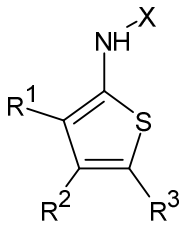
## CLAIMS

1. A compound of structural formula **I** or a pharmaceutically acceptable salt thereof,



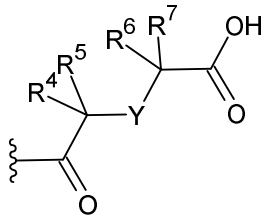
(**I**)

wherein,

$R^1$ is selected from hydrogen, cyano, and 5-membered heteroaryl ring;

$R^2$ and $R^3$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, cyclobutyl, phenyl, trifluoromethyl, and benzyl, or $R^2$ and $R^3$ together form a 5- to 8-membered monocyclic, bicyclic, or spirocyclic carbocycle or heterocycle ring, or a 5- to 8-membered aryl or heteroaryl ring, wherein the carbocycle, heterocycle, aryl, or heteroaryl ring is optionally substituted with one or two substituents selected from $C_1$-$C_4$-alkyl, methoxy, or fluoro;

X is a moiety of formula:



wherein,

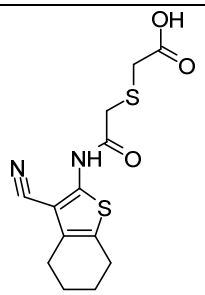
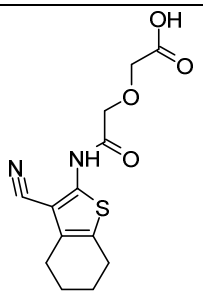
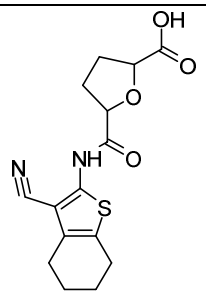
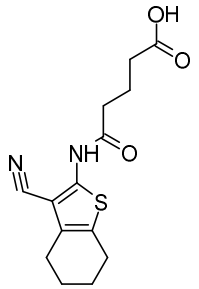
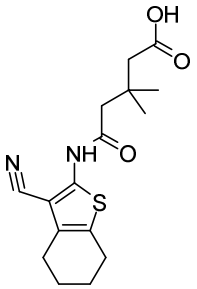
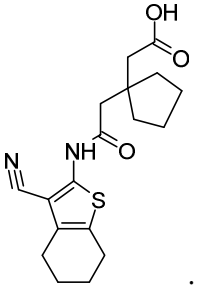
Y is a heteroatom selected from –S–, and –O–, or is $–CR^8R^9–$, wherein $R^8$ and $R^9$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, phenyl, and benzyl, or $R^8$ and $R^9$ together form a cyclopropyl, cyclobutyl, cyclopentyl, or oxetanyl ring;

$R^4$, $R^5$, $R^6$ and $R^7$ is each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, phenyl, and benzyl, and/or

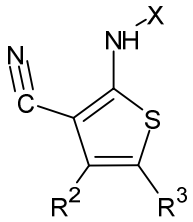
$R^4$ and $R^5$ together or $R^6$ and $R^7$ together form a cyclopropyl ring or a cyclobutyl ring, or

$R^5$ and $R^6$ together form a 5- to 6-membered carbocyclic or heterocyclic ring with Y as a member of the ring;

with the proviso that the compound of structural formula **I** excludes the following compounds:

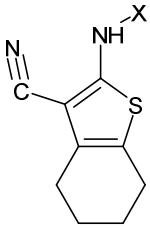
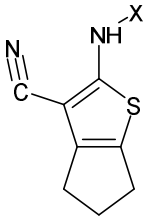
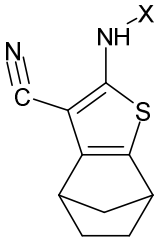
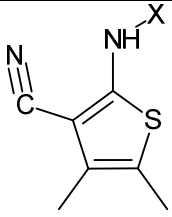
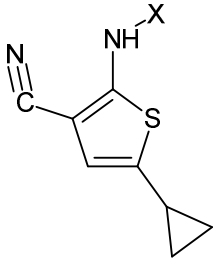
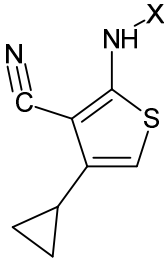
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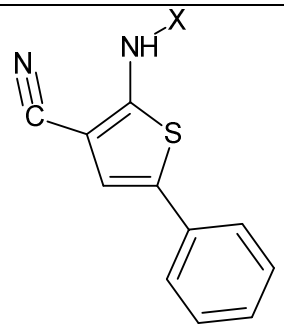
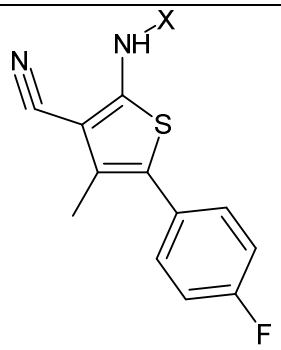
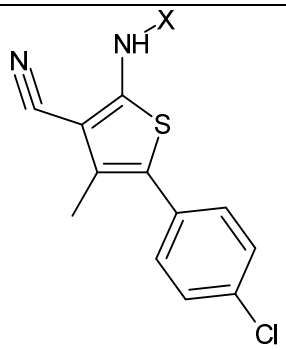
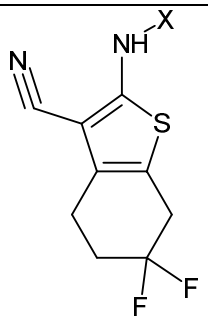
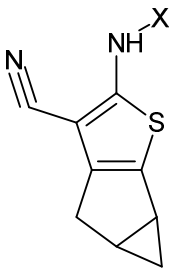
2. The compound of claim 1, wherein the compound has a structural formula **Ia**:



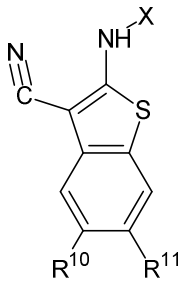
**(Ia)**;

optionally, wherein the compound has a structural formula selected from **Ij, Ik, Il, Im, In, Io, Ip, Iq, Ir, Is,** and **It**:

| | | |
|---|---|---|
|  **(Ij)** |  **(Ik)** |  **(Il)** |
|  **(Im)** |  **(In)** |  **(Io)** |

| | | |
|---|---|---|
|  **(Ip)** |  **(Iq)** |  **(Ir)** |
|  **(Is)** |  **(It).** | |

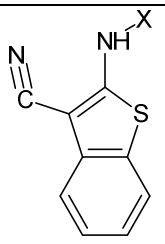
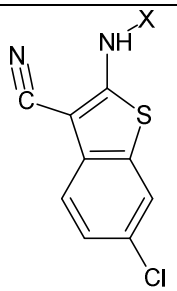
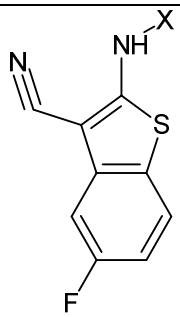
3. The compound of claim 1, wherein the compound has a structural formula selected from **Ib**



**(Ib)**

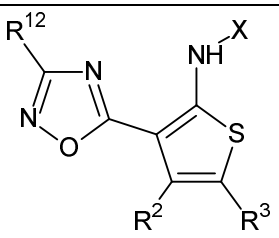
wherein $R^{10}$ and $R^{11}$ are each independently selected from hydrogen, halogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, and cyclobutyl;

optionally, wherein the compound has a structural formula selected from **Iu, Iv,** and **Iw:**

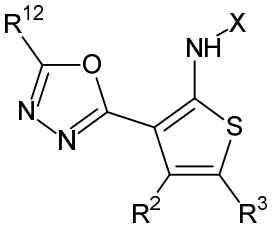
| | | |
|---|---|---|
|  **(Iu)** |  **(Iv)** |  **(Iw).** |

4. The compound of claim 1, wherein $R^1$ is a 5-membered heteroaryl ring, and $R^2$ and $R^3$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, cyclobutyl, phenyl, trifluoromethyl, and benzyl.

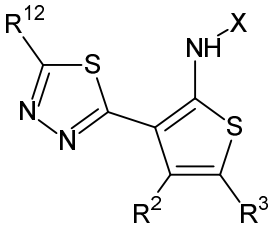
5. The compound of claim 1, wherein the compound has a structural formula selected from formulas **Ic, Id, Ie, If, Ig, Ih,** and **Ii**:



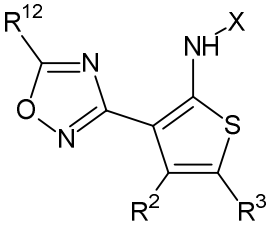
**(Ic)**



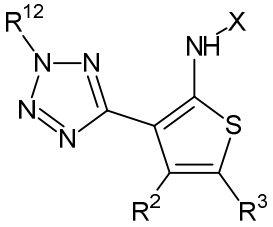
**(Id)**



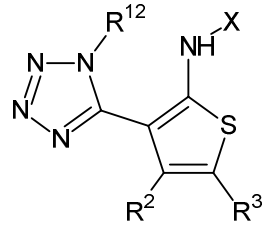
**(Ie)**



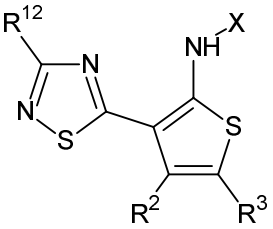
**(If)**



**(Ig)**



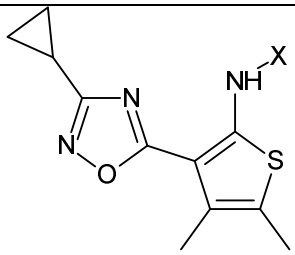
**(Ih)**



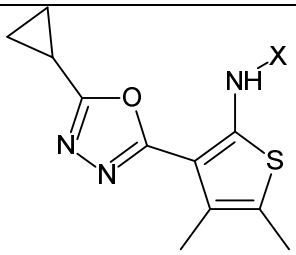
**(Ii)**

wherein $R^{12}$ is selected from hydrogen, halogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, cyclobutyl, phenyl;

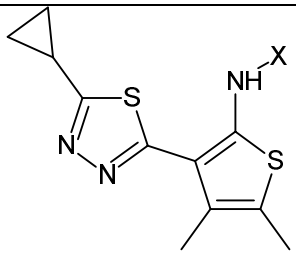
optionally, wherein the compound has a structural formula selected from **Ix, Iy, Iz, Iaa, Ibb, Icc, Idd, Iee, Iff, Igg, Ihh, Iii, Ijj, Ikk, Ill, Imm, Inn, Ioo, Ipp, Iqq,** and **Irr:**



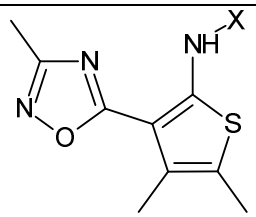
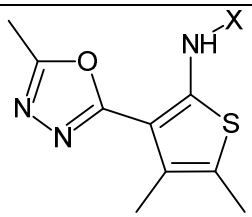
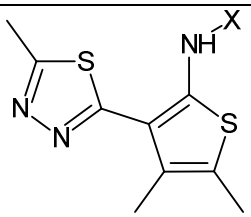
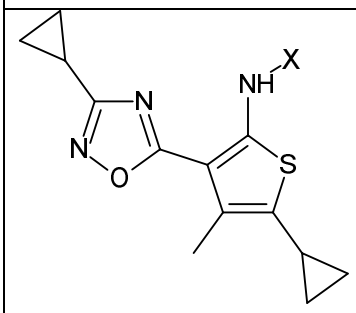
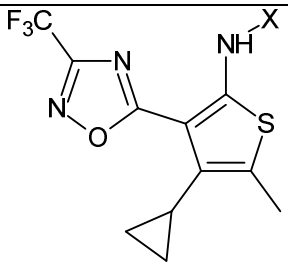
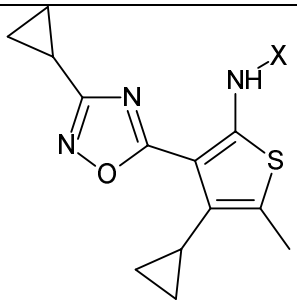
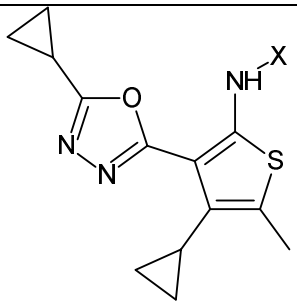
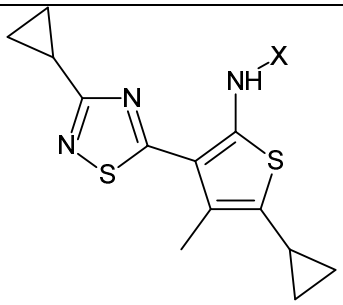
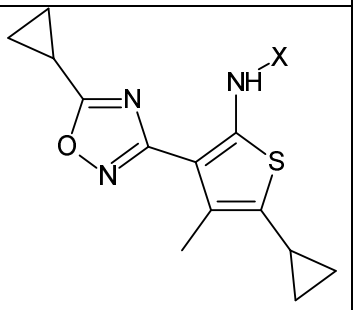
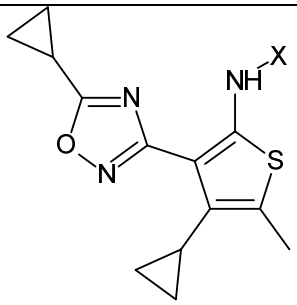
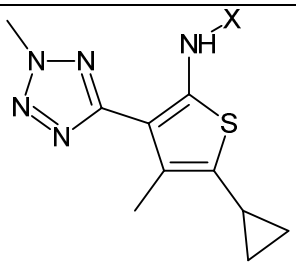
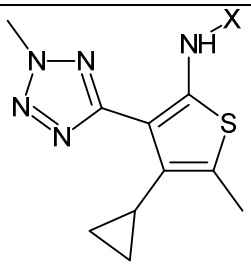
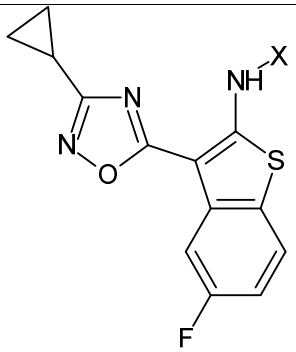
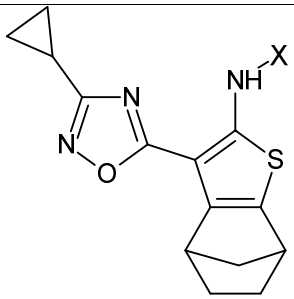
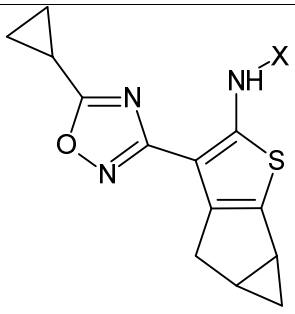
**(Ix)**

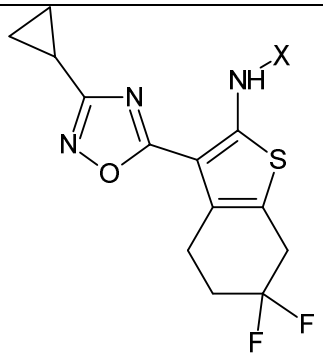
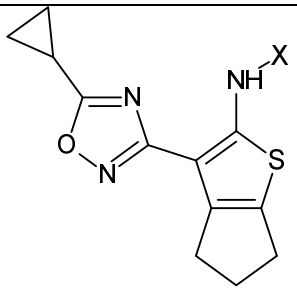
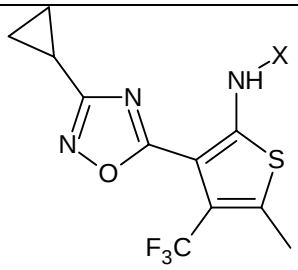


**(Iy)**



**(Iz)**

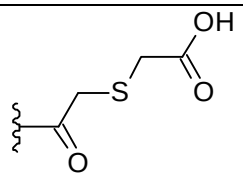
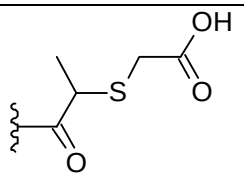
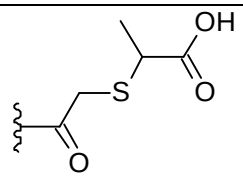
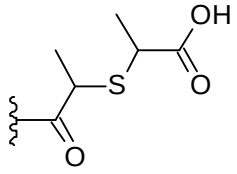
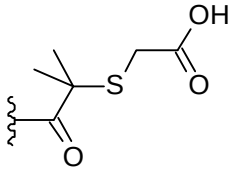
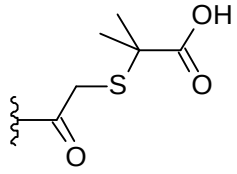
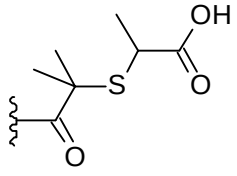
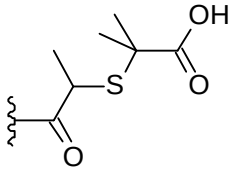
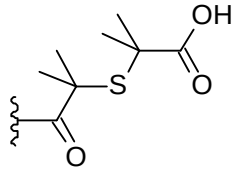
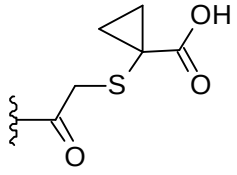
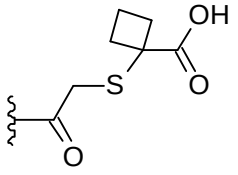
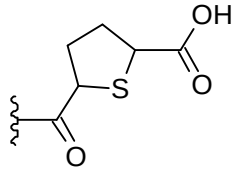
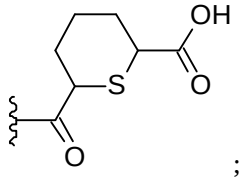
| | | |
|---|---|---|
|  **(Iaa)** |  **(Ibb)** |  **(Icc)** |
|  **(Idd)** |  **(Iee)** |  **(Iff)** |
|  **(Igg)** |  **(Ihh)** |  **(Iii)** |
|  **(Ijj)** |  **(Ikk)** |  **(Ill)** |
|  **(Imm)** |  **(Inn)** |  **(Ioo)** |

| | | |
|---|---|---|
|  **(Ipp)** |  **(Iqq)** |  **(Irr).** |

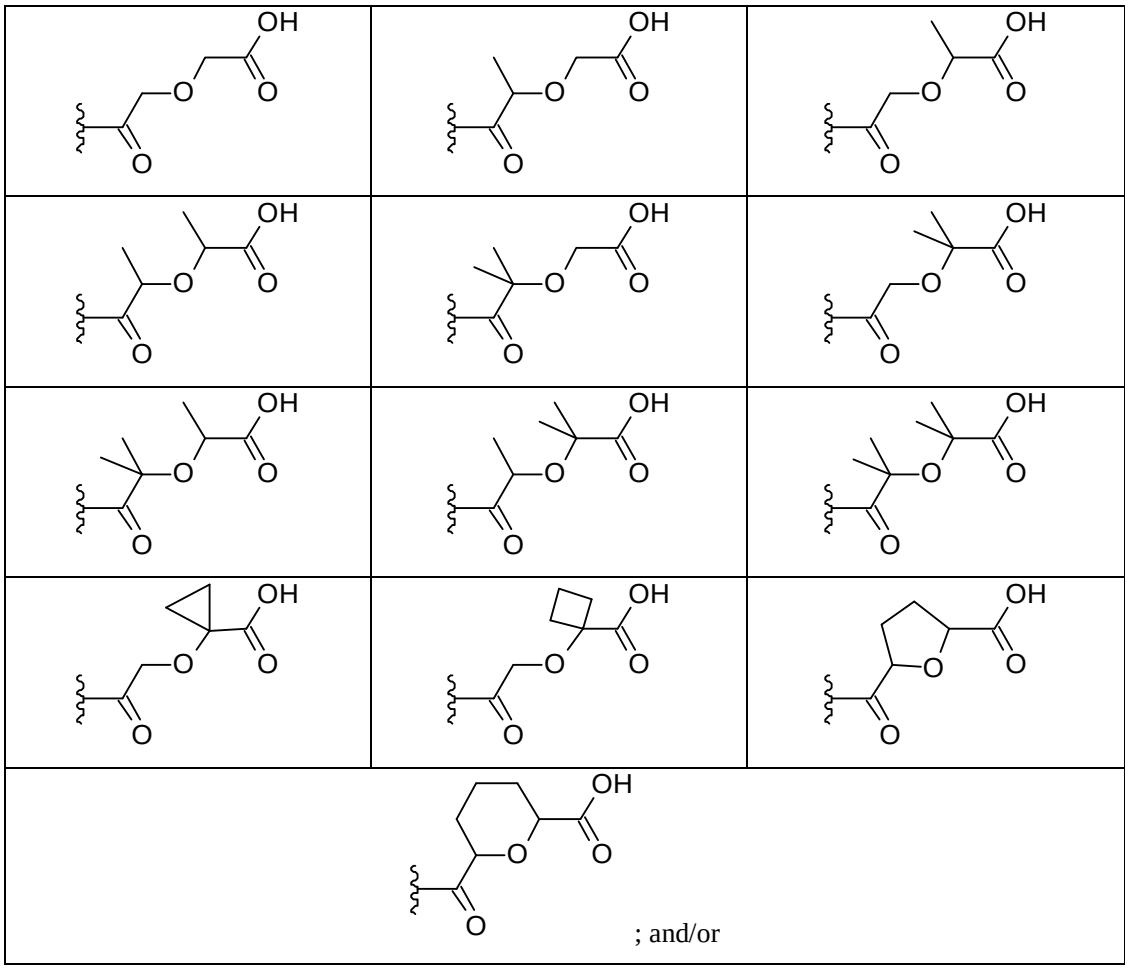
6. The compound of any one of claims 1-5, wherein:

(a) Y is selected from –S– or –O– and $R^4$, $R^5$, $R^6$ and $R^7$ are each independently hydrogen or $C_1$-$C_4$ linear or branched alkyl;

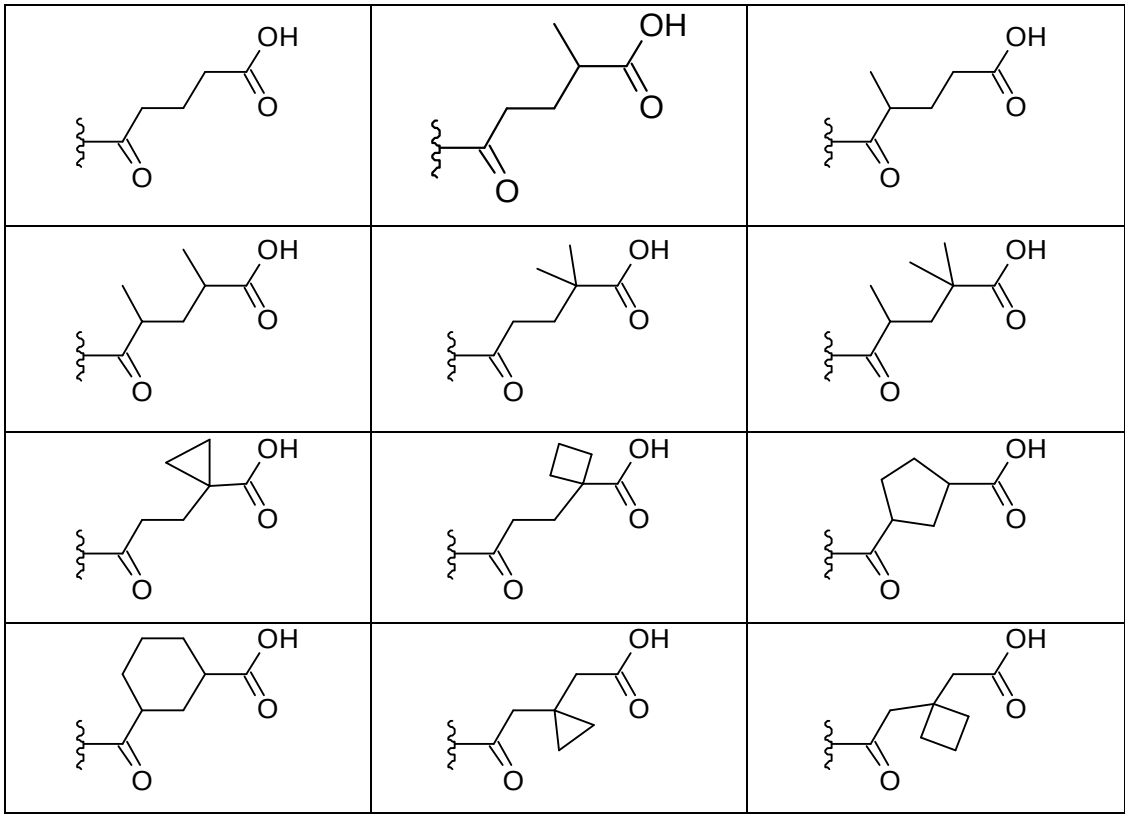
(b) the X moiety is selected from:

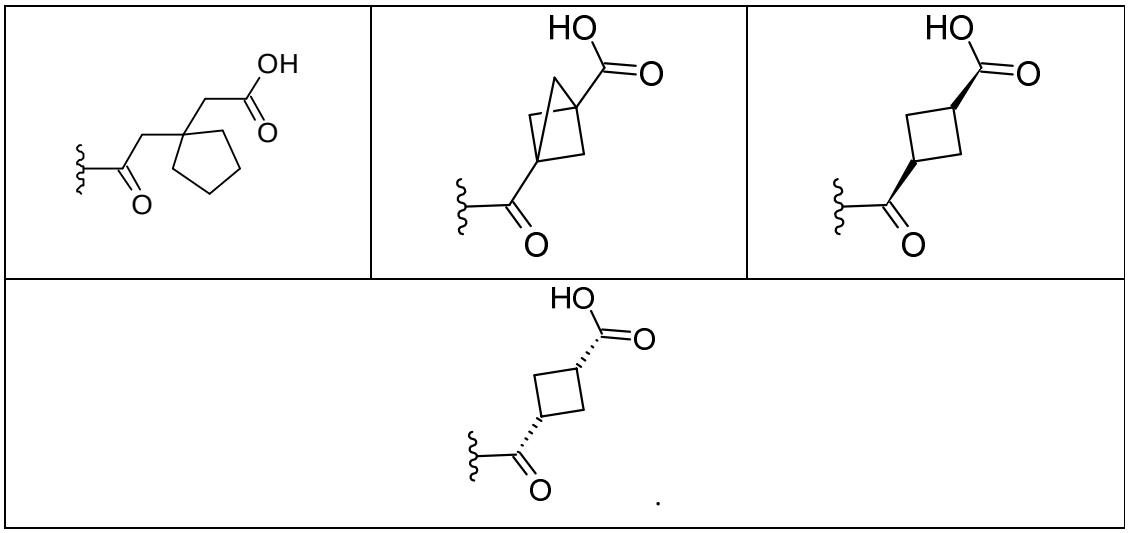
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|  |  |  |
| |  ; | |

(c) the X moiety is selected from:

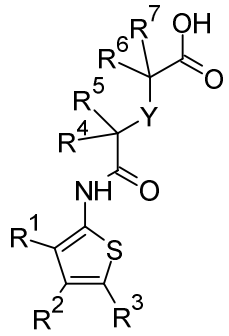



(d) the X moiety is selected from:





7. A compound of structural formula **II** or a pharmaceutically acceptable salt thereof,



(**II**)

wherein,

$R^1$ is selected from hydrogen, cyano, and 5-membered heteroaryl ring;

$R^2$ and $R^3$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, cyclobutyl, phenyl, trifluoromethyl, and benzyl, or $R^2$ and $R^3$ together form a 5- to 8-membered monocyclic, bicyclic, or spirocyclic carbocycle or heterocycle ring, or a 5- to 8-membered aryl or heteroaryl ring, wherein the carbocycle, heterocycle, aryl, or heteroaryl ring is optionally substituted with one or two substituents selected from $C_1$-$C_4$-alkyl, methoxy, or fluoro;

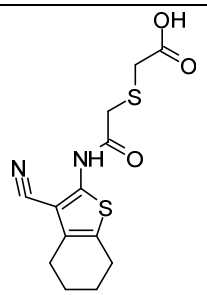
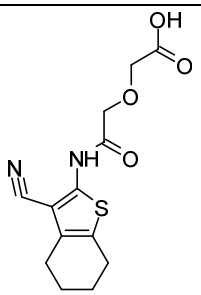
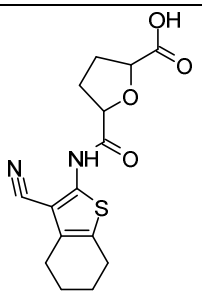
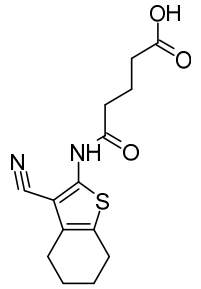
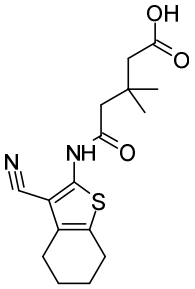
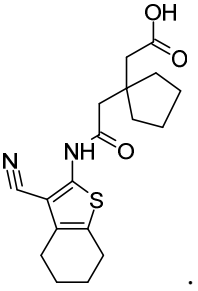
Y is a heteroatom selected from –S–, and –O–, or is $–CR^8R^9–$, wherein $R^8$ and $R^9$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, phenyl, and benzyl, or $R^8$ and $R^9$ together form a cyclopropyl, cyclobutyl, cyclopentyl, or oxetanyl ring;

$R^4$, $R^5$, $R^6$ and $R^7$ is each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, phenyl, and benzyl, and/or

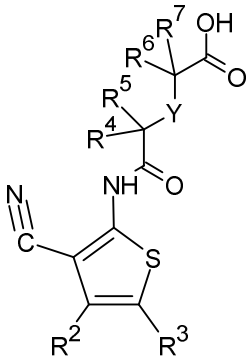
$R^4$ and $R^5$ together or $R^6$ and $R^7$ together form a cyclopropyl ring or a cyclobutyl ring, or

$R^5$ and $R^6$ together form a 5- to 6-membered carbocyclic or heterocyclic ring with Y as a member of the ring;

with the proviso that the compound of structural formula **II** excludes the following compounds:

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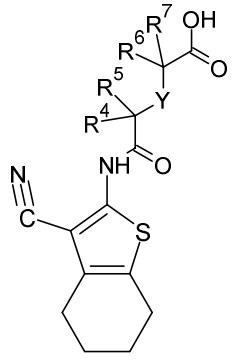
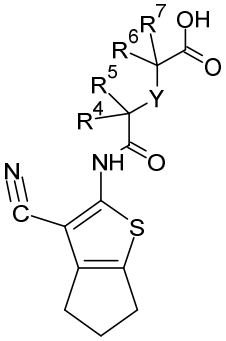
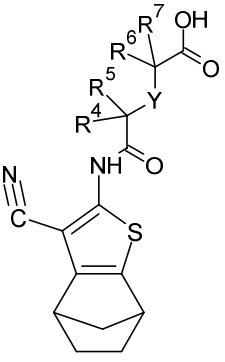
8. The compound of claim 7, wherein the compound has a structural formula **IIa**:

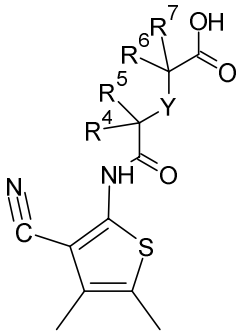
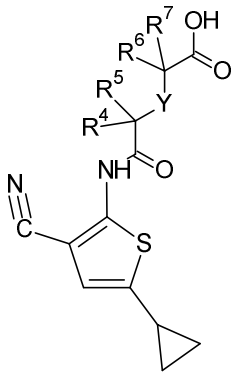
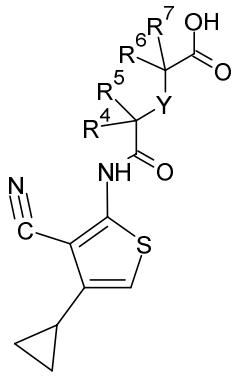
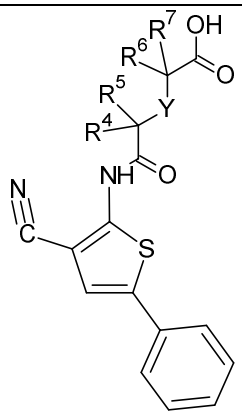
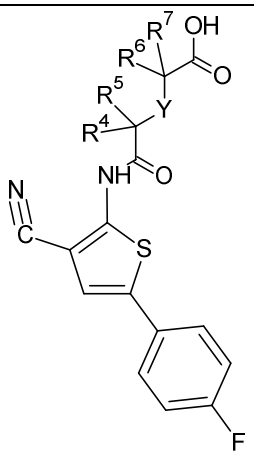
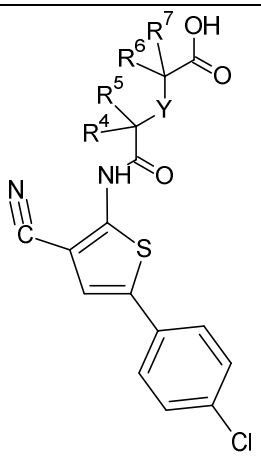
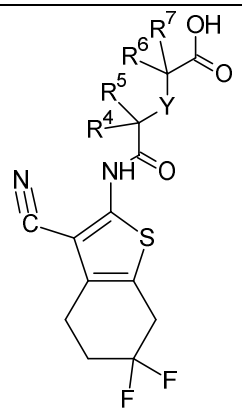
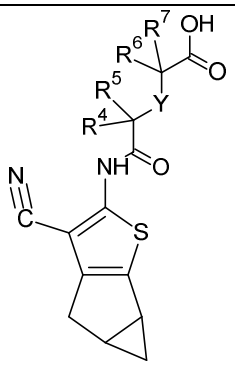


**(IIa)**

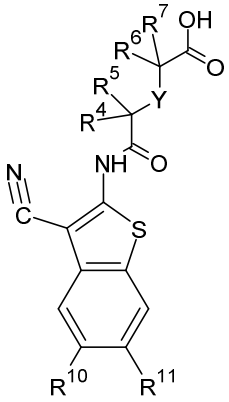
wherein the chemical groups $R^2$, $R^3$, $R^4$, $R^5$, $R^6$ and $R^7$ are as defined for the compound of structural formula **II**;

optionally, wherein the compound has a structural formula selected from **IIj, IIk, IIl, IIm, IIn, IIo, IIp, IIq, IIr, IIs**, and **IIt**:

| | | |
|---|---|---|
|  |  |  |

| (IIj) | (IIk) | (III) |
|---|---|---|
|  (IIm) |  (IIn) |  (IIo) |
|  (IIp) |  (IIq) |  (IIr) |
|  (IIs) |  (IIt). | |

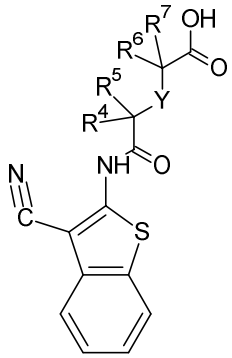
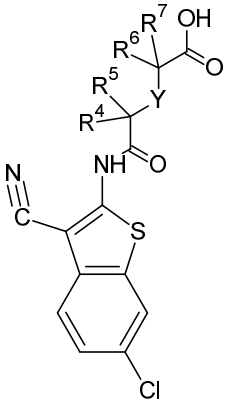
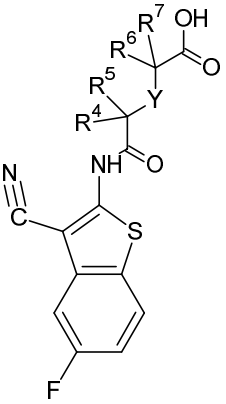
9. The compound of claim 7, wherein the compound has a structural formula **IIb**:



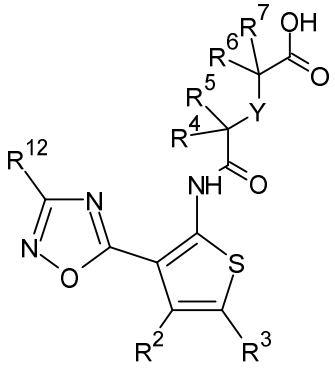
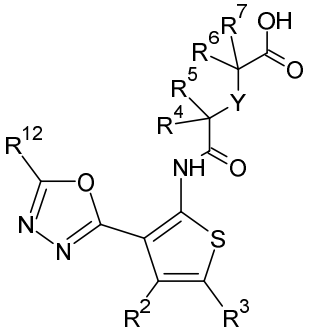
**(IIb)**

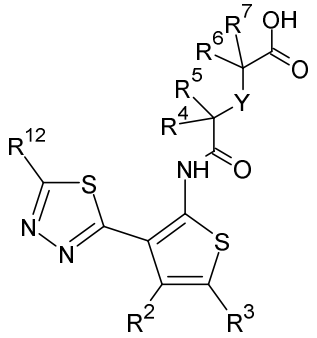
wherein the chemical groups $R^2$, $R^3$, $R^4$, $R^5$, $R^6$ and $R^7$ are as defined for the compound of structural formula **II**, and $R^{10}$ and $R^{11}$ are each independently selected from hydrogen, halogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, and cyclobutyl;

optionally, wherein the compound has a structural formula selected from **IIu, IIv,** and **IIw**

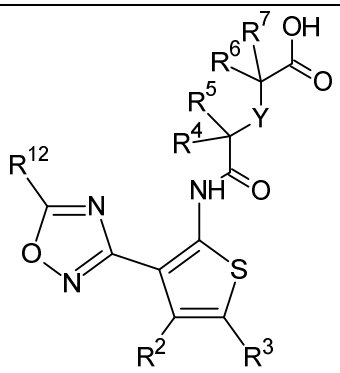
| | | |
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|  **(IIu)** |  **(IIv)** |  **(IIw).** |

10. The compound of claim 7, wherein the compound has a structural formula selected from formulas **IIc, IId, IIe, IIf, IIg, IIh,** and **IIi:**

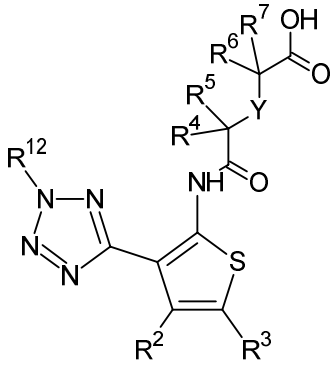
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|  **(IIc)** |  (**IId**) |



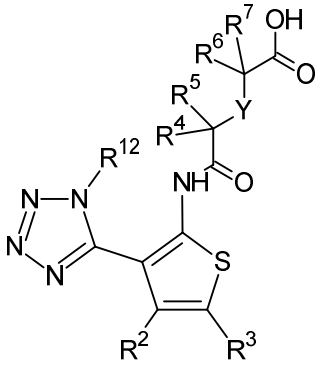
(**IIe**)



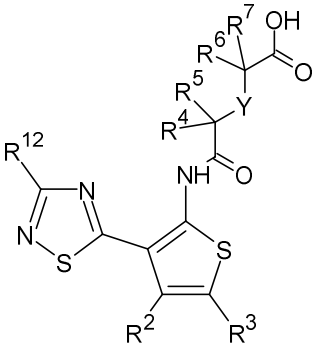
**(IIf)**



**(IIg)**

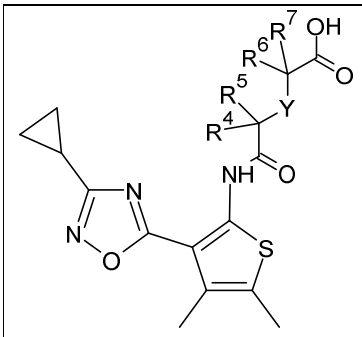
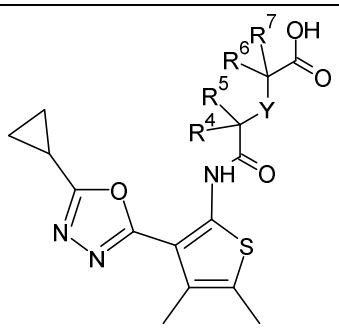
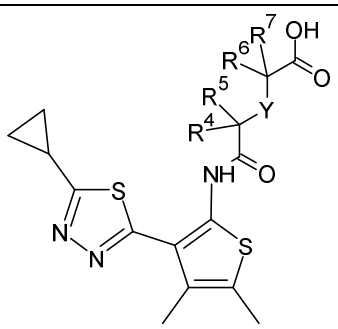
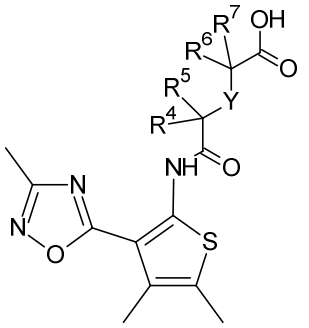
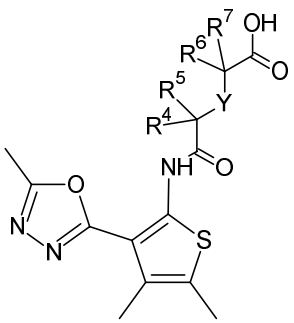
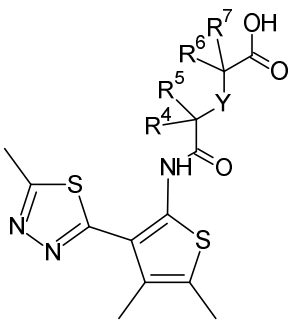
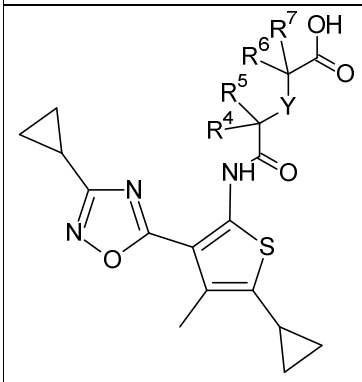
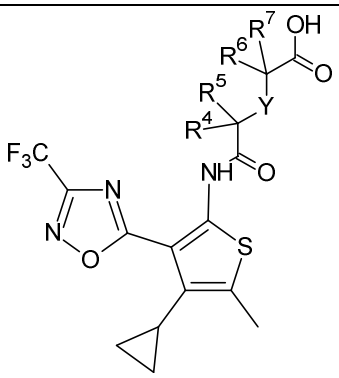
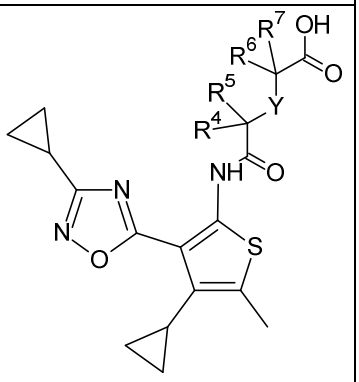
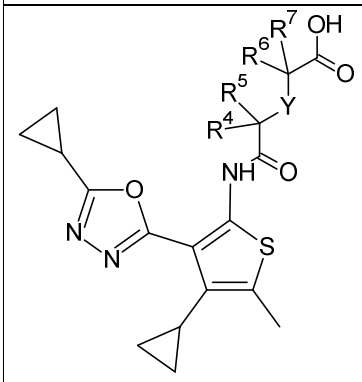
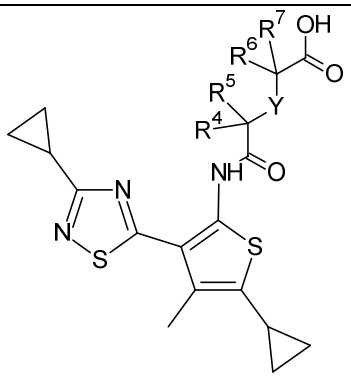
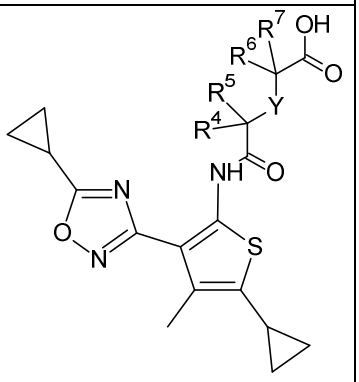


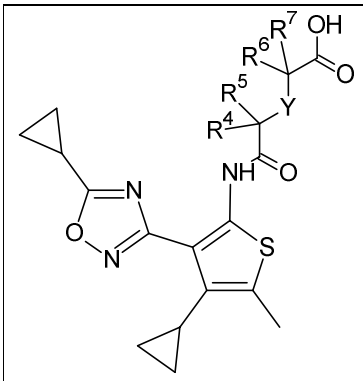
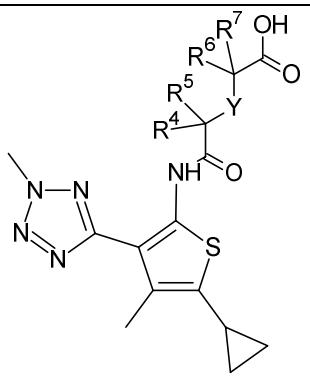
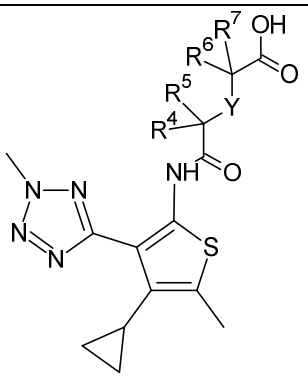
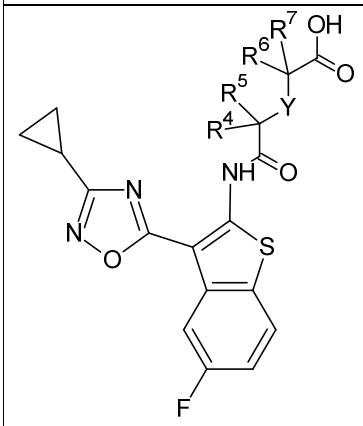
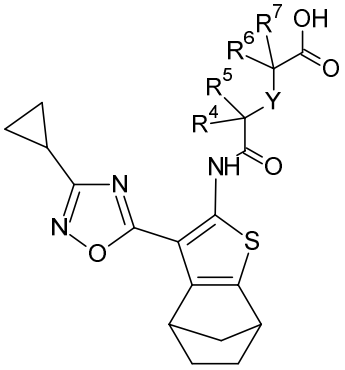
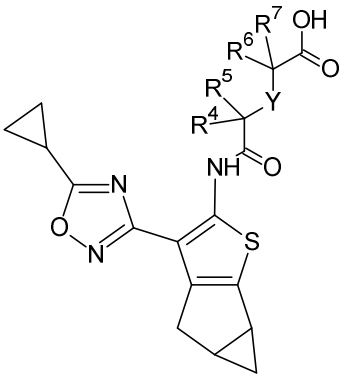
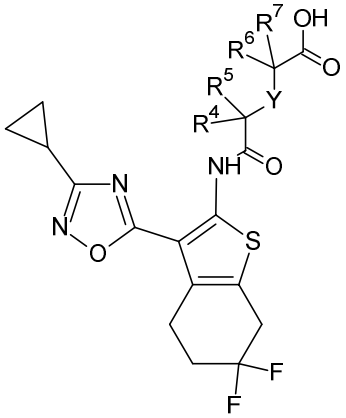
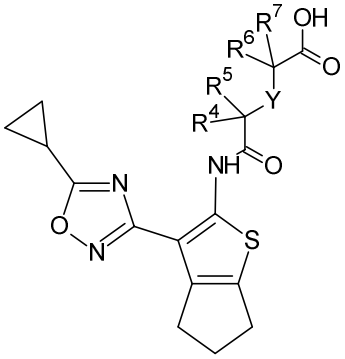
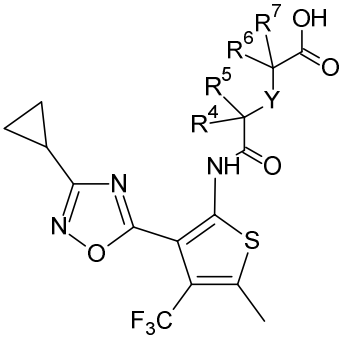
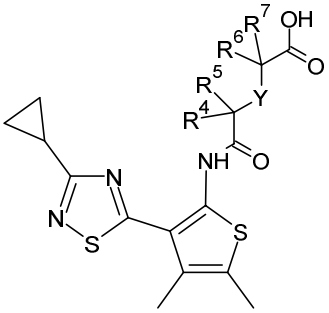
**(IIh)**



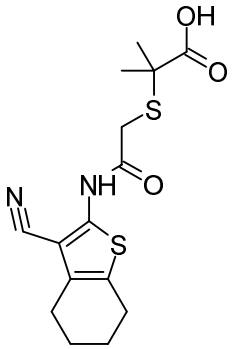
(**IIi**)

wherein $R^2$, $R^3$, $R^4$, $R^5$, $R^6$ and $R^7$ are as defined for the compound of structural formula **II**, and $R^{12}$ in is a hydrogen, halogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, cyclobutyl, or phenyl; optionally, wherein the compound has a structural formula selected from **IIx, IIy, IIz, IIaa, IIbb, IIcc, IIdd, IIee, IIff, IIgg, IIhh, IIii, IIjj, IIkk, IIll, IImm, IInn, IIoo, IIpp, IIqq, IIrr,** and **IIss**:

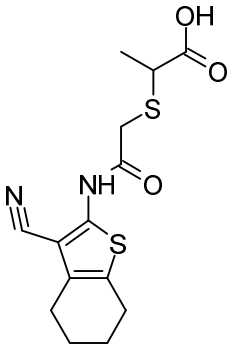
| | | |
|---|---|---|
|  **(IIx)** |  **(IIy)** |  **(IIz)** |
|  **(IIaa)** |  **(IIbb)** |  **(IIcc)** |
|  **(IIdd)** |  **(IIee)** |  **(IIff)** |
|  **(IIgg)** |  **(IIhh)** |  **(IIii)** |

| | | |
|---|---|---|
|  **(IIjj)** |  **(IIkk)** |  **(IIll)** |
|  **(IImm)** |  **(IInn)** |  **(IIoo)** |
|  **(IIpp)** |  **(IIqq)** |  **(IIrr)** |
|  **(IIss).** | | |

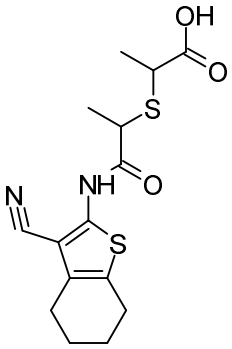
11. The compound of any one of claims 1-10, wherein the compound is selected from compounds **1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64,** and **65**:



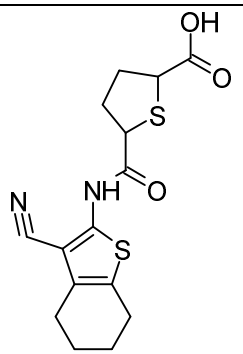
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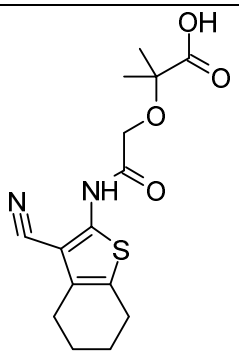
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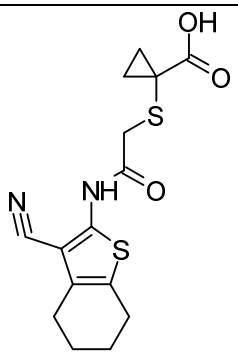
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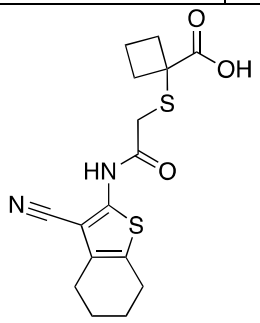
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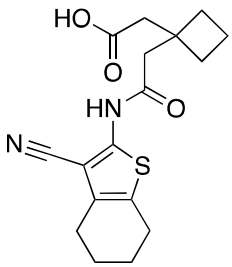
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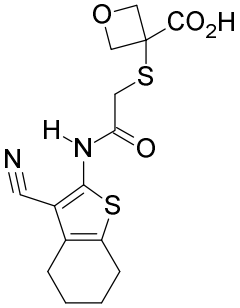
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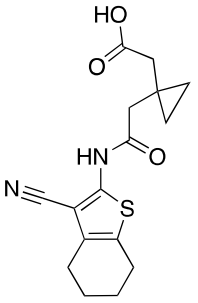
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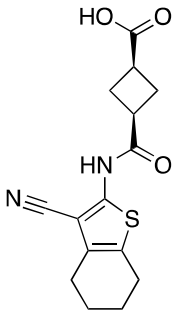
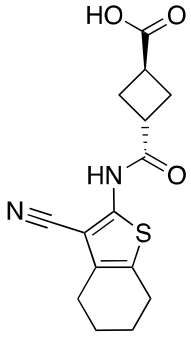
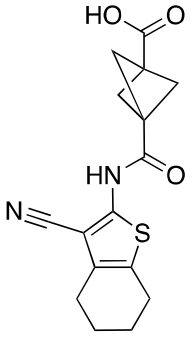
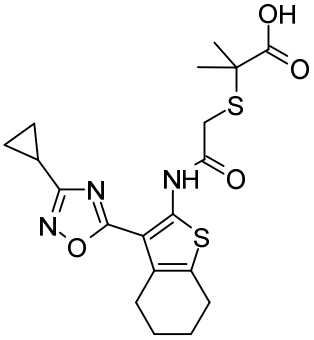
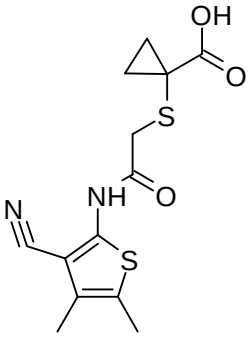
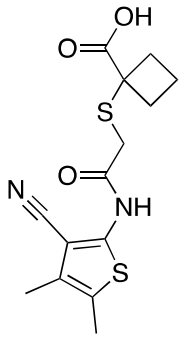
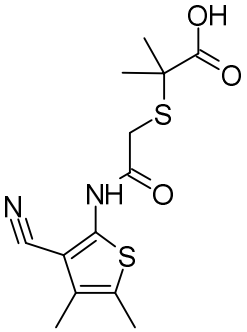
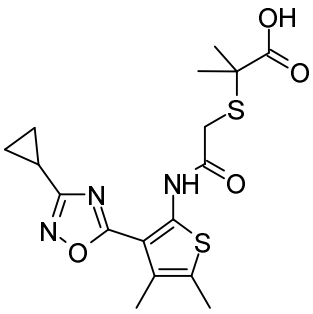
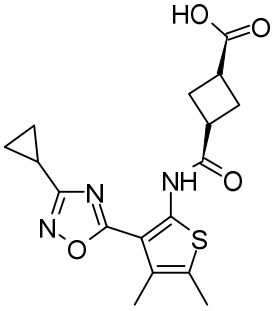
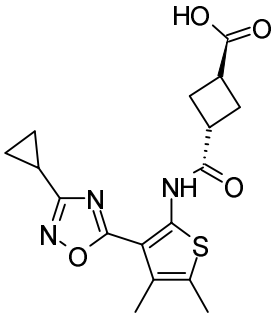
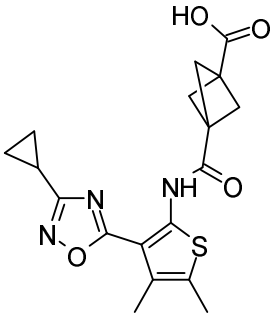
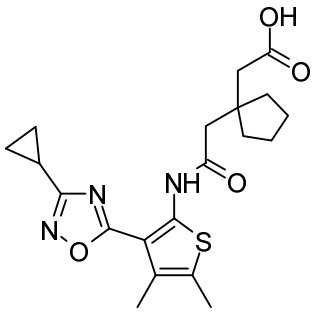
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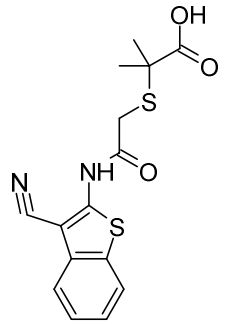
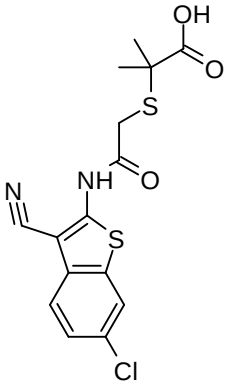
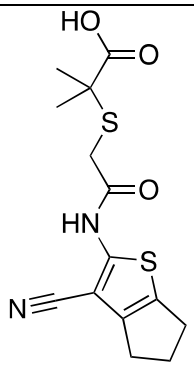
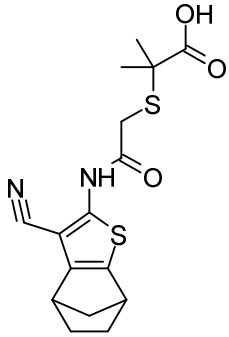
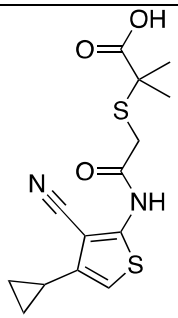
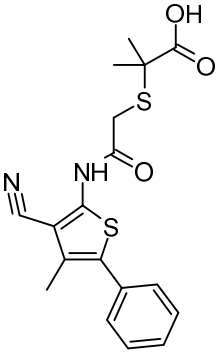
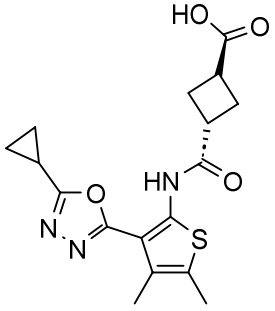
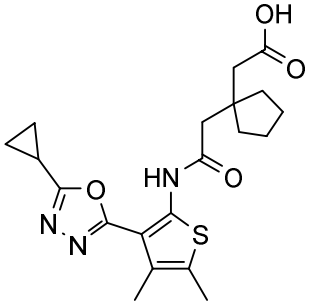
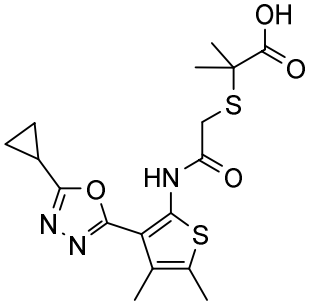
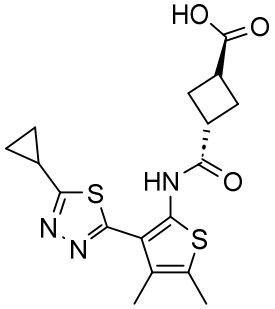
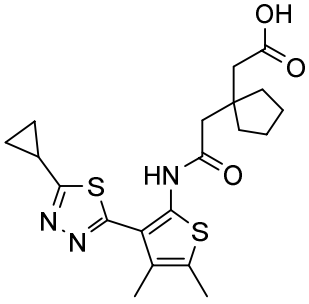
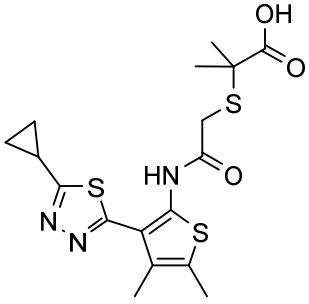


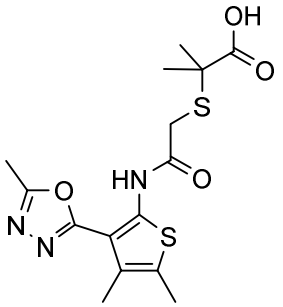
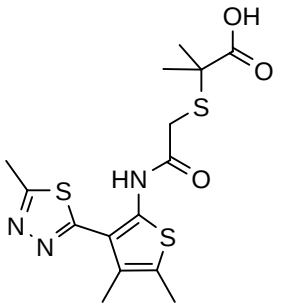
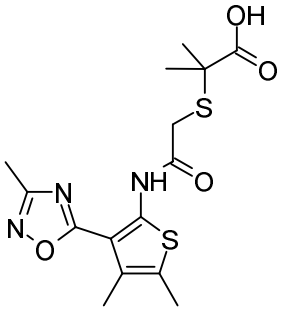
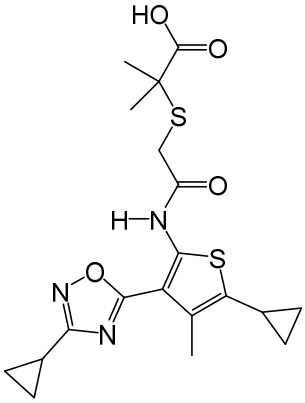
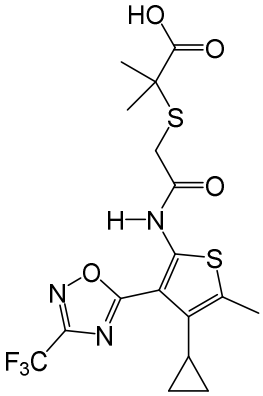
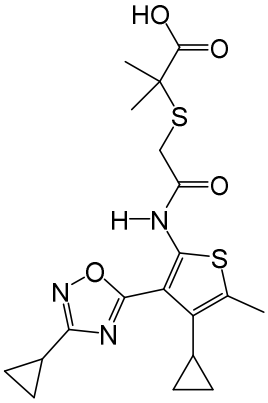
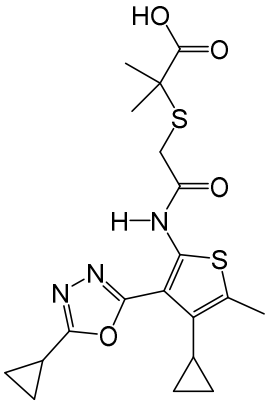
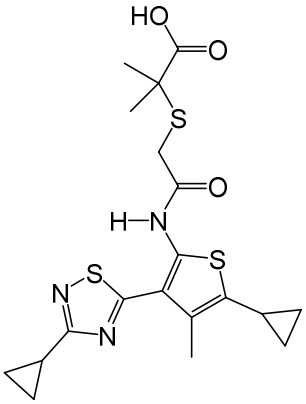
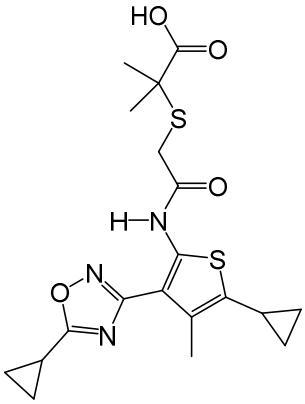
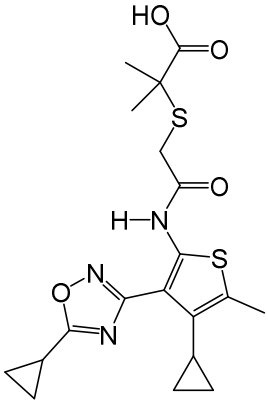
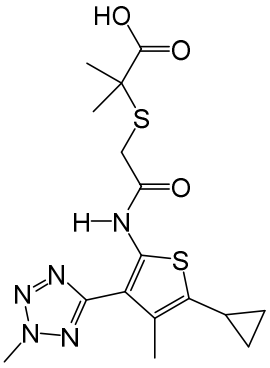
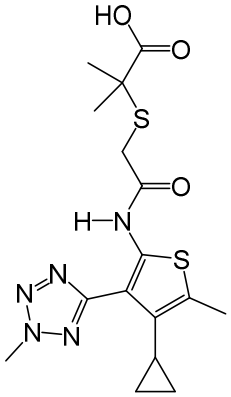
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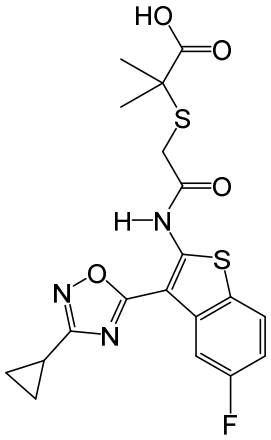
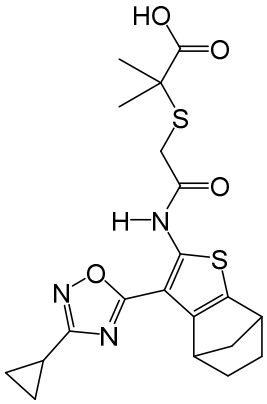
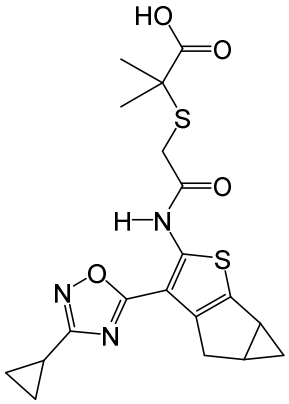
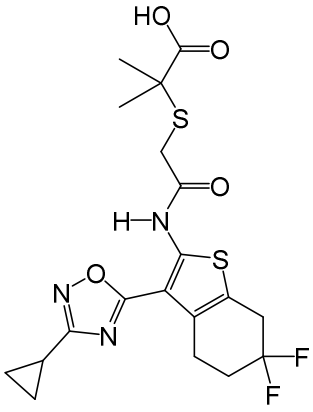
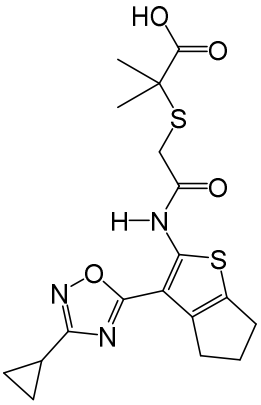
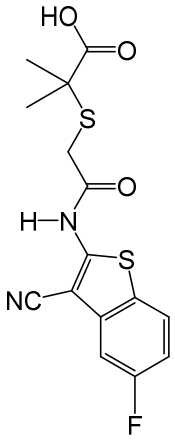
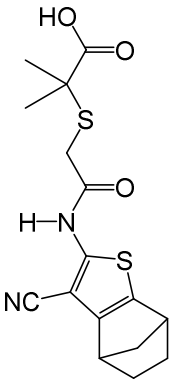
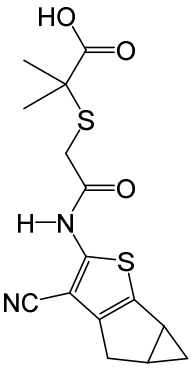
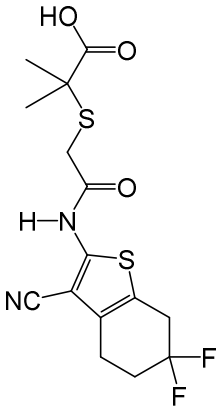


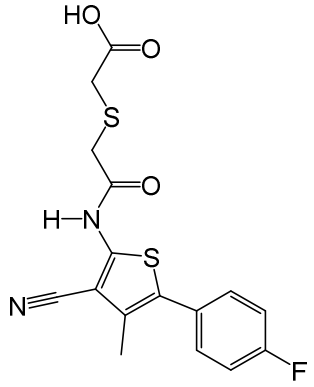
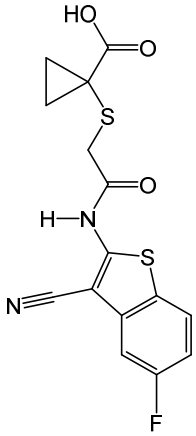
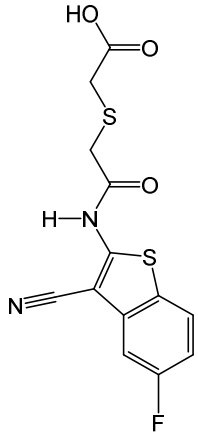
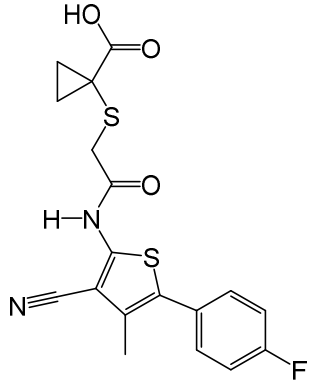
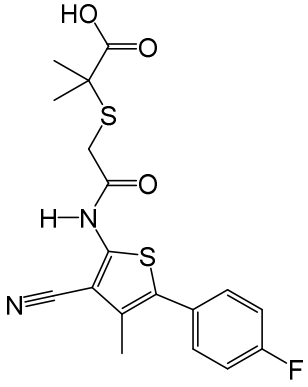
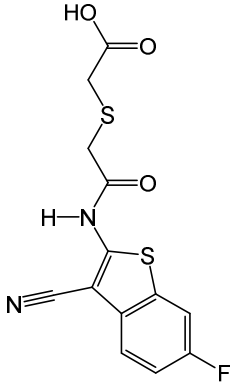
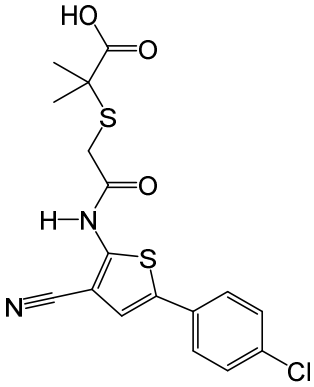
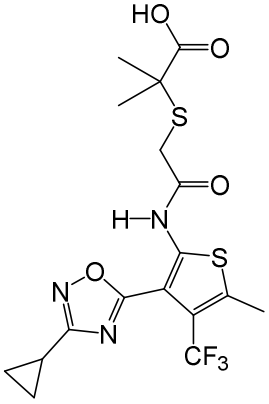
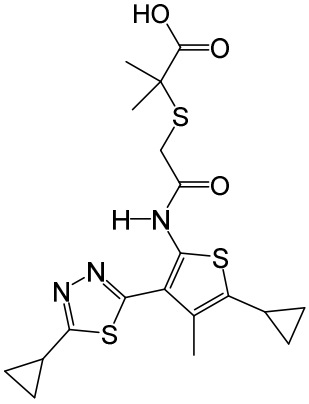
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|  **57** |  **58** |  **59** |
|  **60** |  **61** |  **62** |
|  **63** |  **64** |  **65.** |

12. A pharmaceutical composition, comprising a compound of any one of claims 1-11 and one or more adjunct ingredients.

13. Use of a compound of any one of claims 1 to 11, or a pharmaceutical composition of claim 12, in the manufacture of a medicament for treating a subject having a disease or condition affected by FABP3/4/5/7;

optionally, wherein the disease or condition affected by FABP3/4/5/7 is selected from atherosclerosis, coronary atherosclerosis, arterial fibrosis, pulmonary hypertension, heart failure, obesity, Type-2 diabetes, Type-1-diabetes, gestational diabetes, polycystic ovary syndrome, endometriosis, conditions affected by lipid metabolism and free fatty acid serum levels, metabolic disorders, fatty liver disease, kidney fibrosis, systemic inflammation, acute inflammation, allergic inflammation, airway inflammation, viral infection (e.g., COVID-19, common cold), skin diseases (e.g., vitiligo, psoriasis, atopic dermatitis, allergic contact dermatitis, mycosis fungoides, alopecia areata, cicatricial alopecia, graft vs. host disease (GvHD), contact dermatitis, chronic eczema, dermatitis herpetiformis, cutaneous lupus, scleroderma, dermatomyositis, vasculitis, pemphigus, epidermolysis bullosa, linear IgA, blistering disease), neurological conditions and diseases (e.g., pain, multiple sclerosis (MS), Parkinson’s disease, autoimmune diseases (e.g., experimental autoimmune encephalomyelitis (EAE), asthma, type-1-diabetes, autoimmune lung disease, autoimmune hepatitis, rheumatoid arthritis (RA), spondyloarthropathy, vesicular stomatitis virus infection, multiple sclerosis (MS), lupus nephritis, Crohn's disease, ulcerative colitis, and food allergy), ischemic stroke, graft versus host disease (GvHD) and cancer (e.g., breast cancer, prostate cancer, ovarian cancer, skin cancer, gastric cancer, glioma, cholangiocarcinoma, bladder cancer, multiple myeloma, colorectal cancer, hepatocellular cancer, cervical cancer, oral squamous cell carcinoma, and/or non-small cell lung cancer (NSCLC)).

14. Use of a compound of any one of claims 1 to 11, or a pharmaceutical composition of claim 12, in the manufacture of a medicament for controlling the free fatty acid serum levels in a subject in need thereof;
optionally, wherein the subject has a disease or condition caused by, affected by, and/or characterized by a lack of control of the free fatty acid serum levels in the subject.

15. Use of a compound of any one of claims 1 to 11, or a pharmaceutical composition of claim 12, in the manufacture of a medicament for treating a subject having cancer or diagnosed with cancer;
optionally, wherein the cancer is selected from breast cancer, prostate cancer, ovarian cancer, hepatocellular cancer, multiple myeloma, neuroblastoma, lung adenocarcinoma or gastric carcinoma;
optionally, wherein the cancer is characterized by metastasis of TNBC cells.

16. Use of a compound of any one of claims 1 to 11, or a pharmaceutical composition of claim 12, in the manufacture of a medicament for sensitizing cancer cells for an additional treatment in a subject having cancer;
optionally, wherein the additional treatment comprises administration of a chemotherapeutic agent; optionally, wherein the chemotherapeutic agent is selected from doxorubicin, gemcitabine,

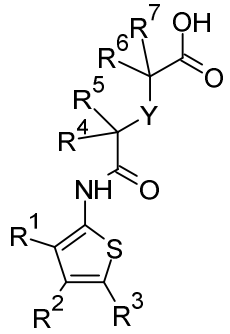
cisplatin, paclitaxel, a PARP inhibitor compound, all-trans retinoic acid (atRA), and an immune checkpoint inhibitor, such as an anti-PD-1 or anti-PD-L1 antibody.

17. Use of a compound of any one of claims 1 to 11, or a pharmaceutical composition of claim 12, in the manufacture of a medicament for treating a subject diagnosed with metabolic syndrome and/or atherosclerosis;
optionally, wherein the subject is diagnosed with Type-2 diabetes.

18. Use of a compound of any one of claims 1 to 11, or a pharmaceutical composition of claim 12, in the manufacture of a medicament for modulating immune cell populations and/or immune cell activity in a subject in need thereof;
optionally, wherein the subject has a disease or disorder caused by, affected by, and/or characterized by immune cell populations and/or immune cell activity, or the disease or disorder is cancer or an autoimmune disease or disorder;
optionally, wherein the immune cells are M2 macrophages or tumor associated macrophages (TAMs).

19. A compound of any one of claims 1-11, or a pharmaceutical composition of claim 12 for use as a medicament.

20. A process for preparing a compound of structural formula **II**




(**II**)

wherein,

$R^1$ is selected from hydrogen, cyano, and 5-membered heteroaryl ring;

$R^2$ and $R^3$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, cyclopropyl, cyclobutyl, phenyl, trifluoromethyl, and benzyl, or $R^2$ and $R^3$ together form a 5- to 8-membered monocyclic, bicyclic, or spirocyclic carbocycle or heterocycle ring, or a 5- to 8-membered aryl or heteroaryl ring, wherein the carbocycle, heterocycle, aryl, or heteroaryl ring is optionally substituted with one or two substituents selected from $C_1$-$C_4$-alkyl, methoxy, or fluoro;

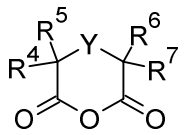
Y is a heteroatom selected from –S–, and –O–, or is $–CR^8R^9–$, wherein $R^8$ and $R^9$ are each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, phenyl, and benzyl, or $R^8$ and $R^9$ together form a cyclopropyl, cyclobutyl, cyclopentyl, or oxetanyl ring;

$R^4$, $R^5$, $R^6$ and $R^7$ is each independently selected from hydrogen, $C_1$-$C_4$ linear or branched alkyl, phenyl, and benzyl, and/or

$R^4$ and $R^5$ together or $R^6$ and $R^7$ together form a cyclopropyl ring or a cyclobutyl ring, or $R^5$ and $R^6$ together form a 5- to 6-membered carbocyclic or heterocyclic ring with Y as a member of the ring;

the method comprising:

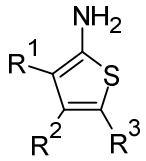
(a) combining in a solvent a substituted anhydride compound of formula **III**:




**(III)**

wherein Y, $R^4$, $R^5$, $R^6$ and $R^7$ are as defined above;

with a substituted 2-amino-thiophene compound of formula **IV**:




**(IV)**

wherein, $R^1$, $R^2$ and $R^3$ are as defined above; and

(b) removing the solvent to obtain a compound having the structural formula **II**.