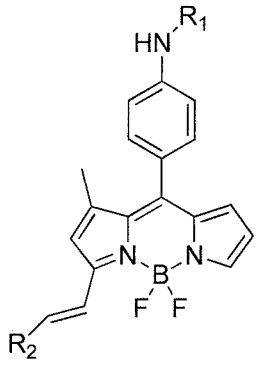
CLAIMS

What is claimed is:

1. A compound represented by structural Formula (I) or pharmaceutically acceptable salts thereof:



(Formula I), wherein:

R_1 is hydrogen or $-COR_3$;

R_2 is $(C_6\text{-}C_{16})$aryl, $(C_3\text{-}C_{10})$heteroaryl, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$cycloalkyl, $(C_2\text{-}C_6)$alkenyl, or C≡CH;

R_2 is optionally substituted with 1-5 substituents independently selected from $(C_1\text{-}C_6)$alkyl, halogen, amino, cyano, -COOH, halo$(C_1\text{-}C_6)$alkyl, hydroxy$(C_0\text{-}C_6)$alkyl, $(C_6\text{-}C_{10})$aryl, $(C_3\text{-}C_{10})$heteroaryl, halo$(C_6\text{-}C_{10})$aryl, hydroxy$(C_6\text{-}C_{10})$aryl, $(C_1\text{-}C_6)$alkoxy, halo$(C_1\text{-}C_6)$alkoxy, $(C_6\text{-}C_{16})$aryloxy, $(C_3\text{-}C_8)$cycloalkyl, halo$(C_6\text{-}C_{10})$aryl$(C_1\text{-}C_6)$alkoxy, $(C_1\text{-}C_6)$alkoxy$(C_6\text{-}C_{10})$aryl$(C_1\text{-}C_6)$alkoxy, nitro, $(C_0\text{-}C_6)$alkyl$(C_6\text{-}C_{10})$aryl$(C_0\text{-}C_6)$alkoxy, $(C_5\text{-}C_{10})$heterocycle, $-OCHF_2$, $-OCF_3$, $-SCF_3$, -OBn, cyano$(C_1\text{-}C_6)$alkylene, $(C_1\text{-}C_6)$alkoxyamino, $(C_6\text{-}C_{10})$aryl$(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkenyl$(C_1\text{-}C_6)$alkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkenyl$(C_6\text{-}C_{10})$aryl, $-N((C_0\text{-}C_6)\text{alkyl})((C_1\text{-}C_6)\text{alkyl})$, $-N((C_1\text{-}C_6)\text{alkyleneOH})((C_1\text{-}C_6)\text{alkyleneOH})$, $-N((C_0\text{-}C_6)\text{alkyl})((C_1\text{-}C_6)\text{alkyleneOH})$, $-N((C_1\text{-}C_6)\text{alkyleneOCO}(C_1\text{-}C_6)\text{alkyl})((C_1\text{-}C_6)\text{alkyleneOCO}(C_1\text{-}C_6)\text{alkyl})$, $-NCO(C_1\text{-}C_6)$alkyl, $-NPh_2$, $-OPh(\text{halogen})_{0\text{-}3}$, $-OPhO(C_1\text{-}C_6)$alkyl, $-OPhO(C_1\text{-}C_6)$alkyl, $-OCO(C_1\text{-}C_6)$alkyl, $-OCO(C_1\text{-}C_6)$alkoxy, $-O(C_1\text{-}C_6)\text{alkyl}(C_6\text{-}C_{10})$aryl, $-O(C_2\text{-}C_6)$alkenyl, $-O(C_2\text{-}C_6)\text{alkyleneN}(CH_3)_2$, $(C_0\text{-}C_6)\text{alkylCOO}(C_1\text{-}C_6)$alkyl, $-B(OH)_2$ or $-S(C_1\text{-}C_6)$alkyl; and wherein any of the substituents selected from $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}$

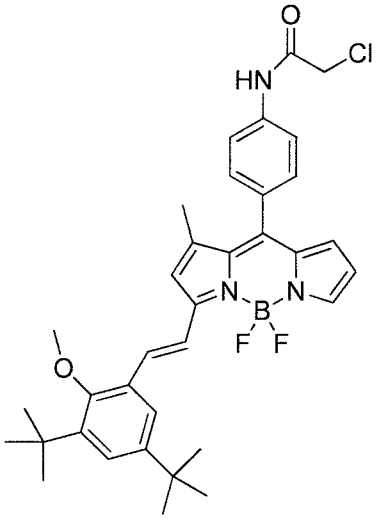
C_6)alkoxy, (C_6-C_{10})aryl, (C_6-C_{16})aryloxy or (C_5-C_{10})heteroaryl is further optionally substituted with 1-4 substituents selected from halogen, (C_1-C_6)alkyl, halo(C_1-C_6)alkyl, amino, nitro, cyano, hydroxy(C_0-C_6)alkyl, (C_1-C_6)alkoxy, -COO(C_0-C_6)alkyl, or -CHO; and

R_3 is (C_1-C_{15})alkyl, (C_2-C_{15})alkenyl, (C_2-C_{15})alkynyl, (C_6-C_{10})aryl or (C_5-C_{10})heteroaryl, wherein R_3 is optionally substituted with 1-4 substituents independently selected from halogen, amino, cyano or hydroxyl.

2. The compound of Claim 1, wherein R_2 is (C_6-C_{10})aryl.

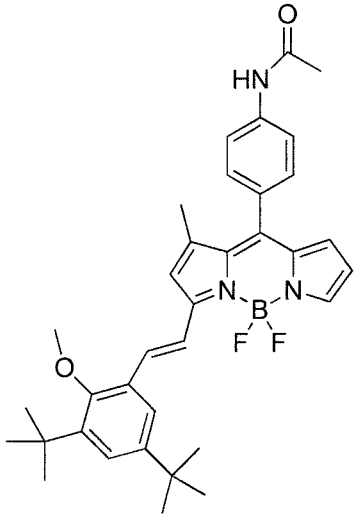
3. The compound of Claim 2, wherein R_2 is phenyl, optionally substituted with 1-4 substituents selected from $-C(CH_3)_3$ and -O-(C_1-C_3)alkyl.

4. The compound of Claim 3, wherein the compound is represented by structural Formula (II):



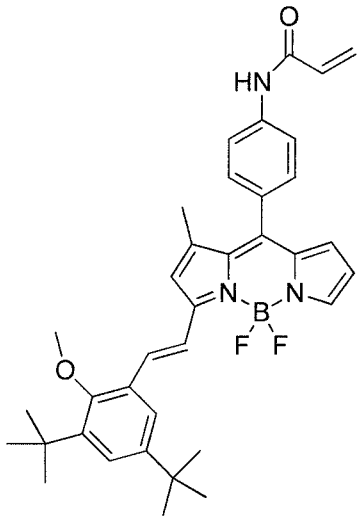
(II).

5. The compound of Claim 3, wherein the compound is represented by structural Formula (III):



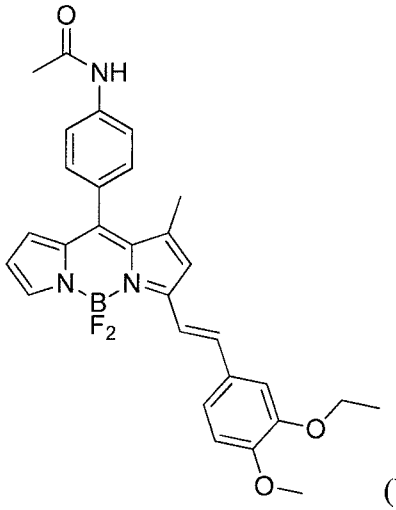
(III).

6. The compound of Claim 3, wherein the compound is represented by structural Formula (IV):



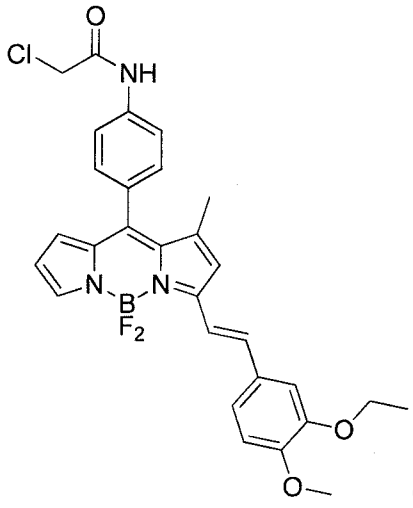
(IV).

7. The ~~compounds~~ compound of Claim 3, wherein the compound is represented by structural Formula (V):



(V).

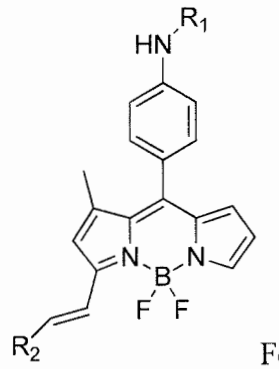
8. The ~~compounds~~ compound of Claim 3, wherein the compound is represented by structural Formula (VI):



(VI).

9. A pharmaceutical composition comprising one or more pharmaceutically acceptable carriers and/or one or more pharmaceutically acceptable diluents and the compound of ~~any one of Claims 1-8~~ Claim 1.

10. A method for detecting beta-cells using image based screening, comprising:
a) contacting a sample comprising cells with a compound of structural Formula (I) or pharmaceutically acceptable salts thereof:



Formula (I), wherein:

R_1 is hydrogen or -COR_3;

R_2 is (C_6-C_{16})aryl, (C_3-C_{10})heteroaryl, (C_1-C_6)alkyl, (C_1-C_6)cycloalkyl, (C_2-C_6)alkenyl, or C≡CH;

R_2 is optionally substituted with 1-5 substituents independently selected from (C_1-C_6)alkyl, halogen, amino, cyano, -COOH, halo(C_1-C_6)alkyl, hydroxy(C_0-C_6)alkyl, (C_6-C_{10})aryl, (C_3-C_{10})heteroaryl, halo(C_6-C_{10})aryl, hydroxy(C_6-C_{10})aryl, (C_1-C_6)alkoxy, halo(C_1-C_6)alkoxy, (C_6-C_{16})aryloxy, (C_3-C_8)cycloalkyl, halo(C_6-C_{10})aryl(C_1-C_6)alkoxy, (C_1-C_6)alkoxy(C_6-C_{10})aryl(C_1-C_6)alkoxy, nitro, (C_0-C_6)alkyl(C_6-C_{10})aryl(C_0-C_6)alkoxy, (C_5-C_{10})heterocycle, -$OCHF_2$, -OCF_3, -SCF_3, -OBn, cyano(C_1-C_6)alkylene, (C_1-C_6)alkoxyamino, (C_6-C_{10})aryl(C_2-C_6)alkenyl, (C_2-C_6)alkenyl(C_1-C_6)alkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkenyl(C_6-C_{10})aryl, -N((C_0-C_6)alkyl)((C_1-C_6)alkyl), -N((C_1-C_6)alkyleneOH)((C_1-C_6)alkyleneOH), -N((C_0-C_6)alkyl)((C_1-C_6)alkyleneOH), -N((C_1-C_6)alkyleneOCO(C_1-C_6)alkyl)((C_1-C_6)alkyleneOCO(C_1-C_6)alkyl), -NCO(C_1-C_6)alkyl, -NPh_2, -OPh(halogen)$_{0-3}$, -OPhO(C_1-C_6)alkyl, -OPhO(C_1-C_6)alkyl, -OCO(C_1-C_6)alkyl, -OCO(C_1-C_6)alkoxy, -O(C_1-C_6)alkyl(C_6-C_{10})aryl, -O(C_2-C_6)alkenyl, -O(C_2-C_6)alkyleneN$(CH_3)_2$, (C_0-C_6)alkylCOO(C_1-C_6)alkyl, -$B(OH)_2$ or -S(C_1-C_6)alkyl; and wherein any of the substituents selected from (C_1-C_6)alkyl, (C_1-C_6)alkoxy, (C_6-C_{10})aryl, (C_6-C_{16})aryloxy or (C_5-C_{10})heteroaryl is further optionally substituted with 1-4 substituents selected from halogen, (C_1-C_6)alkyl, halo(C_1-C_6)alkyl, amino, nitro, cyano, hydroxy(C_0-C_6)alkyl, (C_1-C_6)alkoxy, -COO(C_0-C_6)alkyl, or -CHO; and

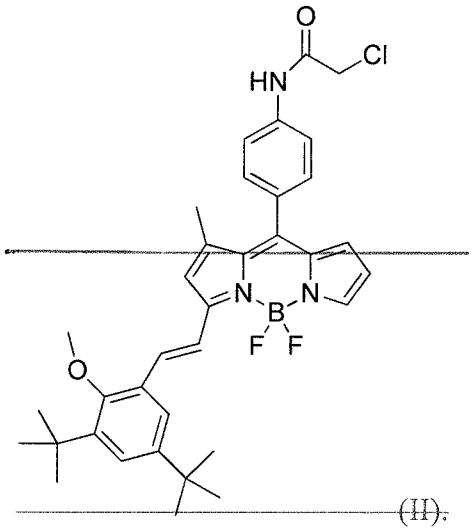
R_3 is (C_1-C_{15})alkyl, (C_2-C_{15})alkenyl, (C_2-C_{15})alkynyl, (C_6-C_{10})aryl or

(C_5-C_{10})heteroaryl, wherein R_3 is optionally substituted with 1-4 substituents independently selected from halogen, amino, cyano or hydroxyl;

b) incubating the sample and the compound of step a) together for a period of time sufficient to stain the cells; and

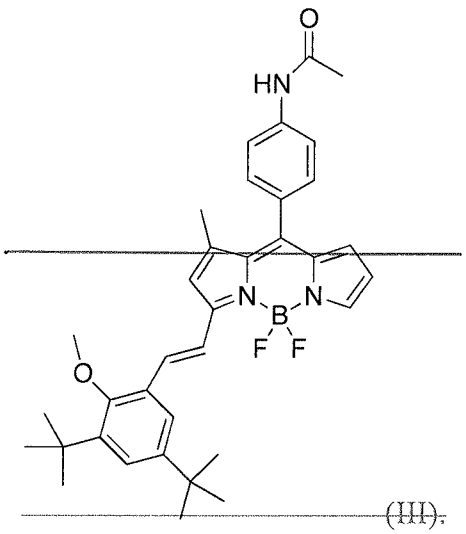
c) analyzing the incubated stained cells by spectroscopy to detect a fluorescence signal, wherein the presence of a fluorescence signal is indicative of the presence of the beta cells.

~~11. The method of Claim 10, wherein the compound of Formula (I) has the structure of Formula (II):~~



~~(II).~~

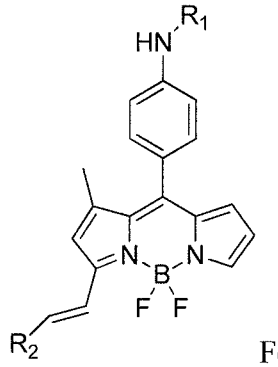
~~12. The method of Claim 10, wherein the compound of Formula (I) has the structure of Formula (III):~~



~~(III).~~

~~13.~~11. A method for detecting microglia cells, comprising:

a) contacting a sample comprising cells with a compound of structural Formula (I) or a pharmaceutically acceptable salt thereof:



Formula (I), wherein:

R_1 is hydrogen or $-COR_3$;

R_2 is $(C_6\text{-}C_{16})$aryl, $(C_3\text{-}C_{10})$heteroaryl, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$cycloalkyl, $(C_2\text{-}C_6)$alkenyl, or C≡CH;

R_2 is optionally substituted with 1-5 substituents independently selected from $(C_1\text{-}C_6)$alkyl, halogen, amino, cyano, -COOH, halo$(C_1\text{-}C_6)$alkyl, hydroxy$(C_0\text{-}C_6)$alkyl, $(C_6\text{-}C_{10})$aryl, $(C_3\text{-}C_{10})$heteroaryl, halo$(C_6\text{-}C_{10})$aryl, hydroxy$(C_6\text{-}C_{10})$aryl, $(C_1\text{-}C_6)$alkoxy, halo$(C_1\text{-}C_6)$alkoxy, $(C_6\text{-}C_{16})$aryloxy, $(C_3\text{-}C_8)$cycloalkyl, halo$(C_6\text{-}C_{10})$aryl$(C_1\text{-}C_6)$alkoxy, $(C_1\text{-}C_6)$alkoxy$(C_6\text{-}C_{10})$aryl$(C_1\text{-}C_6)$alkoxy, nitro, $(C_0\text{-}C_6)$alkyl$(C_6\text{-}C_{10})$aryl$(C_0\text{-}C_6)$alkoxy, $(C_5\text{-}C_{10})$heterocycle, $-OCHF_2$, $-OCF_3$, $-SCF_3$, -OBn, cyano$(C_1\text{-}C_6)$alkylene, $(C_1\text{-}C_6)$alkoxyamino, $(C_6\text{-}C_{10})$aryl$(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkenyl$(C_1\text{-}C_6)$alkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkenyl$(C_6\text{-}C_{10})$aryl, $-N((C_0\text{-}C_6)\text{alkyl})((C_1\text{-}C_6)\text{alkyl})$, $-N((C_1\text{-}C_6)\text{alkyleneOH})((C_1\text{-}C_6)\text{alkyleneOH})$, $-N((C_0\text{-}C_6)\text{alkyl})((C_1\text{-}C_6)\text{alkyleneOH})$, $-N((C_1\text{-}C_6)\text{alkyleneOCO}(C_1\text{-}C_6)\text{alkyl})((C_1\text{-}C_6)\text{alkyleneOCO}(C_1\text{-}C_6)\text{alkyl})$, $-NCO(C_1\text{-}C_6)$alkyl, $-NPh_2$, $-OPh(\text{halogen})_{0\text{-}3}$, $-OPhO(C_1\text{-}C_6)$alkyl, $-OPhO(C_1\text{-}C_6)$alkyl, $-OCO(C_1\text{-}C_6)$alkyl, $-OCO(C_1\text{-}C_6)$alkoxy, $-O(C_1\text{-}C_6)\text{alkyl}(C_6\text{-}C_{10})\text{aryl}$, $-O(C_2\text{-}C_6)$alkenyl, $-O(C_2\text{-}C_6)\text{alkyleneN}(CH_3)_2$, $(C_0\text{-}C_6)\text{alkylCOO}(C_1\text{-}C_6)$alkyl, $-B(OH)_2$ or $-S(C_1\text{-}C_6)$alkyl; and wherein any of the substituents selected from $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$alkoxy, $(C_6\text{-}C_{10})$aryl, $(C_6\text{-}C_{16})$aryloxy or $(C_5\text{-}C_{10})$heteroaryl is further optionally substituted with 1-4 substituents selected from halogen, $(C_1\text{-}C_6)$alkyl,

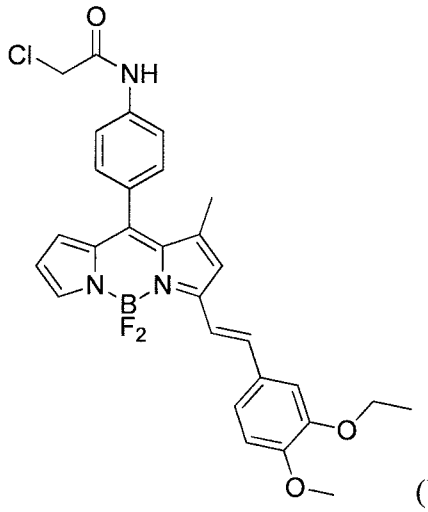
halo(C_1-C_6)alkyl, amino, nitro, cyano, hydroxy(C_0-C_6)alkyl, (C_1-C_6)alkoxy, -COO(C_0-C_6)alkyl, or -CHO; and

R_3 is (C_1-C_{15})alkyl, (C_2-C_{15})alkenyl, (C_2-C_{15})alkynyl, (C_6-C_{10})aryl or (C_5-C_{10})heteroaryl, wherein R_3 is optionally substituted with 1-4 substituents independently selected from halogen, amino, cyano or hydroxyl;

b) incubating the sample and compound of step a) together for a period of time sufficient to stain the cells; and

c) analyzing the incubated stained cells by spectroscopy to detect a fluorescence signal, wherein the presence of a fluorescence signal is indicative of the presence of microglia cells.

~~14.~~12. The method of Claim ~~13~~ 11, wherein the compound of Formula (I) is a compound of Formula (VI):

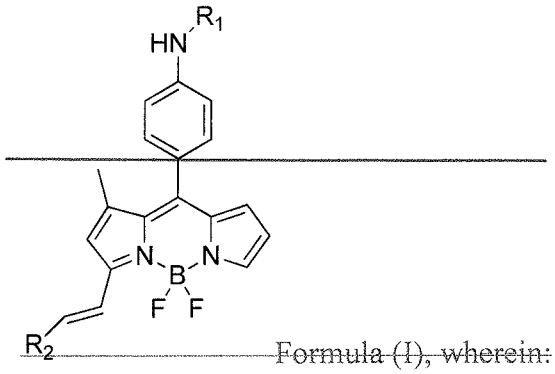


(VI).

~~15.~~13. The method of Claim ~~13~~ 11, wherein the method further distinguishes activated microglia cells from resting microglia cells by fluorescence intensity.

~~16.~~14. A method for fluorescence imaging of pancreatic islet cells to determine health status of the pancreatic islet cells, comprising:

a) contacting the pancreatic islet cells with a compound of structural Formula (I) or pharmaceutically acceptable salts thereof~~:~~ of Claim 1;



Formula (I), wherein:

R_1 is hydrogen or $-COR_3$;

R_2 is (C_6-C_{16})aryl, (C_3-C_{10})heteroaryl, (C_1-C_6)alkyl, (C_1-C_6)cycloalkyl, (C_2-C_6)alkenyl, or C≡CH;

R_2 is optionally substituted with 1-5 substituents independently selected from (C_1-C_6)alkyl, halogen, amino, cyano, -COOH, halo(C_1-C_6)alkyl, hydroxy(C_0-C_6)alkyl, (C_6-C_{10})aryl, (C_3-C_{10})heteroaryl, halo(C_6-C_{10})aryl, hydroxy(C_6-C_{10})aryl, (C_1-C_6)alkoxy, halo(C_1-C_6)alkoxy, (C_6-C_{16})aryloxy, (C_3-C_8)cycloalkyl, halo(C_6-C_{10})aryl(C_1-C_6)alkoxy, (C_1-C_6)alkoxy(C_6-C_{10})aryl(C_1-C_6)alkoxy, nitro, (C_0-C_6)alkyl(C_6-C_{10})aryl(C_0-C_6)alkoxy, (C_5-C_{10})heterocycle, $-OCHF_2$, $-OCF_3$, $-SCF_3$, -OBn, cyano(C_1-C_6)alkylene, (C_1-C_6)alkoxyamino, (C_6-C_{10})aryl(C_2-C_6)alkenyl, (C_2-C_6)alkenyl(C_1-C_6)alkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkenyl(C_6-C_{10})aryl, -N((C_0-C_6)alkyl)((C_1-C_6)alkyl), -N((C_1-C_6)alkyleneOH)((C_1-C_6)alkyleneOH), -N((C_0-C_6)alkyl)((C_1-C_6)alkyleneOH), -N((C_1-C_6)alkyleneOCO(C_1-C_6)alkyl)((C_1-C_6)alkyleneOCO(C_1-C_6)alkyl), -NCO(C_1-C_6)alkyl, $-NPh_2$, -OPh(halogen)$_{0-3}$, -OPhO(C_1-C_6)alkyl, -OPhO(C_1-C_6)alkyl, -OCO(C_1-C_6)alkyl, -OCO(C_1-C_6)alkoxy, -O(C_1-C_6)alkyl(C_6-C_{10})aryl, -O(C_2-C_6)alkenyl, -O(C_2-C_6)alkyleneN$(CH_3)_2$, (C_0-C_6)alkylCOO(C_1-C_6)alkyl, $-B(OH)_2$ or -S(C_1-C_6)alkyl; and wherein any of the substituents selected from (C_1-C_6)alkyl, (C_1-C_6)alkoxy, (C_6-C_{10})aryl, (C_6-C_{16})aryloxy or (C_5-C_{10})heteroaryl is further optionally substituted with 1-4 substituents selected from halogen, (C_1-C_6)alkyl, halo(C_1-C_6)alkyl, amino, nitro, cyano, hydroxy(C_0-C_6)alkyl, (C_1-C_6)alkoxy, -COO(C_0-C_6)alkyl, or -CHO; and

R_3 is (C_1-C_{15})alkyl, (C_2-C_{15})alkenyl, (C_2-C_{15})alkynyl, (C_6-C_{10})aryl or

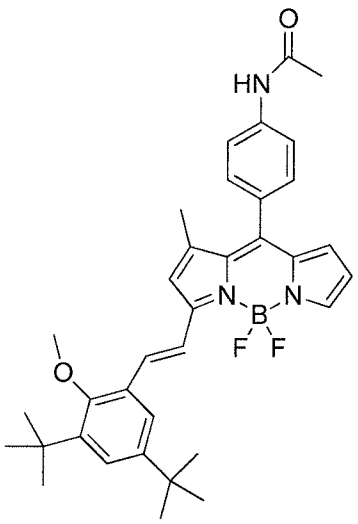
~~(C_5-C_{10})heteroaryl, wherein R_3 is optionally substituted with 1-4 substituents independently selected from halogen, amino, cyano or hydroxyl;~~

b) incubating the cells and compound of step a) together for a period of time sufficient for to stain the cells;

c) analyzing the incubated stained pancreatic islet cells by spectroscopy to detect a fluorescence signal; and

d) comparing the signal from step c) to a fluorescence signal from reference sample of healthy pancreatic islet cells, to determine health status of the pancreatic islet cells.

~~17.~~15. The method of Claim ~~16~~ 14, wherein the compound of Formula (I) has the structure of Formula (III):



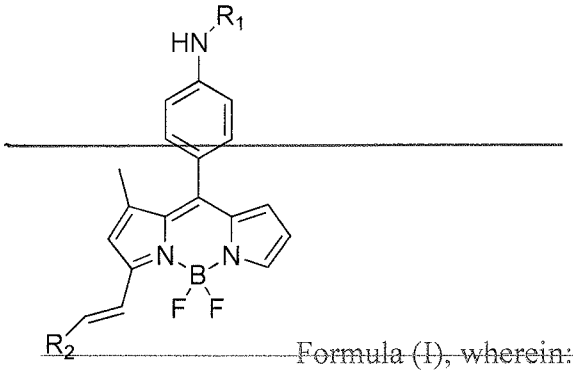
(III).

~~18.~~16. The method of ~~any one of Claims 10 to 17~~ Claim 10, wherein the fluorescence signal is measured by fluorometer, UV/VIS spectrometer, Gemini XS fluorescence plate reader, a flow cytometry or a confocal microscope.

~~19.~~17. The method of ~~any one of Claims 10 to 18~~ Claim 10, wherein the method is applied *in vivo*.

~~20.~~18. The method of ~~any one of Claims 10 to 18~~ Claim 10, wherein the method is applied *in vitro*.

~~21.~~19. A method for a solid-phase synthesis of a compound of structural Formula (I) or a pharmaceutically acceptable salt thereof~~:~~ of Claim 1,



~~Formula (I), wherein:~~

~~R_1 is hydrogen or $-COR_3$;~~

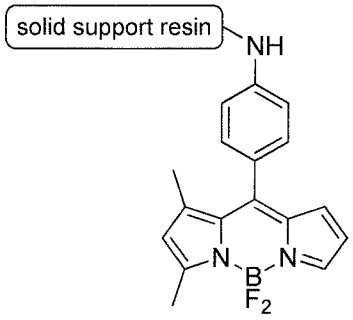
~~R_2 is (C_6-C_{16})aryl, (C_3-C_{10})heteroaryl, (C_1-C_6)alkyl, (C_1-C_6)cycloalkyl, (C_2-C_6)alkenyl, or $C\equiv CH$;~~

~~R_2 is optionally substituted with 1-5 substituents independently selected from (C_1-C_6)alkyl, halogen, amino, cyano, -COOH, halo(C_1-C_6)alkyl, hydroxy(C_0-C_6)alkyl, (C_6-C_{10})aryl, (C_3-C_{10})heteroaryl, halo(C_6-C_{10})aryl, hydroxy(C_6-C_{10})aryl, (C_1-C_6)alkoxy, halo(C_1-C_6)alkoxy, (C_6-C_{16})aryloxy, (C_3-C_8)cycloalkyl, halo(C_6-C_{10})aryl(C_1-C_6)alkoxy, (C_1-C_6)alkoxy(C_6-C_{10})aryl(C_1-C_6)alkoxy, nitro, (C_0-C_6)alkyl(C_6-C_{10})aryl(C_0-C_6)alkoxy, (C_5-C_{10})heterocycle, $-OCHF_2$, $-OCF_3$, $-SCF_3$, -OBn, cyano(C_1-C_6)alkylene, (C_1-C_6)alkoxyamino, (C_6-C_{10})aryl(C_2-C_6)alkenyl, (C_2-C_6)alkenyl(C_1-C_6)alkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkenyl(C_6-C_{10})aryl, $-N((C_0-C_6)$alkyl$)((C_1-C_6)$alkyl), $-N((C_1-C_6)$alkyleneOH$)((C_1-C_6)$alkyleneOH), $-N((C_0-C_6)$alkyl$)((C_1-C_6)$alkyleneOH), $-N((C_1-C_6)$alkyleneOCO(C_1-C_6)alkyl$)((C_1-C_6)$alkyleneOCO(C_1-C_6)alkyl), $-NCO(C_1-C_6)$alkyl, $-NPh_2$, -OPh(halogen)$_{0-3}$, -OPhO(C_1-C_6)alkyl, -OPhO(C_1-C_6)alkyl, -OCO(C_1-C_6)alkyl, -OCO(C_1-C_6)alkoxy, -O(C_1-C_6)alkyl(C_6-C_{10})aryl, -O(C_2-C_6)alkenyl, -O(C_2-C_6)alkyleneN$(CH_3)_2$, (C_0-C_6)alkylCOO(C_1-C_6)alkyl, $-B(OH)_2$ or $-S(C_1-C_6)$alkyl; and wherein any of the substituents selected from (C_1-C_6)alkyl, (C_1-C_6)alkoxy, (C_6-C_{10})aryl, (C_6-C_{16})aryloxy or (C_5-C_{10})heteroaryl is further optionally substituted with 1-4 substituents selected from halogen, (C_1-C_6)alkyl, halo(C_1-C_6)alkyl, amino, nitro, cyano, hydroxy(C_0-C_6)alkyl, (C_1-C_6)alkoxy, -COO(C_0-C_6)alkyl, or -CHO; and~~

~~R_3 is (C_1-C_{15})alkyl, (C_2-C_{15})alkenyl, (C_2-C_{15})alkynyl, (C_6-C_{10})aryl or (C_5-C_{10})heteroaryl, wherein R_3 is optionally substituted with 1-4 substituents independently selected from halogen, amino, cyano or hydroxyl;~~

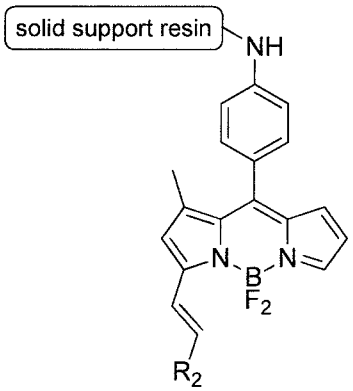
the method comprising:

(a) reacting a compound of structural Formula (VII) wherein the solid support resin is a 2-chlorotrityl polystyrene resin:



(VII)

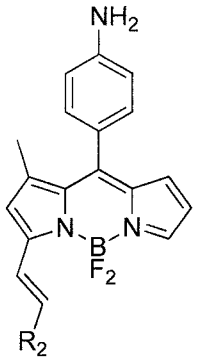
with a base and an aldehyde, such that the activated C_3-methyl group of Formula (VII) is modified in a solid-phase Knoevenagel-type reaction to produce a compound of Formula VIII:



(VIII)

wherein R_2 is defined as above;

b) removing the solid support resin from the compound of structural Formula (VIII) produced in step (a) to generate a BODIPY structure of Formula (IX):

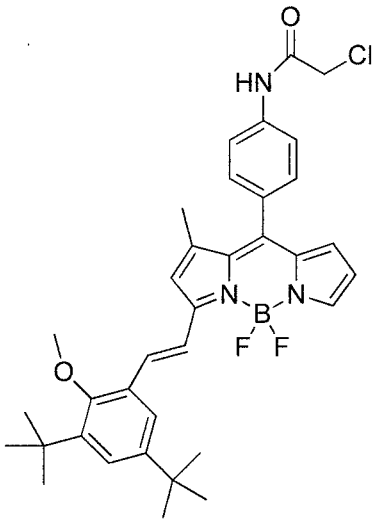


(IX)

wherein R_2 is defined as above; and

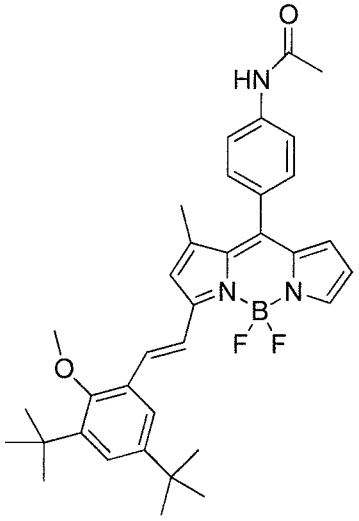
c) optionally reacting the compound of structural Formula (IX) with an acid chloride of the formula $R_1(CO)Cl$ to generate a compound of structural Formula (I), wherein R_1 is defined as above.

22.20. The method of Claim ~~21~~ 19, wherein the compound is represented by a) structural Formula (II):



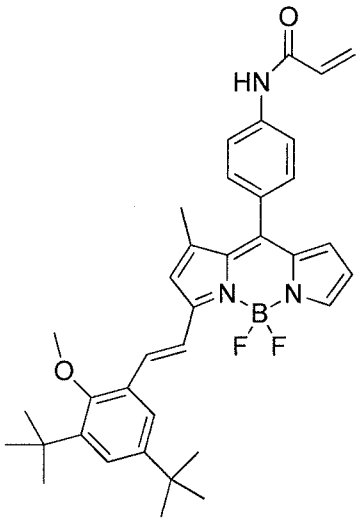
(II);

b) structural Formula (III):



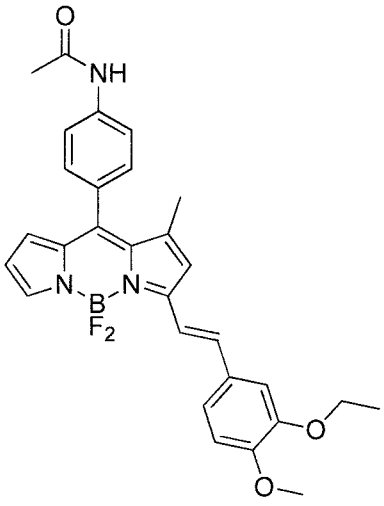
(III);

c) structural Formula (IV):



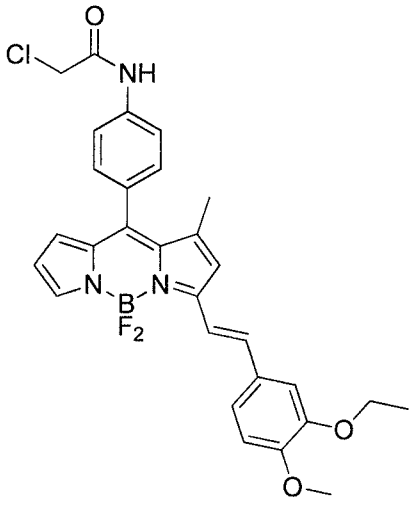
(IV);

d) structural Formula (V):



(V); or

e) structural Formula (VI):



(VI).