

What is claimed is:

1. A method of selecting a subject having a hematological malignancy for treatment with a JAK/STAT inhibitor, the method comprising determining the level of mRNA expression of at least two or more biomarkers listed in Table 1 in a biological sample derived from the subject, thereby to predict an increased likelihood of response to a JAK/STAT inhibitor.
2. The method according to claim 1, comprising determining the level of expression of any three biomarkers in Table 1.
3. The method according to claim 1, comprising determining the level of expression of any four biomarkers in Table 1.
4. The method according to claim 3, wherein the biomarkers comprise PIM1, CISH, SOCS2, and ID1.
5. The method according to claim 1, comprising determining the level of expression of any six biomarkers in Table 1.
6. The method of claim 5, wherein the at least six biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, and EPOR.
7. The method of claim 1, comprising determining the level of expression of PIM1, CISH, SOCS2, ID1, LCN2, EPOR and EGR1.
8. The method according to any of claims 1-7, wherein the JAK/STAT inhibitor is (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof.
9. The method according to any of claims 1-8, wherein the hematological malignancy is leukemia, lymphoma or myeloma.
10. A method of selecting a subject having a hematological malignancy for treatment with a JAK/STAT inhibitor, the method comprising either
selectively administering a therapeutically effective amount JAK/STAT inhibitor to a selected patient on the basis that the selected patient has been determined to have an increased level of mRNA expression of two or more biomarkers listed in Table 1; or

selectively administering a therapeutically effective amount of an inhibitor which is not a JAK/STAT inhibitor to the selected subject on the basis that the sample does not an increased level of mRNA expression of one or more biomarkers listed in Table 1.

11. The method according to claim 10, wherein the biomarkers comprise PIM1, CISH, SOCS2, and ID1.

12. The method of claim 10, wherein the biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, and EPOR.

13. The method of claim 10, wherein the biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, EPOR and EGRI.

14. A method of selecting a subject having a hematological malignancy for treatment with a JAK/STAT inhibitor, the method comprising:

determining the level of expression of at least two or more biomarkers listed in Table 1 in a biological sample derived from the subject, and either

selectively administering a therapeutically effective amount JAK/STAT inhibitor to a selected patient on the basis that the selected patient has been determined to have an increased level of mRNA expression of two or more biomarkers listed in Table 1; or

selectively administering a therapeutically effective amount of an inhibitor which is not a JAK/STAT inhibitor to the selected subject on the basis that the sample does not an increased level of mRNA expression of two or more biomarkers listed in Table 1.

15. The method according to claim 14, wherein the expression of the biomarkers determined are PIM1, CISH SOCS2, and ID1.

16. The method of claim 14, wherein biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, and EPOR.

17. The method of claim 14, wherein the biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, EPOR and EGRI.

18. A method of selecting a subject having a hematological malignancy for treatment with a JAK/STAT inhibitor, the method comprising:

determining the level of expression of at least two or more biomarkers listed in Table 1 in a biological sample derived from the subject, and

thereafter selecting the subject for treatment with a therapeutically effective amount JAK/STAT inhibitor on the basis that the selected patient has been determined to have an increased level of mRNA expression of two or more biomarkers listed in Table 1 and recording the result of the determining step on a tangible or intangible media form for use in transmission.

19. The method according to claim 18, wherein the biomarkers comprise PIM1 and CISH.

20. The method according to claim 18, wherein the biomarkers comprise PIM1, CISH SOCS2, and ID1.

21. The method of claim 18, wherein the biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, and EPOR.

22. The method of claim 18, wherein the biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, EPOR and EGR1.

23. A method of selecting a subject having a hematological malignancy for treatment with a JAK/STAT inhibitor, the method comprising

administering a JAK/STAT inhibitor to a selected patient, wherein a sample from the selected patient has been determined to have an increased level of mRNA expression of two or more biomarkers listed in Table 1.

24. A method of determining if a therapeutic dose of (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof, is administered to a subject having a hematological malignancy comprising determining the level of mRNA expression of at least two or more biomarkers listed in Table 1 in a biological sample derived from the subject, wherein a decrease in mRNA expression following administration of (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof, of at least two or more biomarkers listed in Table 1 in the biological sample is predictive that a therapeutic dose of (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof has been administered.

25. The method of any of the preceding claims, where the JAK/STAT inhibitor is (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof.
26. A kit for comprising a plurality of agents for determining the level of two or more biomarkers listed in Table 1 in a sample and instructions for use.
27. A method for producing a transmittable form of information for predicting the responsiveness of a patient to a JAK/STAT inhibitor, comprising:
- a) determining an increased likelihood that the patient will respond to treatment with the JAK/STAT inhibitor based on an increased level of expression of two or more biomarkers in Table 1; and
 - b) recording the result of the determining step on a tangible or intangible media form for use in transmission.

What is claimed is:

1. A method of selecting a subject having a hematological malignancy for treatment with a JAK/STAT inhibitor, the method comprising determining the level of mRNA expression of at least two or more biomarkers listed in Table 1 in a biological sample derived from the subject, thereby to predict an increased likelihood of response to a JAK/STAT inhibitor.
2. The method according to claim 1, comprising determining the level of expression of any three biomarkers in Table 1.
3. The method according to claim 1, comprising determining the level of expression of any four biomarkers in Table 1.
4. The method according to claim 3, wherein the biomarkers comprise PIM1, CISH, SOCS2, and ID1.
5. The method according to claim 1, comprising determining the level of expression of any six biomarkers in Table 1.
6. The method of claim 5, wherein the at least six biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, and EPOR.
7. The method of claim 1, comprising determining the level of expression of PIM1, CISH, SOCS2, ID1, LCN2, EPOR and EGR1.
8. The method according to any of claims 1-7, wherein the JAK/STAT inhibitor is (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof.
9. The method according to any of claims 1-8, wherein the hematological malignancy is leukemia, lymphoma or myeloma.
10. A method for producing a transmittable form of information for predicting the responsiveness of a patient to a JAK/STAT inhibitor, comprising:

a) determining an increased likelihood that the patient will respond to treatment with the JAK/STAT inhibitor based on an increased level of expression of two or more biomarkers in Table 1; and

b) recording the result of the determining step on a tangible or intangible media form for use in transmission.

11. A JAK/STAT inhibitor for use in a method of treating a hematological malignancy in a patient comprising the administration of a therapeutically effective amount of a JAK/STAT inhibitor to the patient on the basis that a biological sample derived from the patient has been determined to have a level of expression of at least two or more biomarkers listed in Table 1 indicative that the subject will respond to the JAK/STAT inhibitor.

12. The inhibitor for use according to claim 11, wherein the biomarkers comprise PIM1, CISH, SOCS2, and ID1.

13. The inhibitor for use according to claim 11, wherein the biomarkers comprise PIM1, CISH, SOCS2, ID1, LCN2, and EPOR.

14. The inhibitor for use according to any of claims 11-13, wherein the hematological malignancy is leukemia, lymphoma or myeloma.

15. The inhibitor for use according to any of claims 11-14, wherein the JAK/STAT inhibitor is (R)-3-cyclopentyl-3-[4-(7H-pyrrolo[2,3-d]pyrimidin-4-yl)-1H-pyrazol-1-yl]propanenitrile; or a pharmaceutically acceptable salt thereof.