

Statements of invention

1. A method of predicting the response of a subject to a therapy comprising an anti-TNF agent, the method comprising:

providing a biological sample obtained from a subject that has an immune disorder; and measuring the expression level of one or more genes in the biological sample, wherein the one or more genes comprise at least one gene selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2,

wherein at least one of (i) an elevated expression level, as compared to a healthy individual, of one or more of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, or ZFP36L1, or (ii) a reduced expression level, as compared to a healthy individual, of one or more of ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2 predicts that the subject will respond to a therapy comprising an anti-TNF agent.

2. A method of predicting the response of a subject to a therapy comprising an anti-TNF agent, the method comprising:

providing a biological sample obtained from a subject that has an immune disorder; and measuring the expression level of one or more genes in the biological sample, wherein the one or more genes comprise at least one gene selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2,

wherein at least one of (i) an elevated expression level, as compared to a healthy individual, of one or more of ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2, or (ii) a reduced expression level, as compared to a healthy individual, of one or more of ANKIB1, ARF1, ARF5, BRWD2, CALM2,

CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, or ZFP36L1 predicts that the subject will not respond to a therapy comprising an anti-TNF agent.

3. A method of treating an immune disorder, the method comprising administering to a subject in need thereof an effective amount of a therapy comprising an anti-TNF agent, wherein the subject has been identified as having at least one of (i) an elevated expression level, as compared to a healthy individual, of one or more of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, or ZFP36L1, or (ii) a reduced expression level, as compared to a healthy individual, of one or more of ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2.

4. The method of claim 1, comprising:

determining that the expression level of one or more of (i) ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294 are elevated, as compared to a healthy individual, or (ii) ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2 are reduced, as compared to a healthy individual; and

selecting a therapy comprising an anti-TNF agent for the subject.

5. The method of claim 2, comprising:

determining that the expression level of one or more of (i) ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2 are elevated, as compared to a healthy individual, or (ii) ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294 are reduced, as compared to a healthy individual; and

selecting a therapy comprising a non-anti-TNF agent for the subject.

6. The method of any of claims 1, 2, 4 or 5, wherein the RNA level of the one or more genes is measured.

7. The method of any of claims 1, 2, 4 or 5, wherein the protein level of the one or more genes is measured.

8. The method of claim 1, further comprising creating a record indicating that the subject is likely to respond to a therapy comprising an anti-TNF agent, if the expression level of one or more of (i) ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, or ZFP36L1 are elevated, as compared to a healthy individual, or (ii) ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2 are reduced, as compared to a healthy individual.

9. The method of claim 2, further comprising creating a record indicating that the subject is not likely to respond to a therapy comprising an anti-TNF agent, if the expression level of one or more of (i) ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, or SFRS2 are elevated, as compared to a healthy individual, or (ii) ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, or ZFP36L1 are reduced, as compared to a healthy individual.

10. The method of claim 8 or 9, wherein the record is created on a computer readable medium.

11. The method of any of claims 1-10, wherein the expression level of at least one gene selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-,

CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2 is elevated or reduced, as compared to a healthy individual, by at least about 1.5 fold.

12. The method of any of claims 1, 2, or 4-11, wherein the method comprises measuring the expression level of at least five genes selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2.

13. The method of claim 3, wherein the subject has been identified as having elevated or reduced expression levels, as compared to a healthy individual, of at least five genes selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2.

14. The method of claim 12 or 13, wherein the at least five genes are selected from the group consisting of ANKIB1, ARF1, ARF5, C9orf80, CALM2, CASP5, CLTB, COL4A3BP, CXorf52, DNAH1, EEA1, EGLN2, FAM44A, HDAC4, HDAC5, LGALS9, MXRA7, PGK1, RBBP4, RER1, SEL1L, SERF2, SFRS2, and YIPF6.

15. The method of any one of claims 12-14, wherein the at least five genes comprise five or more of CLTB, COL4A3BP, CXorf52, FAM44A, MXRA7, PGK1, SFRS2, or YIPF6.

16. The method of any of claims 1, 2, or 4-11, wherein the method comprises measuring the expression level of at least eight genes selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2.

17. The method of claim 16, wherein the at least eight genes comprise eight or more of ANKIB1, ARF1, ARF5, C9orf80, CALM2, CASP5, CLTB, COL4A3BP, CXorf52, DNAH1, EEA1, EGLN2, FAM44A, HDAC4, HDAC5, LGALS9, MXRA7, PGK1, RBBP4, RER1, SEL1L, SERF2, SFRS2, and YIPF6.

18. The method of claim 16 or 17, wherein the at least eight genes comprise CLTB, COL4A3BP, CXorf52, FAM44A, MXRA7, PGK1, SFRS2, and YIPF6.

19. The method of any of claims 1, 2, or 4-11, wherein the method comprises measuring the expression level of at least 24 genes selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2.

20. The method of claim 19, wherein the at least 24 genes comprise ANKIB1, ARF1, ARF5, C9orf80, CALM2, CASP5, CLTB, COL4A3BP, CXorf52, DNAH1, EEA1, EGLN2, FAM44A, HDAC4, HDAC5, LGALS9, MXRA7, PGK1, RBBP4, RER1, SEL1L, SERF2, SFRS2, YIPF6.

21. A method of predicting the response of a subject to a therapy comprising an anti-TNF agent, the method comprising:

providing a biological sample obtained from a subject that has an immune disorder; and
detecting the presence or absence of one or more SNP genotypes in the biological sample, wherein the one or more SNP genotypes comprise at least one SNP genotype selected from the group consisting of rs11778767 (A/A), rs11780500 (A/A), rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C), rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A),

rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A), rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), and rs868856 (G/G),

wherein the presence of one or more of rs11778767 (A/A), rs11780500 (A/A), rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C), rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A), rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A), rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), or rs868856 (G/G) predicts that the subject will respond to a therapy comprising an anti-TNF agent.

22. A method of predicting the response of a subject to a therapy comprising an anti-TNF agent, the method comprising:

providing a biological sample obtained from a subject that has an immune disorder; and

detecting the presence or absence of one or more SNP genotypes in the biological sample,

wherein the one or more SNP genotypes comprise at least one SNP genotype selected from the group consisting of rs11778767 (A/G), rs11778767 (G/G), rs11780500 (A/G), rs1422422 (A/G), rs1422422 (G/G), rs1441209 (A/G), rs1441209 (G/G), rs1968201 (A/G), rs2170331 (A/A), rs2814707 (A/A), rs3019293 (A/G), rs3019293 (G/G), rs3849942 (A/A), rs437943 (A/G), rs437943 (G/G), rs4562286 (A/G), rs4562286 (G/G), rs4976592 (A/G), rs4976592 (G/G), rs6531358 (A/G), rs6531358 (G/G), rs6665006 (G/G), rs7046653 (A/A), rs774359 (A/G), rs774359 (G/G), rs868856 (A/A), rs983332 (A/C), rs928655 (A/G), rs13393173 (A/G), rs437943 (A/G), rs10945919 (A/G), rs854555 (A/C), rs854548 (A/G), rs854547 (A/G), rs7046653 (A/G), rs868856 (C/T), rs774359 (C/T), rs2814707 (A/G), rs3849942 (A/G), rs6028945 (G/T), rs6138150 (C/T), rs6071980 (C/T), rs1800896 (A/G), rs3024490 (A/C), rs231726 (A/G), rs3096851 (A/C), rs6708660 (A/G), rs2523619 (A/G), rs3915971 (A/G), rs9264869 (A/G), rs2239804 (A/G), rs2395175 (A/G), rs2395185 (A/C), rs2516049 (A/G), rs660895 (A/G), rs7026551 (A/C), rs4803455 (A/C), rs983332 (A/A), rs928655 (A/A), rs13393173 (A/A), rs437943 (G/G), rs10945919 (G/G), rs854555 (A/A), rs854548 (A/A), rs7046653 (A/A), rs868856 (T/T), rs774359 (C/C), rs2814707 (A/A), rs3849942 (A/A), rs6028945 (T/T), rs6138150 (T/T), rs6071980 (C/C), rs1800896 (A/A), rs3024490 (A/A), rs231726 (A/A), rs3096851 (C/C), rs6708660 (A/A), rs2523619 (G/G), rs3915971 (A/A), rs9264869 (A/A), rs2239804 (A/A), rs2395175 (G/G), rs2395185 (C/C), rs2516049 (A/A),

rs660895 (A/A), rs7026551 (C/C), rs4803455 (C/C), and any of the SNP genotypes depicted in Table 13,

wherein the presence of one or more of rs11778767 (A/G), rs11778767 (G/G), rs11780500 (A/G), rs1422422 (A/G), rs1422422 (G/G), rs1441209 (A/G), rs1441209 (G/G), rs1968201 (A/G), rs2170331 (A/A), rs2814707 (A/A), rs3019293 (A/G), rs3019293 (G/G), rs3849942 (A/A), rs437943 (A/G), rs437943 (G/G), rs4562286 (A/G), rs4562286 (G/G), rs4976592 (A/G), rs4976592 (G/G), rs6531358 (A/G), rs6531358 (G/G), rs6665006 (G/G), rs7046653 (A/A), rs774359 (A/G), rs774359 (G/G), rs868856 (A/A), rs983332 (A/C), rs928655 (A/G), rs13393173 (A/G), rs437943 (A/G), rs10945919 (A/G), rs854555 (A/C), rs854548 (A/G), rs854547 (A/G), rs7046653 (A/G), rs868856 (C/T), rs774359 (C/T), rs2814707 (A/G), rs3849942 (A/G), rs6028945 (G/T), rs6138150 (C/T), rs6071980 (C/T), rs1800896 (A/G), rs3024490 (A/C), rs231726 (A/G), rs3096851 (A/C), rs6708660 (A/G), rs2523619 (A/G), rs3915971 (A/G), rs9264869 (A/G), rs2239804 (A/G), rs2395175 (A/G), rs2395185 (A/C), rs2516049 (A/G), rs660895 (A/G), rs7026551 (A/C), rs4803455 (A/C), rs983332 (A/A), rs928655 (A/A), rs13393173 (A/A), rs437943 (G/G), rs10945919 (G/G), rs854555 (A/A), rs854548 (A/A), rs7046653 (A/A), rs868856 (T/T), rs774359 (C/C), rs2814707 (A/A), rs3849942 (A/A), rs6028945 (T/T), rs6138150 (T/T), rs6071980 (C/C), rs1800896 (A/A), rs3024490 (A/A), rs231726 (A/A), rs3096851 (C/C), rs6708660 (A/A), rs2523619 (G/G), rs3915971 (A/A), rs9264869 (A/A), rs2239804 (A/A), rs2395175 (G/G), rs2395185 (C/C), rs2516049 (A/A), rs660895 (A/A), rs7026551 (C/C), rs4803455 (C/C), or any of the SNP genotypes depicted in Table 13 predicts that the subject will not respond to a therapy comprising an anti-TNF agent.

23. A method of treating an immune disorder, the method comprising administering to a subject in need thereof an effective amount of a therapy comprising an anti-TNF agent, wherein the subject has been identified as having one or more single nucleotide polymorphisms (SNPs) genotypes selected from the group consisting of rs11778767 (A/A), rs11780500 (A/A), rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C), rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A), rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A),

rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), and rs868856 (G/G).

24. The method of claim 21, wherein the method comprises detecting the presence or absence of five or more SNP genotypes selected from the group consisting of rs11778767 (A/A), rs11780500 (A/A), rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C), rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A), rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A), rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), and rs868856 (G/G).

25. The method of claim 22, wherein the method comprises detecting the presence or absence of five or more SNP genotypes selected from the group consisting of rs11778767 (A/G), rs11778767 (G/G), rs11780500 (A/G), rs1422422 (A/G), rs1422422 (G/G), rs1441209 (A/G), rs1441209 (G/G), rs1968201 (A/G), rs2170331 (A/A), rs2814707 (A/A), rs3019293 (A/G), rs3019293 (G/G), rs3849942 (A/A), rs437943 (A/G), rs437943 (G/G), rs4562286 (A/G), rs4562286 (G/G), rs4976592 (A/G), rs4976592 (G/G), rs6531358 (A/G), rs6531358 (G/G), rs6665006 (G/G), rs7046653 (A/A), rs774359 (A/G), rs774359 (G/G), and rs868856 (A/A).

26. The method of claim 22, wherein the method comprises detecting the presence or absence of five or more SNP genotypes selected from the group consisting of any of rs983332 (A/C), rs928655 (A/G), rs13393173 (A/G), rs437943 (A/G), rs10945919 (A/G), rs854555 (A/C), rs854548 (A/G), rs854547 (A/G), rs7046653 (A/G), rs868856 (C/T), rs774359 (C/T), rs2814707 (A/G), rs3849942 (A/G), rs6028945 (G/T), rs6138150 (C/T), rs6071980 (C/T), rs983332 (A/A), rs928655 (A/A), rs13393173 (A/A), rs437943 (G/G), rs10945919 (G/G), rs854555 (A/A), rs854548 (A/A), rs7046653 (A/A), rs868856 (T/T), rs774359 (C/C), rs2814707 (A/A), rs3849942 (A/A), rs6028945 (T/T), rs6138150 (T/T), and rs6071980 (C/C).

27. The method of any of claims 1-26, further comprising prescribing a therapy comprising an anti-TNF agent for the subject.

28. The method of any of claims 1-27, further comprising administering to the subject an anti-TNF agent.

29. The method of any of claims 1-28, wherein the subject has an inflammatory disorder.

30. The method of any of claims 1-29, wherein the subject has rheumatoid arthritis or Crohn's disease.

31. The method of any of claims 1-30, wherein the subject is a human.

32. A composition comprising at least five polynucleotides that selectively hybridize to each of at least five genes selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G-, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SEL1L, and SFRS2.

33. The composition of claim 32, wherein the at least five genes are selected from the group consisting of ANKIB1, ARF1, ARF5, C9orf80, CALM2, CASP5, CLTB, COL4A3BP, CXorf52, DNAH1, EEA1, EGLN2, FAM44A, HDAC4, HDAC5, LGALS9, MXRA7, PGK1, RBBP4, RER1, SEL1L, SERF2, SFRS2, and YIPF6.

34. The composition of claim 32 or 33, wherein the at least five genes are selected from the group consisting of CLTB, COL4A3BP, CXorf52, FAM44A, MXRA7, PGK1, SFRS2, and YIPF6.

35. A composition comprising at least five polynucleotides that selectively hybridize to each of at least five SNP genotypes selected from the group consisting of rs11778767 (A/A), rs11780500 (A/A), rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C).

rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A), rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A), rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), rs868856 (G/G), rs11778767 (A/G), rs11778767 (G/G), rs11780500 (A/G), rs1422422 (A/G), rs1422422 (G/G), rs1441209 (A/G), rs1441209 (G/G), rs1968201 (A/G), rs2170331 (A/A), rs2814707 (A/A), rs3019293 (A/G), rs3019293 (G/G), rs3849942 (A/A), rs437943 (A/G), rs437943 (G/G), rs4562286 (A/G), rs4562286 (G/G), rs4976592 (A/G), rs4976592 (G/G), rs6531358 (A/G), rs6531358 (G/G), rs6665006 (G/G), rs7046653 (A/A), rs774359 (A/G), rs774359 (G/G), rs868856 (A/A), rs983332 (A/C), rs928655 (A/G), rs13393173 (A/G), rs437943 (A/G), rs10945919 (A/G), rs854555 (A/C), rs854548 (A/G), rs854547 (A/G), rs7046653 (A/G), rs868856 (C/T), rs774359 (C/T), rs2814707 (A/G), rs3849942 (A/G), rs6028945 (G/T), rs6138150 (C/T), rs6071980 (C/T), rs1800896 (A/G), rs3024490 (A/C), rs231726 (A/G), rs3096851 (A/C), rs6708660 (A/G), rs2523619 (A/G), rs3915971 (A/G), rs9264869 (A/G), rs2239804 (A/G), rs2395175 (A/G), rs2395185 (A/C), rs2516049 (A/G), rs660895 (A/G), rs7026551 (A/C), rs4803455 (A/C), rs983332 (A/A), rs928655 (A/A), rs13393173 (A/A), rs437943 (G/G), rs10945919 (G/G), rs854555 (A/A), rs854548 (A/A), rs7046653 (A/A), rs868856 (T/T), rs774359 (C/C), rs2814707 (A/A), rs3849942 (A/A), rs6028945 (T/T), rs6138150 (T/T), rs6071980 (C/C), rs1800896 (A/A), rs3024490 (A/A), rs231726 (A/A), rs3096851 (C/C), rs6708660 (A/A), rs2523619 (G/G), rs3915971 (A/A), rs9264869 (A/A), rs2239804 (A/A), rs2395175 (G/G), rs2395185 (C/C), rs2516049 (A/A), rs660895 (A/A), rs7026551 (C/C), rs4803455 (C/C), and any of the SNP genotypes depicted in Table 13.

36. The composition of claim 35, wherein the at least five polynucleotides selectively hybridize to each of at least five SNP genotypes selected from the group consisting of rs11778767 (A/A), rs11780500 (A/A), rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C), rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A), rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A), rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), rs868856 (G/G), rs11778767 (A/G), rs11778767 (G/G), rs11780500 (A/G), rs1422422 (A/G), rs1422422 (G/G), rs1441209 (A/G), rs1441209 (G/G), rs1968201 (A/G), rs2170331 (A/A), rs2814707 (A/A), rs3019293 (A/G), rs3019293 (G/G),

rs3849942 (A/A), rs437943 (A/G), rs437943 (G/G), rs4562286 (A/G), rs4562286 (G/G), rs4976592 (A/G), rs4976592 (G/G), rs6531358 (A/G), rs6531358 (G/G), rs6665006 (G/G), rs7046653 (A/A), rs774359 (A/G), rs774359 (G/G), and rs868856 (A/A).

37. The composition of claim 35, wherein the at least five polynucleotides selectively hybridize to each of at least five SNP genotypes selected from the group consisting of any of rs983332 (A/C), rs928655 (A/G), rs13393173 (A/G), rs437943 (A/G), rs10945919 (A/G), rs854555 (A/C), rs854548 (A/G), rs854547 (A/G), rs7046653 (A/G), rs868856 (C/T), rs774359 (C/T), rs2814707 (A/G), rs3849942 (A/G), rs6028945 (G/T), rs6138150 (C/T), rs6071980 (C/T), rs983332 (A/A), rs928655 (A/A), rs13393173 (A/A), rs437943 (G/G), rs10945919 (G/G), rs854555 (A/A), rs854548 (A/A), rs7046653 (A/A), rs868856 (T/T), rs774359 (C/C), rs2814707 (A/A), rs3849942 (A/A), rs6028945 (T/T), rs6138150 (T/T), and rs6071980 (C/C).

38. The composition of any one of claims 32-37, wherein the at least five polynucleotides are bound to a solid support.

39. A kit comprising:

an array comprising a plurality of polynucleotides bound to a solid support, wherein the plurality comprises at least five polynucleotides that selectively hybridize to each of at least five genes selected from the group consisting of ANKIB1, ARF1, ARF5, BRWD2, CALM2, CLTB, COL4A3BP, C9orf80, EGLN2, HDAC5, LGALS9, MYLIP, PCBP2, PGK1, RBBP4, RER1, RPA3, SERF2, SLC25A39, SRGAP2, TUG1, YIPF6, ZNF294, ZFP36L1, ANKRD12, CAMK2G, CASP5, CXorf52, DNAH1, EEA1, FAM44A, FOXJ3, HDAC4, MNT, MXRA7, PTCH1, SELIL, and SFRS2; and

instructions for detecting the presence or amount of one or more of the polynucleotides in a sample.

40. A kit comprising:

an array comprising a plurality of polynucleotides bound to a solid support, wherein the plurality comprises at least five polynucleotides that selectively hybridize to each of at least five SNP genotypes selected from the group consisting of rs11778767 (A/A), rs11780500 (A/A),

rs11780500 (G/G), rs1422422 (A/A), rs1441209 (A/A), rs1968201 (A/A), rs2028446 (A/A), rs2028446 (A/G), rs2028446 (G/G), rs2170331 (A/G), rs2170331 (G/G), rs2814707 (A/G), rs2814707 (G/G), rs3019293 (A/A), rs3087615 (A/C), rs3087615 (C/C), rs3849942 (A/G), rs3849942 (G/G), rs437943 (A/A), rs4562286 (A/A), rs4976592 (A/A), rs6531358 (A/A), rs6665006 (A/A), rs6665006 (A/G), rs7046653 (A/G), rs7046653 (G/G), rs774359 (A/A), rs868856 (A/G), rs868856 (G/G), rs11778767 (A/G), rs11778767 (G/G), rs11780500 (A/G), rs1422422 (A/G), rs1422422 (G/G), rs1441209 (A/G), rs1441209 (G/G), rs1968201 (A/G), rs2170331 (A/A), rs2814707 (A/A), rs3019293 (A/G), rs3019293 (G/G), rs3849942 (A/A), rs437943 (A/G), rs437943 (G/G), rs4562286 (A/G), rs4562286 (G/G), rs4976592 (A/G), rs4976592 (G/G), rs6531358 (A/G), rs6531358 (G/G), rs6665006 (G/G), rs7046653 (A/A), rs774359 (A/G), rs774359 (G/G), rs868856 (A/A), rs983332 (A/C), rs928655 (A/G), rs13393173 (A/G), rs437943 (A/G), rs10945919 (A/G), rs854555 (A/C), rs854548 (A/G), rs854547 (A/G), rs7046653 (A/G), rs868856 (C/T), rs774359 (C/T), rs2814707 (A/G), rs3849942 (A/G), rs6028945 (G/T), rs6138150 (C/T), rs6071980 (C/T), rs1800896 (A/G), rs3024490 (A/C), rs231726 (A/G), rs3096851 (A/C), rs6708660 (A/G), rs2523619 (A/G), rs3915971 (A/G), rs9264869 (A/G), rs2239804 (A/G), rs2395175 (A/G), rs2395185 (A/C), rs2516049 (A/G), rs660895 (A/G), rs7026551 (A/C), rs4803455 (A/C), rs983332 (A/A), rs928655 (A/A), rs13393173 (A/A), rs437943 (G/G), rs10945919 (G/G), rs854555 (A/A), rs854548 (A/A), rs7046653 (A/A), rs868856 (T/T), rs774359 (C/C), rs2814707 (A/A), rs3849942 (A/A), rs6028945 (T/T), rs6138150 (T/T), rs6071980 (C/C), rs1800896 (A/A), rs3024490 (A/A), rs231726 (A/A), rs3096851 (C/C), rs6708660 (A/A), rs2523619 (G/G), rs3915971 (A/A), rs9264869 (A/A), rs2239804 (A/A), rs2395175 (G/G), rs2395185 (C/C), rs2516049 (A/A), rs660895 (A/A), rs7026551 (C/C), rs4803455 (C/C), and any of the SNP genotypes depicted in Table 13; and

instructions for detecting the presence or amount of one of more of the SNP genotypes in a sample.

41. The kit of claim 39 or 40, further comprising one or more reagents for isolating nucleic acid from a sample.

42. The kit of any of claims 39-41, further comprising a means for amplifying a nucleic acid.