# CLAIMS

1. A method of screening a sample of donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein release of the donor material for clinical use occurs in about 15 to about 60 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

2. The method of claim 1, wherein release of the donor material for clinical use occurs in about 20 to about 60 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

3. The method of claim 1, wherein release of the donor material for clinical use occurs in about 20 to about 45 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

4. The method of any one of claims 1 or 2, wherein the nucleic acid analysis comprises a nucleic acid amplification and detection process of about 1 minutes to about 20 minutes in duration.

5. The method of any one of claims 1–4, wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agents has a time to result of about 20 to about 45 minutes.

6. The method of any one of claims 1–5, wherein the nucleic acid analysis is performed on an automated system, and wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

7. The method of any one of claims 1–6, wherein the nucleic acid analysis is performed on an automated system, and wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

8. A method of screening a sample of donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein the method comprises screening a plurality of samples of donor blood for release of the donor material for clinical use and the determinations based on the nucleic acid analyses are performed within about 20 minutes to about 3.5 hours from initial aspiration of the first sample of donor blood for performance of the nucleic acid analysis.

9. A method of screening a sample of donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein the nucleic acid analysis comprises a nucleic acid amplification and detection process of about 8 minutes to about 20 minutes in duration.

10. A method of screening a sample of donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agents is completed in about 20 to about 45 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

11. A method of screening a sample of donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agents has a time to result of about 20 to about 45 minutes.

12. A method of screening samples of donor blood for release of a donor material for clinical use, comprising:

performing nucleic acid analysis on the samples of donor blood on an automated system to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analyses, is indicative of release of the donor material for clinical use, and

wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

13. A method of screening samples of donor blood for release of a donor material for clinical use, comprising:

performing nucleic acid analysis on the samples of donor blood on an automated system to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

14. A method of screening a sample of donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use, and

wherein, upon a determination of the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents at or in excess of the predetermined level in a pooled sample, the methods further comprising screening samples of individual donor blood or sub-pools thereof included in the pooled sample, comprising:

performing a nucleic acid analysis on the samples of donor blood to detect a plurality of pathogens or infectious agents;

wherein a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, is indicative of release of the donor material for clinical use.

15. A method of screening a sample associated with donor blood for release of a donor material for clinical use, comprising:

performing a nucleic acid analysis on the sample, comprising:

a sample preparation process comprising providing nucleic acid isolated from the sample in a volume of eluate;

dispensing the volume of eluate into at least two amplification vessels;

performing an amplification process on the eluate in the at least two amplification vessels; and

performing a detection process to detect whether nucleic acid derived from one or more pathogens or infectious agents is present in the eluate.

16. The method of claim 15, wherein the detection process includes detecting whether nucleic acid derived from a plurality of pathogens or infections agents is present in the eluate.

17. The method of any one of claims 15 and 16, wherein the dispensing comprises dispensing the volume of eluate into at least three, four, or more amplification vessels; subjecting the eluate in the amplification vessels to a nucleic acid amplification reaction; and detecting whether nucleic acid present in a pathogen or an infectious agent is present in the eluate.

18. The method of any one of claims 15–17, wherein an equal volume of eluate is dispensed into the amplification vessels.

19. The method of any one of claims 15–17, wherein different volumes of the eluate are dispensed into the amplification vessels.

20. The method of any one of claims 15–19, wherein the amplification reaction in each amplification vessels is for amplification of nucleic acid present in a different pathogen or infectious agent.

21. The method of any one of claims 15–20, wherein the amplification reaction in each amplification vessel is for amplification of nucleic acid present in a plurality of different pathogens or infectious agents.

22. The method of any one of claims 15–21, wherein the amplification reaction comprises an isothermal reaction.

23. The method of claim 22, wherein the isothermal reaction is recombinase polymerase amplification.

24. The method of claim 22, wherein the isothermal reaction is a nicking enzyme amplification reaction.

25. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples including a sample preparation process and an amplification process;

determining a result from the nucleic acid analysis; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result wherein release of the donor blood for transfusion occurs in about 20 to about 60 minutes from initial aspiration of the sample for performance of the nucleic acid analysis.

26. The method of claim 9, wherein the nucleic acid analysis comprises a nucleic acid amplification and detection process of about 1 minute to about 20 minutes in duration.

27. The method of any one of claims 25–26, wherein the result is completed in about 15 to about 45 minutes from initial aspiration of a sample for performance of the nucleic acid analysis.

28. The method of any one of claims 25–27, wherein each result has a time to result of about 20 to about 45 minutes.

29. The method of any one of claims 25–28, wherein the nucleic acid analysis is performed on an automated system and wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

30. The method of any one of claims 25–29, wherein the nucleic acid analysis is performed on an automated system and wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

31. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples including a sample preparation process and an amplification process;

determining a result from the nucleic acid analysis; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result wherein the determinations based on the nucleic acid analyses are performed within about 20 minutes to about 3.5 hours from initial aspiration of the first sample for performance of the nucleic acid analysis.

32. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples including a sample preparation process and an amplification process;

determining a result from the nucleic acid analysis; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result wherein the nucleic acid analysis comprises a nucleic acid amplification reaction of about 8 minutes to about 20 minutes in duration.

33. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples including a sample preparation process and an amplification process;

determining a result from the nucleic acid analysis; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result, wherein each result includes a determination of a predetermined level of nucleic acid from at least one of a plurality of pathogens or infectious agents, and wherein each determination is completed in about 20 to about 45 minutes from initial aspiration of the sample for performance of the nucleic acid analysis.

34. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples including a sample preparation process and an amplification process;

determining a result from the nucleic acid analysis; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result, wherein each result includes a determination of a predetermined level of nucleic acid from at least one of a plurality of pathogens or infectious agents, and wherein each determination has a time to result of about 20 to about 45 minutes.

35. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples on an automated system, including a sample preparation process and an amplification process;

determining a result from each of the nucleic acid analyses of the samples; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis results wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

36. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on the samples on an automated system, including a sample preparation process and an amplification process;

determining a result from each of the nucleic acid analyses of the samples; and

making a determination whether donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

37. A method for the detection of a target nucleic acid derived from a pathogen or infectious agent in a sample, comprising:

performing a nucleic acid analysis on an automated system, comprising:

a) a sample preparation process including preparing nucleic acid from the sample for an amplification reaction;

b) an amplification process including amplifying the target nucleic acid with the amplification reaction; and

c) a detection process including detecting the presence or absence of the target nucleic acid amplified in the reaction,

wherein the sample preparation process, amplification process and detection process are completed in less than about 60 minutes from initial aspiration of the sample for the nucleic acid analysis.

38. The method of claim 37, wherein the method includes detection of a target nucleic acid derived from a pathogen or infectious agent in a plurality of samples and wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

39. The method of any one of claims 37–38, wherein between about 140 results and 300 results are obtained per hour per $m^2$ of a footprint of the automated system.

40. The method of any one of claims 37–39, wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

41. The method of any one of claims 37–40, wherein detecting the presence or absence of the target nucleic acid comprises optically detecting a fluorescent signal corresponding to the target nucleic acid at a plurality of times during the amplification reaction.

42. The method of any one of claims 37–40, wherein detecting the presence or absence of the target nucleic acid comprises determining an amount of the target nucleic acid.

43. The method of claim 42, wherein determining the amount comprises optically detecting a fluorescent signal corresponding to the amount of the target nucleic acid at a plurality of times during the amplification reaction.

44. The method of any one of claims 41 and 43, wherein the plurality of times comprises optically detecting the signal at a predetermined interval of about every 20 seconds or about every 30 seconds.

45. The method of any one of claims 41, 43, and 44, wherein the optically detecting a fluorescent signal for a plurality of times occurs over a period of about 12 minutes.

46. The method of any one of claims 37–45, wherein the method is for screening a sample for release of a donor material for clinical use.

47. The method of any one of claims 37–46, wherein the sample is a sample associated with donor blood.

48. The method of any one of claims 37–47, wherein the sample preparation process, amplification process and detection process are completed in about 15 minutes to about 60 minutes.

49. The method of any one of claims 37–48, wherein the sample preparation process, amplification process and detection process are completed in about 20 minutes to about 60 minutes.

50. The method of any one of claims 37–49, wherein the target nucleic acid comprises nucleic acid derived from at least one of SARS-CoV-2 (COVID-19), HIV-1, HIV-2, HBV, HCV, CMV, Parvovirus B19, HAV, Chlamydia, Gonorrhea, WNV, Zika Virus, Dengue Virus, Chikungunya Virus, Influenza, Babesia, Malaria, and HEV.

51. The method of any one of claims 37–50, wherein the target nucleic acid comprises nucleic acid from a plurality of pathogens or infectious agents.

52. The method of claim 48, wherein the plurality of pathogens or infectious agents are selected from the group consisting of: SARS-CoV-2 (COVID-19), HIV-1, HIV-2, HBV, HCV, CMV, Parvovirus B19, HAV, Chlamydia, Gonorrhea, WNV, Zika Virus, Dengue Virus, Chikungunya Virus, Influenza, Babesia, Malaria, and HEV.

53. The method of claim 46, wherein release of the donor material for clinical use occurs in about 15 to about 60 minutes from initial aspiration of the sample for performance of the nucleic acid analysis.

54. The method of claim 46, wherein release of the donor material for clinical use occurs in about 20 to about 45 minutes from initial aspiration of the sample for performance of the nucleic acid analysis.

55. The method of any one of claims 37–54, wherein the nucleic acid analysis comprises a nucleic acid amplification and detection process of about 1 minute to about 20 minutes in duration.

56. The method of any one of claims 37–55, wherein detecting the presence or absence of the target nucleic acid comprises a determination of a predetermined level of nucleic acid derived from one or more of a plurality of pathogens or infectious agents.

57. A method for generating a plasma-derived product, comprising:

a) performing a nucleic acid analysis on a donor plasma sample including a sample preparation process and an amplification process;

b) determining a result from the nucleic acid analysis; and

c) making a determination whether plasma associated with the donor plasma sample is acceptable for generating a plasma-derived product based at least in part on the nucleic acid analysis result,

wherein release of the plasma for generating a plasma-derived product occurs in about 15 to about 60 minutes from initial aspiration of the donor plasma sample for performance of the nucleic acid analysis.

58. The method of claim 57, wherein release of the plasma for clinical use occurs in about 20 to about 60 minutes from initial aspiration of the donor plasma sample for performance of the nucleic acid analysis.

59. The method of claim 57, wherein release of the plasma for clinical use occurs in about 20 to about 45 minutes from initial aspiration of the donor plasma sample for performance of the nucleic acid analysis.

60. The method of any one of claims 57–59, wherein the nucleic acid analysis comprises a nucleic acid amplification and detection process of about 1 minutes to about 20 minutes in duration.

61. The method of any one of claims 57–60, wherein each result from the nucleic acid analysis has a time to result of about 20 to about 45 minutes.

62. The method of any one of claims 57–61, wherein the nucleic acid analysis is performed on an automated system, and wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

63. The method of any one of claims 57–62, wherein the nucleic acid analysis is performed on an automated system, and wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

64. The method of any one of claims 57–63, wherein each result includes a determination of a predetermined level of nucleic acid from at least one of a plurality of pathogens or infectious agents

65. The method of claim 64, wherein the plurality of pathogens or infectious agents are selected from the group consisting of: HIV-1, HIV-2, HBV, HCV, CMV, Parvovirus B19, HAV, Gonorrhea, WNV, Zika Virus, Dengue Virus, Chikungunya Virus, Babesia, Malaria, HEV and a combination thereof.

66. The method of any one of claims 57–65, wherein the plasma-derived product is selected from the group consisting of a coagulation factor, a protease inhibitor, albumin, immunoglobulin G (IgG) and a combination thereof.

67. A method of performing a wash process for nucleic acid analysis, comprising:

providing a wash vessel comprising a first well, a second well adjacent the first well, and a third well adjacent the second well, wherein

a first side wall defines a first side of the first, second, and third wells,

a second side wall opposite the first side wall, defines a second side of the first, second, and third wells,

the first and second side walls comprise an inner surface facing the first, second, and third wells and an outer surface opposite the inner surface,

a first divider separates the first and second well,

the first side wall is higher than the first divider,

the inner surface of the first side wall is substantially planar at least in a region extending between the first and second wells,

a second divider separates the second and third wells,

the inner surface of the second side wall is substantially planar at least in a region extending between the second and third wells,

introducing magnetic microparticles having nucleic acid from a sample bound thereto into the first well, wherein the first well comprises a wash solution,

applying a magnetic force to capture the magnetic microparticles on an inner surface of the first side wall in the first well;

translating the captured magnetic microparticles from the first well over the first divider to the second well along the inner planar surface of the first side wall, wherein the second well comprises a wash solution;

removing the magnetic force and allowing the magnetic microparticles to be released into the second well from the inner surface;

applying a magnetic force to capture the magnetic microparticles on the inner surface of the second side wall opposite the first side wall, wherein the second side wall is higher than the second divider,

translating the captured magnetic microparticles from the second well over the second divider to the third well along the inner planar surface of the second side wall, wherein the third well comprises a wash solution or an elution solution; and

removing the magnetic force and allowing the magnetic microparticles to be released into the third well from the inner surface of the second side wall.

68. The method of claim 67, wherein the third well comprises an elution solution and the method further comprises, applying a magnetic force to the magnetic microparticles in the third well to capture the magnetic microparticles on an inner surface of the first side wall and removing the elution solution

69. The method of claim 67, wherein the wash vessel comprises a fourth well and wherein the third well comprises a wash solution and the fourth well comprises an elution solution, and the third and fourth wells are separated by a third divider.

70. The method of claim 286, wherein

the first and second side walls extend along the first, second, third and fourth wells and define opposite sides of the wells,

the inner surface of the first and second side wall faces the wells,

the inner surface of the first side wall is non-planar in a region extending between the second and third wells, and planar in a region extending between the third and the fourth wells,

the inner surface of the second side wall is non-planar in a region extending between the third and fourth wells, and

the planar regions are conducive to translation of captured magnetic microparticles across the inner surface and the non-planar regions do not allow translation of captured magnetic microparticles across the inner surface.

71. The method of claim 287, further comprising:

applying a magnetic force to capture the magnetic particles in the third well on an inner surface of the first side wall, wherein the first side wall is higher than the third divider;

translating the captured magnetic microparticles from the third well over the third divider to the fourth well along the inner surface of the first side wall; and

removing the magnetic force and allowing the magnetic microparticles to be released into the fourth well from the inner surface of the first side wall.

72. The method of claim 288, wherein the third well comprises a wash solution and the fourth well comprises an elution solution and the method further comprises applying a magnetic force to the magnetic microparticles in the fourth well to capture the magnetic microparticles on an inner surface of the second side wall and removing the elution solution.

73. The method of any one of claims 284-289, wherein the magnetic force is produced using an electromagnet.

74. The method of claim 290, wherein the electromagnet is located along the outer surface of the first and second side walls and the translating the captured magnetic microparticles comprises sequentially activating and deactivating different regions of the electromagnet.

75. The method of any one of claims 284-289, wherein the magnetic force is produced using a permanent magnet.

76. The method of claim 292, wherein the translating the captured magnetic microparticles comprises moving the permanent magnet along the outer surface of the first or the second side wall.

77. The method of any one of claims 284-293, wherein the non-planar inner surface comprises a notch at the inner surface, wherein the notch extends out of the inner surface or extends into the inner surface.

78. The method of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, and 64 wherein the determination of a level equal to or greater than the predetermined level indicates that the donor material, donor blood, biological sample, or plasma is not released for clinical use.

79. The method of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, and 64, wherein the determination of a level less than the predetermined level indicates that the donor material, donor blood, biological sample, or plasma is released for clinical use.

80. The method of any one of claims 1–79, wherein the nucleic acid analysis includes a sample preparation process.

81. The method of claim 80, wherein the sample preparation process includes a pre-treatment process.

82. The method of any one of claims 80–81, wherein the sample preparation process includes a lysis process.

83. The method of any one of claims 80–82, wherein the sample preparation process includes an onboard pooling process.

84. The method of any one of claims 80–83, wherein the sample preparation process includes a wash process.

85. The method of any one of claims 80–84, wherein the sample preparation process includes a pre-treatment process, an onboard pooling process, a lysis process, and a wash process.

86. A method for performing nucleic acid analysis on a sample to detect one or more pathogens or infectious agents, comprising:

performing a sample preparation process, an amplification process, and a detection process to detect one or more pathogens or infectious agents in the sample, wherein the sample preparation process includes:

transporting the sample and one or more reagents in a vessel on a sample transport along a transport path from a sample dispense position to a sample capture and transfer position, and

successively oscillating the sample transport to mix the sample and one or more reagents in the vessel, the vessel moving in an arc with each oscillation.

87. The method of claim 86, wherein the sample transport includes a serpentine path, carousel, conveyor, extrusion, robotic handler, or belt.

88. The method of any one of claims 86 or 87, wherein successively oscillating the sample transport includes successively moving the sample transport between about 1 and about 5 degrees clockwise followed by moving the sample transport between about 1 and about 5 degrees counterclockwise.

89. The method of any one of claims 86–88, wherein mixing the sample and one or more reagents in the vessel includes forming a vortex within the contents of the vessel.

90. The method of claim 89, where the vortex is formed in about 1 second to about 2 seconds.

91. The method of any one of claims 86–90, wherein the vessel has a draft angle of between about 0.5 degrees and about 1.5 degrees.

92. The method of any one of claims 86–91, wherein the vessel has a conical bottom.

93. The method of any one of claims 86–92, wherein the method further comprises aspirating the sample from the vessel while the sample transport is successively oscillating.

94. The method of any one of claims 25–32 or 35–36, wherein each result includes a determination of a predetermined level of nucleic acid from at least one of a plurality of pathogens or infectious agents.

95. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94 wherein the plurality of pathogens or infectious agents are selected from the group consisting of: HIV-1, HIV-2, HBV, HCV, Parvovirus B19, HAV, WNV, Zika Virus, Dengue Virus, Chikungunya Virus, Babesia, Malaria, and HEV.

96. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV.

97. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and WNV.

98. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Zika Virus and WNV

99. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Chikungunya Virus and Dengue Virus.

100. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Zika Virus, WNV, Chikungunya Virus and Dengue Virus.

101. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Babesia and Malaria.

102. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Parvovirus B19 and HAV.

103. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Zika Virus.

104. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, and Chikungunya Virus.

105. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, and Dengue Virus.

106. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, and Babesia.

107. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, and Malaria.

108. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, and Parvovirus B19.

109. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, and HAV.

110. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, HAV, and HEV.

111. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Parvovirus B19.

112. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Parvovirus B19, and HAV.

113. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Babesia.

114. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HAV.

115. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HEV.

116. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Zika Virus.

117. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, and Dengue Virus.

118. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and Chikungunya Virus.

119. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and WNV.

120. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, and Chikungunya Virus.

121. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, Dengue Virus, and Chikungunya Virus.

122. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Malaria.

123. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Malaria, and Babesia.

124. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Dengue Virus.

125. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, and Chikungunya Virus.

126. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, WNV, and Chikungunya Virus.

127. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Chikungunya Virus.

128. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, and Zika Virus.

129. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, Zika Virus, and WNV.

130. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Dengue Virus.

131. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, Zika Virus, and WNV.

132. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2.

133. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HCV.

134. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HBV.

135. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HCV, and HBV.

136. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2; and

the nucleic acid analysis comprises multiplex analysis of HCV and HBV.

137. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, HCV, and HBV.

138. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV.

139. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus.

140. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV; and

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus.

141. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV; and

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue Virus.

142. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue; and

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV.

143. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Babesia and Malaria; and

the nucleic acid analysis comprises multiplex analysis of Babesia and Malaria.

144. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Parvovirus B19 and HAV; and

the nucleic acid analysis comprises multiplex analysis of Parvovirus B19 and HAV.

145. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents and predetermined levels are selected from the following:

HIV-1 at a predetermined level of at least 1-50 copies/mL;

HIV-2 at a predetermined level of at least 1-20 IU/mL;

HBV at a predetermined level of at least 1-10 IU/mL;

HCV at a predetermined level of at least 1-50 IU/mL;

Parvovirus B19 at a predetermined level of at least 1-40 IU/mL;

HAV at a predetermined level of at least 1-10 IU/mL;

WNV at a predetermined level of at least 1-50 copies/mL;

Zika Virus at a predetermined level of at least 1-50 copies/mL;

Dengue Virus at a predetermined level of at least 1-50 copies/mL;

Chikungunya Virus at a predetermined level of at least 1-50 copies/mL;

Babesia at a predetermined level of at least 1-20 copies/mL;

Malaria at a predetermined level of at least 1-50 copies/mL; and

HEV at a predetermined level of at least 1-20 IU/mL.

146. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

147. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of WNV.

148. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Zika Virus and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of WNV.

149. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Chikungunya Virus and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

150. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Zika Virus, WNV, Chikungunya Virus and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

151. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Babesia and Malaria; and wherein the predetermined levels are:

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria.

152. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are Parvovirus B19 and HAV; and wherein the predetermined levels are:

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

153. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Zika Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Zika Virus.

154. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

155. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

156. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, and Babesia; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-20 copies/mL of Babesia.

157. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, and Malaria; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria.

158. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, and Parvovirus B19; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria; and

at least 1-40 IU/mL of Parvovirus B19.

159. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, and HAV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria;

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

160. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, HAV, and HEV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria;

at least 1-40 IU/mL of Parvovirus B19;

at least 1-10 IU/mL of HAV; and

at least 1-20 IU/mL of HEV.

161. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Parvovirus B19; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-40 IU/mL of Parvovirus B19.

162. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Parvovirus B19, and HAV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

163. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Babesia; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-20 copies/mL of Babesia.

164. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HAV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-10 IU/mL of HAV.

165. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HEV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-20 IU/mL HEV.

166. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Zika Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Zika Virus.

167. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of Dengue Virus.

168. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

169. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of WNV.

170. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Chikungunya Virus.

171. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, Dengue Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

172. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Malaria; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Malaria.

173. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Malaria, and Babesia; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Malaria; and

at least 1-20 copies/mL of Babesia.

174. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Dengue Virus.

175. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

176. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, WNV, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL Dengue Virus;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Chikungunya Virus.

177. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Chikungunya Virus.

178. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, and Zika Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Zika Virus.

179. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, Zika Virus, and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Chikungunya Virus

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of WNV.

180. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Dengue Virus.

181. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

182. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HCV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

183. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

184. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HCV, and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

185. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2;

the nucleic acid analysis comprises multiplex analysis of HCV and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

186. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, HCV, and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

187. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

188. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

189. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

190. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue Virus; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

191. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

192. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Babesia and Malaria;

the nucleic acid analysis comprises multiplex analysis of Babesia and Malaria; and

the predetermined levels are:

at least 1-50 copies/mL of Malaria; and

at least 1-20 copies/mL of Babesia.

193. The methods of any one of claims 1–14, 16, 21, 33–34, 46, 48–56, 64, and 94, wherein:

the plurality of pathogens or infectious agents comprise Parvovirus B19 and HAV;

the nucleic acid analysis comprises multiplex analysis of Parvovirus B19 and HAV; and

the predetermined levels are:

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

194. The method of any one of claims 15–56, wherein the sample or biological sample is a sample of donor blood.

195. The method of any one of claims 1–14 and 194, wherein the sample of donor blood is human donor blood.

196. The method of any one of claims 1–14 and 194, wherein the sample of donor blood is whole blood.

197. The method of any one of claims 1–14 and 194, wherein the sample of donor blood is lysed whole blood.

198. The method of any one of claims 1–14 and 194, wherein the sample of donor blood is serum.

199. The method of any one of claims 1–14 and 194, wherein the sample of donor blood is plasma.

200. The method of any one of claims 1–24, 56, and 94–199, wherein the release of the donor material is for transfusion.

201. The method of any one of claims 1–24, 56, and 94–199, wherein the release of the donor material is for use in a pharmaceutical.

202. The method of any one of claims 1–24, 56, and 94–199, wherein the release of the donor material is for use in a therapeutic treatment.

203. The method of any one of claims 1–14 and 194–199, wherein the sample of donor blood is for use as a blood donation.

204. The method of any one of claims 1–24, 43, 48–56, and 94–199, wherein the clinical use is an *in vivo* clinical use.

205. The method of any one of claims 1–24, 43, 48–56, and 94–199, wherein the clinical use is an *in vitro* clinical use.

206. The method of any one of claims 1–24, 43, 48–56, 94–199, and 204 wherein the clinical use is transfusion.

207. The method of any one of claims 1–24, 43, 48–56, 94–199, and 204 wherein the clinical use is use in a pharmaceutical.

208. The method of any one of claims 1–24, 43, 48–56, and 94–199, and 204 wherein the clinical use is use in a therapeutic treatment.

209. The method of any one of claims 1–24, 43, 48–56, and 94–199, and 204, wherein the clinical use is organ or tissue donation.

210. The method of any one of claims 1–24, 43, 48–56, and 94–199, and 204, wherein the clinical use is use in a plasma-derived product.

211. The method of any one of claims 1–24, 43, 48–56, and 94–199, and 205, wherein the clinical use is use in disease diagnostics or in quality assurance/laboratory diagnostics.

212. The methods of any one of claims 1–211, wherein the nucleic acid analysis comprises a nucleic acid amplification reaction.

213. The methods of claim 212, wherein the nucleic acid amplification reaction is an isothermal reaction.

214. The methods of claim 213, wherein the isothermal reaction is recombinase polymerase amplification.

215. The methods of claim 213, wherein the isothermal reaction is a nicking enzyme amplification reaction.

216. The method of any one of claims 1–215, wherein the nucleic acid analysis comprises optical detection of the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents.

217. The methods of any one of claims 1–216, wherein the nucleic acid analysis comprises digital detection of the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents.

218. The method of any one of claims 1–217, wherein the nucleic acid analysis includes a determination of a predetermined level of nucleic acids, the determination comprising optically

detecting a fluorescent signal corresponding to the predetermined level of a target nucleic acid at a plurality of times during the amplification reaction.

219. The method of claim 218, wherein the plurality of times comprises optically detecting the signal at a predetermined interval of about every 20 seconds or about every 30 seconds.

220. The method of claim 218 or 219, wherein the optically detecting a fluorescent signal for a plurality of times occurs over a period of about 12 minutes.

221. The methods of any one of claims 1–220, wherein the nucleic acid analysis comprises contemporaneous contact of the sample with sample lysis buffer and a protease.

222. The methods of any one of claims 1–221, wherein the nucleic acid analysis comprises contacting the sample with CuTi-coated microparticles.

223. The methods of any one of claims 1–222, wherein the nucleic acid analysis comprises contacting the sample with a plurality of microparticles and translation of the microparticles on a surface via magnetic force.

224. The methods of any one of claims 1–223, wherein the nucleic acid analysis comprises:

purification of nucleic acid from the sample of donor blood;

division of the purified nucleic acid into a plurality of fractions;

and at least one fraction is reserved for further screening.

225. The method of any one of claims 1–224, wherein the nucleic acid analysis is completed in about 15 to about 36 minutes.

226. The method of any one of claims 1–225, wherein the nucleic acid analysis is completed in about 32 to about 36 minutes.

227. The method of any one of claims 1–226, wherein the nucleic acid analysis comprises a sample preparation process and an amplification and detection process.

228. The method of claim 227, wherein the sample preparation process comprises a lysis process and a wash process.

229. The method of any one of claims 227 or 228, wherein the sample preparation process is completed in about 12 to about 16 minutes.

230. The method of any one of claims 227–229, wherein the amplification and detection process is completed in about 1 to about 22 minutes.

231. The method of any one of claims 227–230, wherein the amplification and detection process is completed in about 5 to about 22 minutes.

232. The method of any one of claims 227–231, wherein the amplification and detection process is completed in about 18 to about 22 minutes.

233. The method of any one of claims 228–232, wherein the lysis process is completed in about 4 to about 8 minutes.

234. The method of any one of claims 228–233, wherein the wash process is completed in about 5 to about 9 minutes.

235. The method of any one of claims 228–234, wherein the wash process comprises a first wash step, a second wash step, a third wash step and an elution step.

236. The method of claim 235, wherein the first wash step is completed in about 1 to about 3 minutes.

237. The method of claim 235 or 236, wherein the second wash step is completed in about 0.1 to about 1 minute.

238. The method of any one of claims 235–237, wherein the third wash step is completed in about 0.1 to about 1 minute.

239. The method of any one of claims 235–238, wherein the elution step is completed in about 2 to about 5 minutes.

240. The method of any one of claims 227–239, wherein the sample preparation process further comprises a pre-treatment process.

241. The method of claim 240, wherein the pre-treatment process is completed in about 3 to about 7 minutes.

242. The method of any one of claims 240–241, wherein the sample preparation process further comprises an onboard pooling process, and wherein up to 6 samples of donor blood are pre-treated and pooled in about 6 minutes or less.

243. The method of any one of claims 227–239, wherein the sample preparation process further comprises an onboard pooling process, and wherein up to 24 samples are pooled in about 5 minutes or less.

244. The method of any one of claims 1–243, wherein the nucleic acid analysis includes at least about 140 sample aspirations per hour.

245. The method of any one of claims 1–244, wherein the nucleic acid analysis includes an amplification process including at least about 140 amplifications per hour.

246. The method of any one of claims 1–245, wherein the nucleic acid analysis includes an amplification process including multiplex amplification.

247. The method of any one of claims 1–246, wherein the nucleic acid analysis includes a sample preparation process including preparing eluate and wherein the eluate is split into two or more amplification vessels.

248. The method of any one of claims 1–247, wherein the nucleic acid analysis is performed on an automated system and wherein between about 140 results and about 300 results are obtained per hour per $m^2$ of a footprint of the automated system.

249. The method of any one of claims 1-248, wherein the sample of donor blood, sample, or biological sample is a pooled sample.

250. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 2 donors.

251. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 3 donors.

252. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 4 donors.

253. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 5 donors.

254. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 10 donors.

255. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 12 donors.

256. The method of claim 249, wherein the pooled sample comprises blood or plasma or serum or biological samples from 96 donors.

257. The method of any one of claims 1–256, wherein the nucleic acid analysis includes a sample preparation process comprising onboard pooling of a subset of a plurality of samples to form a pooled sample, the nucleic acid analysis being performed on the pooled sample.

258. The method of claim 257, wherein onboard pooling includes continually transporting individual vessels on a sample transport along a transport path from a sample dispense position to a sample capture and transfer position, with intermediate positions therebetween; and

pooling a first sample and a second sample in a vessel on the sample transport to form a pooled sample.

259. The method of claim 258, wherein the sample transport includes a serpentine path, carousel, conveyor, extrusion, robotic handler, or belt.

260. The method of claim 258, wherein the first sample and the second sample are individual donor samples.

261. The method of claim 258, wherein the first sample and the second sample are pooled samples.

262. The method of claim 258, wherein the first sample and the second sample each include 48 pooled samples.

263. The method of claim 258, wherein the sample transport includes a sample preparation carousel and wherein continually transporting individual vessels along the transport path includes rotating the sample preparation carousel.

264. The method of claim 263, wherein the sample preparation carousel rotates in a lockstep fashion, moving one position with each lockstep.

265. The method of claim 264, wherein the duration of each lockstep is between about 15 and about 30 seconds.

266. The method of any one of claims 258–265, wherein pooling the first sample and the second sample includes dispensing the first sample and the second sample into a first vessel at the sample dispense position prior to the sample preparation carousel transporting the first vessel to a first intermediate position.

267. The method of claim 266, further comprising dispensing third and fourth samples into the first vessel at the first intermediate position to add the third and fourth samples to the pooled sample.

268. The method of any one of claims 266–267, wherein the sample preparation process comprises a lysis process, and wherein onboard pooling includes aspirating the pooled sample from the first vessel and dispensing the pooled sample into a second vessel at the sample dispense position to initiate the lysis process for the pooled sample.

269. The methods of any one of claims 257–268, wherein the sample preparation process includes a pre-treatment process.

270. The method of claim 269, wherein the pre-treatment process includes dispensing a sample and reagent into a vessel on the sample transport at the sample dispense position, continually transporting the vessel along the transport path defined between the sample dispense position and the capture and transfer position, with intermediate positions therebetween; and mixing the sample and reagent at each intermediate position.

271. The method of claim 404, wherein mixing the sample and reagent includes successively oscillating the sample transport to mix the sample and reagent in the vessel, the vessel moving in an arc with each oscillation..

272. The method of any one of claims 269–271, wherein the sample includes a whole blood sample and wherein the reagent includes a lysis buffer.

273. The method of claim 272, wherein the pre-treatment process includes lysing the sample for between about 3 and about 6 minutes.

274. The method of any one of claims 269–273, further comprising onboard pooling of a subset of pre-treated samples to form a pooled sample, the nucleic acid analysis being performed on the pooled sample, and wherein onboard pooling includes aspirating a first pre-treated sample from a first vessel at a first intermediate position, aspirating a second pre-treated sample from a second vessel at a second intermediate position, and dispensing the first pre-treated sample and second pre-treated sample in a third vessel at the sample dispense position.

275. The method of any one of claims 257–268, wherein up to about 300 samples are pooled for nucleic acid analysis per hour.

276. The method of any of claim 274, wherein up to about 75 pre-treated samples are pooled for nucleic acid analysis per hour.

277. The method of any one of claims 257–276, wherein the nucleic acid analysis includes detection of one or more of a plurality of pathogens or infectious agents.

278. The method of claim 277, wherein a determination of a presence or absence of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis of the pooled sample is indicative of whether (a) donor blood associated with the pooled sample is acceptable for transfusion or (b) a donor material associated with the pooled sample is acceptable for clinical use.

279. The method of 278, wherein upon a determination of the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents in a pooled sample, the method further comprises nucleic acid analysis of individual samples or sub-pools thereof included in the pooled sample and making a determination whether (a) donor blood associated with individual samples or sub-pools thereof is acceptable for transfusion based at least in part on the nucleic acid analysis of the individual samples or sub-pools thereof or (b) a donor

material associated with individual samples or sub-pools thereof is acceptable for clinical use based at least in part on the nucleic acid analysis of the individual samples or sub-pools thereof.

280. The method of claim 279, wherein individual samples included in the pooled sample are stored in a loading area during nucleic acid analysis of the pooled sample.

281. The method of any one of claims 279–280, wherein nucleic acid analysis of sub-pools includes onboard pooling to create the sub-pools.

282. The method of any one of claims 279–281, wherein the pooled sample includes 96 individual donor samples, and wherein upon a determination of the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents in the pooled sample, a determination whether donor blood associated with each of the 96 individual samples is acceptable for transfusion is made in less than about 4 hours from initial aspiration of a first sample included in the pooled sample for performance of the nucleic acid analysis.

283. The method of any one of claims 1–282 further comprising treating the sample of donor blood, the donor material, the plasma or the biological sample with a pathogen reduction technology.

284. The method of any one of claims 1–36 further comprising treating donor material indicated for release for clinical use or donor blood determined to be acceptable for transfusion with a pathogen reduction technology.

285. The method of claim 284, wherein the pathogen reduction technology comprises an agent that intercalates into nucleic acids present within the donor material or donor blood or causes dimers in nucleic acids present within the donor material or donor blood.

286. The method of any one of claims 283–285, wherein the pathogen reduction technology comprises at least one of the following: (i) amotosalen and Ultraviolet A (UVA) light, (ii) riboflavin and UVA/Ultraviolet B (UVB) light, (iii) amustaline and glutathione, (iv) Ultraviolet C (UVC) light; and (v) methylene blue and visible light.

287. The method of any one of claims 283–286, wherein the donor material comprises at least one of the following: (i) whole blood, (ii) plasma, (iii) platelets, (iv) red blood cells; and (v) plasma-derived products.

288. The method of any one of claims 283–287, wherein the method further comprises:

performing an immunoassay on a second portion of the sample or sample of donor blood for detecting one or more pathogens or infectious agents in the sample or sample of donor blood.

289. The method of claim 288, wherein the immunoassay is performed simultaneously with the nucleic acid analysis.

290. The method of claim 288, wherein the immunoassay is performed before the nucleic acid analysis.

291. The method of claim 288, wherein the nucleic acid analysis is performed before the immunoassay is performed.

292. The method of claim 288, wherein the immunoassay is performed before the donor material indicated for release for clinical use or donor blood determined to be acceptable for transfusion is treated with the pathogen reduction technology.

293. The method of any one of claims 284–292, wherein the pathogen or infectious agent is selected from the group consisting of: SARS-CoV-2 (COVID-19), coronaviruses, HIV-1, HIV-2, HBV, HCV, CMV, Epstein-Barr virus (EBV), human T-lymphotropic virus (HTLV) Parvovirus B19, HAV, syphilis, Chlamydia, Gonorrhea, Dengue, Chikungunya, WNV, HEV, Creutzfeldt-Jakob disease (vCJD) and a combination thereof.

294. The method of any one of claims 284–293, wherein the nucleic acid analysis and the pathogen reduction technology are performed in the same physical location.

295. The method of any one of claims 1–294 further comprising performing a serological test on the sample of donor blood, the donor material, the plasma or the biological sample.

296. An automated system for screening a sample of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein the release of the donor material for clinical use occurs in about 15 to about 60 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

297. The system of claim 296, wherein release of the donor material for clinical use occurs in about 20 to about 60 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis..

298. The system of any one of claims 296 or 297, wherein the nucleic acid analysis comprises a nucleic acid amplification reaction of about 8 minutes to about 20 minutes in duration.

299. The system of any one of claims 296–298, wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agent is completed in about 30 to about 45 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

300. The system of any one of claims 296–299, wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agent has a time to result of about 30 to about 45 minutes.

301. The system of any one of claims 296–300, wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

302. The method of any one of claims 296–301, wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system..

303. An automated system for screening a sample of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein the system is configured to screen a plurality of samples of donor blood for release of the donor material for clinical use and the determinations based on the nucleic acid analyses are performed within about 20 minutes to about 3.5 hours from initial aspiration of the first sample of donor blood for performance of the nucleic acid analysis.

304. An automated system for screening a sample of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein the nucleic acid analysis comprises a nucleic acid amplification reaction of about 8 minutes to about 20 minutes in duration.

305. An automated system for screening a sample of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agent is completed in about 30 to about 45 minutes from initial aspiration of the sample of donor blood for performance of the nucleic acid analysis.

306. An automated system for screening a sample of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from

each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein each determination of a predetermined level of nucleic acid from at least one of the plurality of pathogens or infectious agent has a time to result of about 30 to about 45 minutes.

307. An automated system for screening samples of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on each of the samples of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents as a result of the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

308. An automated system for screening samples of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on each of the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents as a result of the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

309. An automated system for screening a sample of donor blood for release of a donor material for clinical use, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to:

perform a nucleic acid analysis on the sample of donor blood to detect one or more of a plurality of pathogens or infectious agents;

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of the donor material for clinical use; and

wherein the system is configured to screen a plurality of samples of donor blood for release of the donor material for clinical use and the nucleic acid analysis is performed in the absence of batching of the plurality of the samples.

310. An automated system for the detection of target nucleic acid derived from one or more pathogens or infectious agents in a sample, comprising:

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area;

a processor and memory comprising instructions, when executed by the processor cause the system to perform a nucleic acid analysis on the sample to detect target nucleic acid from one or more pathogens or infectious agents, the nucleic acid analysis comprising:

a sample preparation process at the sample preparation area including preparing nucleic acid from the sample for an amplification reaction;

an amplification process at the nucleic acid amplification area including amplifying the target nucleic acid with the amplification reaction; and

a detection process at the nucleic acid detection area including determining an amount of target nucleic acid amplified in the reaction;

wherein the sample preparation process, amplification process and detection process are completed in less than about 60 minutes from initial aspiration of the sample for the nucleic acid analysis and wherein at least about 140 results are obtained per hour per $m^2$ of a footprint of the automated system.

311. The system of any of claim 310, wherein the nucleic acid amplification reaction has a duration of about 8 minutes to about 20 minutes.

312. The system of any one of claims 310-311, wherein the sample preparation process, amplification process and detection process are completed in about 20 minutes to about 60 minutes.

313. The system of any one of claims 310–312, wherein the system is configured to detect target nucleic acid in a plurality of samples and wherein at least about 70 results are obtained per hour per $m^3$ of a volume of the automated system.

314. The system of any one of claims 310–313, wherein the system is configured to detect target nucleic acid in a plurality of samples and wherein between about 140 results and about 300 results are obtained per hour per $m^2$ of the footprint of the system.

315. The system of any one of claims 310–314, wherein the target nucleic acid comprises nucleic acid from a plurality of pathogens or infectious agents.

316. The system of claim 315, wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis, the system is indicative of release of a donor material for clinical use.

317. A wash vessel for nucleic acid analysis comprising:

a first well adjacent a second well and a third well adjacent the second well,

a first side wall defining a first side of the first, second, and third wells,

a second side wall opposite the first side wall and defining a second side of the first, second, and third wells,

the first and second side walls comprising an inner surface facing the first, second, and third wells and an outer surface opposite the inner surface,

a first divider separating the first and second well,

a second divider separating the second and third wells,

wherein:

the first side wall is higher than the first divider,

the inner surface of the first side wall is substantially planar at least in a region extending between the first and second wells for translation of magnetic microparticles captured in the first well over the first divider into the second well,

the inner surface of the first side wall is non-planar in a region extending between the second and third wells such that the non-planar inner surface prevents translation of magnetic particles captured at a region of the inner surface in the second well to a region of the inner surface in the third well,

the second side wall is higher than the second divider,

the inner surface of the second side wall is substantially planar at least in a region extending between the second and third wells and provides a substantially planar surface for capture of magnetic microparticles in the second well and translation of the captured magnetic particles over the second divider to the third well.

318. The vessel of claim 295, wherein the first and second wells comprise a wash solution and the third well comprises a wash solution or an elution solution.

319. The vessel of claim 295, comprising:

a fourth well adjacent the third well,

a third divider separating the third and fourth wells,

wherein:

the first side wall defines a first side of the fourth well and the second side wall defines a second side the fourth well,

the first side wall is higher than the third divider,

the inner surface of the first side wall is substantially planar at least in a region extending between the third and fourth wells for translation of magnetic microparticles captured in the third well over the third divider into the fourth well, and

the inner surface of the second side wall is non-planar in a region extending between the third and fourth wells such that the non-planar inner surface prevents translation of magnetic particles captured at a region of the inner surface of the second side wall in the third well to a region of the inner surface of the second side wall in the fourth well.

320. The wash vessel of claim 297, wherein the first, second, and third wells comprise wash solution.

321. The wash vessel of claim 297 or 298, wherein the first, second, and third wells comprise wash solution and the fourth well comprises an elution solution.

322. The wash vessel of any one of claims 295-299, wherein the non-planar inner surface comprises a notch at the inner surface, wherein the notch extends out of the inner surface or extends into the inner surface.

323. A system for performing nucleic acid analysis on one or more samples to detect one or more pathogens or infectious agents, comprising

a sample analysis station comprising, a sample loading area, a sample preparation area, a nucleic acid amplification area and a nucleic acid detection area, wherein the sample preparation area includes:

a sample transport configured to transport one or more samples in a vessel along a transport path from a sample dispense position to a sample capture and transfer position, the sample transport configured to successively oscillate to mix the one or more samples and one or more reagents in the vessel, the vessel moving in an arc with each oscillation.

324. The method of system of claim 316, wherein the sample transport includes a serpentine path, carousel, conveyor, extrusion, robotic handler, or belt.

325. The method of any one of claims 316 or 317, wherein the sample transport is configured to successively move between about 1 and about 5 degrees clockwise followed by between about 1 and about 5 degrees counterclockwise.

326. The method of any one of claims 316–318, wherein the sample transport is configured to form a vortex within the contents of the vessel.

327. The method of claim 319, where the sample transport is configured to form the vortex in about 1 second to about 2 seconds.

328. The method of any one of claims 316–320, wherein the vessel has a draft angle of between about 0.5 degrees and about 1.5 degrees.

329. The method of any one of claims 316–321, wherein the vessel has a conical bottom.

330. The method of any one of claims 316–322, wherein the system further includes at least one pipettor, and wherein the at least one pipettor is configured to aspirate the one or more samples from the vessel while the sample transport is successively oscillating.

331. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are selected from the group consisting of: HIV-1, HIV-2, HBV, HCV, CMV, Parvovirus B19, HAV, Gonorrhea, WNV, Zika Virus, Dengue Virus, Chikungunya Virus, Babesia, Malaria, and HEV.

332. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV.

333. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and WNV.

334. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are Zika Virus and WNV.

335. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are Chikungunya Virus and Dengue Virus.

336. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are Zika Virus, WNV, Chikungunya Virus and Dengue Virus.

337. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are Babesia and Malaria.

338. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are Parvovirus B19 and HAV.

339. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Zika Virus.

340. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, and Chikungunya Virus.

341. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, and Dengue Virus.

342. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, and Babesia.

343. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, and Malaria.

344. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, and Parvovirus B19.

345. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, and HAV.

346. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, HAV, and HEV.

347. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Parvovirus B19.

348. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Parvovirus B19, and HAV.

349. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Babesia.

350. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HAV.

351. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HEV.

352. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Zika Virus.

353. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, and Dengue Virus.

354. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and Chikungunya Virus.

355. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and WNV.

356. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, and Chikungunya Virus.

357. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, Dengue Virus, and Chikungunya Virus.

358. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Malaria.

359. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Malaria, and Babesia.

360. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Dengue Virus.

361. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, and Chikungunya Virus.

362. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, WNV, and Chikungunya Virus.

363. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Chikungunya Virus.

364. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, and Zika Virus.

365. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, Zika Virus, and WNV.

366. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Dengue Virus.

367. The system of any one of claims 296–309 and 315–316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, Zika Virus, and WNV.

368. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2.

369. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HCV.

370. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HBV.

371. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HCV, and HBV.

372. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2; and

the nucleic acid analysis comprises multiplex analysis of HCV and HBV.

373. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, HCV, and HBV.

374. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV.

375. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus.

376. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV; and

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus.

377. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV; and

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue Virus.

378. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue; and

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV.

379. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Babesia and Malaria; and

the nucleic acid analysis comprises multiplex analysis of Babesia and Malaria.

380. The system of any one of claims 296–309 and 315–316, wherein:

the plurality of pathogens or infectious agents comprise Parvovirus B19 and HAV; and

the nucleic acid analysis comprises multiplex analysis of Parvovirus B19 and HAV.

381. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents and predetermined levels are selected from the following:

HIV-1 at a predetermined level of at least 1-50 copies/mL;

HIV-2 at a predetermined level of at least 1-20 IU/mL;

HBV at a predetermined level of at least 1-10 IU/mL;

HCV at a predetermined level of at least 1-50 IU/mL;

CMV at a predetermined level of at least 10-50 IU/mL;

Parvovirus B19 at a predetermined level of at least 1-40 IU/mL;

HAV at a predetermined level of at least 1-10 IU/mL;

Gonorrhea at a predetermined level of at least 100-500 copies/mL;

WNV at a predetermined level of at least 1-50 copies/mL;

Zika Virus at a predetermined level of at least 1-50 copies/mL;

Dengue Virus at a predetermined level of at least 1-50 copies/mL;

Chikungunya Virus at a predetermined level of at least 1-50 copies/mL;

Babesia at a predetermined level of at least 1-20 copies/mL;

Malaria at a predetermined level of at least 1-50 copies/mL; and

HEV at a predetermined level of at least 1-20 IU/mL.

382. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

383. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of WNV.

384. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are Zika Virus and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of WNV.

385. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are Chikungunya Virus and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

386. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are Zika Virus, WNV, Chikungunya Virus and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

387. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are Babesia and Malaria; and wherein the predetermined levels are:

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria.

388. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are Parvovirus B19 and HAV; and wherein the predetermined levels are:

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

389. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Zika Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Zika Virus.

390. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

391. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

392. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, and Babesia; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-20 copies/mL of Babesia.

393. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, and Malaria; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria.

394. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, and Parvovirus B19; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria; and

at least 1-40 IU/mL of Parvovirus B19.

395. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, and HAV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria;

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

396. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, Zika Virus, Chikungunya Virus, Dengue Virus, Babesia, Malaria, Parvovirus B19, HAV, and HEV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Chikungunya Virus;

at least 1-50 copies/mL of Dengue Virus;

at least 1-20 copies/mL of Babesia; and

at least 1-50 copies/mL of Malaria;

at least 1-40 IU/mL of Parvovirus B19;

at least 1-10 IU/mL of HAV; and

at least 1-20 IU/mL of HEV.

397. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Parvovirus B19; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-40 IU/mL of Parvovirus B19.

398. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Parvovirus B19, and HAV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

399. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Babesia; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-20 copies/mL of Babesia.

400. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HAV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-10 IU/mL of HAV.

401. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and HEV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-20 IU/mL HEV.

402. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Zika Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Zika Virus.

403. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of Dengue Virus.

404. The system of any one of claims 155-161, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

405. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, Dengue Virus, and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of WNV.

406. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Chikungunya Virus.

407. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Zika Virus, WNV, Dengue Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

408. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Malaria; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Malaria.

409. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Malaria, and Babesia; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Malaria; and

at least 1-20 copies/mL of Babesia.

410. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Dengue Virus.

411. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Dengue Virus; and

at least 1-50 copies/mL of Chikungunya Virus.

412. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Dengue Virus, WNV, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL Dengue Virus;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Chikungunya Virus.

413. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, and Chikungunya Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV; and

at least 1-50 copies/mL of Chikungunya Virus.

414. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, and Zika Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Zika Virus.

415. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, Chikungunya Virus, Zika Virus, and WNV; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of Chikungunya Virus

at least 1-50 copies/mL of Zika Virus; and

at least 1-50 copies/mL of WNV.

416. The system of any one of claims 296–309 and 316, wherein the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, HBV, WNV, and Dengue Virus; and wherein the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV;

at least 1-10 IU/mL of HBV;

at least 1-50 copies/mL of WNV; and

at least 1-50 copies/mL of Dengue Virus.

417. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

418. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HCV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

419. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

420. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HCV, and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

421. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1 and HIV-2;

the nucleic acid analysis comprises multiplex analysis of HCV and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

422. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV;

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, HCV, and HBV; and

the predetermined levels are:

at least 1-50 copies/mL of HIV-1;

at least 1-20 IU/mL of HIV-2;

at least 1-50 IU/mL of HCV; and

at least 1-10 IU/mL of HBV.

423. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

424. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

425. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and WNV;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and Dengue Virus; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

426. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue Virus; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

427. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue;

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV; and

the predetermined levels are:

at least 1-50 copies/mL of Zika Virus;

at least 1-50 copies/mL of WNV;

at least 1-50 copies/mL of Chikungunya Virus; and

at least 1-50 copies/mL of Dengue Virus.

428. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Babesia and Malaria;

the nucleic acid analysis comprises multiplex analysis of Babesia and Malaria; and

the predetermined levels are:

at least 1-50 copies/mL of Malaria; and

at least 1-20 copies/mL of Babesia.

429. The system of any one of claims 296–309 and 316, wherein:

the plurality of pathogens or infectious agents comprise Parvovirus B19 and HAV;

the nucleic acid analysis comprises multiplex analysis of Parvovirus B19 and HAV; and

the predetermined levels are:

at least 1-40 IU/mL of Parvovirus B19; and

at least 1-10 IU/mL of HAV.

430. The system of any one of claims 310–316 and 323–330, wherein the sample or one or more samples is a sample of donor blood.

431. The system of any one of claims 296–309 and 430, wherein the sample of donor blood is human donor blood.

432. The system of any one of claims 296–309 and 430, wherein the sample of donor blood is whole blood.

433. The system of any one of claims 296–309 and 430, wherein the sample of donor blood is lysed whole blood.

434. The system of any one of claims 296–309 and 430, wherein the sample of donor blood is serum.

435. The system of any one of claims 296–309 and 430, wherein the sample of donor blood is plasma.

436. The system of any one of claims 296–309 and 331–435145-263, wherein the release of the donor material is for transfusion.

437. The system of any one of claims 296–309 and 331–435, wherein the release of the donor material is for use in a pharmaceutical.

438. The system of any one of claims 296–309 and 331–435, wherein the release of the donor material is for use in a therapeutic treatment.

439. The system of any one of claims 296–309 and 331–435, wherein the sample of donor blood is for use as a blood donation.

440. The system of any one of claims 296–309 and 331–435, wherein the clinical use is an *in vivo* clinical use.

441. The system of any one of claims 296–309 and 331–435, wherein the clinical use is an *in vitro* clinical use.

442. The system of any one of claims 296–309, 331–435 and 440, wherein the clinical use is transfusion.

443. The system of any one of claims 296–309, 331–435 and 440, wherein the clinical use is use in a pharmaceutical.

444. The system of any one of claims 296–309, 331–435 and 440, wherein the clinical use is use in a therapeutic treatment.

445. The system of any one of claims 296–309, 331–435 and 440, wherein the clinical use is organ or tissue donation.

446. The system of any one of claims 296–309, 331–435 and 440, wherein the clinical use is use in a plasma-derived product.

447. The system of any one of claims 296–309, 331–435 and 441, wherein the clinical use is a diagnostic use.

448. The system of any one of claims 296–447, wherein the nucleic acid analysis comprises a nucleic acid amplification reaction.

449. The system of claim 448, wherein the nucleic acid amplification reaction is an isothermal reaction.

450. The system of claim 449, wherein the isothermal reaction is recombinase polymerase amplification.

451. The system of claim 449, wherein the isothermal reaction is a nicking enzyme amplification reaction.

452. The system of any one of claims 296–451, wherein the nucleic acid analysis comprises digital detection of the presence of a nucleic acid derived from at least one of a plurality of pathogens or infectious agents.

453. The system of claim 452, wherein the system is configured to digitally detect the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious

agents a plurality of times to quantitatively detect the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents.

454. The system of any one of claims 296–451, wherein the nucleic acid analysis comprises optical detection of the presence of a nucleic acid derived from at least one of a plurality of pathogens or infectious agents.

455. The system of claim 454, wherein the system is configured to optically detect the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents a plurality of times to quantitatively detect the presence of a nucleic acid derived from at least one of the plurality of pathogens or infectious agents.

456. The system of any one of claims 296–455, wherein the nucleic acid analysis comprises contemporaneous contact of the sample with sample lysis buffer and a protease.

457. The system of any one of claims 296–456, wherein the nucleic acid analysis comprises contacting the sample with CuTi-coated microparticles.

458. The system of any one of claims 296–457, wherein the nucleic acid analysis comprises contacting the sample with a plurality of microparticles and translation of the microparticles on a surface via magnetic force.

459. The system of any one of claims 296–458, wherein the nucleic acid analysis comprises:

purification of nucleic acid from the sample of donor blood;

division of the purified nucleic acid into a plurality of fractions;

and at least one fraction is reserved for further screening.

460. The system of any one of claims 296–459, wherein the nucleic acid analysis is completed in about 15 to about 36 minutes.

461. The system of any one of claims 296–459, wherein the nucleic acid analysis is completed in about 32 to about 36 minutes.

462. The system of any one of claims 296–461, wherein the nucleic acid analysis comprises a sample preparation process at the sample preparation area and an amplification and detection process at an amplification and detection system.

463. The system of claim 462, wherein the sample preparation process comprises a lysis process and a wash process.

464. The system of any one of claims 462–463, wherein the sample preparation process is completed in about 12 to about 16 minutes.

465. The system of any one of claims 462–464, wherein the amplification and detection process is completed in about 1 to about 22 minutes.

466. The system of any one of claims 462–465, wherein the amplification and detection process is completed in about 5 to about 22 minutes.

467. The system of any one of claims 462–466, wherein the amplification and detection process is completed in about 18 to about 22 minutes.

468. The system of any one of claims 463–467, wherein the lysis process is completed in about 4 to about 8 minutes.

469. The system of any one of claims 463–468, wherein the wash process is completed in about 5 to about 9 minutes.

470. The system of any one of claims 463–469, wherein the wash process comprises a first wash step, a second wash step, a third wash step and an elution step.

471. The system of claim 470 wherein the first wash step is completed in about 1 to about 3 minutes.

472. The system of claim 470 or 471, wherein the second wash step is completed in about 0.1 to about 1 minute.

473. The system of any one of claims 470–472, wherein the third wash step is completed in about 0.1 to about 1 minute.

474. The system of any one of claims 470–473, wherein the elution step is completed in about 2 to about 5 minutes.

475. The system of any one of claims 462–474 384, wherein the sample preparation further comprises a pre-treatment process.

476. The system of claim 475, wherein the pre-treatment process is completed in about 3 to about 7 minutes.

477. The system of any one of claims 475–476, wherein the sample preparation process further comprises an onboard pooling process, and wherein up to 6 samples of donor blood are pre-treated and pooled in about 6 minutes or less.

478. The system of claim 462–474, wherein the sample preparation process further comprises an onboard pooling process.

479. The system of claim 478, wherein up to 24 samples are pooled in about 5 minutes or less.

480. The system of any one of claims 296–479, wherein the nucleic acid analysis includes at least about 140 sample aspirations per hour.

481. The system of any one of claims 296–480, wherein the nucleic acid analysis includes an amplification process including at least about 140 amplifications per hour.

482. The system of any one of claims 296–481, wherein the nucleic acid analysis includes an amplification process including multiplex amplification.

483. The system of any one of claims 296–482, wherein the nucleic acid analysis includes a sample preparation process including preparing eluate and wherein the eluate is split into two or more amplification vessels.

484. The system of any one of claims 296–483, wherein between about 140 results and about 300 results are obtained per hour per $m^2$ of a footprint of the automated system.

485. The system of any one of claims 296–316, and 323–484, wherein the sample of donor blood, sample, or one or more samples is a pooled sample.

486. The system of claim 485, wherein the pooled sample comprises blood or plasma or serum or biological samples from 2 donors.

487. The system of claim 485, wherein the pooled sample of donor blood comprises blood or plasma or serum or biological samples from 3 donors.

488. The system of claim 485, wherein the pooled sample of donor blood comprises blood or plasma or serum or biological samples from 4 donors.

489. The system of claim 485, wherein the pooled sample of donor blood comprises blood or plasma or serum or biological samples from 5 donors.

490. The system of claim 485, wherein the pooled sample of donor blood comprises blood or plasma or serum or biological samples from 10 donors.

491. The system of claim 485, wherein the pooled sample of donor blood comprises blood or plasma or serum or biological samples from 12 donors

492. The system of claim 485, wherein the pooled sample of donor blood comprises blood or plasma or serum or biological samples from 96 donors.

493. The system of any one of claims 145–152, wherein the nucleic acid analysis includes a sample preparation process comprising onboard pooling of a subset of a plurality of samples at the sample preparation area to form a pooled sample, the nucleic acid analysis being performed on the pooled sample.

494. The system of claim 493, wherein:

the sample preparation area includes at least one pipettor and at least one sample transport, and wherein the sample transport is configured to continually transport individual vessels along a transport path from a sample dispense position to a sample capture and transfer position, with intermediate positions therebetween; and

wherein the onboard pooling includes dispensing a first sample and a second sample in a vessel on the sample transport to form a pooled sample.

495. The system of claim 494, wherein the sample transport includes a serpentine path, carousel, conveyor, extrusion, robotic handler, or belt.

496. The system of any one of claims 494–495, wherein the sample transport includes a sample preparation carousel and wherein the sample preparation carousel is configured to rotate to continually transport individual vessels along the transport path.

497. The system of claim 496, wherein the sample preparation carousel is configured to rotate in a lockstep fashion, moving one position with each lockstep.

498. The system of claim 497, wherein the duration of each lockstep is between about 15 and about 30 seconds.

499. The system of any one of claims 493–498, wherein the system is configured to hold samples included in the pooled sample at the sample loading area during nucleic acid analysis of the pooled sample.

500. The system of any one of claims 493–499, wherein:

upon a determination of the presence of a nucleic acid derived from at least one of a plurality of pathogens or infectious agents in excess of a predetermined level in the pooled sample, the instructions, when executed by the processor, cause the system to perform nucleic acid analysis of individual samples or sub-pools thereof included in the pooled sample; and

wherein upon a determination of a predetermined level of nucleic acids derived from each of the plurality of pathogens or infectious agents based on the nucleic acid analysis of the individual samples or sub-pools thereof, the system is indicative of release of a donor material associated with the individual samples or sub-pools thereof for clinical use.

501. The system of any one of claims 310–316, wherein the pathogen or infectious agent is selected from the group consisting of: SARS-CoV-2 (COVID-19), coronaviruses, HIV-1, HIV-2, HBV, HCV, CMV, Epstein-Barr virus (EBV), human T-lymphotropic virus (HTLV) Parvovirus B19, HAV, syphilis, Chlamydia, Gonorrhea, Dengue, Chikungunya, WNV, HEV, Creutzfeldt-Jakob disease (vCJD) and a combination thereof.

502. The method of claim 56, wherein the plurality of pathogens or infectious agents and predetermined levels are selected from the following:

SARS-CoV-2 (COVID-19) at a predetermined level of at least 1-50 copies/mL;

HIV-1 at a predetermined level of at least 1-50 copies/mL;

HIV-2 at a predetermined level of at least 1-20 IU/mL;

HBV at a predetermined level of at least 1-10 IU/mL;

HCV at a predetermined level of at least 1-50 IU/mL;

CMV at a predetermined level of at least 10-50 IU/mL;

Parvovirus B19 at a predetermined level of at least 1-40 IU/mL;

HAV at a predetermined level of at least 1-10 IU/mL;

Chlamydia at a predetermined level of at least 100-500 copies/mL;

Gonorrhea at a predetermined level of at least 100-500 copies/mL;

WNV at a predetermined level of at least 1-50 copies/mL;

Zika Virus at a predetermined level of at least 1-50 copies/mL;

Dengue Virus at a predetermined level of at least 1-50 copies/mL;

Chikungunya Virus at a predetermined level of at least 1-50 copies/mL;

Influenza at a predetermined level of at least 10-500 copies/mL;

Babesia at a predetermined level of at least 1-20 copies/mL;

Malaria at a predetermined level of at least 1-50 copies/mL; and

HEV at a predetermined level of at least 1-20 IU/mL.

503. The system of any one of claims 310–316, wherein the plurality of pathogens or infectious agents and predetermined levels are selected from the following:

SARS-CoV-2 (COVID-19) at a predetermined level of at least 1-50 copies/mL;

HIV-1 at a predetermined level of at least 1-50 copies/mL;

HIV-2 at a predetermined level of at least 1-20 IU/mL;

HBV at a predetermined level of at least 1-10 IU/mL;

HCV at a predetermined level of at least 1-50 IU/mL;

CMV at a predetermined level of at least 10-50 IU/mL;

Parvovirus B19 at a predetermined level of at least 1-40 IU/mL;

HAV at a predetermined level of at least 1-10 IU/mL;

Chlamydia at a predetermined level of at least 100-500 copies/mL;

Gonorrhea at a predetermined level of at least 100-500 copies/mL;

WNV at a predetermined level of at least 1-50 copies/mL;

Zika Virus at a predetermined level of at least 1-50 copies/mL;

Dengue Virus at a predetermined level of at least 1-50 copies/mL;

Chikungunya Virus at a predetermined level of at least 1-50 copies/mL;

Influenza at a predetermined level of at least 10-500 copies/mL;

Babesia at a predetermined level of at least 1-20 copies/mL;

Malaria at a predetermined level of at least 1-50 copies/mL; and

HEV at a predetermined level of at least 1-20 IU/mL.

## CLAIMS

1. A method for screening a plurality of samples to determine whether donor blood associated with the samples is acceptable for transfusion comprising:

performing a nucleic acid analysis on each sample of the plurality of samples, wherein the nucleic acid analysis comprises a sample preparation process, an amplification process, and a detection process;

determining a result from the nucleic acid analysis, wherein the result includes a determination of a predetermined level of nucleic acid from at least one of a plurality of pathogens or infectious agents, and wherein each result has a time to result of about 20 to about 45 minutes; and

determining whether the donor blood is acceptable for transfusion based at least in part on the nucleic acid analysis result.

2. The method of claim 1, wherein the nucleic acid analysis and the determining a result from the nucleic acid analysis are performed on an automated system.

3. The method of claim 2, wherein at least about 140 results are obtained per hour per $m^2$ of a footprint occupied by the automated system.

4. The method of claim 2 or 3, wherein at least about 70 results are obtained per hour per $m^3$ of a volume occupied by the automated system.

5. The method of any one of claims 1-4, wherein the plurality of pathogens or infectious agents are selected from the group consisting of: HIV-1, HIV-2, HBV, HCV, Parvovirus B19, HAV, WNV, Zika Virus, Dengue Virus, Chikungunya Virus, Babesia, Malaria, and HEV.

6. The method of any one of claims 1-5, wherein the determination of a level less than the predetermined level indicates that the donor blood is acceptable for transfusion.

7. The method of any one of claims 1-6, wherein the plurality of pathogens or infectious agents and predetermined levels are selected from the following:

HIV-1 at a predetermined level of at least 1-50 copies/mL;

HIV-2 at a predetermined level of at least 1-20 IU/mL;

HBV at a predetermined level of at least 1-10 IU/mL;

HCV at a predetermined level of at least 1-50 IU/mL;

Parvovirus B19 at a predetermined level of at least 1-40 IU/mL;

HAV at a predetermined level of at least 1-10 IU/mL;

WNV at a predetermined level of at least 1-50 copies/mL;

Zika Virus at a predetermined level of at least 1-50 copies/mL;

Dengue Virus at a predetermined level of at least 1-50 copies/mL;

Chikungunya Virus at a predetermined level of at least 1-50 copies/mL;

Babesia at a predetermined level of at least 1-20 copies/mL;

Malaria at a predetermined level of at least 1-50 copies/mL; and

HEV at a predetermined level of at least 1-20 IU/mL.

8. The method of any one of claims 1-7, wherein:

the plurality of pathogens or infectious agents are HIV-1, HIV-2, HCV, and HBV; and

the nucleic acid analysis comprises multiplex analysis of HIV-1, HIV-2, HCV, and HBV.

9. The method of any one of claims 1-7, wherein:

the plurality of pathogens or infectious agents comprise Zika Virus, WNV, Chikungunya Virus and Dengue Virus;

the nucleic acid analysis comprises multiplex analysis of Zika Virus and Dengue; and

the nucleic acid analysis comprises multiplex analysis of Chikungunya Virus and WNV.

10. The method of any one of claims 1-7, wherein:

the plurality of pathogens or infectious agents comprise Parvovirus B19 and HAV; and

the nucleic acid analysis comprises multiplex analysis of Parvovirus B19 and HAV.

11. The method of any one of claims 1-10, wherein at least one of the plurality of samples of donor blood is a pooled sample.

12. The method of any one of claims 1-11, wherein the sample preparation process comprises onboard pooling of a subset of the plurality of samples to form a pooled sample, the nucleic acid analysis being performed on the pooled sample.

13. The method of any one of claims 1-12, wherein the sample preparation process comprises preparing an eluate and wherein the eluate is split into two or more amplification vessels.

14. The method of any one of claims 1-13, wherein the sample preparation process comprises a lysis process and a wash process.

15. The method of claim 14, wherein the lysis process is completed in about 4 to about 8 minutes.

16. The method of claim 14 or 15, wherein the wash process is completed in about 5 to about 9 minutes.

17. The method of any one of claims 14-16, wherein the wash process comprises at least one wash step and an elution step.

18. The method of any one of claims 1-17, wherein the sample preparation process is completed in about 12 to about 16 minutes.

19. The method of any one of claims 1-18, wherein the amplification process and the detection process are performed together in an amplification and detection process.

20. The method of claim 19, wherein the amplification and detection process is completed in about 1 to about 22 minutes.

21. The method of any one of claims 1-20, wherein the time to result begins from initial aspiration of the sample for performing the nucleic acid analysis and/or ends with the determination of the result.

22. The method of any one of claims 2-21, wherein the automated system comprises a sample analysis station comprising:

a sample loading area;

a sample preparation area for performing the sample preparation process;

a nucleic acid amplification area for performing the amplification process; and

a nucleic acid detection area for performing the detection process.

23. The method of claim 22, wherein the nucleic acid amplification area and the nucleic acid detection area is a single area.

24. The method of claim 23, wherein the single area includes an amplification and detection system configured to perform the amplification process and the detection process simultaneously.

25. The method of any one of claims 22–24, wherein the sample preparation area includes a sample preparation carousel and/or a wash and elution system.