

~~WHAT IS CLAIMED IS:~~ **Claims**

1. A method for detecting fetal cells in a sample from a pregnant subject, comprising:
 - (a) contacting the sample with a first antibody, wherein the sample comprises a plurality of cells;
 - (b) isolating cells bound to the first antibody to produce an enriched sample;
 - (c) contacting the enriched sample with a second antibody; and
 - (d) identifying a cell that is bound to the second antibody as a fetal cell,wherein the first antibody or the second antibody:
 - (i) is an antibody that binds to a Triggering Receptor Expressed on Myeloid Cells Like 2 (TREML2) protein; or
 - (ii) comprises an antigen binding fragment that binds to a TREML2 protein.
2. The method of claim 1, wherein the fetal cell is a fetal nucleated red blood cell (fnRBC).
3. The method of claim 1 or 2, wherein the first antibody is conjugated to one or more magnetic particles.
4. The method of claim 3, wherein the magnetic particles are colloidal magnetic particles.
5. The method of claim 4, wherein the colloidal magnetic particles are ferrofluid magnetic particles.
6. The method of any one of claims 3-5, wherein step (b) comprises subjecting the sample to a magnetic field.
7. The method of claim 6, wherein the magnetic particles are coupled to a first exogenous aggregation enhancing factor (EAEF), the first EAEF comprising one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A- antibody Fc, and avidin-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.
8. The method of claim 7, wherein step (a) comprises adding a second EAEF to induce aggregation of the magnetic particles, the second EAEF comprising the other member of the specific binding pair.
9. The method of claim 8, wherein step (b) comprises adding to the enriched sample a member of the specific binding pair in order to reverse aggregation of the magnetic particles in the enriched sample.

10. The method of any one of the preceding claims, further comprising, prior to step (a), adding to the sample at least one aggregation inhibiting agent selected from the group consisting of a reducing agent, an immune-complex, a chelating agent, and a diamino butane.

11. The method of claim 10, wherein the aggregation inhibiting agent is a chelating agent, and wherein the chelating agent is EDTA. ~~which is EDTA.~~

12. The method of any one of the preceding claims, wherein the second antibody is an antibody that binds to TREML2 protein or comprises an antigen binding fragment that binds to a TREML2 protein.

13. The method of claim 12, further comprising, prior to step (d), isolating single fetal cells.

14. The method of claim 13, wherein isolating single fetal cells is carried out by isolating single fetal cells that are bound to the second antibody.

15. The method of claim 14, wherein the second antibody which is conjugated to a label.

16. The method of claim 15, wherein the label is a fluorescent label.

17. The method of claim 16, wherein isolating single fetal cells is based on immunofluorescent technology.

18. The method of claim 17, wherein isolating single fetal cells is carried out by fluorescence activated cell sorting (FACS).

19. The method of claim 17, wherein isolating single cells is carried out with a DEP Array.

20. The method of any one of the preceding claims, wherein step (d) comprises performing a sequencing analysis.

21. The method of claim 20, wherein the sequencing analysis comprises short tandem repeat (STR) analysis.

22. The method of any one of the ~~preceding~~ ~~previous~~ claims, further comprising analyzing the fetal cell.

23. The method of claim 22, wherein analyzing the fetal cell comprises performing a genomic or a genetic analysis.

24. The method of claim 23, wherein performing a genetic analysis comprises detecting the presence or absence of one or more genetic abnormalities in the fetal cell.

25. The method of any one of the preceding claims, wherein the first antibody is an antibody that binds to a TREML2 protein or comprises an antigen binding fragment that binds to a TREML2 protein.

26. The method of any one of claims 1-24, wherein the first antibody binds to a protein selected from EpCAM, CD105, and CD71, and the second antibody is an antibody that binds to a TREML2 protein or comprises an antigen binding fragment that binds to a TREML2 protein.

~~26~~27. The method of any one of the preceding claims, wherein the antibody that binds to a TREML2 protein or an antigen binding fragment that binds to a TREML2 protein comprises one or more CDRs selected from:

- (i) a heavy chain variable region (HCVR) complementarity determining region (CDR) 1 comprising the amino acid sequence of SEQ ID NO: 6;
- (ii) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;
- (iii) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;
- (iv) a light chain variable region (LCVR) CDR1 comprising the amino acid sequence of SEQ ID NO: 9;
- (v) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and
- (vi) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.

28. The method of any one of the preceding claims, wherein the antibody that binds to a TREML2 protein is selected from sc-109096, ARP49877 P050, OACA04996, AF3259, MA5-30973, PA5-47471, ABIN634968, ABIN928294, 30-552, ABIN2463297, ABIN19999041, 11655-r001, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282- 40, ABIN4249314, nbp1-70737-20ul, and BD563661.

~~27. A method for detecting fetal cells in a sample from a pregnant subject, comprising:~~

- ~~(a) contacting the sample with a magnetic reagent, wherein the sample comprises a plurality of cells, wherein the magnetic reagent comprises a magnetic particle conjugated to a first antibody, and wherein the first antibody binds to a protein selected from EpCAM, CD105, and CD71;~~
- ~~(b) contacting the sample with an anti-TREML2 antibody or antigen binding fragment thereof; and~~
- ~~(c) identifying a cell that is bound to the anti-TREML2 antibody as a fetal cell.~~

~~28. The method of claim 27, further comprising, prior to step (c), isolating cells bound to the first antibody.~~

~~29. The method of claim or 28, wherein isolating cells comprises subjecting the sample to a magnetic field in order to enrich the sample with cells that are bound to the first antibody.~~

~~30. The method of any of claims 27-29, wherein the magnetic particle is a colloidal magnetic particle.~~

31. The method of claim 30, wherein the colloidal magnetic particle is a ferrofluid magnetic particle.

32. The method of any of claims 27-31, wherein the magnetic particle is further coupled to a first exogenous aggregation enhancing factor (EAEF), the first EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody, Fe, and avi-din-biotin, biotin-analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.

33. The method of claim 32, which comprises adding during step (a) a second EAEF to induce aggregation of the particles wherein the second EAEF comprising the other member of the specific binding pair.

34. The method of claim 33, which further comprises adding to the enriched sample a member of the specific binding pair in order to reverse aggregation of said sample, thereby facilitating identification of the cell.

35. The method of any one of claims 27-34, further comprising, prior to step (a), adding to the sample at least one aggregation inhibiting agent selected from the group consisting of a reducing agent, an immune complex, a chelating agent, a diamino-butane.

36. The method of claim 35, wherein the aggregation inhibiting agent is a chelating agent.

37. The method of claim 36, wherein the chelating agent is EDTA.

38. The method of any one of claims 27-37, further comprising, prior to step (c), isolating the cell using the anti-TREML2 antibody or a second antibody.

39. The method of claim 38, wherein the second antibody is selected from an anti-cytokeratin antibody and anti-HLAG antibody.

40. The method of claim 38 or 39, wherein the anti-TREML2 antibody or the second antibody is conjugated to a label.

41. The method of claim 40, wherein the label is a fluorescent label.

42. The method of claim 41, wherein isolating the cell is based on immunofluorescent technology.

43. The method of claim 42, wherein isolating the cell is carried out by fluorescence activated cell sorting (FACS).

44. The method of claim 41, wherein isolating the cell is carried out with a DEP Array.

45. The method of any of claims 27-44, wherein identifying the cell comprises performing a sequencing analysis.

46. The method of claim 45, wherein the sequencing analysis comprises short tandem repeat (STR) analysis.

47. The method of any of claims 27-46, further comprising analyzing the fetal cell.

48. The method of claim 47, wherein analyzing the fetal cell comprises performing a genomic or a genetic analysis.

49. The method of claim 48, wherein performing a genetic analysis comprises detecting the presence or absence of one or more genetic abnormalities in the fetal cell.

50. The method of any of claims 27-49, wherein the fetal cell is a fetal erythroblast or fetal trophoblast.

51. The method of any of claims 27-50, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises one or more complementarity determining regions (CDRs) selected from:

(i) a heavy chain variable region (HCVR) CDR1 comprising the amino acid sequence of SEQ ID NO: 6;

(ii) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;

(iii) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;

(iv) a light chain variable region (LCVR) CDR1 comprising the amino acid sequence of SEQ ID NO: 9;

(v) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and

(vi) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.

52. The method of claim 51, wherein any one of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions, or deletions.

53. The method of any of claims 27-50, wherein the anti-TREML2 antibody is selected from sc-109096, ARP49877_P050, OACA04996, AF3259, MA5-30973, PA5-47471, ABIN634968, ABIN928294, 30-552, ABIN2463297, ABIN19999041, 11655-r001, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282-40, ABIN4249314, nbp1-70737-20ul, and BD563661.

54. A kit comprising (a) an antibody that binds to a Triggering Receptor Expressed on Myeloid Cells Like 2 (TREML2) protein (anti-TREML2 antibody) or an antigen binding fragment thereof; and (b) a magnetic reagent comprising colloidal magnetic particles.

55. The kit of claim 54, wherein the anti-TREML2 antibody is selected from sc-109096,

~~ARP49877_P050, OACA04996, AF3259, MA5-30973, PA5-47471, ABIN634968, ABIN928294, 30-552, ABIN2463297, ABIN19999041, 11655-r001, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282-40,~~

~~ABIN4249314, nbp1-70737-20ul, and BD563661.~~

~~56. The kit of claim 54, wherein the anti-TREML2 antibody, or an antigen binding fragment thereof, comprises one or more complementarity determining regions (CDRs) selected from:~~

~~(a) a heavy chain variable region (HCVR) CDR1 comprising the amino acid sequence of SEQ ID NO: 6;~~

~~(b) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~

~~(c) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~

~~(d) a light chain variable region (LCVR) CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~

~~(e) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~

~~(f) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~57. The kit of claim 56, wherein any one of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions, or deletions.~~

~~58. The kit of any of claims 54-57, wherein the anti-TREML2 antibody or antigen binding fragment thereof is a conjugated to a label to produce a conjugated antibody.~~

~~59. The kit of claim 58, wherein the label is selected from phycoerythrin (PE), allophycocyanin (APC), horse radish peroxidase (HRP), and biotin.~~

~~60. The kit of any of claims 54-59, wherein the colloidal magnetic particles are less than 200nm in size.~~

~~61. The kit of any of claims 54-60, wherein the colloidal magnetic particles are ferrofluid particles.~~

~~62. The kit of any of claims 54-61, wherein the colloidal magnetic particles are conjugated to an antibody or antigen binding fragment thereof.~~

~~63. The kit of claim 62, wherein the antibody is an anti-TREML2 antibody.~~

~~64. The kit of claim 63, wherein the anti-TREML2 antibody, or the antigen binding fragment thereof, comprises one or more CDRs selected from:~~

~~(a) a HCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 6;~~

~~(b) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~

- ~~(c) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~
- ~~(d) a LCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~
- ~~(e) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~
- ~~(f) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~65. The kit of claim 65, wherein any one of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions or deletions.~~

~~66. The kit of any of claims 54-65, further comprising an inhibiting agent selected from the group consisting of a reducing agent, an immune complex, a chelating agent, a diamino butane.~~

~~67. The kit of claim 66, wherein the chelating agent is EDTA.~~

~~68. The kit of any of claims 54-67, further comprising an exogenous aggregation enhancing factor (EAEF), wherein the EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avidin-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.~~

~~69. A kit comprising (a) a first antibody, capable of binding to a protein expressed on the surface of a fetal cell, wherein the first antibody is bound to colloidal magnetic particles; and (b) an anti-TREML2 antibody or an antigen binding fragment thereof.~~

~~70. The kit of claim 65, wherein the first antibody binds to a protein selected from EpCAM, CD105, and CD71.~~

~~71. The kit of claim 69 or 27, wherein the colloidal magnetic particles are ferrofluid particles~~

~~72. The kit of any of claims 69-71, wherein the anti-TREML2 antibody, or the antigen binding fragment thereof, comprises one or more CDRs selected from~~

- ~~(a) a HCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 6;~~
- ~~(b) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~
- ~~(c) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~
- ~~(d) a LCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~
- ~~(e) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~
- ~~(f) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~73. The kit of claim 72, wherein any one of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions or deletions.~~

~~74. The kit of any of claims 69-73, further comprising an inhibiting agent selected from the group consisting of a reducing agent, an immune complex, a chelating agent, a diamino butane.~~

~~75. The kit of claim 74, wherein the chelating agent is EDTA.~~

~~76. The kit of any of claims 69-75, further comprising an exogenous aggregation enhancing factor (EAEF), wherein the EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avidin-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.~~

~~77. A method for cell-based fetal genetic testing, comprising:~~

~~(a) contacting a sample obtained from a pregnant subject with an anti-TREML2 antibody or antigen binding fragment thereof, wherein the sample comprises a plurality of cells;~~

~~(b) isolating cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof;~~

~~(c) analyzing one or more nucleic acid molecules from the cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof; and~~

~~(d) generating a report based on the analysis of the one or more nucleic acid~~

~~molecules, wherein the report provides the likelihood of a fetus having one or more genetic abnormalities.~~

~~78. The method of claim 77, wherein the cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof are fetal cells.~~

~~79. The method of claim 78, wherein the fetal cells are fetal erythroblasts.~~

~~80. The method of claim 78, wherein the fetal cells are fetal trophoblasts.~~

~~81. The method of any of claims 77-80, wherein analyzing the one or more nucleic acid molecules comprised conducting a karyotype analysis.~~

~~82. The method of any of claims 77-80, wherein analyzing the one or more nucleic acid molecules comprises performing a sequencing analysis.~~

~~83. The method of claim 82, wherein the sequencing analysis comprises short tandem repeat (STR) analysis.~~

~~84. The method of any of claims 77-83, wherein the one or more genetic abnormalities is selected from a trisomy, sex chromosome anomaly, and structural anomaly.~~

85. The method of claim 84, wherein the trisomy is selected from trisomy 3, trisomy 4, trisomy 6, trisomy 7, trisomy 8, trisomy 9, trisomy 10, trisomy 11, trisomy 12, trisomy 13, trisomy 16, trisomy 17, trisomy 18, trisomy 20, trisomy 21, and trisomy 22.
86. The method of claim 85, wherein the sex chromosome anomaly is selected from monosomy X, triple X, and Klinefelter's syndrome.
87. The method of claim 86, wherein the structural anomaly is a copy number variation (CNV).
88. The method of claim 87, wherein the structural anomaly is a deletion of the CNV or duplication of the CNV.
89. The method of any of claims 77-88, wherein the anti-TREML2 antibody is conjugated to a magnetic particle.
90. The method of claim 89, wherein the magnetic particle is a colloidal magnetic particle.
91. The method of claim 90, wherein the colloidal magnetic particle is a ferrofluid magnetic particle.
92. The method of any of claims 89-91, wherein step (b) comprises subjecting the sample to a magnetic field.
93. The method of any of claims 77-88, further comprising, prior to step (a), contacting the sample with a first antibody, wherein the first antibody binds to a protein selected from EpCAM, CD105, and CD71.
94. The method of claim 93, further comprising, prior to step (a), isolating cells that are bound to the first antibody.
95. The method of claim 93 or 94, wherein the first antibody is conjugated to a magnetic particle.
96. The method of claim 95, wherein the magnetic particle is a colloidal magnetic particle.
97. The method of claim 96, wherein the colloidal magnetic particle is a ferrofluid magnetic particle.
98. The method of any of claims 95-97, wherein isolating cells that are bound to the first antibody comprises subjecting the sample to a magnetic field.
99. The method of any of claims 77-88 and 93-98, wherein the anti-TREML2 antibody or antigen binding fragment thereof is conjugated to a label.
100. The method of claim 99, wherein the label is a fluorescent label.
101. The method of claim 100, wherein isolating cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof is based on immunofluorescent technology.

~~102. The method of claim 101, wherein isolating cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof is carried out by fluorescence activated cell sorting (FACS).~~

~~103. The method of claim 101, wherein isolating cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof is carried out with a DEP Array.~~

~~104. The method of any of claims 77-92, further comprising contacting the cells that are bound to the anti-TREML2 antibody or antigen binding fragment thereof with a second antibody or antigen binding fragment thereof.~~

~~105. The method of claim 104, wherein the second antibody is an anti-TREML2 antibody or antigen binding fragment thereof.~~

~~106. The method of claim 104 or 105, wherein the second antibody is conjugated to a label.~~

~~107. The method of claim 106, wherein the label is a fluorescent label.~~

~~108. The method of claim 107, further comprising isolating cells that are bound to the second antibody or antigen binding fragment thereof.~~

~~109. The method of claim 108, wherein isolating cells that are bound to the second antibody or antigen binding fragment thereof is based on immunofluorescent technology.~~

~~110. The method of claim 109, wherein isolating cells that are bound to the second antibody or antigen binding fragment thereof is carried out by fluorescence activated cell sorting (FACS).~~

~~111. The method of claim 109, wherein isolating cells that are bound to the second antibody or antigen binding fragment thereof is carried out with a DEP Array.~~

~~112. The method of any of claims 77-111, wherein the anti-TREML2 antibody is selected from sc-109096, ARP49877_P050, OACA04996, AF3259, MA5-30973, PA5-47471, ABIN634968, ABIN928294, 30-552, ABIN2463297, ABIN19999041, 11655-r001, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282-40, ABIN4249314, nbp1-70737-20ul, and BD563661.~~

~~113. The method of any of claims 77-111, wherein the anti-TREML2 antibody, or an antigen binding fragment thereof, comprises one or more CDRs selected from:~~

~~(a) a HCVR-CDR1 comprising the amino acid sequence of SEQ ID NO: 6;~~

~~(b) a HCVR-CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~

~~(c) a HCVR-CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~

~~(d) a LCVR-CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~

~~(e) a LCVR-CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~

(f) a LCVR-CDR3 comprising the amino acid sequence of SEQ ID NO: 11.

114. The method of claim 113, wherein any one of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions or deletions.

115. A method for detecting fetal cells in a sample from a pregnant subject, comprising:

(a) contacting the sample with a first antibody, wherein the sample comprises a

plurality of cells, and wherein the first antibody binds to a Triggering Receptor Expressed on Myeloid Cells Like 2 (TREM2) protein (anti-TREM2 antibody) or an antigen binding fragment thereof; and

(b) identifying a cell that is bound to the first antibody as a fetal cell.

116. The method of claim 115, wherein the fetal cell is a fetal nucleated red blood cell

(fnRBC).

117. The method of claim 115 or 116, wherein the first antibody is conjugated to one or more magnetic particles.

118. The method of claim 117, wherein the magnetic particles are colloidal magnetic particles.

119. The method of claim 118, wherein the colloidal magnetic particles are ferrofluid magnetic particles.

120. The method of any of claims 117-119, further comprising subjecting the sample to a magnetic field.

121. The method of any of claims 117-120, wherein the magnetic particles are coupled to a first exogenous aggregation enhancing factor (EAEF), wherein the first EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avidin-biotin, biotin analog-avidin,

desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.

122. The method of claim 121, further comprising, prior to step (b), adding a second EAEF to induce aggregation of the magnetic particles, wherein the second EAEF comprises the other member of the specific binding pair.

123. The method of claim 122, further comprising isolating cells that are bound to the first antibody to produce an enriched sample.

124. The method of claim 123, further comprising adding to the enriched sample a third

EAEF in order to reverse aggregation of the magnetic particles in the enriched sample, wherein the third EAEF is capable of binding to the first EAEF or the second EAEF.

125. The method of claim 124, wherein the third EAEF is a member of the specific binding pair.

126. The method of any of claims 115–125, further comprising, prior to step (a), adding to the sample at least one aggregation inhibiting agent selected from the group consisting of a reducing agent, an immune complex, a chelating agent, and a diamino butane.

127. The method of claim 126, wherein the aggregation inhibiting agent is the chelating agent.

128. The method of claim 127, wherein the chelating agent is EDTA.

129. The method of claim 115 or 116, wherein the first antibody is conjugated to a label.

130. The method of claim 129, wherein the label is a fluorescent label.

131. The method of claim 130, further comprising, prior to step (b), isolating cells that are bound to the first antibody, wherein isolating cells is based on immunofluorescent technology.

132. The method of claim 131, wherein isolating cells that are bound to the first antibody is carried out by fluorescence activated cell sorting (FACS).

133. The method of claim 131, wherein isolating cells that are bound to the first antibody is carried out with a DEP Array.

134. The method of any of claims 115–133, wherein step (b) comprises performing a sequencing analysis.

135. The method of claim 134, wherein the sequencing analysis comprises short tandem repeat (STR) analysis.

136. The method of any of claims 115–135, further comprising analyzing the fetal cell.

137. The method of claim 136, wherein analyzing the fetal cell comprises performing a genomic or a genetic analysis.

138. The method of claim 137, wherein performing a genetic analysis comprises detecting the presence or absence of one or more genetic abnormalities in the fetal cell.

139. The method of any of claims 115–138, wherein the first antibody or antigen binding fragment thereof comprises one or more CDRs selected from:

(a) a HCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 6;

(b) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;

- ~~(c) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~
- ~~(d) a LCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~
- ~~(e) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~
- ~~(f) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~140. The method of claim 139, wherein any of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions, or deletions.~~

~~141. The method of any of claims 115-138, wherein the first antibody is selected from se-109096, ARP49877_P050, OACA04996, AF3259, MA5_30973, PA5_47471, ABIN634968, ABIN928294, 30_552, ABIN2463297, ABIN19999041, 11655_r001, ABIN749888, bs_2737r, ABIN1999045, 11655_rp02, ABIN293207, ABIN2387613, t8282-40,~~

~~ABIN4249314, nbp1_70737-20ul, and BD563661.~~

~~142. An anti TREML2 antibody, or an antigen binding fragment thereof, comprising one or more CDRs selected from:~~

- ~~(a) a HCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 6;~~
- ~~(b) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~
- ~~(c) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~
- ~~(d) a LCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~
- ~~(e) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~
- ~~(f) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~143. The anti TREML2 antibody of claim 142, wherein any of SEQ ID Nos: 6-11~~

~~independently comprise one or more amino acid substitutions, additions, or deletions.~~

~~144. The anti TREML2 antibody of claim 142 or 143, wherein the anti TREML2 antibody or antigen binding fragment thereof comprises two or more CDRs selected from (a)-(f).~~

~~145. The anti TREML2 antibody of claim 142 or 143, wherein the anti TREML2 antibody or antigen binding fragment thereof comprises three or more CDRs selected from (a)-(f).~~

~~146. The anti TREML2 antibody of claim 142 or 143, wherein the anti TREML2 antibody or antigen binding fragment thereof comprises four or more CDRs selected from (a)-(f).~~

~~147. The anti TREML2 antibody of claim 142 or 143, wherein the anti TREML2 antibody or antigen binding fragment thereof comprises five or more CDRs selected from (a)-(f).~~

148. The anti-TREML2 antibody of claim 142 or 143, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises all of the CDRs of (a)-(f).
149. The anti-TREML2 antibody of any of claims 142-148, wherein the anti-TREML2 antibody or antigen binding fragment thereof is conjugated to a label.
150. The anti-TREML2 antibody of claim 149, wherein the label is a fluorescent label.
151. The anti-TREML2 antibody of any of claims 142-148, wherein the anti-TREML2 antibody or antigen binding fragment thereof is conjugated to a magnetic particle.
152. The anti-TREML2 antibody of claim 151, wherein the magnetic particle is a colloidal magnetic particle.
153. The anti-TREML2 antibody of claim 152, wherein the colloidal magnetic particle is a ferrofluid magnetic particle.
154. The anti-TREML2 antibody of claim 152 or 153, wherein the colloidal magnetic particle is less than 200 nm.
155. The anti-TREML2 antibody of claim 152 or 153, wherein the colloidal magnetic particle is between about 80 to 200 nm.
156. The anti-TREML2 antibody of claim 152 or 153, wherein the colloidal magnetic particle is between about 90 to 150 nm.
157. The anti-TREML2 antibody of any of claims 152-156, wherein the colloidal magnetic particle has a magnetic mass of at least 50%.
158. The anti-TREML2 antibody of claim 157, wherein the colloidal magnetic particle has a magnetic mass of at least 60%.
159. The anti-TREML2 antibody of claim 157, wherein the colloidal magnetic particle has a magnetic mass of between 70% to 90%.
160. The anti-TREML2 antibody of any of claims 152-159, wherein the colloidal magnetic particle comprises a crystalline core of a superparamagnetic material that is surrounded by coating molecules.
161. The anti-TREML2 antibody of any of claims 151-160, wherein the magnetic particle is coupled to a first exogenous aggregation enhancing factor (EAEF), wherein the first EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avidin-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.

~~162. An anti-TREML2 antibody conjugate comprising (a) an anti-TREML2 antibody or antigen binding fragment thereof; and (b) a magnetic particle, wherein the magnetic particle is conjugated to the anti-TREML2 antibody.~~

~~163. The anti-TREML2 antibody conjugate of claim 155, wherein the magnetic particle is a colloidal magnetic particle.~~

~~164. The anti-TREML2 antibody conjugate of claim 156, wherein the colloidal magnetic particle is a ferrofluid magnetic particle.~~

~~165. The anti-TREML2 antibody conjugate of claim 163 or 164, wherein the colloidal magnetic particle is less than 200 nm.~~

~~166. The anti-TREML2 antibody conjugate of claim 163 or 164, wherein the colloidal magnetic particle is between about 80 to 200 nm.~~

~~167. The anti-TREML2 antibody conjugate of claim 163 or 164, wherein the colloidal magnetic particle is between about 90 to 150 nm.~~

~~168. The anti-TREML2 antibody conjugate of any of claims 163-167, wherein the colloidal magnetic particle has a magnetic mass of at least 50%.~~

~~169. The anti-TREML2 antibody conjugate of claim 168, wherein the colloidal magnetic particle has a magnetic mass of at least 60%.~~

~~170. The anti-TREML2 antibody conjugate of claim 169, wherein the colloidal magnetic particle has a magnetic mass of between 70% to 90%.~~

~~171. The anti-TREML2 antibody conjugate of any of claims 163-170, wherein the colloidal magnetic particle comprises a crystalline core of a superparamagnetic material that is surrounded by coating molecules.~~

~~172. The anti-TREML2 antibody conjugate of any of claims 162-171, wherein the magnetic particle is coupled to a first exogenous aggregation enhancing factor (EAEF), wherein the first EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avi-din-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.~~

~~173. The anti-TREML2 antibody conjugate of any of claims 162-171, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises one or more CDRs selected from:~~

~~(a) a HCVR-CDR1 comprising the amino acid sequence of SEQ ID NO: 6;~~

~~(b) a HCVR-CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~

- ~~(c) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~
- ~~(d) a LCVR CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~
- ~~(e) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~
- ~~(f) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~174. The anti-TREML2 antibody conjugate of claim 173, wherein any of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions, or deletions.~~

~~175. The anti-TREML2 antibody conjugate of claim 173 or 174, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises two or more CDRs selected from~~

~~(a)-(f).~~

~~176. The anti-TREML2 antibody conjugate of claim 173 or 174, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises three or more CDRs selected from~~

~~(a)-(f).~~

~~177. The anti-TREML2 antibody conjugate of claim 173 or 174, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises four or more CDRs selected from~~

~~(a)-(f).~~

~~178. The anti-TREML2 antibody conjugate of claim 173 or 174, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises five or more CDRs selected from~~

~~(a)-(f).~~

~~179. The anti-TREML2 antibody conjugate of claim 173 or 174, wherein the anti-TREML2 antibody or antigen binding fragment thereof comprises all of the CDRs of (a)-(f).~~

~~180. The anti-TREML2 antibody conjugate of any of claims 162-171, wherein the anti-TREML2 antibody is selected from sc-109096, ARP49877 P050, OACA04996, AF3259, MA5-30973, PA5-47471, ABIN634968, ABIN928294, 30-552, ABIN2463297,~~

~~ABIN19999041, 11655-r001, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282-40, ABIN4249314, nbp1-70737-20ul, and BD563661.~~

~~181. A method of preparing a fetal cell sample from a maternal sample obtained from a pregnant subject, comprising:~~

~~(a) contacting the maternal sample that comprises fetal cells and maternal cells with a first antibody conjugate, wherein the first antibody conjugate comprises (i) a first antibody; and (ii) a colloidal magnetic particle, wherein the first antibody is conjugated to the colloidal magnetic particle; and~~

~~(b) isolating cells that are bound to the first antibody conjugate by subjecting the maternal sample to a magnetic field, thereby preparing a fetal cell sample.~~

~~182. The method of claim 181, wherein the colloidal magnetic particle is less than 200 nm.~~

~~183. The method of claim 181, wherein the colloidal magnetic particle is between about 80 to 200 nm.~~

~~184. The method of claim 181, wherein the colloidal magnetic particle is between about 90 to 150 nm.~~

~~185. The method of any of claims 181-184, wherein the colloidal magnetic particle has a magnetic mass of at least 50%.~~

~~186. The method of claim 185, wherein the colloidal magnetic particle has a magnetic mass of at least 60%.~~

~~187. The method of claim 185, wherein the colloidal magnetic particle has a magnetic mass of between 70% to 90%.~~

~~188. The method of any of claims 181-187, wherein the colloidal magnetic particle comprises a crystalline core of a superparamagnetic material that is surrounded by coating molecules.~~

~~189. The method of any of claims 181-188, wherein the colloidal magnetic particle is a ferrofluid magnetic particle.~~

~~190. The method of any of claims 181-189, wherein the colloidal magnetic particle is further conjugated to a first exogenous aggregation enhancing factor (EAEF), wherein the first EAEF comprises one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avidin-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.~~

~~191. The method of claim 190, further comprising adding a second EAEF to the maternal sample, wherein the second EAEF comprises the other member of the specific binding pair.~~

~~192. The method of any of claim s 181-191, wherein the first antibody is an anti-TREML2 antibody.~~

~~193. The method of any of claims 181-191, wherein the first antibody is an anti-CD71 antibody.~~

~~194. The method of any of claims 181-191, wherein the first antibody binds to a protein selected from EpCAM and CD105.~~

195. The method of claim 194, wherein preparing the fetal cell sample further comprises contacting the cells that are isolated from the maternal sample with a second antibody.
196. The method of claim 195, wherein the second antibody is conjugated to a label.
197. The method of claim 196, wherein the label is a fluorescent label.
198. The method of claim 197, wherein preparing the fetal cell sample further comprises isolating cells that are bound to the second antibody.
199. The method of claim 198, wherein isolating cells that are bound to the second antibody is based on immunofluorescent technology.
200. The method of claim 199, wherein isolating cells that are bound to the second antibody is carried out by fluorescence activated cell sorting (FACS).
201. The method of claim 199, wherein isolating cells that are bound to the second antibody is carried out with a DEP Array.
202. The method of claim 26, wherein the antibody that binds to a TREML2 protein or an antigen binding fragment that binds to a TREML2 protein comprises 2, 3, 4, 5 or 6 of the CDRs selected from (i) (vi).
203. The method of claim 26, wherein any of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions, or deletions.
204. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle is less than 200 nm.
205. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle is between about 80 to 200 nm.
206. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle is between about 90 to 150 nm.
207. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle has a magnetic mass of at least 50%.
208. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle has a magnetic mass of at least 60%.
209. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle has a magnetic mass of between 70% to 90%.

210. The method of any of claims 4, 5, 30, 31, 90, 91, 96, 97, 118, and 119, wherein the colloidal magnetic particle comprises a crystalline core of a superparamagnetic material that is surrounded by coating molecules.

211. The method of any of claims 1-25, wherein the anti TREML2 antibody is selected from sc-109096, ARP49877_P050, OACA04996, AF3259, MA5-30973, PA5-47471,

ABIN634968, ABIN928294, 30-552, ABIN2463297, ABIN19999041, 11655-r001, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282-40, ABIN4249314, nbp1-70737-20ul, and BD563661.

212. A method for detecting fetal cells in a sample from a pregnant subject, comprising:

(a) contacting the sample with a first antibody conjugate, wherein the sample comprises a plurality of cells, and wherein the first antibody comprises a first antibody conjugated to a colloidal magnetic particle;

(b) isolating cells bound to the first antibody by subjecting the sample to a magnetic field, thereby producing an enriched sample;

(c) contacting the enriched sample with a second antibody, wherein the second antibody binds to a marker on the surface of a fetal cell; and

(d) identifying a cell that is bound to the second antibody as a fetal cell.

213. The method of claim 212, wherein the fetal cell is a fetal nucleated red blood cell (fnRBC).

214. The method of claim 212 or 213, wherein the colloidal magnetic particles are ferrofluid magnetic particles.

215. The method of any of claims 212-214, wherein the colloidal magnetic particle is less than 200 nm.

216. The method of any of claims 212-214, wherein the colloidal magnetic particle is between about 80 to 200 nm.

217. The method of any of claims 212-214, wherein the colloidal magnetic particle is between about 90 to 150 nm.

218. The method of any of claims 212-217, wherein the colloidal magnetic particle has a magnetic mass of at least 50%.

219. The method of any of claims 212-217, wherein the colloidal magnetic particle has a magnetic mass of at least 60%.

220. The method of any of claims 212-217, wherein the colloidal magnetic particle has a magnetic mass of between 70% to 90%.

221. The method of any of claims 212-220, wherein the colloidal magnetic particle comprises a crystalline core of a superparamagnetic material that is surrounded by coating molecules.

222. The method of any of claims 212-221, wherein the magnetic particles are coupled to a first exogenous aggregation enhancing factor (EAEF), the first EAEF comprising one member of a specific binding pair selected from the group comprising biotin-streptavidin, antigen-antibody, receptor-hormone, receptor-ligand, agonist-antagonist, lectin-carbohydrate, Protein A-antibody Fc, and avi-din-biotin, biotin analog-avidin, desthiobiotin-streptavidin, desthiobiotin-avidin, iminobiotin-streptavidin, and iminobiotin-avidin.

223. The method of claim 222, wherein step (a) comprises adding a second EAEF to induce aggregation of the magnetic particles, the second EAEF comprising the other member of the specific binding pair.

224. The method of claim 223, wherein step (b) comprises adding to the enriched sample a member of the specific binding pair in order to reverse aggregation of the magnetic particles in the enriched sample.

225. The method of any of claims 212-224, further comprising, prior to step (a), adding to the sample at least one aggregation inhibiting agent selected from the group consisting of a reducing agent, an immune complex, a chelating agent, and a diamino butane.

226. The method of claim 225, wherein the aggregation inhibiting agent is a chelating agent.

227. The method of claim 226, wherein the chelating agent is EDTA.

228. The method of any of claims 212-227, wherein the second antibody is an antibody that binds to TREML2 protein or comprises an antigen binding fragment that binds to a TREML2 protein.

229. The method of claim 228, further comprising, prior to step (d), isolating single fetal cells.

230. The method of claim 229, wherein isolating single fetal cells is carried out by isolating single fetal cells that are bound to the second antibody.

231. The method of claim 230, wherein the second antibody which is conjugated to a label.

232. The method of claim 231, wherein the label is a fluorescent label.

233. The method of claim 232, wherein isolating single fetal cells is based on immunofluorescent technology.

234. The method of claim 233, wherein isolating single fetal cells is carried out by fluorescence activated cell sorting (FACS).

~~235. The method of claim 233, wherein isolating single cells is carried out with a DEP Array.~~

~~236. The method of any of claims 212-233, wherein step (d) comprises performing a sequencing analysis.~~

~~237. The method of claim 236, wherein the sequencing analysis comprises short tandem repeat (STR) analysis.~~

~~238. The method of any of claims 212-237, further comprising analyzing the fetal cell.~~

~~239. The method of claim 238, wherein analyzing the fetal cell comprises performing a genomic or a genetic analysis.~~

~~240. The method of claim 239, wherein performing a genetic analysis comprises detecting the presence or absence of one or more genetic abnormalities in the fetal cell.~~

~~241. The method of any of claims 212-240, wherein the first antibody is an antibody that binds to a TREML2 protein or comprises an antigen binding fragment that binds to a TREML2 protein.~~

~~242. The method of any of claims 228-235 and 241 wherein the antibody that binds to a TREML2 protein or an antigen binding fragment that binds to a TREML2 protein comprises one or more CDRs selected from:~~

~~(i) a heavy chain variable region (HCVR) complementarity determining region (CDR) 1 comprising the amino acid sequence of SEQ ID NO: 6;~~

~~(ii) a HCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 7;~~

~~(iii) a HCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 8;~~

~~(iv) a light chain variable region (LCVR) CDR1 comprising the amino acid sequence of SEQ ID NO: 9;~~

~~(v) a LCVR CDR2 comprising the amino acid sequence of SEQ ID NO: 10; and~~

~~(vi) a LCVR CDR3 comprising the amino acid sequence of SEQ ID NO: 11.~~

~~243. The method of claim 242, wherein the antibody that binds to a TREML2 protein or an antigen binding fragment that binds to a TREML2 protein comprises 2, 3, 4, 5 or 6 of the CDRs selected from (i)-(vi).~~

~~244. The method of claim 242 or 243, wherein any of SEQ ID Nos: 6-11 independently comprise one or more amino acid substitutions, additions, or deletions.~~

245. The method of any of 228-235 and 241, wherein the antibody that binds to a TREML2 protein is selected from sc-109096, ARP49877_P050, OACA04996, AF3259, MA5-30973, PA5-47471, ABIN634968, ABIN928294, 30-552, ABIN2463297, ABIN19999041, 11655-rOO1, ABIN749888, bs-2737r, ABIN1999045, 11655-rp02, ABIN293207, ABIN2387613, t8282-40, ABIN4249314, nbp1-70737-20ul, and BD563661.