m, 1H); 4.85 (m, 1H); 4.45 (m, 1H); 4.05-3.7 (m, 5H); 1.9 (m, 1H)
86	413.20	2.30	H NMR (500 MHz, DMSO) 12.63 (s, 1H), 8.87 - 8.86 (bs, 1H), 8.61 (m, 2H), 8.35 - 8.31 (m, 2H), 7.25 (d, J = 4.8 Hz, 1H), 5.39 (q, J = 7.1 Hz, 1H), 3.95 - 3.81 (m, 2H), 3.18 (s, 3H), 1.43 (d, J = 6.9 Hz, 3H)
87	431.20	2.70	H NMR (500 MHz, DMSO) 12.38 (s, 1H), 8.70 - 8.65 (m, 2H), 8.32 (d, J = 6.9 Hz, 1H), 8.29 (dd, J = 2.4, 2.8 Hz, 2H), 5.16 (q, J = 7.0 Hz, 1H), 3.95 - 3.86 (m, 2H), 3.17 (d, J = 4.2 Hz, 3H), 1.46 (d, J = 7.0 Hz, 3H)

Cmpd #	M+H	RT	NMR
88	400.10	2.30	DMSO-d6: 12.6 (m, 1H); 8.60 (m, 1H); 8.50 (m, 1H); 8.30 (m, 1H); 8.25 (m, 1H); 4.50 (m, 1H); 3.80 (m, 2H); 1.42 (m, 3H)
89	441.20	2.10	H NMR (500 MHz, DMSO) 12.41 (s, 1H), 8.78 (t, J = 6.3 Hz, 1H), 8.71 (d, J = 2.4 Hz, 1H), 8.36 (d, 1H), 8.33 (d, 1H), 8.30 (d, J = 2.4 Hz, 1H), 4.86 (d, J = 10.4 Hz, 1H), 3.98 - 3.88 (m, 2H), 3.20 (d, J = 4.9 Hz, 3H), 2.44 - 2.40 (m, 1H), 1.04 (d, J = 6.5 Hz, 3H), 0.90 (d, J = 6.7 Hz, 3H)
90	459.10	3.40	H NMR (500 MHz, DMSO) 12.98 (s, 1H), 8.87 (bs, 1H), 8.70 (s, 2H), 8.42 (d, 1H), 8.38 (d, 1H), 5.4 (bs, 1H), 3.97 - 3.89 (m, 2H), 3.14 (bs, 3H), 2.51 - 2.42 (m, 1H), 1.03 (bs, 3H), 0.86 (d, J = 6.7 Hz, 3H)
91	459.40	2.95	10.95 (s, 1H), 8.68 (s, 1H), 8.51 (s, 1H), 8.36 (s, 1H), 8.28 (d, 1H), 7.25 (m, 2H), 4.1-4.5 (s, 8H), 3.95 (m, 1H), 3.69 (m, 1H), 2.39 (m, 1H), 1.72 (s, 3H), 1.09 (dd, 6H) (CD3CN)
92	445.40	2.70	10.69 (s, 1H), 8.70 (d, 1H), 8.48 (s, 1H), 8.41 (d, 1H), 8.28 (d, 1H), 7.34 (s, 1H), 7.23 (m, 1H), 3.75-4.2 (m, 26H), 2.20 (m, 2H), 1.72 (s, 3H), 0.93 (t, 3H) (CD3CN)
93	487.30	2.10	DMSO-d6: 12.3 (br s, 1H); 8.85 (s, 1H); 8.65 (s, 1H); 8.3 (m, 2H); 8.15 (s, 1H); 4.75 (dd, 1H); 4.25 (m, 1H); 4.05-3.8 (m, 4H); 3.6-3.45 (m, 3H); 2.0 (m, 1H); 1.1 (dd, 3H)
94	499.40	2.20	
95	469.40	1.90	DMSO-d6: 12.3 (br s, 1H); 9.1-8.3 (m, 5H); 6.75 (m, 0.7H); 6.2 (m, 0.3H); 4.85 (m, 0.7H); 4.6 (m, 0.3H); 4.3 (m, 1H); 4.1-3.5 (m, 7H); 2.1 (m, 1H); 1.1 (dd, 3H)
96	481.40	2.00	
97	426.10	2.51	DMSO-d6: 12.6 (m, 1H); 8.82 (m, 0.5H); 8.75 (s, 0.5H); 8.62 (m, 1H); 8.58 (s, 0.5H); 8.48 (m, 1H); 8.38 (m, 0.5H); 8.35 (m, 0.5H); 8.22 (m, 0.5H); 4.65-4.55 (m, 1H); 3.80-3.60 (m, 4H); 2.25 (m, 1H); 1.90 (m, 3H)
98	414.10	2.52	DMSO-d6: 12.6 (m, 1H); 8.95 (s, 0.5H); 8.70 (m, 0.5H); 8.50 (m, 0.5H); 8.40 (0.5H); 8.20 (m, 2.0H); 8.10-7.90 (m, 1H)
99	427.10	1.80	H NMR (500 MHz, DMSO-d6) 13.07 (s, 1H), 9.17 (s, 1H), 8.69 - 8.66 (m, 3H), 8.61 (m, 1H), 8.39 (d, J = 2.2 Hz, 1H), 8.20 (d, J = 7.1 Hz, 1H), 6.78 (d, J = 6.9 Hz, 1H), 3.83 - 3.78 (m, 2H), 2.14 - 2.07 (m, 1H), 2.01 - 1.94 (m, 1H), 1.61 (s, 3H), 0.88 (t, J = 7.5 Hz, 3H)
100	445.10	2.70	H NMR (500 MHz, DMSO-d6) 12.36 (s, 1H), 8.68 (d, J = 2.4 Hz, 1H), 8.41 (t, J = 6.4 Hz, 1H), 8.30 - 8.27 (m, 2H), 8.11 (s, 1H), 7.53 (s, 1H), 3.85 - 3.72 (m, 2H), 2.19 - 2.15 (m, 1H), 1.99 - 1.95 (m, 1H), 1.55 (s, 3H), 0.81 (t, J = 7.5 Hz, 3H)
101	473.21	2.55	DMSO-d6: 12.3 (br s, 1H); 8.8 (s, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.15 (m, 1H); 8.75 (m, 1H); 4.15 (m, 1H); 4.1-3.75

Cmpd #	M+H	RT	NMR
			(m, 4H); 3.45 (m, 4H); 2.0 (m, 1H)
102	487.23	2.70	DMSO-d6: 12.3 (br s, 1H); 8.8 (s, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.15 (m, 1H); 4.75 (m, 1H); 4.2 (m, 1H); 4.05-4.75 (m, 4H); 3.5 (m, 3H); 2.0 (m, 1H); 1.1 (dd, 3H)
103	455.10	1.70	
104	500.10	1.90	
105	499.10	2.90	DMSO-d6: 12.35 (br s, 1H); 8.85 (s, 1H); 8.65 (s, 1H); 8.3 (m, 2H); 8.15 (m, 1H); 5.9 (m, 1H); 5.3 (d, 1H); 5.15 (d, 1H); 4.8 (m, 1H); 4.3 (m, 1H); 4.05 (m, 2H); 4.0-3.8 (m, 5H); 2.0 (m, 1H)
106	455.10	1.70	
107	427.40	1.80	10.07 (s, 1H), 8.83 (d, 1H), 8.26 (d, 1H), 8.22 (d, 1H), 8.13 (d, 1H), 7.20 (m, 1H), 6.38 (d, 1H), 6.00 (s, 1H), 3.88 (m, 1H), 3.77 (m, 1H), 1.95 (m, 2H), 1.57 (s, 3H), 0.91 (t, 3H) (CD3CN) .
108	359.40	1.65	
109	395.40	1.77	
110	441.40	1.91	10.01 (s, 1H), 8.71 (d, 1H), 8.23 (d, 1H), 8.17 (d, 1H), 8.12 (d, 1H), 7.16 (m, 1H), 6.40 (d, 1H), 5.86 (s, 1H), 3.97 (m, 1H), 3.61 (m, 1H), 1.53 (s, 3H), 1.02 (dd, 6H) (CD3CN)
111	414.10	2.50	DMSO-d6: 12.65 (m, 1H); 8.95 (s, 0.5H);,8.72 (m, 0.5H); 8.70 (m, 0.5H); 8.50 (m, 1H); 8.48 (m, 0.5H); 8.40 (m, 0.5H); 8.30 (m, 1H); 8.28 (m, 0.5H); 8.03 (m, 0.5H); 4.45 (m, 1H); 3.80 (m, 2H); 1.75 (m, 2H); 1.00 (m, 3H)
112	440.10	2.70	DMSO-d6: 12.68 (m, 1H); 8.98 (s, 0.5H); 8.68 (s, 0.5H); 8.58 (s, 0.5H); 8.48 (s, 0.5H); 8.43 (s, 0.5H); 8.35-8.15 (m, 3.5H); 3.75 (m, 2H); 2.15 (m, 2H); 2.02 (m, 2H); 1.65 (m, 4H)
113	426.10	2.60	DMSO-d6: 12.55 (m, 1H); 8.95 (m, 0.5H); 8.68 (m, 0.5H); 8.62 (m, 0.5H); 8.56 (m, 0.5H); 8.52 (m, 0.5H); 8.45 (m, 0.5H); 8.40 (m, 0.5H); 8.35 (m, 1H); 8.22 (0.5H); 8.16 (m, 1H); 3.80 (m, 2H); 2.70 (m, 1H); 2.40 (m, 1H); 2.25 (m, 2H); 1.88 (m, 2H)
114	512.10	1.80	DMSO-d6: 12.5 (bs, 1H); 8.95 (bs, 1H); 8.50 (m, 2H); 8.32 (m, 2H); 6.80 (m, 1H); 4.50 (m, 1H); 4.00-3.40 (m, 10H); 1.15 (t, 3H)
115	540.10	2.10	
116	496.10	1.70	DMSO-d6: 12.6 (m, 1H); 8.95 (m, 1H); 8.50 (m, 2H); 8.32 (m, 2H); 6.80 (m, 1H); 4.50 (m, 1H); 4.00-3.40 (m, 10): 1.15 (t, 3H)
117	508.10	1.70	
118	522.20	1.90	
119	459.30	1.70	DMSO-d6: 12.35 (br s, 1H); 8.8 (m, 1H); 8.65 (s, 1H); 8.3 (m, 2H); 8.15 (m, 1H); 4.8 (m, 1H); 4.4 (m, 1H); 4.05-3.7 (m, 4H); 2.3 (m, 1H); 1.95 (m, 1H)
120	441.40	1.70	DMSO-d6: 12.9 (br s, 1H); 9.05 (m, 0.3H); 8.9 (m, 0.7H);

Cmpd #	M+H	RT	NMR
			8.7-8.5 (m, 2H); 8.4-8.25 (m, 2H); 6.75 (m, 0.7H); 6.2 (m, 0.3H); 4.95 (m, 0.7H); 4.7 (m, 0.3H); 4.5 (m, 1H); 4.05-3.5 (m, 4H); 2.4 (m, 1H); 2.05 (m, 1H)
121	425.00	2.03	10.1 (s, 1H), 8.89 (s, 1H), 8.29 (m, 3H), 7.27 (s, 1H), 6.51 (d, 1H), 3.88 (m, 2H), 3.30 (s, 6H), 1.86 (m, 1H), 1.57 (m, 1H), 1.43 (m, 1H), 1.19 (m, 1H) (CD3CN)
122	461.30	2.40	
123	443.30	1.90	
124	487.40	2.20	
125	479.40	2.30	
126	443.30	1.90	
127	439.17	1.84	H NMR (500 MHz, MeOD) 8.79 (d, J = 2.3 Hz, 1H), 8.51 (t, J = 6.4 Hz, 1H), 8.48 (s, 1H), 8.35 (d, J = 2.3 Hz, 1H), 8.06 (d, J = 7.2 Hz, 1H), 6.73 (d, J = 7.2 Hz, 1H), 3.87 - 3.81 (m, 2H), 2.56 - 2.52 (m, 2H), 2.25 - 2.20 (m, 2H), 1.93 - 1.86 (m, 4H), 0.00 (TMS)
128	441.40	2.20	H NMR (500 MHz, DMSO) 8.66 (s, 1H), 8.62 (s, 1H), 8.58 (s, 1H), 8.38 (d, J = 2.0 Hz, 1H), 8.18 (d, J = 7.0 Hz, 1H), 6.81 (s, 1H), 4.09 - 3.78 (m, 2H), 2.18 - 2.16 (m, 2H), 2.10 (m, 2H), 0.77 (t, J = 7.4 Hz, 6H), 0.00 (TMS)
129	459.40	2.40	
130	461.30	2.40	
131	377.30	1.67	
132	441.09	1.65	H NMR (500 MHz, MeOD) 8.70 (d, J = 2.2 Hz, 1H), 8.48 (s, 1H), 8.36 (d, J = 2.3 Hz, H), 8.12 (d, J = 7.2 Hz, 1H), 7.59 (d, J = 8.2 Hz, 2H *0.7 equiv p-TsOH), 7.37 (d, J = 8.0 Hz, 2H*0.7 equiv p-TsOH), 6.76 (d, J = 7.2 Hz, 1H), 4.41 (d, J = 9.6 Hz, 1H), 4.22 (d, J = 9.5 Hz, 1H), 4.07 - 4.04 (m, 2H), 3.88 - 3.83 (m, 2H), 2.88 - 2.82 (m, 1H), 2.52 - 2.43 (m, 1H), 2.43 (s, 3H*0.7 equiv p-TsOH), 0.00 (TMS)
133	443.30	2.86	
134	441.16	1.50	
135	455.10	1.80	DMSO-d6: 12.8 (br s, 1H); 9.05-8.85 (m, 1H); 8.8-8.4 (m, 2H); 8.35 (m, 2H); 6.75 (m, 0.8H); 6.2 (m, 0.2H); 4.85 (m, 0.8H); 4.6 (m, 0.2H); 4.2 (m, 1H); 4.0 (m, 1H); 3.9-3.6 (m, 3H); 3.3 (s, 3H); 2.2 (m, 1H)
136	455.10	1.80	DMSO-d6: 12.9 (br s, 1H); 8.75-8.25 (m, 5H); 6.75 (m, 0.8H); 8.45 (m, 0.2H); 4.95 (m, 0.8H); 4.75 (m, 0.2H); 4.2 (m, 1H); 4.1-3.7 (m, 4H); 3.2 (s, 3H); 2.3 (m, 1H)
137	473.10	2.00	DMSO-d6: 12.35 (br s, 1H); 8.65 (m, 1H); 8.45 (dd, 1H); 8.25 (m, 2H); 8.15 (m, 1H); 4.8 (d, 1H); 4.1 (m, 1H); 4.0 (m, 1H); 3.9 (m, 1H); 3.85 (m, 2H); 3.2 (s, 3H); 2.2 (m, 1H)
138	397.00	1.74	(500 MHz, CD3OD) 8.57 (t, J=6.2 Hz, 1H), 8.50 (s, 1H),

Cmpd #	M+H	RT	NMR
			8.48 (d, J=2.6 Hz, 1H), 8.3 (d, J=1.2 Hz, 1H), 8.05 (d, J= 7.2 Hz, 1H), 6.7 (d, J=7.2 Hz, 1H), 3.86-3.8 (m, 2H), 1.74 (s, 6H), 0 (TMS)
139	445.10	3.30	H NMR (500 MHz, DMSO) 12.24 (s, 1H), 8.69 (s, 1H), 8.32 (d, J = 6.9 Hz, 1H), 8.24 (m, 2H), 8.15 (s, 1H), 3.68 - 3.63 (m, 2H), 3.20 (s, 1H), 1.51 (s, 1H)
140	427.10	1.80	H NMR (500 MHz, DMSO) 12.7 (bs, 1H), 8.82 (s, 1H), 8.34 - 8.30 (m, 2H), 8.16 (s, 1H), 8.07 (d, J = 6.2 Hz, 1H), 6.63 (d, J = 6.2 Hz, 1H), 3.77 - 3.70 (m, 2H), 3.06 (s, 3H), 1.56 (s, 6H)
141	431.10	2.50	DMSO-d6: 12.2 (m, 1H); 8.60 (m, 1H); 8.22 (s, 1H); 8.18 (s, 1H); 8.10 (s, 1H); 7.70 (m, 1H); 5.16 (m, 1H); 4.18 (m, 2H); 3.3(s, 2.5H); 2.9 (s, 0.5H); 1.35 (m, 3H)
142	413.10	1.80	DMSO-d6: 12.5 (m, 1H); 8.70 (m, 1H); 8.30 (m, 2H); 8.18 (m, 2H); 6.42 (m, 1H); 5.25 (m, 1H); 4.20 (m, 2H); 3.30 (s, 2.5H); 2.90 (s, 0.5H); 1.32 (m, 3H)
143	413.10	1.84	
144	377.10	1.70	
145	395.10	1.74	
146	428.10	2.00	
147	411.10	2.00	
148	497.10	2.40	
149	554.00	2.20	
150	498.00	1.80	DMSO-d6: 12.7 (m, 1H); 8.92 (m, 1H); 8.60 (m, 1H); 8.42 (m, 1H); 8.32 (m, 1H); 8.28 (m, 1H); 6.80 (m, 1H); 5.20 (m, 1H); 4.30-3.60 (m, 8H); 3.55 (m, 3H)
151	512.00	1.90	DMSO-d6: 12.5 (m, 1H); 8.90 (m, 1H); 8.55 (m, 1H); 8.42 (m, 1H); 8.32 (m, 1H); 8.30 (m, 1H); 6.70 (m, 1H); 5.20 (m, 1H); 4.35-3.55 (m, 10H); 1.15 (t, 3H)
152	526.10	2.00	
153	526.00	2.00	
154	540.10	2.10	
155	540.10	2.10	
156	532.80	3.10	DMSO-d6: 12.35 (br s, 1H); 8.9 (m, 1H); 8.7 (s, 1H); 8.4-8.1 (m, 3H); 4.85 (dd, 1H); 4.35-4.1 (m, 2H); 4.0-3.7 (m, 2H); 3.3 (m, 4H); 2.85 (m, 1H); 2.4 (m, 1H)
157	546.90	3.20	DMSO-d6: 12.35 (br s, 1H); 8.9 (m, 1H); 8.7 (s, 1H); 8.35 -8.15 (m, 3H); 4.9 (dd, 1H); 4.1-3.75 (m, 4H); 3.1-2.9 (m, 5H); 2.15 (m, 1H); 1.95 (m, 2H)
158	493.90	1.70	
159	522.00	1.90	
160	524.00	1.90	
161	538.00	2.10	
162	511.00	1.70	DMSO-d6: 12.8 (m, 1H); 8.90 (m, 1H); 8.55 z9m, 2H); 8.35 (, 2H); 6.80 (m, 1H); 5.25 (, 1H); 4.20-3.60 (m, 8H);

Cmpd #	M+H	RT	NMR
			2.62 (s, 6H)
163	525.00	1.80	
164	560.00	2.20	
165	508.00	1.80	
166	443.00	1.60	DMSO-d6: 12.8 (br s, 1H); 8.95-8.65 (m, 1H); 8.65-8.45 (m, 2H); 8.4-8.25 (m, 2H); 6.75 (m, 0.7H); 6.25 (m, 0.3H); 5.5 (d, 1H); 5.05 (m, 0.7H); 4.85 (m, 0.3H); 4.2-3.7 (m, 4H); 2.8-2.55 (m,1H); 2.5-2.35 (m, 1H)
167	460.90	1.80	DMSO-d6: 12.75 (br s, 1H); 9.0 (m, 1H); 8.65-8.3 (m, 4H); 6.7 (m, 1H); 5.15 (m, 1H); 4.2 (m, 2H); 4.0 (m, 1H); 3.85 (m, 1H); 3.1 (m, 1H); 2.6 (m, 1H)
168	443.00	1.60	DMSO-d6: 12.8 (br s, 1H); 9.2-8.9 (m, 1H); 8.7-8.45 (m, 2H); 8.4-8.3 (m, 2H); 6.75 (m, 0.7H); 6.25 (m, 0.3H); 5.55 (d, 1H); 5.0 (m, 0.7H); 4.8 (m, 0.3H); 4.2-3.7 (m, 4H); 2.9-2.7 (m, 1H); 2.3-2.1 (m, 1H)
169	403.10	2.20	DMSO-d6: 12.45 (s, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.25 (m, 1H); 8.0 (dd, 1H); 4.7 (m, 1H); 3.95 (m, 1H); 3.8 (m, 1H); 3.05 (m, 1H); 2.95 (m, 1H); 2.25 (m, 1H); 2.0 (m, 3H); 1.4 (m, 2H); 0.75 (m, 3H).
170	385.10	1.70	DMSO-d6: 12.9 (br s, 1H); 8.7-8.6 (m, 2H); 8.4 (m, 1H); 8.3 (m, 1H); 8.15 (m, 1H); 6.7 (d, 0.7H); 6.3 (d, 0.3H); 4.85 (d, 0.7H); 4.5 (0.3H); 4.05-3.6 (m, 2H); 3.2-3.05 (m, 1H); 2.9 (m, 1H); 2.35 (m, 1H); 2.05 (m, 3H); 1.5-1.3 (m, 2H); 0.8 (m, 1H); 0.7 (m, 2H).
171	387.40	2.00	DMSO-d6: 12.95 (br s, 1H); 8.7 (s, 1H); 8.6 (s, 1H); 8.4 (s, 1H); 8.3 (s, 1H); 8.15 (m, 1H); 6.8 (s, 1H); 4.65 (s, 1H); 3.2 (m, 1H); 3.0 (m, 1H); 2.25 (m, 1H); 1.45 (m, 2H); 1.1-0.95 (m, 6H); 0.85 (m, 3H).
172	457.10	2.40	DMSO-d6: 12.35 (br s, 1H); 8.7 (s, 1H); 8.3-8.25 (m, 3H); 8.2 (m, 1H); 4.65 (d, 1H); 4.0 (m, 1H); 3.8 (m, 1H); 3.5-3.3 (m, 2H); 2.4-2.2 (m, 3H); 2.0 (m, 3H).
173	439.20	1.70	DMSO-d6: 12.9 (br s, 1H); 8.7-8.65 (m, 2H); 8.45-8.25 (m, 3H); 6.75 (d, 0.8H); 6.3 (d, 0.2H); 4.85 (d, 0.8H); 4.55 (d, 0.2H); 4.05-3.55 (m, 4H); 2.4-2.25 (m, 3H); 2.1-2.0 (m, 3H).
174	441.40	2.00	
175	373.40	1.74	
176	427.30	1.87	
177	401.10	2.00	DMSO-d6: 12.45 (s, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.25 (s, 1H); 8.15 (s, 1H); 4.6 (d, 1H); 3.9 (m, 1H); 3.8 (m, 1H); 2.6 (m, 1H); 2.25 (m, 1H); 1.95 (m, 3H); 0.6 (m, 2H); 0.4 (m, 1H); 0.35 (m, 1H).
178	383.10	1.60	DMSO-d6: 13.0 (br s, 1H); 8.65 (m, 1H); 8.6 (s, 1H); 8.4 (m, 1H); 8.35-8.2 (m, 2H); 6.75 (d, 0.7H); 6.3 (d, 0.3H); 4.8 (d, 0.7H); 4.5 (0.3H); 4.05-3.6 (m, 2H); 2.7-2.55 (m, 1H); 2.35 (m, 1H); 2.05 (m, 3H); 0.7-0.2 (m, 4H).

Cmpd #	M+H	RT	NMR
179	385.40	1.90	DMSO-d6: 12.95 (br s, 1H); 8.7 (s, 1H); 8.6 (s, 1H); 8.4 (s, 1H); 8.35 (s, 1H); 8.15 (m, 1H); 6.8 (s, 1H); 4.6 (s, 1H); 2.7 (m, 1H); 2.25 (m, 1H); 1.05-0.95 (m, 6H); 0.65 (m, 2H); 0.45 (m, 2H).
180	371.40	1.65	

Table 5

Cmpd #	M+H	RT	NMR
181	473.1	1.9	
182	415.1	1.8	(500 MHz, DMSO) 12.22 (s, 1H), 8.42 (dd, J = 2.8, 9.9 Hz, 1H), 8.37 (t, J = 6.4 Hz, 1H), 8.26 - 8.25 (m, 2H), 8.10 (d, J = 2.5 Hz, 1H), 3.78 - 3.71 (m, 2H), 1.57 (s, 6H), 0.00 (TMS)
183	361.1	1.6	(500 MHz, DMSO) 12.27 (s, 1H), 8.47 (dd, J = 2.8, 9.8 Hz, 1H), 8.25 (d, J = 3.0 Hz, 2H), 8.19 (d, J = 2.2 Hz, 1H), 7.75 (t, J = 5.6 Hz, 1H), 7.56 (bs, 1H), 3.02 - 2.99 (m, 2H), 1.56 (s, 6H), 0.77 (t, J = 7.1 Hz, 3H), 0.00 (TMS)
184	379.1	1.6	(500 MHz, DMSO) 12.3 (s, 1H), 8.45 (dd, J = 2.8, 9.8 Hz, 1H), 8.25 (m, 2H), 8.19 (bs, 1H), 8.05 (t,1H), 7.7 (bs, 1H), 4.2 (dt, 2H, under water), 3.2 (dq, 2H), 1.6 (s, 6H), 0.00 (TMS)
185	397.1	1.7	(500 MHz, DMSO) 12.28 (s, 1H), 8.44 (dd, J = 2.8, 9.9 Hz, 1H), 8.27 (d, J = 4.4 Hz, 2H), 8.19 (t, J = 5.9 Hz, 1H), 8.15 (d, J = 2.5 Hz, 1H), 7.69 (bs, 1H), 5.7 (tt, J = 48 Hz, J = 4.3 Hz, 1H), 3.39 - 3.31 (m, 2H), 1.57 (s, 6H), 0.00 (TMS)
186	375.1	1.7	
187	361.1	2.04	
188	379.1	2.21	
189	343.1	2.04	
190	357.1	2.3	
191	457	2.9	(DMSO-d6) 12.35 (s, 1H); 8.7 (d, 1H); 8.4-8.25 (m, 3H); 8.1 (s, 1H); 4.1 (m, 1H); 3.95 (m, 1H); 3.85 (m, 1H); 3.7 (m, 1H); 2.05 (m, 4H); 1.65 (s, 3H).
192	439	1.7	(DMSO-d6) 12.9 (s, 1H); 8.75-8.65 (m, 1.1H); 8.55 (m, 0.9H); 8.45-8.15 (m, 3H); 6.7 (m, 0.9H); 6.1 (m, 0.1H); 4.15 (m, 0.1H); 3.95 (m, 0.9H); 3.8 (m, 3H); 2.2-2.05 (m, 4H); 1.75-1.6 (m, 3H).
193	455.1	1.8	(500 MHz, DMSO) 12.95 (s, 1H), 8.71 (s, 1H), 8.59 (bd, 2H), 8.36 (d, J = 2.2 Hz, 1H), 8.23 (d, J = 6.9 Hz, 1H), 6.82 (s, 1H), 3.82 - 3.77 (m, 4H), 3.66 (t, J = 10.5 Hz, 4H), 2.27 - 2.20 (m, 2H), 2.20 - 2.08 (m, 2H), 0.00 (TMS)

Cmpd #	M+H	RT	NMR
194	439.1	1.7	(500 MHz, DMSO) 12.89 (s, 1H), 8.61 (m, 2H), 8.46 (d, J = 9.6 Hz, 1H), 8.36 (s, 1H), 8.22 (d, J = 6.9 Hz, 1H), 6.82 (bd, 1H), 3.81 - 3.79 (m, 4H), 3.67 - 3.63 (m, 2H), 2.23 (t, J = 10.2 Hz, 2H), 2.12 (m, 2H), 0.00 (TMS)
195	409.1	1.8	
196	427.08	1.7	
197	528.9	2	(DMSO-d6) 12.5 (br s, 1H); 8.9 (m, 1H); 8.65 (m, 1H); 8.4-8.3 (m, 3H); 6.75 (m, 0.5H); 6.5 (m, 0.5H); 4.9 (m, 1H); 4.1-3.7 (m, 4H); 3.1-2.9 (m, 5H); 2.2 (m, 1H); 1.95 (m, 2H).
198	409.1	1.9	(500 MHz, MeOD) 8.91 (d, J = 2.2 Hz, 1H), 8.72 (s, 1H), 8.55 (d, J = 8.3 Hz, 1H), 8.38 (d, J = 2.2 Hz, 1H), 8.03 (t, J = 7.6 Hz, 2H), 7.88 (d, J = 8.3 Hz, 1H), 7.74 (t, J = 7.8 Hz, 1H), 3.21 - 3.15 (m, 2H), 1.87 (s, 6H), 0.89 (t, J = 7.2 Hz, 3H).
199	447.1	1.79	(500 MHz, MeOD) 8.73 (s, 1H), 8.63 (d, J = 9.5 Hz, 1H), 8.57 (m, 2H), 8.33 (s, 1H), 8.03 (m, 1H), 7.89 (d, J = 8.4 Hz, 1H), 7.74 (t, J = 7.7 Hz, 1H), 3.82 (m, 2 H), 2.66 (s, 1.3H), 1.88 (s, 6H). (Peak at 2.66 is unidentified.)
200	397.1	1.65	(500 MHz, DMSO-d6) 12.90 (s, 1H), 9.05 (s, 1H), 8.66 (s, 1H), 8.40 (s, 1H), 8.37 (s, 1H), 8.16 (d, J = 6.4 Hz, 1H), 6.73 (s, 1H), 4.75 (s, 1H), 4.08 - 4.01 (m, 2H), 3.87 (d, J = 6.5 Hz, 1H), 1.93 - 1.83 (m, 2H), 1.00 (t, J = 7.4 Hz, 3H), 0.00 (TMS)
201	445	1.7	(DMSO-d6) 12.75 (br s, 1H); 9.0 (dd, 1H); 8.55 (s, 1H); 8.45-8.25 (m, 3H); 6.7 (m, 1H); 5.2 (m, 1H); 4.2 (m, 2H); 4.05-3.7 (m, 2H); 3.1 (m, 1H); 2.6 (m, 1H).
202	441	2.7	(DMSO-d6) 12.25 (br s, 1H); 8.4 (d, 1H); 8.35 (dd, 1H); 8.3 (d, 1H); 8.25 (s, 1H); 8.1 (s, 1H); 4.1 (m, 1H); 3.95 (m, 1H); 3.8 (m, 1H); 3.7 (m, 1H); 2.1-2.0 (m, 4H); 1.65 (s, 3H).
203	423	1.7	(DMSO-d6) 12.8 (br s, 1H); 8.5-8.2 (m, 5H); 6.7 (m, 1H); 4.0-3.7 (m, 4H); 2.2-2.0 (m, 4H); 1.7 (s, 3H).
204	427	1.5	(DMSO-d6) 12.85 (br s, 1H); 9.2-9.0 (m, 1H); 8.7-8.6 (m, 1H); 8.4 (m, 3H); 6.85 (m, 0.8H); 6.25 (m, 0.2H); 5.55 (d, 1H); 5.05 (dd, 0.8H); 4.8 (m, 0.2H); 4.2-3.6 (m, 4H); 2.8 (m, 1H); 2.3-2.15 (m, 1H).
205	423.1	2	
206	441.1	2	
207	459.1	2.1	(500 MHz, DMSO) 13.17 (s, 1H), 8.87 (s, 1H), 8.80 - 8.60 (m, 2H), 8.40 - 8.30 (m, 2H), 8.05 - 7.94 (m, 1H), 7.89 (d, J = 8.3 Hz, 1H), 7.70 (m, 1H), 5.70 (tt, J = 15.1, 3.9 Hz, 1H), 3.40 - 3.30 (m, 2H), 2.38 - 2.31 (m, 1H), 2.07 (m, 1H), 1.70 (s, 3H), 0.89 (t, J = 7.5 Hz, 3H).

Cmpd #	M+H	RT	NMR
208	477.1	2.2	(500 MHz, DMSO) 8.85 (s, 1H), 8.67 - 8.55 (m, 3H), 8.39 (s, 1H), 7.99 (m, 1H), 7.89 (d, J = 8.1 Hz, 1H), 7.69 (m, 1H), 3.86 - 3.71 (m, 2H), 2.40 - 2.34 (m, 1H), 2.10 - 2.06 (m, 1H), 1.70 (s, 3H), 0.89 (t, J = 7.5 Hz, 3H).
209	359.1	1.6	(500 MHz, MeOD) 8.48 (dd, J = 2.8, 9.3 Hz, 1H), 8.43 (s, 1H), 8.35 - 8.33 (m, 1H), 8.28 - 8.27 (m, 1H), 3.21 (q, J = 7.2 Hz, 2H), 1.77 - 1.75 (m, 2H), 1.29 (m, 2H), 0.97 (t, J = 7.2 Hz, 3H).
210	395.1	1.7	(500 MHz, DMSO) 12.35 (s, 1H), 8.57 (s, 1H), 8.39 (d, J = 6.1 Hz, 2H), 8.31 (d, J = 3.9 Hz, 1H), 8.27 - 8.25 (m, 2H), 5.95 - 5.71 (m, 1H), 3.45 - 3.37 (m, 2H), 1.53 (br, 2H), 1.16 (br, 2H).
211	413	1.8	(500 MHz, MeOD) 8.46 - 8.43 (m, 2H), 8.37 (t, J = 4.8 Hz, 1H), 8.27 - 8.26 (m, 1H), 3.90 - 3.83 (m, 2H), 1.82 (m, 2H), 1.38 (m, 2H). Multiplet (0.47H) at 8.71, identified as an exchangeable proton that did not fully exchange, which decreased to 0.38H after 1 h.
212	373.1	1.72	(500 MHz, DMSO-d6) 13.04 (s, 1H), 9.16 (d, J = 3.2 Hz, 1H), 8.82 (s, 1H), 8.66 (d, J = 3.0 Hz, 1H), 8.39 (d, J = 2.0 Hz, 1H), 8.15 (d, J = 7.0 Hz, 1H), 7.64 (d, J = 7.2 Hz, 1H), 6.68 (d, J = 7.1 Hz, 1H), 3.88 - 3.84 (m, 1H), 1.60 (s, 6H), 0.84 (d, J = 6.2 Hz, 6H), 0.00 (TMS)
213	405.1	1.6	(500 MHz, MeOD) 8.83 (d, J = 2.3 Hz, 1H), 8.58 (s, 1H), 8.35 (d, J = 2.3 Hz, 1H), 8.18 (m, 1H), 4.21 (t, J = 4.8 Hz, 1H), 4.11 (t, J = 4.8 Hz, 1H), 3.37 - 3.32 (m, 2H), 2.58 (s, 3H), 2.27 (s, 3H), 1.79 (s, 6H).
214	423	1.71	(500 MHz, MeOD) 8.79 (d, J = 2.3 Hz, 1H), 8.58 (s, 1H), 8.36 (d, J = 2.3 Hz, 1H), 8.29 (m, 1H), 5.67 - 5.43 (m, 1H), 3.48 - 3.38 (m, 2H), 2.58 (s, 3H), 2.27 (s, 3H), 1.79 (s, 6H).
215	441	1.8	(500 MHz, MeOD) 8.77 (d, J = 2.3 Hz, 1H), 8.56 (s, 1H), 8.44 - 8.34 (m, 1H), 8.34 (d, J = 2.2 Hz, 1H), 3.86 - 3.79 (m, 2H), 2.58 (s, 3H), 2.28 (s, 3H), 1.79 (s, 6H).
216	471	2.9	(500 MHz, DMSO) 12.32 (s, 1H), 8.69 (m, 2H), 8.28 - 8.13 (m, 3H), 4.9 - 4.75 (m, 1H), 4.7 - 4.5 (m, 1H), 3.95 - 3.75 (m, 3H), 2.15 - 1.95 (m, 1H), 1.87 (m, 2H), 1.6 (s, 1H), 1.44 - 1.41 (m, 1H), 1.1 - 0.85 (m, 3H)
217	439	1.8	(500 MHz, MeOD) 8.77 (s, 1H), 8.22 - 8.19 (m, 3H), 6.40 (s, 1H), 4.69 (s, 1H), 4.32 (bs, 1H), 4.01 - 3.91 (m, 2H), 2.43 - 2.38 (m, 1H), 2.27 - 2.16 (m, 2H), 1.86 - 1.82 (m, 1H), 1.45 (d, J = 6.0 Hz, 3H)
218	457	2.7	(500 MHz, MeOD) 8.78 - 8.77 (m, 1H), 8.20 (d, J = 2.1 Hz, 1H), 8.15 - 8.10 (m, 2H), 4.90 (d, J = 9.4 Hz, 1H), 3.94 - 3.82 (m, 2H), 2.58 -2.40 (m, 1H), 2.24 - 2.21 (m, 1H), 2.0 - 2.1 (m, 1H), 1.82 (m, 1H), 1.50 (d, 1H), 1.4 - 1.23 (m, 3H)

Cmpd #	M+H	RT	NMR
219	452.9	2	(500 MHz, MeOD) 8.76 (s, 1H), 8.21 - 8.17 (m, 3H), 6.40 (d, J = 5.9 Hz, 1H), 4.90 (d, J = 9.1 Hz, 1H), 4.04 - 3.88 (m, 2H), 3.63 (s, 1H), 2.53 - 2.39 (m, 1H), 2.22 - 2.11 (m, 3H), 2.01 - 1.92 (m, 1H), 1.60 - 1.45 (m, 1H), 1.08 (t, J = 7.2 Hz, 2H), 1.01 (t, J = 7.1 Hz, 1H),
220	469.1	1.84	(500 MHz, DMSO) 13.52 - 13.35 (br, 1H), 13.12 - 12.96 (br, 1H), 9.07 - 8.61 (br, 1H), 8.93 (s, 1H), 8.37 (s, 1H), 8.07 - 7.54 (m, 2H), 7.40 - 7.27 (br, 1H), 3.02 - 2.97 (m, 2H), 1.71 (s, 6H), 0.72 (t, J = 7.1 Hz, 3H).
221	487.1	1.85	(500 MHz, MeOD) 8.93 (d, J = 2.3 Hz, 1H), 8.61 (s, 1H), 8.37 (d, J = 2.2 Hz, 1H), 8.21 (m, 1H), 7.98 (s, 1H), 7.31 (s, 1H), 4.20 (t, J = 4.8 Hz, 1H), 4.11 (t, J = 4.9 Hz, 1H), 4.07 (s, 3H), 4.06 (s, 3H), 3.36 - 3.35 (m, 2H), 1.87 (s, 6H).
222	505.1	1.9	(500 MHz, MeOD) 8.89 (d, J = 2.3 Hz, 1H), 8.61 (s, 1H), 8.37 (d, J = 2.3 Hz, 1H), 8.33 (m, 1H), 7.99 (s, 1H), 7.32 (s, 1H), 5.67 - 5.43 (m, 1H), 4.07 (s, 3H), 4.06 (s, 3H), 3.35 - 3.33 (m, 2H), 1.87 (s, 6H).
223	483	1.9	(500 MHz, MeOD) 8.91 (d, J = 2.3 Hz, 1H), 8.62 (s, 1H), 8.37 (d, J = 2.3 Hz, 1H), 7.98 (s, 1H), 7.31 (s, 1H), 4.07 (s, 3H), 4.07 (s, 3H), 3.12 - 3.08 (m, 2H), 1.86 (s, 6H), 1.33 - 1.25 (m, 2H), 0.62 (t, J = 7.5 Hz, 3H).
224	329.05	1.4	(500 MHz, MeOD) 8.49 (d, J = 3.2 Hz, 1H), 8.45 - 8.40 (m, 1H), 8.33 (d, J = 1.5 Hz, 1H), 8.03 (d, J = 7.1 Hz, 1H), 6.69 (d, J = 6.9 Hz, 1H), 4.77 - 4.75 (m, 1H), 3.3 (m overlap with meoh signal, 2H), 1.61 (d, 7.1 Hz, 3H), 1.10 (t, J = 7.2 Hz, 3H), 0.00 (TMS)
225	346.93	1.4	
226	365	1.4	(500 MHz, MeOD) 8.49 (s, 1H), 8.41 (d, J = 7.9 Hz, 1H), 8.33 - 8.32 (m, 1H), 8.04 (d, J = 6.9 Hz, 1H), 6.70 (d, J = 6.6 Hz, 1H), 5.84 (t, J = 55.8 Hz, 1H), 3.74 - 3.44 (2m, 2H), 1.63 (d, J = 7.2 Hz, 3H), 0.00 (TMS)
227	383	1.6	
228	391.1	2.3	(500 MHz, DMSO) 12.96 (s, 1H), 8.65 (s, 1H), 8.42 - 8.38 (m, 2H), 8.25 (s, 1H), 8.20 (d, J = 7.0 Hz, 1H), 6.68 (d, J = 6.8 Hz, 1H), 5.76 (t, J = 56.1 Hz, 1H), 3.43 - 3.37 (m, 2H), 2.81 - 2.78 (m, 2H), 2.30 (dd, J = 8.6, 18.9 Hz, 2H), 2.01 (qn, J = 8.1 Hz, 2H), 0.00 (TMS)
229	409.1	2.4	(500 MHz, DMSO) 12.91 (s, 1H), 8.62 (s, 1H), 8.46 (s, 1H), 8.41 (d, J = 8.8 Hz, 1H), 8.36 (s, 1H), 8.20 (d, J = 6.7 Hz, 1H), 6.66 (d, J = 6.6 Hz, 1H), 3.82 - 3.79 (m, 2H), 2.84 (m, 2H), 2.32 - 2.28 (m, 2H), 2.02 - 1.95 (m, 2H), 0.00 (TMS)

Cmpd #	M+H	RT	NMR
230	369.2	1.6	(500 MHz, DMSO) 12.92 (s, 1H), 8.63 (s, 1H), 8.47 (d, J = 8.5 Hz, 1H), 8.37 (s, 1H), 8.18 (d, J = 6.8 Hz, 1H), 7.84 (s, 1H), 6.65 (d, J = 6.5 Hz, 1H), 2.97 (m, 2H), 2.79 (m, 2H), 2.26 (m, 2H), 2.00 (m, 2H), 1.23 (dd, J = 6.9, 14.1 Hz, 2H), 0.54 (t, J = 7.1 Hz, 3H), 0.00 (TMS)
231	373.1	1.76	(500 MHz, DMSO-d6) 13.02 (s, 1H), 8.99 (s, 1H), 8.76 (s, 1H), 8.63 (s, 1H), 8.39 (d, J = 2.3 Hz, 1H), 8.16 (d, J = 6.7 Hz, 1H), 7.92 (s, 1H), 6.75 (d, J = 4.9 Hz, 1H), 3.07 - 3.05 (m, 2H), 2.10 - 1.93 (m, 2H), 1.58 (s, 3H), 0.86 (t, J = 7.5 Hz, 3H), 0.81 (s, 3H), 0.00 (TMS)
232	391.1	1.77	(500 MHz, DMSO-d6) 13.66 - 13.49 (m, 1H), 12.96 - 12.93 (m, 1H), 8.76 (s, 1H), 8.57 (d, J = 10.2 Hz, 1H), 8.37 (s, 1H), 8.16 - 8.13 (m, 2H), 6.68 (d, J = 9.6 Hz, 1H), 4.21 (d, J = 51.9 Hz, 2H), 3.28 (q, J = 5.4 Hz, 2H), 2.10 - 1.94 (m, 2H), 1.57 (s, 3H), 0.87 (t, J = 7.5 Hz, 3H), 0.00 (TMS)
233	409.1	1.87	(500 MHz, DMSO-d6) 13.02 (s, 1H), 9.05 (s, 1H), 8.70 (s, 1H), 8.62 (s, 1H), 8.39 (d, J = 2.2 Hz, 1H), 8.35 (s, 1H), 8.18 (d, J = 7.0 Hz, 1H), 6.75 (d, J = 5.6 Hz, 1H), 5.86 - 5.64 (m, 1H), 3.43 - 3.37 (m, 2H), 2.12 - 1.93 (m, 2H), 1.59 (s, 3H), 0.88 (t, J = 7.5 Hz, 3H), 0.00 (TMS)
234	387.1	1.87	(500 MHz, DMSO-d6) 13.56 (s, 1H), 12.89 (s, 1H), 8.89 (s, 1H), 8.57 (s, 1H), 8.36 (s, 1H), 8.16 (d, J = 6.8 Hz, 1H), 6.63 (s, 1H), 3.24 (s, 3H), 2.94 (s, 2H), 2.20 - 1.87 (m, 2H), 1.57 (s, 3H), 0.87 (t, J = 7.4 Hz, 3H), 0.75 (s, 3H), 0.00 (TMS)
235	523.1	1.9	
236	355.2	1.8	
237	373.1	1.8	
238	398	2.6	(DMSO-d6) 12.56 (m, 1H); 8.80 (m, 0.5H); 8.55 (s, 0.5H); 8.50 (s, 0.5H); 8.45 (m, 1.0H); 8.40-8.30 (m, 1.5H); 8.28 (m, 1.5H); 8.10 (m, 0.5H); 3.80 (m, 2H); 1.42 (m, 6H)
239	410.9	1.7	(500 MHz, DMSO) (warmed at 100 C) 12.26 (s, 1H), 8.84 (d, J = 2.2 Hz, 1H), 8.43 (bs, 1H), 8.38 (s, 1H), 8.29 (d, J = 2.4 Hz, 1H), 8.23 (d, J = 6.3 Hz, 1H), 8.13 (bt, 1H), 6.46 (d, J = 6.3 Hz, 1H), 3.93 - 3.83 (m, 2H), 1.62 - 1.60 (m, 2H), 1.23 - 1.17 (m, 2H), 0.0(TMS)
240	395	1.6	(500 MHz, CD3OD, RT) 8.8 (m, 0.6 H), 8.65 (bt, 1H), 8.5 (s, 1H), 8.45 (bd, 1H), 8.25 (m, 1.3H), 8.1 (d, 0.8 H), 6.7 (d, 1H), 3.9 (m, 2H), 1.8 (bm, 2H), 1.35 (bm, 2H), 0 (TMS)
241	371.1	1.76	
242	393.1	1.77	
243	411.1	1.86	

Cmpd #	M+H	RT	NMR
244	341.1	1.5	(500 MHz, MeOD, rt, contains conformers) 8.77 (dd, J = 2.8, 9.2 Hz, 0.29H), 8.54 - 8.49 (m, 1.66H), 8.31 (d, J = 1.5 Hz, 1H), 8.26 - 8.24 (m, 0.3H), 8.10 (dd, J = 4.3, 7.2 Hz, 0.82H), 6.70 (d, J = 7.3 Hz, 0.29H), 6.66 (dd, J = 4.3, 7.2 Hz, 0.71H), 3.27 - 3.18 (m, 2H), 1.77 - 1.72 (m, 2H), 1.28 - 1.24 (m, 2H), 1.09 (t, J = 7.1 Hz, 0.98H), 0.96 (t, J = 7.1 Hz, 2.2H).
245	359.1	1.6	(500 MHz, MeOD, rt, contains conformers) 8.82 - 8.72 (m, 0.26H), 8.50 (m, 1.67H), 8.43 - 8.31 (m, 1.84H), 8.25 (br, 0.26H), 8.10 (d, J = 6.4 Hz, 0.72H), 6.70 - 6.65 (m, 1H), 4.48 - 4.25 (m, 2H), 3.49 - 3.37 (m, 2H), 1.80 (m, 2H), 1.27 (br, 2H).
246	377.1	1.65	(500 MHz, MeOD, rt, contains conformers) 8.77 (dd, J = 2.8, 9.1 Hz, 0.28H), 8.57 - 8.45 (m, 2.29H), 8.32 (d, J = 1.5 Hz, 1H), 8.27 - 8.26 (m, 0.29H), 8.11 (dd, J = 4.0, 7.1 Hz, 0.74H), 6.72 (d, J = 7.3 Hz, 0.29H), 6.68 (d, J = 7.1 Hz, 0.73H), 5.89 - 5.60 (m, 1H), 3.59 - 3.47 (m, 2H), 1.80 - 1.76 (m, 2H), 1.34 - 1.30 (m, 2H).
247	355.1	1.6	(500 MHz, MeOD, rt, contains conformers) 8.77 (dd, J = 2.8, 9.3 Hz, 0.28H), 8.56 - 8.50 (m, 1.68H), 8.31 (d, J = 1.5 Hz, 1H), 8.26 (dd, J = 4.4, 7.2 Hz, 0.28H), 8.10 (dd, J = 4.4, 7.2 Hz, 0.75H), 6.72 - 6.70 (m, 0.29H), 6.67 (m, 0.72H), 3.18 - 3.12 (m, 2H), 1.77 - 1.72 (m, 2H), 1.50 (m, 0.6H), 1.38 (m, 1.57H), 1.29 - 1.24 (m, 2H), 0.87 (t, J = 7.4 Hz, 0.92H), 0.67 (t, J = 7.3 Hz, 2.2H).
248	460.9	2.7	(DMSO-d6) 12.4 (s, 1H); 8.9 (m, 1H); 8.65 (s, 1H); 8.35 (d, 1H); 8.3 (s, 1H); 8.2 (m, 1H); 5.5 (d, 1H); 4.9 (dd, 1H); 4.3-3.8 (m, 4H); 2.7 (m, 1H); 2.2-2.0 (m, 1H).
249	478.9	2.9	(DMSO-d6) 12.4 (s, 1H); 8.9 (m, 1H); 8.65 (s, 1H); 8.4 (d, 1H); 8.3 (m, 1H); 8.2 (m, 1H); 5.05 (m, 1H); 4.3 (m, 2H); 3.9 (m, 2H); 3.0 (m, 1H); 2.5 (m, 1H).
250	373	1.59	(500 MHz, MeOD) 8.81 (d, J = 2.1 Hz, 1H), 8.45 (s, 1H), 8.36 (d, J = 2.1 Hz, 1H), 7.99 (s, 1H), 3.98 (s, 1H), 3.19 (q, J = 7.2 Hz, 2H), 2.31 (s, 3H), 1.79 (s, 6H), 0.90 (t, J = 7.2 Hz, 3H).
251	391	1.61	(500 MHz, DMSO) 13.07 - 12.73 (br, 1H), 8.83 (d, J = 2.0 Hz, 1H), 8.55 (s, 1H), 8.36 (d, J = 1.8 Hz, 1H), 8.12 (s, 1H), 8.09 (br, 1H), 4.18 (t, J = 5.1 Hz, 1H), 4.08 (t, J = 5.1 Hz, 1H), 3.27 (q, J = 5.3 Hz, 1H), 3.22 (q, J = 5.3 Hz, 1H), 2.24 (s, 3H), 1.65 (s, 6H).
252	409.1	1.69	(500 MHz, MeOD) 8.79 (d, J = 2.1 Hz, 1H), 8.44 (s, 1H), 8.37 (d, J = 2.0 Hz, 1H), 8.32 (br, 1H), 8.01 (s, 1H), 5.58 (m, 1H), 3.48 - 3.42 (m, 2H), 2.31 (s, 3H), 1.79 (s, 6H).
253	427.1	1.77	(500 MHz, MeOD) 8.78 (s, 1H), 8.46 (br, 1H), 8.42 (s, 1H), 8.35 (s, 1H), 8.01 (s, 1H), 3.85 - 3.82 (m, 2H), 2.32 (s, 3H), 1.79 (s, 6H). Unidentified peak at d 1.94.

Cmpd #	M+H	RT	NMR
254	387	1.66	(500 MHz, MeOD) 8.81 (d, J = 2.0 Hz, 1H), 8.45 (s, 1H), 8.36 (d, J = 2.0 Hz, 1H), 8.00 (s, 1H), 3.98 (s, 1H), 3.12 - 3.09 (m, 2H), 2.31 (s, 3H), 1.79 (s, 6H), 1.33 (m, 2H), 0.67 (t, J = 7.4 Hz, 3H).
255	344	2	(500 MHz, MeOD) 8.79 (br, 0.27H), 8.59 (d, J = 8.9 Hz, 0.69H), 8.53 (s, 1H), 8.47 (s, 1H), 8.24 (s, 1H), 3.17 (m, 2H), 1.66 (s, 6H), 1.08 (br, 0.93H), 0.91 (m, 2.14H).
256	385	1.9	
257	403	1.8	
258	421	2	
259	399.1	2	
260	428	2.7	(500 MHz, MeOD) 9.07 (s, 0.33H), 8.78 (s, 0.56H), 8.57 - 8.31 (m, 3.58H), 3.88 (m, 2H), 2.18 (m, 1H), 2.05 - 2.03 (m, 1H), 1.66 (m, 3H), 0.96 (t, J = 7.4 Hz, 3H).
261	412	2.5	(500 MHz, MeOD) 8.80 (m, 0.35H), 8.56 - 8.47 (m, 3.2H), 8.40 (m, 0.36H), 8.26 (m, 1H), 3.85 (m, 2H), 2.18 (m, 1H), 2.04 (m, 1H), 1.66 (m, 3H), 0.96 (t, J = 7.5 Hz, 3H).
262	360	2.1	
263	445	2.4	(DMSO-d6) 12.3 (br s, 1H); 8.9 (m, 1H); 8.4 (d, 1H); 8.35 (d, 1H); 8.25 (s, 1H); 8.2 (s, 1H); 5.5 (d, 1H); 4.9 (dd, 1H); 4.3-3.75 (m, 4H); 2.7 (m, 1H); 2.2-2.0 (m, 1H).
264	463	2.8	(DMSO-d6) 12.3 (br s, 1H); 8.9 (dd, 1H); 8.4-8.3 (m, 2H); 8.25-8.2 (m, 2H); 5.05 (d, 1H); 4.35 (m, 2H); 3.9 (m, 2H); 3.0 (m, 1H); 2.5 (m, 1H).
265	432.2	2.6	(CD3CN) 10.40 (s, 1H), 8.80 (s, 1H), 8.29 (m, 3H), 6.97 (m, 1H), 5.22 (m, 1H), 4.79 (m, 1H), 4.43 (dt, 2H), 3.49 (dt, 2H), 2.54 (m, 1H), 2.43 (m, 1H), 2.39 (m, 1H), 2.22 (m, 1H)
266	450.2	2.7	(CD3CN) 10.48 (s, 1H), 8.79 (s, 1H), 8.30 (m, 3H), 7.01 (t, 1H), 5.90 (tt, 1H), 5.24 (m, 1H), 5.83 (m, 1H), 3.60 (m, 2H), 2.53 (m, 1H), 2.42 (m, 1H), 2.36 (m, 1H), 2.21 (m, 1H)
267	468.2	2.86	(CD3CN) 10.38 (s, 1H), 8.79 (s, 1H), 8.29 (m, 3H), 7.21 (t, 1H), 5.21 (m, 1H), 4.83 (m, 1H), 3.99 (m, 1H), 3.86 (m, 1H), 2.51 (m, 1H), 2.45 (m, 1H), 2.35 (m, 1H), 2.20 (m, 1H)
268	450.1	1.88	
269	450.1	1.93	
270	374.1	2.3	(500 MHz, MeOD) 9.05 (s, 0.32H), 8.84 (s, 0.65H), 8.53 (s, 1H), 8.43 (s, 1H), 8.29 (s, 1H), 3.27 - 3.17 (m, 2H), 2.18 - 2.10 (m, 1H), 2.07 - 2.00 (m, 1H), 1.64 (m, 3H), 1.08 (m, 1H), 0.95 (t, J = 7.4 Hz, 5H).

Cmpd #	M+H	RT	NMR
271	358	2.1	(500 MHz, MeOD) 8.78 (br, 0.33H), 8.58 (d, J = 8.6 Hz, 0.81H), 8.53 (s, 1H), 8.46 (s, 1H), 8.24 (s, 1H), 3.26 - 3.16 (m, 2H), 2.17 - 2.13 (m, 1H), 2.01 (m, 1H), 1.71 - 1.57 (m, 3H), 0.95 (t, J = 7.5 Hz, 6H).
272	450	2.4	(500 MHz, MeOD) 8.87 (s, 1H), 8.56 (bt, 1H), 8.53 (s, 1H), 8.43 (d, J = 6.9 Hz, 1H), 8.35 (d, J = 2.2 Hz, 1H), 6.91 (d, J = 6.7 Hz, 1H), 5.09 (apparent d, 1H), 4.86 (apparent d, 1H), 4.02 - 3.96 (m, 1H), 3.87 - 3.81 (m, 1H), 2.03 (m, 1H), 1.88 - 1.80 (m, 2H), 1.48 - 1.43 (m, 1H), 0.00 (TMS)
273	464.1	2.5	(500 MHz, MeOD) 8.86 (d, J = 2.1 Hz, 1H), 8.44 (t, 1H), 8.40 (s, 1H), 8.37 (d, J = 6.6 Hz, 1H), 8.31 (d, J = 2.2 Hz, 1H), 6.52 (bs, 1H), 4.85 (s, 2H), 3.93 (m, 2H), 2.86 (m, 2H), 2.72 (m, 2H), 2.25 (m, 1H), 2.06 (m, 1H), 0.00 (TMS)
274	428	2.4	(DMSO-d6) (rotational mixture about 1.3:1): 12.6 (m, 1H); 9.0 (dd, 0.6H); 8.8 (dd, 0.4H); 8.65-8.3 (m, 4H); 5.6-5.35 (m, 1H); 4.8 (t, 0.6H); 4.7 (t, 0.4H); 4.35 (m, 0.4H); 4.2 (m, 0.6H) 4.1-3.7 (m, 3H); 2.75-2.6 (m, 1H); 2.25-2.05 (m, 1H).
275	428	2.3	(DMSO-d6) (rotational mixture about 1.3:1): 12.6 (m, 1H); 8.7-8.25 m, 5H); 5.5-5.3 (m, 1H); 4.9 (d, 0.6H); 4.75 (d, 0.4H); 4.1-3.7 (m, 4H); 2.75-2.6 (m, 1H); 2.4-2.3 (m, 1H).
276	444	2.5	(DMSO-d6) (rotational mixture about 1.3:1): 12.7 (m, 1H); 9.0-8.3 (m, 5H); 5.6-5.4 (m, 1H); 4.8 (t, 0.6H); 4.7 (t, 0.4H); 4.4-3.75 (m, 4H); 2.8-2.6 (m, 1H); 2.25-2.05 (m, 1H).
277	473	2.3	(DMSO-d6) 12.35 (m, 1H); 8.75-8.6 (m, 2H); 8.35-8.15 (m, 3H); 4.75 (m, 1H); 4.0-3.7 (m, 4H); 2.3 (m, 1H); 2.0 (m, 1H); 1.35 (s, 3H).
278	487	2.5	(DMSO-d6) 12.35 (m, 1H); 8.75-8.6 (m, 2H); 8.35-8.15 (m, 3H); 4.75 (m, 1H); 4.0-3.7 (m, 4H); 2.3 (m, 1H); 2.0 (m, 1H); 1.6 (m, 2H); 1.0 (m, 3H).
279	468.1	1.59	
280	455	1.5	(DMSO-d6) 13.05-12.9 (m, 1H); 8.8-8.25 (m, 5H); 6.75 (m, 0.7H); 6.35 (m, 0.3H); 4.95 (m, 0.7H); 4.75 (m, 0.3H); 4.05-3.6 (m, 4H); 2.4-2.1 (m, 2H); 1.4 (m, 3H).
281	469	1.6	(DMSO-d6) 13.0-12.9 (m, 1H); 8.8-8.25 (m, 5H); 6.7 (m, 0.7H); 6.3 (m, 0.3H); 5.05-4.8 (m, 1H); 4.1-3.6 (m, 4H); 2.4-2.05 (m, 2H); 1.75-1.6 (m, 2H); 1.05-0.9 (m, 3H).
282	392.9	2.7	(500 MHz, MeOD) 8.80 (d, J = 2.3 Hz, 1H), 8.35 (s, 1H), 8.33 (s, 1H), 8.28 (d, J = 2.3 Hz, 1H), 3.19 (q, J = 7.2 Hz, 2H), 1.74 (s, 6H), 0.93 (t, J = 7.2 Hz, 3H).

Cmpd #	M+H	RT	NMR
283	410.9	2.7	(500 MHz, MeOD) 8.81 (d, J = 2.3 Hz, 1H), 8.35 (s, 1H), 8.33 (s, 1H), 8.28 (d, J = 2.2 Hz, 1H), 8.19 - 8.17 (m, 0.33H), 4.23 (dt, J = 47.4, 5.1 Hz, 2H), 3.42 (dt, J = 25.5, 5.1 Hz, 2H), 1.75 (s, 6H).
284	439.9	1.9	(500 MHz, MeOD) 8.72 (s, 1H), 8.57 - 8.53 (m, 2H), 8.45 (s, 1H), 8.26 (s, 1H), 3.85 - 3.78 (m, 2H), 1.75 (s, 6H).
285	428	2.8	(500 MHz, MeOD) 9.07 (d, J = 1.9 Hz, 0.53H), 8.81 - 8.78 (m, 0.84H), 8.55 (d, J = 10.5 Hz, 1H), 8.45 (d, J = 15.6 Hz, 1H), 8.30 (s, 1H), 4.56 - 4.52 (m, 1H), 4.06 - 4.00 (m, 1H), 3.89 - 3.84 (m, 1H), 2.34 - 2.24 (m, 1H), 1.12 - 1.06 (m, 6H).
286	428.9	2.9	(500 MHz, MeOD) 8.79 (d, J = 2.3 Hz, 1H), 8.36 (s, 1H), 8.33 - 8.28 (m, 2.8H), 5.64 (tt, J = 56.5, 4.2 Hz, 1H), 3.51 - 3.43 (m, 2H), 1.74 (s, 6H).
287	446.9	3	(500 MHz, MeOD) 8.78 (d, J = 2.3 Hz, 1H), 8.45 (t, J = 6.1 Hz, 1H), 8.34 (s, 1H), 8.25 (d, J = 3.3 Hz, 2H), 3.86 - 3.44 (m, 2H), 1.73 (s, 6H).
288	437.96	2.9	(500 MHz, MeOD) 9.24 (m, 0.5H), 8.87 - 8.73 (m, 0.27H), 8.62 - 8.29 (m, 2.7H), 7.76 - 7.37 (m, 0.46H), 3.86 - 3.76 (m, 2H), 1.80 - 1.50 (m, 6H).
289	403.5	2.9	(DMSO-d6) 12.3 (br s, 1H); 8.7 (s, 1H); 8.3-8.2 (m, 2H); 8.1 (s, 1H); 7.65 (m, 1H); 4.1-3.85 (m, 2H); 3.15-2.9 (m, 2H); 2.1-1.9 (m, 4H); 1.6 (s, 3H); 0.8 (m, 3H).
290	421.5	2.9	(DMSO-d6) 12.3 (br s, 1H); 8.7 (s, 1H); 8.25 (m, 2H); 8.1 (s, 1H); 7.95 (m, 1H); 4.35-4.05 (m, 3H); 3.95 (m, 1H); 3.35-3.2 (m, 2H); 2.1-1.9 (m, 4H); 1.6 (s, 3H).
291	439.5	3	(DMSO-d6) 12.3 (br s, 1H); 8.7 (s, 1H); 8.3 (m, 2H); 8.15-8.05 (m, 2H); 5.8 (dd, 1H); 4.1 (m, 1H); 3.9 (m, 1H); 3.4 (m, 2H); 2.1-1.9 (m, 4H); 1.6 (s, 3H).
292	417.1	2.7	(DMSO-d6) 12.3 (s, 1H); 8.7 (s, 1H); 8.25 (m, 2H); 8.1 (s, 1H); 7.7 (dd, 1H); 4.1 (m, 1H); 3.9 (m, 1H); 3.1-2.8 (m, 2H); 2.1-1.9 (m, 4H); 1.6 (s, 3H); 1.35-1.15 (m, 2H); 0.6 (m, 3H).
293	455.1	2.09	
294	483.1	2.42	
295	453	2.02	
296	410.3	1.75	
297	407.1	2.3	(DMSO-d6): 12.45 (br s, 1H); 8.7 (s, 1H); 8.4-8.2 (m, 4H); 5.5 (d, 1H); 4.75 (t, 1H); 4.25-3.9 (m, 2H); 3.2-3.0 (m, 2H); 2.6-2.0 (m, 2H); 1.0 (m, 3H).
298	421.2	2.5	(DMSO-d6) 12.4 (br s, 1H); 8.7 (s, 1H); 8.4-8.2 (m, 4H); 5.5 (d, 1H); 4.75 (t, 1H); 4.25-3.9 (m, 2H); 3.8 (m, 1H); 3.0 (m, 1H); 2.3-2.0 (m, 2H); 1.45-1.2 (m, 2H); 0.75 (m, 3H).

Cmpd #	M+H	RT	NMR
299	425.1	2.3	(DMSO-d6) 12.4 (br s, 1H); 8.7 (s, 1H); 8.6 (m, 1H); 8.35-8.2 (m, 3H); 5.5 (d, 1H); 4.8 (t, 1H); 4.45 (m, 1H); 4.3-3.9 (m, 3H); 3.3 (m, 1H); 2.7 (m, 1H); 2.3-2.0 (m, 2H).
300	443.1	2.5	(DMSO-d6) 12.4 (br s, 1H); 8.8-8.6 (m, 2H); 8.4-8.2 (m, 3H); 5.9 (dd, 1H); 5.5 (d, 1H); 4.85 (t, 1H); 4.3-3.9 (m, 2H); 2.75-2.0 (m, 4H).
301	441.1	2.6	
302	465.2	1.9	
303	411.2	1.8	
304	447.2	1.8	
305	425.2	1.9	
306	437.2	1.8	
307	455.2	2	
308	437.2	1.9	
309	457.1	1.8	(DMSO-d6) 12.3 (br s, 1H); 8.75 (s, 1H); 8.35-8.2 (m, 3H); 8.1 (s, 1H); 6.45 (m, 1H); 5.55 (m, 1H); 4.2-3.7 (m, 4H); 2.4-2.2 (m, 2H); 1.7 (s, 3H).

Table 6

Cmpd #	M+H	RT	NMR
310	409.00	1.80	DMSO-d6: 12.25 (br s, 1H); 8.8 (m, 1H); 8.7 (m, 1H); 8.35-8.3 (m, 2H); 8.2 (m, 1H); 7.2 (m, 1H); 4.85 (d, 1H); 4.0 (m, 1H); 3.95-3.8 (m, 3H); 2.35 (m, 1H); 2.1-1.85 (m, 3H).
311	409.00	1.80	DMSO-d6: 12.25 (br s, 1H); 8.8 (m, 1H); 8.7 (m, 1H); 8.35-8.3 (m, 2H); 8.2 (m, 1H); 7.2 (m, 1H); 4.85 (d, 1H); 4.0 (m, 1H); 3.95-3.8 (m, 3H); 2.35 (m, 1H); 2.1-1.85 (m, 3H).
312	444.90	2.20	500MHz DMSO-d6 @60C: 12.8(br m,1H), 8.85(m,1H), 8.8(m,1H), 8.65(s,1H), 8.3(d,1H), 8.25(1H), 7.75(br m,1H), 7.3(d,1H), 4.85(m,1H),3.9(m,2H), 3.0(d m,2H), 2.2(s,3H)
313	495.00	2.30	
314	438.00	2.00	500MHz MeOD-d4: 8.68(m,1H), 8.5(s,1H), 8.35(s,1H), 8.1(d.1H),6.71(d,1H), 4.04(m,1H), 3.99m,1H), 2.7(t,2H), 2.4(m,1H), 2.24(m,1H)
315	456.00	2.80	500MHz MeOD-d4: 8.66(s,1H), 8.4(s,1H), 8.35(d,1H), 8.3(d.1H),5.45(m,1H,parially ex), 5.04(m,1H), 4.01m,1H), 3.93(m,1H), 2.73(t,2H), 2.5(m,1H), 2.32(m,1H)
316	488.00	2.10	500MHz MeOD-d4: 8.77(s,1H), 8.71(s,1H), 8.5(d,1H), 8.35(s.1H), 8.02(t,1H), 7.88(d,1H), 7.71(t,1H), 5.25(m,1H), 4.02(m,1H), 3.90(m,1H)2.73(t,2H), 2.6(m,1H), 2.5(m,1H)
317	482.00	2.70	DMSO d5 12.8 (bs, 1H); 8.7 (bs, 1H); 8.5 (m, 2H); 8.4 (s, 1H); 7.7 (s, 1H); 6.9 (s, 1H); 4.8 (m, 1H); 3.8 (m, 2H); 3.6

Cmpd #	M+H	RT	NMR
			(m, 3H); 29 (m, 2H); 2.0 (m, 2H); 1.2 (m, 2H)
318	496.10	2.90	DMSO d5 12.6 (bs, 1H); 8.8 (bs, 1H); 8.7 (m, 2H); 8.4 (s, 1H); 7.7 (s, 1H); 6.9 (s, 1H); 4.8 (m, 1H); 3.8 (m, 2H); 3.6 (m, 2H); 3.5 (m, 5H); 2.0 (m, 2H); 1.2 (t, 3H)
319	510.10	3.10	DMSO d5 12.6 (bs, 1H); 8.9 (bs, 1H); 8.6 (m, 2H); 8.4 (s, 1H); 7.8 (s, 1H); 4.7 (m, 1H); 3.9 (m, 2H); 3.7 (m, 2H); 3.3 (m, 2H); 2.0 (m, 2H); 1.5 (m, 2H); 0.9 (t, 3H)
320	508.10	3.00	DMSO d5 12.6 (bs, 1H); 8.8 (bs, 1H); 8.6 (m, 2H); 8.4 (s, 1H); 7.7 (s, 1H); 4.7 (m, 1H); 4.0 (m, 2H); 3.8 (m, 2H); 2.9 (s, 1H); 2.0 (m, 2H); 1.9 (m, 3H); 0.8 (t, 2H); 0.6 (m, 1H)
321	424.20	1.50	(d4-methanol) 8.86 (d, 1H), 8.40 (d, 1H), 8.29 (d, 1H), 8.25 (s, 1H), 7.30 (dd, 1H), 5.65 (br s, 1H), 4.62 (d, 1H), 4.03-3.35 (m, 7H)
322	403.10	2.10	DMSO-d6: 12.5 (s, 1H); 8.7 (s, 1H); 8.3 (m, 3H); 7.9 (d, 1H); 4.65 (d, 1H); 3.95 (m, 1H); 3.85 (m, 2H); 2.25 (m, 1H); 2.0 (m, 3H); 1.05 (m, 3H).
323	395.10	1.70	(500 MHz, DMSO-d6) d 12.31 (s, 1H), 8.79 (s, 1H), 8.65 (d, J = 7.8 Hz, 1H), 8.61 (t, J = 6.3 Hz, 1H), 8.38 (d, J = 4.1 Hz, 1H), 8.29 (dd, J = 4.7, 1.5 Hz, 1H), 8.24 (s, 1H), 7.15 (dd, J = 7.9, 4.7 Hz, 1H), , 3.81 (m, 2H), 1.57 (t, 2H), 1.19 (t, 2H)
324	385.20	1.70	DMSO-d6: 13.0 (br s, 1H); 8.7-8.6 (m, 2H); 8.4 (m, 1H); 8.3 (m, 1H); 8.15 (d, 0.3H); 8.0 (d, 0.7H); 6.75 (d, 0.7H); 6.3 (d, 0.3H); 4.85 (d, 0.7H); 4.5 (0.3H); 4.0-3.85 (m, 1H); 3.8-3.6 (m, 2H); 2.35 (m, 1H); 2.05 (m, 3H); 1.1 (dd, 2H); 0.95 (dd, 4H).
325	399.10	2.10	DMSO-d6: 12.4 (br s, 1H); 8.65 (s, 1H); 8.55 (m, 1H); 8.3 (m, 2H); 8.25 (s, 1H); 4.7 (d, 1H); 3.95 (m, 1H); 3.85 (m, 2H); 3.8 (m, 1H); 3.0 (s, 1H); 2.25 (m, 1H); 2.0 (m, 3H).
326	452.39	3.60	CD3OD/CDCl3: 1.68 (6H, s), 2.14 (2H, m), 3.38 (2H, m), 7.98 (1H, t), 8.22 (1H, s), 8.28 (1H, s), 8.54 (1H, s), 8.83 (1H, s)
327	438.41	3.56	CD3OD/CDCl3: 1.70 (6H, s), 3.81 (2H, m), 7.59 (1H, m), 8.22 (1H, s), 8.26 (1H, s), 8.45 (1H, t), 8.58 (1H, s), 8.81 (1H, s)
328	404.34	3.23	DMSO-d6/CD3OD/CDCl3: 1.58 (6H, s), 3.12 (1H, s), 3.75 (2H, m), 7.21 (1H, m), 8.19 (1H, s), 8.28 (1H, m), 8.45 (1H, t), 8.69 (1H, s), 8.71 (1H, d)
329	470.35	3.24	MeOD: 1.75 (6H, s), 2.16 (2H, m), 3.35 (2H, m), 8.34 (2H, s), 8.48 (1H, s), 8.75 (1H, s), 8.85 (1H, s)
330	381.20	1.50	DMSO-d6: 12.8 (s, 1H); 8.7-8.5 (m, 3H); 8.4-8.25 (m, 2H); 6.7 (m, 0.7H) 6.3 (m, 0.3H); 4.8 (m, 0.7H); 4.6 (m, 0.3H); 4.0-3.6 (m, 4H); 2.95 (m, 1H); 2.35 (m, 1H); 2.05 (m, 3H).
331	383.20	1.70	DMSO-d6: 12.9 (br s, 1H); 8.8 (s, 1H); 8.7 (s, 1H); 8.6 (s, 1H); 8.4 (s, 1H); 8.15 (m, 1H); 6.8 (s, 1H); 4.7 (s, 1H); 4.05-3.85 (m, 2H); 3.1 (s, 1H); 2.25 (m, 1H); 1.1-0.95 (m,

Cmpd #	M+H	RT	NMR
			6H).
332	387.40	2.00	DMSO-d6: 12.95 (br s, 1H); 8.7 (s, 1H); 8.6 (s, 1H); 8.4 (s, 1H); 8.15 (m, 2H); 6.8 (s, 1H); 4.6 (s, 1H); 3.9 (m, 1H); 2.25 (m, 1H); 1.1-0.95 (m, 12H).
333	400.20	2.00	DMSO-d6: 12.35 (br s, 1H); 8.77 (dd, 1H); 8.65 (s, 1H); 8.3 (m, 2H); 8.2 (s, 1H); 4.7 (d, 1H); 4.1 (m, 2H); 3.95 (m, 1H); 3.8 (m, 1H); 2.25 (m, 1H); 2.0 (m, 3H).
334	382.20	1.50	DMSO-d6: 12.9 (br s, 1H); 8.95 (dd, 1H); 8.75 (m, 0.4H); 8.6 (m, 1.6H); 8.4-8.3 (m, 2H); 6.75 (d, 0.8H); 6.35 (d, 0.2H); 4.9 (d, 0.8H); 4.65 (d, 0.2H); 4.2-4.0 (m, 2H); 3.8 (m, 1H); 3.6 (m, 1H); 2.35 (m, 1H); 2.1-2.0 (m, 3H).
335	387.40	2.00	
336	403.40	1.90	
337	385.40	1.80	
338	511.20	2.50	DMSO-d6: 8.60 (m, 2H); 8.30 (s, 1H); 8.23 (bs, 1H); 5.50 (m, 2H); 4.38 (m, 2H); 4.10 (m, 2H); 3.38 (m, 4H); 2.50 (m, 1H); 1.90-2.00 (m, 3H); 1.32 (t, 3H)
339	421.30	2.00	
340	455.20	2.10	
341	439.20	1.90	DMSO-d6: 13.0 (bs, 1H); 8.55 (m, 1H); 8.45 (m, 1H); 8.35 (m, 1H); 6.72 (m, 1H); 5.60 (m, 1H); 4.20-3.70 (m, 5H); 3.30 (s, 3H); 2.00 (m, 3H)
342	457.10	2.40	DMSO-d6: 8.30 (m, 1H); 8.30 (m, 3H); 7.70 (m, 1H); 5.40 (m, 1H); 4.20-3.70 (m, 5H); 3.30 (s, 3H); 2.00 (m, 3H)
343	379.20	2.04	(500 MHz, DMSO) 12.83 (s, 1H), 9.30 (s, 1H), 8.61 (t, J = 7.6 Hz, 2H), 8.37 (d, J = 4.5 Hz, 1H), 8.17 (d, J = 7.1 Hz, 1H), 7.27 (dd, J = 4.7, 7.7 Hz, 1H), 6.69 (d, J = 6.9 Hz, 1H), 3.79 - 3.76 (m, 2H), 1.63 (s, 6H)
344	366.10	1.87	DMSO-d6: 12.5 (m, 1H); 8.95 (m, 0.5 H); 8.78 (m, 0.5H); 8.65 (m, 0.5H); 8.52 (m, 0.5H); 8.48 (s, 1H); 8.32-8.25 (m, 2H); 8.30 (m, 1.5H); 8.12 (m, 1H); 7.20 (m, 1H); 4.54 (m, 1H); 3.80 (m, 2H); 1.32 (m, 3H)
345	411.20	1.90	(500 MHz, DMSO-d6) 12.20 (s, 1H), 8.67 (dd, J = 1.4, 7.9 Hz, 1H), 8.43 (t, J = 6.2 Hz, 1H), 8.32 - 8.28 (m, 2H), 8.10 (s, 1H), 7.5 (bs, 1H), 7.20 (dd, J = 4.7, 7.9 Hz, 2H), 3.81 - 3.73 (m, 2H), 2.20 - 2.16 (m, 1H), 1.99 - 1.95 (m, 1H), 1.56 (s, 3H), 0.82 (t, J = 7.5 Hz, 3H)
346	393.20	1.60	(DMSO-d6, 300 MHz) 11.95 (bs, 1H), 8.7 (d, 1H), 8.25 (m, 2H), 8.12 (d, 1H), 8.02 (d, 1H), 7.28 (s, 1H), 7.13 (dd, 1H), 6.38 (bd, 1H), 3.75 (m, 2H), 2.06 (m, 1H), 1.83 (m, 1H), 1.46 (s, 3H), 0.8 (t, 3H);
347	425.27	2.25	(500 MHz, MeOD) 8.87 (d, J = 8.1 Hz, 1H), 8.60 (t, 1H), 8.36 (d, 1H), 8.27 - 8.26 (m, 2H), 7.39 (dd, J = 5.0, 8.0 Hz, 1H), 3.86 (m, 2H), 2.29 (t, J = 7.5 Hz, 4H), 0.87 (t, J = 7.5 Hz, 6H)
348	407.20	1.67	(500 MHz, DMSO-d6) d 12.81 (s,1H), 8.92 (s, 1H), 8.68-

Cmpd #	M+H	RT	NMR
			8.57 (m, 3H), 8.38 (d, J = 3.3 Hz, 1H), 8.17 (d, 1H), 7.30 - 7.27 (m, 1H), 6.82 (d, 1H), 3.82-3.74 (m, 2H), 2.26-2.12 (m, 2H), 2.12-2.05 (m, 2H), 0.82 - 0.78 (m, 6H)
349	373.40	1.74	
350	407.40	1.72	CD3CN: 9.89 (s, 1H), 8.79 (d, 1H), 8.27 (m, 1H), 8.19 (d, 1H), 8.10 (d, 1H), 7.18 (m, 2H), 6.49 (d, 1H), 5.80 (s, 1H), 3.97 (m, 1H), 3.59 (m, 1H), 1.53 (s, 3H), 1.02 (dd, 6H)
351	425.40	1.40	DMSO-d6: 12.2 (br s, 1H); 8.85 (m, 1H); 8.7 (d, 1H); 8.3 (m, 2H); 8.15 (m, 1H); 7.2 (m, 1H); 4.9 (dd, 1H); 4.45 (m, 1H); 4.05-3.7 (m, 4H); 2.3 (m, 1H); 1.95 (m, 1H).
352	407.40	1.40	DMSO-d6: 12.8 (br s, 1H); 9.1 (m, 1H); 8.7-8.6 (m, 2H); 8.45-8.3 (m, 2H); 7.4 (m, 0.3H); 7.3 (m, 0.7H); 6.85 (d, 0.7H); 6.35 (d, 0.3H); 5.1 (dd, 0.7H); 4.8 (dd, 0.3H); 4.5 (m, 1H); 4.2-3.6 (m, 4H); 2.4 (m, 1H); 2.1 (m, 1H).
353	401.40	1.95	
354	387.40	1.87	
355	369.30	1.69	
356	409.40	2.25	
357	423.30	1.90	
358	405.40	1.80	
359	399.10	1.80	DMSO-d6: 12.7 (br s, 1H); 8.8 (s, 1H); 8.7-8.2 (s, 3H); 6.5 (m, 0.8H); 6.2 (m, 0.2H); 4.2 (m, 0.3H); 4.0 (m, 0.7H); 3.8-3.6 (m, 2H); 3.4 (m, 1H); 3.2-3.05 (m, 1H); 2.7 (m, 2H); 2.2 (m, 3H); 2.05 (m, 1H); 1.7 (s, 2.7H); 1.6 (s, 0.3H); 1.0 (m, 0.3H); 0.7 (m, 2.7H).
360	379.20	1.60	DMSO-d6: 11.92 (m, 1H); 8.72 (bs, 1H); 8.22 (m, 1H); 8.05 (m, 2H); 7.42 (m, 1H); 7.18 (m, 1H); 6.32 (bs, 1H); 5.22 (m, 1H); 4.20 (m, 2H); 3.32 (s, 3H); 1.35 (m, 3H)
361	397.10	1.90	DMSO-d6: 11.9 (m, 1H); 8.55 (m, 1H); 8.25 (m, 1H); 8.18 (m, 1H); 7.98 (m, 1H); 7.65 (m, 1H); 7.15 (m, 1H); 5.15 (m, 1H); 4.18 (m, 2H); 3.30 (s, 2.5H); 2.90 (s, 0.5H); 1.35 (m, 3H)
362	357.10	1.51	
363	343.10	1.40	
364	361.10	1.41	
365	391.10	1.85	
366	393.10	1.60	(500 MHz, DMSO) 12.83 (s, 1H), 9.2 (bs, 1H), 9.07 (s, 1H), 8.68 (d, J = 7.8 Hz, 1H), 8.61 (s, 1H), 8.42 (d, J = 4.6 Hz, 1H), 8.15 (d, J = 7.1 Hz, 1H), 7.35 (dd, J = 4.8, 7.8 Hz, 1H), 6.86 (d, J = 7.2 Hz, 1H), 4.86 (t, J = 6.3 Hz, 1H), 4.12 - 4.04 (m, 1H), 3.90 - 3.85 (m, 1H), 2.31 (t, J = 6.6 Hz, 1H), 1.02 (d, 6H)
367	410.91	2.10	(500 MHz, DMSO) 12.36 (s, 1H), 8.86 (t, J = 6.3 Hz, 1H), 8.72 (dd, J = 1.4, 7.9 Hz, 1H), 8.35 - 8.31 (m, 3H), 7.86 (s, 1H), 7.26 (dd, J = 4.7, 7.9 Hz, 1H), 4.60 (t, J = 7.6 Hz, 1H), 4.04 - 3.96 (m, 1H), 3.90 - 3.83 (m, 1H), 2.28 (td, J = 13.8,

Cmpd #	M+H	RT	NMR
			6.9 Hz, 1H), 1.02 (t, 6H),
368	474.00	1.60	
369	490.00	1.80	
370	504.10	1.90	
371	477.00	1.50	
372	491.00	1.60	
373	409.00	1.40	DMSO-d6: 12.9 (m, 1H); 8.95-8.85 (m, 1H); 8.8-8.65 (m, 2H); 8.55-8.3 (m, 2H); 7.4 (m, 0.3H); 7.3 (m, 0.7H); 6.85 (d, 0.7H); 6.5 (d, 0.3H); 5.55 (d, 1H); 5.2 (d, 0.7H); 5.0 (d, 0.3H); 4.3-3.8 (m, 4H); 2.8-2.6 (m, 1H); 2.5-2.4 (m, 1H).
374	427.00	1.60	DMSO-d6: 12.8 (br s, 1H); 9.1 (m, 1H); 8.7-8.35 (m, 4H); 7.3 (m, 1H); 6.8 (m, 0.7H); 6.5 (m, 0.3H); 5.3 (m, 0.7H); 5.1 (m, 0.3H); 4.3 (m, 2H); 3.9 (m, 2H); 3.15 (m, 1H); 2.65 (m, 1H).
375	409.00	1.40	DMSO-d6: 12.9 (m, 1H); 9.25-9.1 (m, 1H); 8.75-8.6 (m, 2H); 8.45-8.35 (m, 2H); 7.4 (m, 0.3H); 7.3 (m, 0.7H); 6.9 (d, 0.7H); 6.3 (d, 0.3H); 5.6 (d, 1H); 5.1 (dd, 0.7H); 4.9 (dd, 0.3H); 4.5 (m, 0.3H); 4.2 (m, 0.7H); 4.3-3.6 (m, 3H); 2.8 (m, 1H); 2.3-2.1 (m, 1H).
376	343.10	1.37	
377	361.10	1.48	
378	325.10	1.37	
379	339.10	1.49	
380	397.10	1.60	
381	379.10	1.99	
382	429.35	1.70	(500 MHz, MeOD) 8.83 (d, J = 8 Hz, 2H), 8.68 (s, 1H), 8.59 - 8.57 (m, 2H), 8.42 - 8.41 (m, 1H), 8.07 - 8.03 (m, 1H), 7.90 (dd, J = 4.4, 8.2 Hz, 1H), 7.77 - 7.73 (m, 1H), 7.41 (m, 1H), 3.83 - 3.76 (m, 2H), 1.88 (s, 6H).
383	423.00	2.10	DMSO-d6: 12.3 (s, 1H); 8.7 (d, 1H); 8.45-8.25 (m, 3H); 8.15 (s, 1H); 7.25 (m, 1H); 4.15 (m, 1H); 4.0 (m, 1H); 3.85 (m, 1H); 3.7 (m, 1H); 2.05 (m, 4H); 1.75 (s, 3H).
384	405.10	1.50	DMSO-d6: 12.8 (s, 1H); 8.8-8.2 (m, 5H); 7.4 (m, 0.2H); 7.25 (m, 0.8H); 6.8 (d, 0.8H); 6.15 (d, 0.2H); 4.2 (m, 0.2H); 3.95 (m, 0.8H); 3.8 (m, 3H); 2.2-2.0 (m, 4H); 1.8-1.6 (m, 3H).
385	488.00	1.70	
386	380.00	1.90	DMSO-d6: 12.4 (bs, 1H); 8.92 (m, 0.5H); 8.62 (m, 0.5H); 8.50 (s, 0.5H); 8.42 (s, 0.5H); 8.40-8.20 (m, 4H); 7.20 (m, 0.5H); 7.15 (m, 0.5H); 3.72 (m, 2H); 1.45 (m, 6H)
387	421.10	1.50	(500 MHz, DMSO) 12.81 (s, 1H), 8.65 - 8.56 (m, 3H), 8.36 (d, J = 4.4 Hz, 1H), 8.22 (d, J = 6.9 Hz, 1H), 7.26 (dd, J = 4.7, 7.9 Hz, 1H), 6.85 (d, J = 6.4 Hz, 1H), 3.80 (bm, 4H), 3.66 - 3.62 (m, 2H), 2.26 - 2.22 (m, 2H), 2.15 (m, 2H), 0.00 (TMS)
388	453.30	1.68	(500 MHz, MeOD) 8.88 (dd, J = 1.5, 8.1 Hz, 1H), 8.60 (s,

Cmpd #	M+H	RT	NMR
			1H), 8.40 (d, J = 3.1 Hz, 1H), 8.32 - 8.26 (m, 1H), 7.99 (s, 1H), 7.40 (dd, J = 4.7, 8.0 Hz, 1H), 7.31 (s, 1H), 4.19 (t, J = 4.8 Hz, 1H), 4.11 - 4.09 (m, 1H), 4.07 (s, 3H), 4.07 (s, 3H), 3.35 - 3.32 (m, 2H), 1.87 (s, 6H), 1.38 - 1.29 (m, 2H, impurity).
389	489.00	1.78	(500 MHz, MeOD) 8.82 (dd, J = 1.4, 8.1 Hz, 1H), 8.58 (s, 1H), 8.52 (m, 1H), 8.40 (d, J = 3.2 Hz, 1H), 8.00 (s, 1H), 7.39 (dd, J = 4.7, 8.0 Hz, 1H), 7.32 (s, 1H), 4.08 (s, 3H), 4.07 (s, 3H), 3.80 - 3.77 (m, 2H), 1.87 (s, 6H).
390	471.10	1.70	(500 MHz, MeOD) 8.85 (dd, J = 1.4, 8.1 Hz, 1H), 8.60 (s, 1H), 8.42 - 8.40 (m, 1H), 8.37 - 8.30 (m, 1H), 8.00 (s, 1H), 7.40 (dd, J = 4.7, 8.0 Hz, 1H), 7.32 (s, 1H), 5.64 - 5.41 (m, 1H), 4.08 (s, 3H), 4.07 (s, 3H), 3.44 (m, 2H), 1.87 (s, 6H).
391	449.20	1.70	(500 MHz, MeOD) 8.88 - 8.87 (m, 1H), 8.59 (s, 1H), 8.40 (d, J = 3.3 Hz, 1H), 8.03 - 8.02 (m, 1H), 7.99 (s, 1H), 7.40 (dd, J = 4.7, 8.1 Hz, 1H), 7.31 (s, 1H), 4.07 (s, 3H), 4.07 (s, 3H), 3.07 (m, 2H), 1.86 (s, 6H), 1.29 (m, 2H), 0.61 (t, J = 7.5 Hz, 3H).
392	339.10	1.45	
393	353.10	1.56	
394	357.10	1.47	
395	375.10	1.56	
396	427.00	1.90	DMSO-d6: 12.25 (s, 1H); 8.95 (m, 1H); 8.7 (d, 1H); 8.35 (d, 1H); 8.3 (m, 1H); 8.2 (m, 1H); 7.25 (dd, 1H); 5.5 (d, 1H); 4.95 (dd, 1H); 4.3-3.75 (m, 4H); 2.7 (m, 1H); 2.2-2.0 (m, 1H).
397	445.00	2.30	DMSO-d6: 12.15 (s, 1H); 8.9 (m, 1H); 8.65 (d, 1H); 8.35 (d, 1H); 8.3 (m, 1H); 8.15 (m, 1H); 7.2 (m, 1H); 5.1 (m, 1H); 4.3 (m, 2H); 3.9 (m, 2H); 3.0 (m, 1H); 2.5 (m, 1H).
398	394.00	2.10	(500 MHz, MeOD) 9.14 (m, 0.25H), 8.95 (d, J = 6.7 Hz, 0.66H), 8.59 - 8.41 (m, 3.64H), 7.45 (m, 1H), 3.84 (m, 2H), 2.21 - 2.18 (m, 1H), 2.05 - 2.02 (m, 1H), 1.67 (m, 3H), 0.97 (t, J = 7.3 Hz, 3H).
399	325.90	1.60	
400	340.00	1.80	(500 MHz, MeOD) 9.07 (br, 0.24H), 8.54 (s, 1H), 8.46 (s, 1H), 8.36 (d, J = 4.3 Hz, 1H), 7.39 - 7.36 (m, 1H), 3.25 - 3.15 (m, 2H), 2.19 - 2.00 (m, 2H), 1.65 (m, 3H), 0.97 - 0.90 (m, 6H).
401	410.10	2.10	DMSO-d6 (rotational mixture about 1.3:1): 12.45 (m, 1H); 9.05 -8.3 (m, 5H); 7.3-7.2 (m, 1H); 5.6-5.4 (m, 1H); 4.8 (t, 0.6H); 4.7 (t, 0.4H); 4.45 3.75 (m, 4H); 2.8-2.6 (m, 1H); 2.25-2.1 (m, 1H).
402	410.10	2.00	DMSO-d6 (rotational mixture about 1.3:1): 12.45 (m, 1H); 8.8-8.3 m, 5H); 7.3-7.15 (m, 1H); 5.5-5.35 (m, 1H); 4.9 (d, 0.6H); 4.75 (d, 0.4H); 4.15-3.8 (m, 4H); 2.75-2.6 (m, 1H); 2.4-2.3 (m, 1H).

Cmpd #	M+H	RT	NMR
403	392.10	2.00	
404	409.10	1.50	
405	409.00	1.50	

Example 3: JAK3 Inhibition Assay

[0216] Compounds were screened for their ability to inhibit JAK3 using the assay shown below. Reactions were carried out in a kinase buffer containing 100 mM HEPES (pH 7.4), 1 mM DTT, 10 mM $MgCl_2$, 25 mM NaCl, and 0.01% BSA. Substrate concentrations in the assay were 5 μM ATP (200 uCi/μmole ATP) and 1 μM poly(Glu)$_4$Tyr. Reactions were carried out at 25°C and 1 nM JAK3.

[0217] To each well of a 96 well polycarbonate plate was added 1.5 μl of a candidate JAK3 inhibitor along with 50 μl of kinase buffer containing 2 μM poly(Glu)$_4$Tyr and 10 μM ATP. This was then mixed and 50 μl of kinase buffer containing 2 nM JAK3 enzyme was added to start the reaction. After 20 minutes at room temperature (25°C), the reaction was stopped with 50 μl of 20% trichloroacetic acid (TCA) that also contained 0.4 mM ATP. The entire contents of each well were then transferred to a 96 well glass fiber filter plate using a TomTek Cell Harvester. After washing, 60 μl of scintillation fluid was added and ^{33}P incorporation detected on a Perkin Elmer TopCount.

Example 4: JAK2 Inhibition Assay

[0218] The assays were as described above in Example 3 except that JAK-2 enzyme was used, the final poly(Glu)$_4$Tyr concentration was 15 μM, and final ATP concentration was 12 μM.

[0219] All compounds depicted in Tables 1, 2 and 3 were found to inhibit JAK3 with a Ki of less than 0.1 μM except for compounds 22, 35, 56, 68, 177, 223, 310, 317, 318, 319, 320, 321, 322, 326, 336, 337, 338, 339, 340, 351, 356, 367, 369, 370, 388, and 390. All Table 1, 2 and 3 compounds inhibited JAK3 with a Ki of less than 2.0 μM except for compounds 68 and 319. All Table 1, 2 and 3 compounds were found to inhibit JAK2 with a Ki of less than 0.5 μM except for compounds 9, 22, 35, 56, 57, 68, 310, 317, 38, 319, 320, 321, 336, 338, 339, 340, 348, 351, 356, 367 and 372. All Table 1, 2 and 3 compounds inhibited JAK2 with a Ki of less than 5.0 μM except for compounds 68, 318 and 319.

Example 5: JAK3 Cellular Inhibition Assay

[0220] HT-2 clone A5E cells (ATCC Cat. # CRL-1841) were grown and maintained at 37°C in a humidified incubator in cell culture medium (RPMI 1640 supplemented with 2 mM L-glutamine adjusted to contain 1.5 g/L sodium bicarbonate, 4.5 g/L glucose, 10 mM HEPES, 1.0 mM sodium pyruvate, 0.05 mM 2-mercaptoethanol, 10% fetal bovine serum, and 10% by volume rat T-STIM factor [Fisher Scientific Cat # CB40115] with Con A). On the day of the experiment, HT-2 cells were washed, resuspended at a density of 5 x 10^6 cells per ml in fresh cell culture medium without T-STIM and incubated for 4 hours without T-STIM. After four hours, 50 μl (0.25 x 10^6 cells) of the resuspended cells were added to each well of a 96 well plate. Serial dilutions of compounds were made in DMSO and then added to RPMI. 100 μl of the diluted compounds were added to each well and the plates were incubated for 1 hour at 37°C. 50 μl of recombinant murine interleukin-2 (rmIL-2) at 40ng/ml (R & D systems Inc. Cat # 402-ML) was added and the plates were incubated for 15 minutes at 37°C.

[0221] The plates were then centrifuged for 5 minutes at 1000 rpm, the supernatant was aspirated and 50 μl of 3.7% formaldehyde in phosphate buffered saline (PBS) was added per well. The plates were incubated for 5 minutes at room temperature on a plate shaker. The plates were again centrifuged at 1000 rpm for 5 minutes. The supernatant was aspirated, 50 μl of 90% methanol was added to each well, and the plate was incubated on ice for 30 minutes. The supernatant was aspirated and the plate washed with PBS. 25 μl per well of 1:10 diluted Phospho STAT-5 (Y694) PE conjugated antibody (PS-5 PE antibody; Becton-Dickinson Cat. # 61256) was added to the plates and the plates were incubated for 45 minutes at room temperature on a plate shaker. 100 μl PBS was added and the plates were centrifuged. The supernatant was aspirated and the cells resuspended in 100 μl PBS. The plate was then read on a 96 well FACS reader (Guava PCA-96).

[0222] Compounds of the invention were found to inhibit JAK3 in this assay.

Example 6: JAK2 Cellular Inhibition Assay

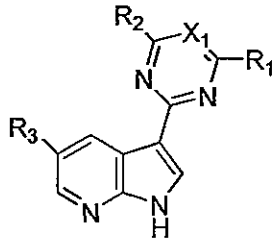
[0223] TF-1 cells (ATCC Cat. # CRL-2003) were grown and maintained at 37°C in a humidified incubator in cell culture medium (RPMI 1640 supplemented with 2 mM L-glutamine adjusted to contain 1.5 g/L sodium bicarbonate, 4.5 g/L glucose, 10 mM HEPES, 1.0 mM sodium pyruvate, 10% fetal bovine serum and recombinant human

granulocyte-macrophage colony stimulating factor [rhGMCSF, R&D Systems Inc. Cat. # 215-GM]). On the day of the experiment, TF-1 cells were washed, resuspended at a density of 5 x 10^6 cells per ml in fresh cell culture medium without rhGMCSF and incubated for 4 hours without rhGMCSF. After four hours, 50 μl (0.25 x 10^6 cells) of the resuspended cells were added to each well of a 96 well plate. Serial dilutions of compounds were made in DMSO and then added to RPMI. 100 μl of the diluted compounds were added to each well and the plates were incubated for 1 hour at 37°C. 50 μl of rhGMCSF at 10ng/ml was added and the plates were incubated for 15 minutes at 37°C. The plates were then processed for FACS analysis as detailed above in Example 5. Compounds of the invention were found to inhibit JAK2 in this cellular assay.

[0224] While we have described a number of embodiments of this invention, it is apparent that our basic examples may be altered to provide other embodiments which utilize the compounds and methods of this invention. Therefore, it will be appreciated that the scope of this invention is to be defined by the appended claims rather than by the specific embodiments that have been represented by way of example above.

CLAIMS

1. A compound of formula (I):



I

or a pharmaceutically acceptable salt thereof, wherein:

R^3 is H;

X^1 is N or CR^4;

R^2 is H, F, R', OH, OR', COR', COOH, COOR', $CONH_2$, CONHR', $CON(R')_2$, or CN;

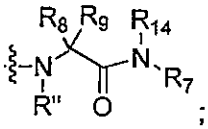
R^4 is H, F, R', OH, OR', COR', COOH, COOR', $CONH_2$, CONHR', $CON(R')_2$, or CN;

or R^2 and R^4, taken together, form a 5-7 membered aryl or heteroaryl ring optionally substituted with 1-4 occurrences of R^{10};

R' is a C_{1-3} aliphatic optionally substituted with 1-4 occurrences of R^5;

each R^5 is independently selected from halogen, CF_3, OCH_3, OH, SH, NO_2, NH_2, SCH_3, NCH_3, CN or unsubstituted C_{1-2} aliphatic, or two R^5 groups, together with the carbon to which they are attached, form a cyclopropyl ring or C=O;

each R^{10} is independently selected from halogen, OCH_3, OH, NO_2, NH_2, SH, SCH_3, NCH_3, CN or unsubstituted C_{1-2}aliphatic;

R^1 is ;

R" is H or is a C_{1-2} aliphatic optionally substituted with 1-3 occurrences of R^{11};

each R^{11} is independently selected from halogen, OCH_3, OH, SH, NO_2, NH_2, SCH_3, NCH_3, CN, $CON(R^{15})_2$ or unsubstituted C_{1-2} aliphatic, or two R^{11} groups, together with the carbon to which they are attached, form a cyclopropyl ring or C=O;

each R^{12} is independently selected from halogen, OCH_3, OH, NO_2, NH_2, SH, SCH_3, NCH_3, CN or unsubstituted C_{1-2}aliphatic, or two R^{12} groups, together with the carbon to which they are attached, form a cyclopropyl ring;

R^8 is C_{1-4} aliphatic optionally substituted with 1-5 occurrences of R^{12};

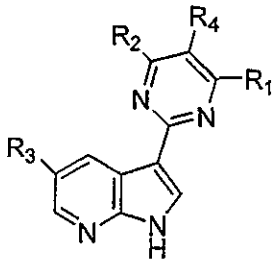
R^9 is unsubstituted C_{1-2} alkyl; or

R^{14} is H or unsubstituted C_{1-2} alkyl;

R^{15} is H or unsubstituted C_{1-2} alkyl; and

R^7 is a C_{2-3} aliphatic or cycloaliphatic optionally substituted with up to 6 occurrences of F.

2. The compound according to claim 1, wherein the compound has formula I-A:



I-A.

3. The compound according to either of claims 1 or 2, wherein R^2 is H, F, R', OH or OR'.

4. The compound according to claim 3, wherein R^2 is H or F.

5. The compound according to any one of claims 2-4, wherein the compound is of formula **I-A** and R^4 is H, F, R', OH or OR', or R^2 and R^4 are taken together to form a 6-membered aryl ring.

6. The compound according to claim 5, wherein R^4 is H or F.

7. The compound according to claim 6, wherein if R^4 is F, then R^2 is H and if R^2 is F, then R^4 is H.

8. The compound according to claim 6, wherein R^2 and R^4 are both H.

9. The compound according to any one of claims 1-8, wherein R^7 is CH_2CH_3, CH_2CF_3, CH_2CHF_2, CH_2CH_2F, $CH_2CH_2CH_3$, $CH_2CH_2CF_3$, $CH_2CH_2CH_2F$ or $CH_2CH_2CHF_2$.

10. The compound according to claim 9, wherein R^7 is CH_2CH_3, CH_2CF_3, $CH_2CH_2CH_3$ or $CH_2CH_2CF_3$.

11. The compound according to claim 10, wherein R^7 is CH_2CF_3.

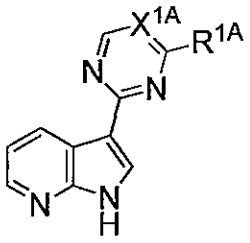
12. The compound according to any one of claims 1-11, wherein R" is H or CH_3.

13. The compound according to claim 12, wherein R" is H.

14. The compound according to any one of claims 1-13, wherein R^{14} is H.

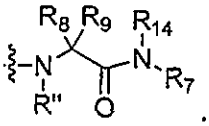
15. The compound according to any one of claims 1-14, wherein R^{15} is H.

16. The compound according to claim 1, wherein the compound is of formula **III**:



III,

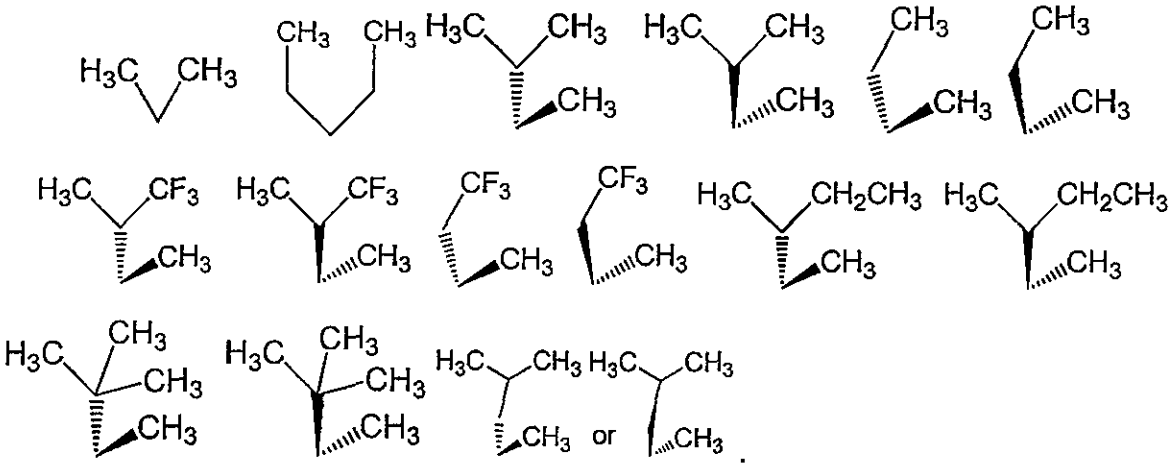
wherein X^{1A} is N, CH or CF and R^{1A} is



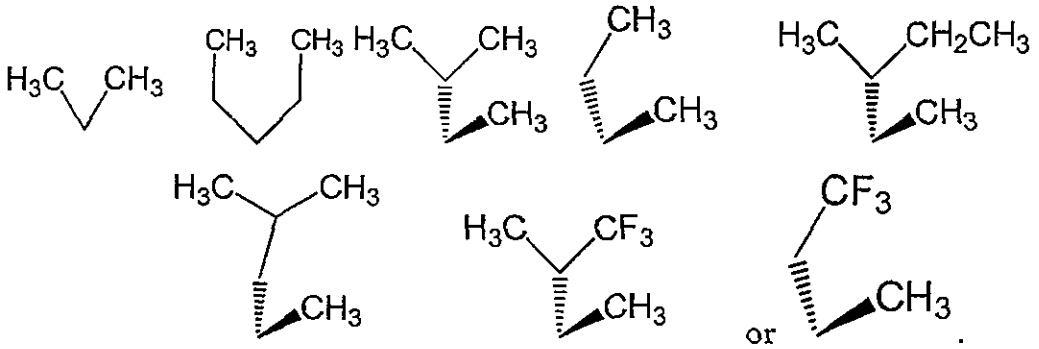
17. The compound according to claim 16, wherein R^7 is CH_2CH_3, CH_2CF_3, $CH_2CH_2CH_3$ or $CH_2CH_2CF_3$.

18. The compound according to claim 17, wherein R^7 is CH_2CF_3.

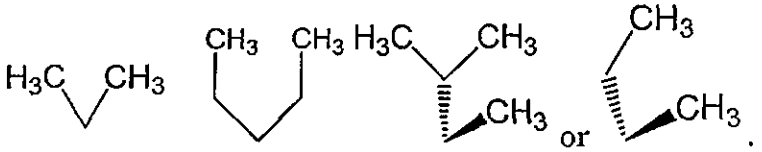
19. The compound according to any one of claims 1-18, wherein R^8, R^9, and the carbon atom to which they are attached form



20. The compound according to claim 19, wherein R^8, R^9, and the carbon atom to which they are attached form

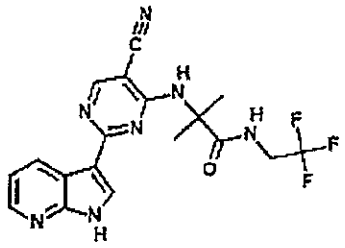
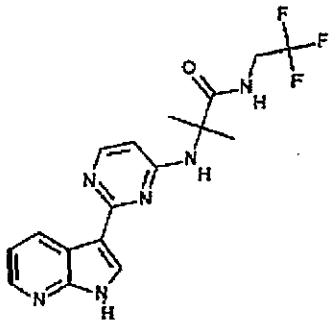
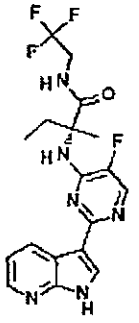
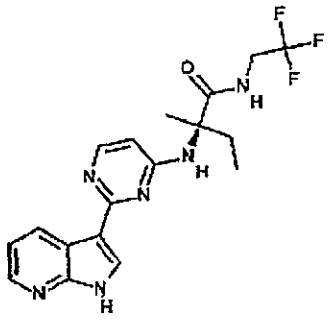
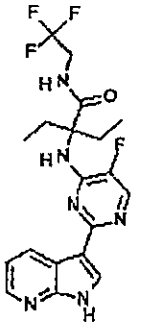
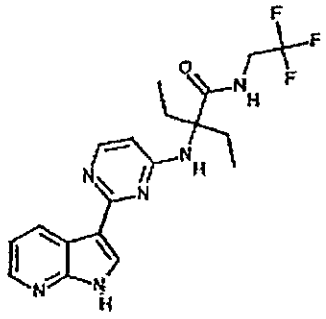
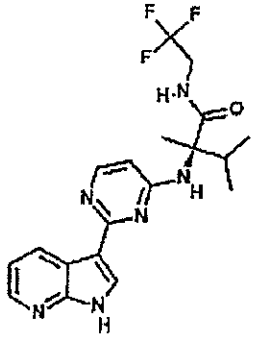


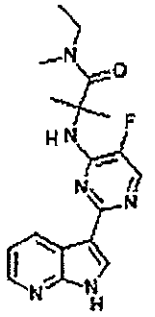
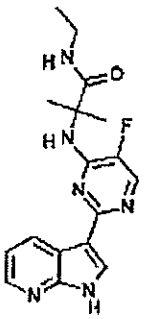
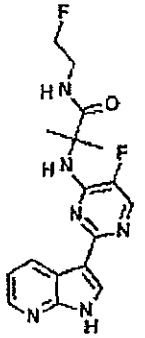
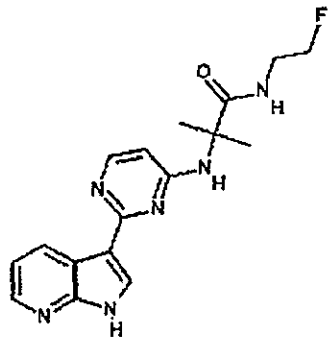
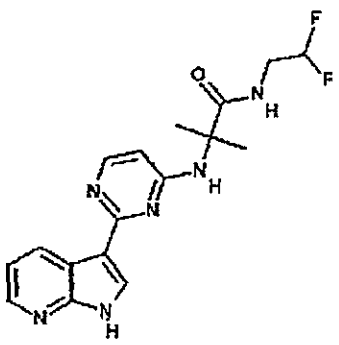
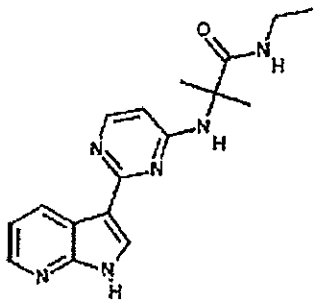
21. The compound according to claim 20, wherein R^8, R^9, and the carbon atom to which they are attached form

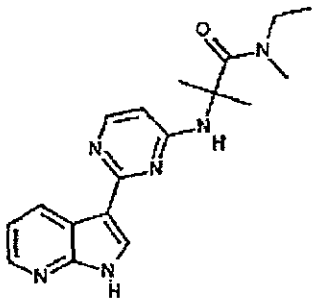
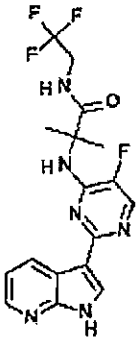
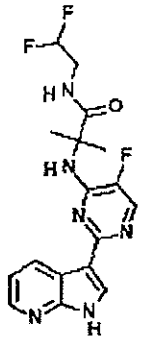
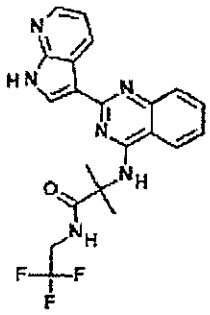
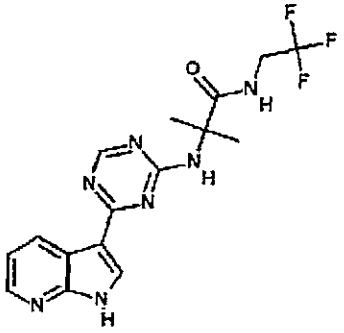
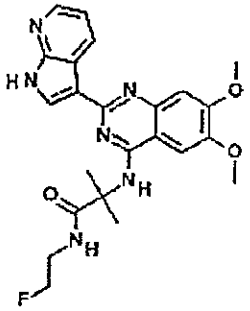
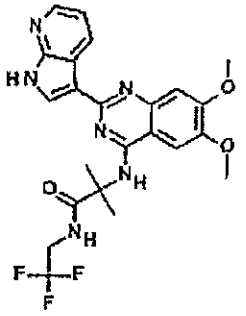
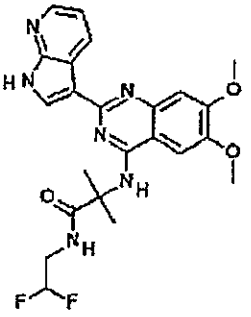


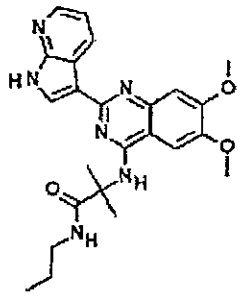
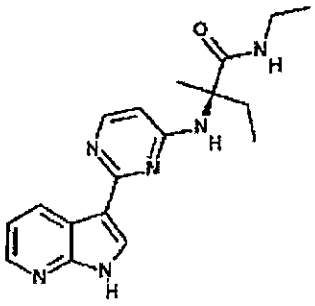
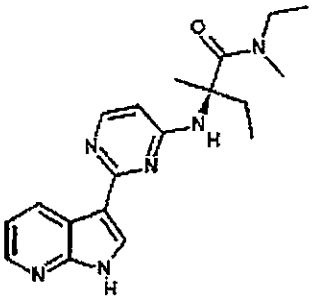
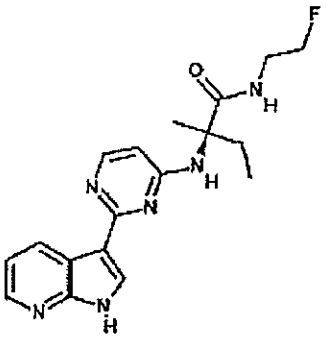
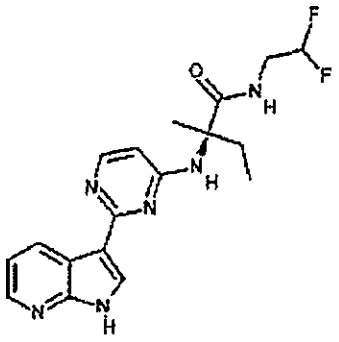
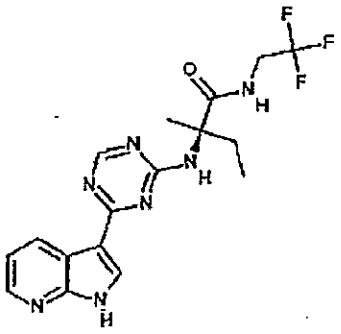
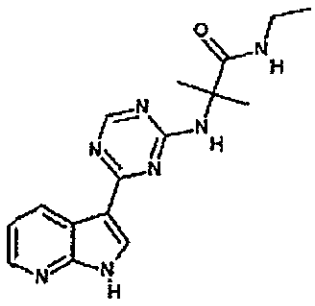
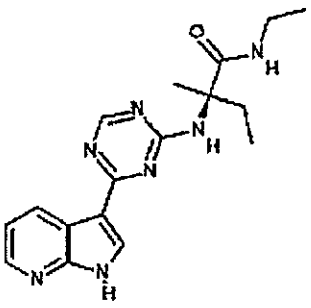
22. The compound according to any one of claims 16-21, wherein X^{1A} is CH or CF.

23. A compound selected from

	328	343
		
345	346	347
		
348	350	
		

362	363	364
		
376	377	378
		

379	380	381
		
382	386	
		
388	389	390
		

391	392	393
		
394	395	398
		
399	400	
		

24. A pharmaceutical composition comprising a compound according to any one of claims 1-18 or 19-23 and a pharmaceutically acceptable carrier, adjuvant, or vehicle.

25. The composition according to claim 24, additionally comprising a therapeutic agent selected from a chemotherapeutic or anti-proliferative agent, an anti-inflammatory agent, an immunomodulatory or immunosuppressive agent, a neurotrophic factor, an agent for

treating cardiovascular disease, an agent for treating destructive bone disorders, an agent for treating liver disease, an anti-viral agent, an agent for treating blood disorders, an agent for treating diabetes, or an agent for treating immunodeficiency disorders.

26. A method of inhibiting JAK kinase activity in an in vitro biological sample, comprising contacting said biological sample with a compound according to any one of claims 1-18 or 19-23 or with a composition according to either of claims 24 or 25.

27. A compound according to any one of claims 1-18 or 19-23 or a pharmaceutical composition according to either of claims 24 or 25 for use in the treatment of a disease or condition selected from a proliferative disorder, a cardiac disorder, a neurodegenerative disorder, an autoimmune disorder, a condition associated with organ transplantation, an inflammatory disorder, or an immunologically mediated disorder in a patient.

28. The compound or pharmaceutical composition according to claim 27, wherein the disease or disorder is selected from an allergic or type I hypersensitivity reactions, asthma, diabetes, Alzheimer's disease, Huntington's disease, Parkinson's disease, AIDS-associated dementia, amyotrophic lateral sclerosis (AML, Lou Gehrig's disease), multiple sclerosis (MS), schizophrenia, cardiomyocyte hypertrophy, reperfusion/ischemia, stroke, baldness, transplant rejection, graft versus host disease, rheumatoid arthritis, a solid malignancy, a hematologic malignancy, a leukemia, a lymphoma and a myeloproliferative disorder.

29. The compound or pharmaceutical composition of claim 28, wherein said disease or disorder is asthma.

30. The compound or pharmaceutical composition of claim 28, wherein said disease or disorder is transplant rejection.

31. The compound or pharmaceutical composition of claim 28, wherein said disease or disorder is rheumatoid arthritis.

32. The compound of claim 23, wherein the compound is

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