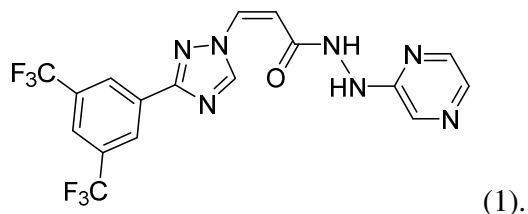


## CLAIMS

1. A computer-implemented method of identifying a responder or a non-responder to a therapy by a compound represented by structural formula (1), comprising:
  - determining a plurality of protein activity values based on gene expression data collected from ~~in~~ a subject suffering from multiple myeloma (MM), each protein activity value corresponding to one of a set of proteins in the subject;
  - providing the plurality of protein activity values to a trained classifier, the trained classifier being trained to differentiate between responders and non-responders to a treatment of MM with a compound of formula (1);
  - determining from the classifier a classification of the subject as a responder or non-responder to a therapy by a compound represented by structural formula (1) based on the plurality of protein activity values;
  - wherein the subject determined to be a responder is subsequently to be administered a therapeutically effective amount of the compound represented by structural formula (1) or a pharmaceutically acceptable salt thereof



2. The method of Claim 1, wherein determining a plurality of protein activity values comprises receiving information of a plurality of protein activity values in a subject suffering from multiple myeloma (MM), each protein activity value corresponding to one of a set of proteins in the subject.
3. The method of any one of Claims 1 or 2, wherein the set of proteins is selected from IRF3, ARL2BP, ZBTB17, ATRX, MPP7, TDP2, ATF1, FBXW11, C1D, PKD1, GDI2, SUPT5H, SHOC2, RBCK1, ZNF598, ZNF697, PRKACB, SIRT7, RPS6KB1, RAB1A, ZNF575, MBTD1, ZNF24, TBL3, MYBBP1A, CELSR1, SETD1A, TP53, CASP8AP2, ZNF28, STK11, SMARCA4, SIRT1, ZNF324B, ZNF532, MBD3, ZFYVE16, CSDE1,

IFT27, PER1, FBXO11, CREG1, DEDD, DVL1, TERF2IP, ZC3H7A, TYK2, CSNK1G2, SCARB1, E4F1, HSBP1, ZCCHC9, BCKDK, PRKD2, CENPB, FBXW7, ZNF688, UBE2D3, SIGIRR, IKBKE, MED25, ASB7, H3F3A, CRTCL1, FLYWCH1, AHCTF1, ESRRA, NFKBIB, ZNF616, CDK3, PPP1R15A, AKT1S1, ARID4B, SETD1B, ERO1L, TCEANC2, MAP3K11, PSMB10, PRKCSH, ZNF358, ZNF493, PPM1A, MAPK8IP3, JRKL, AGPAT2, HIST1H1C, WASF2, C14orf169, RIN2, EED, ZNF579, SCAI, MYBL2, DDX20, CLN3, HIRA, ZC4H2, XPR1, PUF60, and HOXB2.

4. The method of any one of Claims 1-3, wherein the set of proteins is IRF3, ARL2BP, ZBTB17, and ATRX.
5. The method of any one of Claims 1-4, wherein the set of proteins is selected by cross-validation.
6. The method of any one of Claims 1-5, wherein the set of proteins consists of proteins having at least a pre-determined value of differential protein activity between responders and non-responders.
7. The method of any one of Claims 1-6, wherein the protein activity value is a normalized enrichment score.
8. The method of any one of Claims 1-7, wherein determining the plurality of protein activity values comprises applying VIPER algorithm to gene expression data of the subject.
9. The method of any one of Claims 1-8, wherein the trained classifier comprises a support vector machine, an artificial neural network, a random forest, a linear classifier, linear discriminant analysis, logistic regression, or ridge regression.
10. The method of any one of Claims 1-9, further comprising:  
collecting a bone marrow sample from the subject;

separating CD131+ cells in the bone marrow sample;  
identifying the activity pattern of the MR proteins in the CD131+ cells.

11. The method of any one of Claims 1-10, wherein the multiple myeloma is a relapsed or refractory multiple myeloma.
12. The method of any one of Claims 1-11, wherein the subject has received from 1 to 7 prior therapies.
13. The method of Claim 12, wherein the subject has received at least two prior therapies.
14. The method of Claim 12, wherein the subject has received at least three prior therapies.
15. The method of Claim 12, wherein the subject has received at least four prior therapies.
16. The method of any one of Claims 1-15, wherein the subject is a human.
17. The method of Claim 16, wherein the human is an adult.
18. The method of any one of Claim 1-17, wherein the compound represented by formula (1) is to be administered orally.
19. The method of Claim 18, wherein the multiple myeloma is refractory to at least two proteasome inhibitors, at least two immunomodulatory agents, and an anti-CD38 monoclonal antibody.
20. The method of any one of Claims 1-19 wherein the compound of formula (1) is to be administering with at least one additional therapeutic agent.
21. The method of Claim 20, wherein the additional therapeutic agent is dexamethasone.

22. The method of Claim 21, wherein the dexamethasone is to be orally administered at an amount of 20 mg/day.
23. The method of any one of Claims 21 or 22, wherein the subject determined to be a responder is to be further administered bortezomib.
24. The method of any one of Claims 1-10, wherein the multiple myeloma is relapsed or refractory multiple myeloma, the subject is an adult human who has received at least four prior therapies and the multiple myeloma is refractory to at least two proteasome inhibitors, at least two immunomodulatory agents and an anti-CD38 monoclonal antibody.
25. The method of Claim 24, wherein the compound of formula (1) is to be administered at 80 mg/per day on days 1 and 3 of each week of treatment.
26. The method of Claim 25, wherein an additional therapeutic agent is to be administered.
27. The method of Claim 26, wherein the additional therapeutic agent is dexamethasone.
28. The method of Claim 27, wherein the dexamethasone is to be administered at 20 mg/day on days 1 and 3 of each week of treatment.
29. The method of any one of Claims 1-10, wherein the multiple myeloma is relapsed or refractory multiple myeloma, the subject is an adult human who has received from 1 to 3 prior therapies.
30. The method of Claim 29, wherein the compound of formula (1) is to be administered at 100 mg once a week.
31. The method of Claim 29 or Claim 30, wherein at least one additional therapeutic agent is to be administered.

32. The method of Claim 31, wherein the additional therapeutic agents are bortezomib administered at 1.3 mg/m<sup>2</sup> once a week and dexamethasone administered twice a week at 20 mg per administration.