~~WHAT IS CLAIMED IS:~~

CLAIMS

1. A composition comprising:

(a) glutathione, a glutathione derivative, a glutathione conjugate, or a pharmaceutically-acceptable salt thereof; ~~and~~

(b) an ~~organic~~ascorbic acid; and

(c) a bicarbonate,

wherein the molar ratio of (a~~) to ():(~~b~~):(~~c) is about 0.1-0.5: 0.5-1: 1.

~~1.~~ 2. The composition of claim 1, wherein the ~~organic acid is ascorbic acid.~~

~~2. The composition of claim 1 or 2, wherein the composition further comprises (c) a bicarbonate salt.~~

~~The composition of claim 3, wherein the~~ bicarbonate ~~salt~~ is sodium bicarbonate.

~~3.~~ 3. The composition of ~~any one of claims~~claim 1~~-4, wherein the composition comprises: (a) glutathione; (b) ascorbic acid; and (c) sodium bicarbonate.~~

~~The composition of any one of claims 1-5~~, wherein the molar ratio of (a):(b):(c) is about 0.~~1~~4-0.5: 0.5-1: 1.

~~The composition of any one of claims 1-6, wherein the molar ratio of (a):(b):(c) is about 0.4. 4-0.5: 0.5-1: 1.~~

. The composition of ~~any one of claims 1-7~~claim 1, wherein the molar ratio of (a):(b):(c) is about 0.4-0.5: 0.5: 1 or 0.4-0.5: 1: 1.

~~5.~~ 5. The composition of ~~any one of claims~~claim 1~~-8, wherein the pH of the composition is at least about 5.5.~~

~~The composition of any one of claims 1-9~~, wherein the pH of the composition is about 5.5 to about 10, about 5.5 to about 8, about 6 to about 10, or about 6 to about 8.

~~The composition of any one of claims 1-10, wherein the pH is about 5.5, about 6.~~ 6.~~5, about 7.0, or about 7.5.~~

~~7.~~ The composition of claim ~~11, wherein the pH of the composition is 7 ± 1.5~~

~~8. The composition of claim 12, wherein the pH of the composition is about 6.~~

~~The composition of any one of claims 1-13~~1, wherein the reduced glutathione in the composition is more than about 80%, more than about 82%, more than about 84%, more than about 85%, more than about 88%, more than about 90%, more than about 91%, more than about 92%, more than about 93%, more than about 94%, more than about 95%, more than about 96%, or more than about 97% by weight of the total glutathione in the composition after storage of the composition for 4 weeks at about 5° C.

~~9. The composition of any one of claims 1-14, wherein the oxidized glutathione in the composition is less than about 20%, less than about 18%, less than about 16%, less than about 15%, less than about 12%, less than about 10%, less than about 9%, less than about 8%, less than about 7%, less than about 6%, less than about 5%, less than about 4%, or less than about 3% by weight of the total glutathione in the composition after storage of the composition for 4 weeks (e.g., at 5°C in a N_2 atmosphere and/or ambient atmosphere).~~

~~The composition of any one of claims 1-15~~

7. The composition of claim 1, wherein the reduced ascorbic acid is more than about 80%, more than about 85%, more than about 86%, more than about 87%, more than about 88%, more than about 89%, or more than about 90% by weight of the total ascorbic acid in the composition after storage of the composition after storage of the composition for 4 weeks at about 5° C.

~~10.~~ 8. The composition of ~~any one of claims 1-16~~claim 1, wherein the ~~oxidized ascorbic acid in the composition is less than about 20%, less than about 18%, less than about 16%, less than about 15%, less than about 12%, less than about 10%, or less than about 9% by weight of the total ascorbic acid in the composition after storage of the composition for 4 weeks at about 5° C.~~

~~11. The composition of any one of claims 1-17, which is suitable for pharmaceutical use.~~

~~The composition of any one of claims 1-18, the~~ composition is an aqueous solution.

9. The composition of ~~any one of claims 1-18,~~claim 8, wherein the ~~composition~~aqueous solution is constituted from a dry powder.

10. The composition of ~~any one of claims~~claim 1~~-18~~, wherein the composition is suitable for administration by inhalation.

~~12. A method of inhibiting or reducing growth of a clinical isolate bacteria comprising contacting the clinical isolate with the composition of any one of claims 1-21.~~

~~13. A method of inhibiting or reducing formation of a clinical isolate bacteria biofilm comprising contacting the clinical isolate with a composition comprising the composition of any one of claims 1-21.~~

~~14. A method of treating or reducing symptoms in a subject suffering from or at risk for a clinical isolate bacterial infection comprising contacting the clinical isolate with the composition of any one of claims 1-21.~~

~~15. The method of claim 24, wherein the subject has a pulmonary or airway disease or disorder.~~

~~16. The method of claim 25, wherein the pulmonary or airway disorder is selected from the group consisting of chronic inflammatory lung disease, pulmonary fibrosis, pulmonary vasculitis, pulmonary sarcoidosis, inflammation and/or infection associated with lung transplantation, acute or lung rejection and/or dysfunction, pulmonary artery hypertension, bronchitis, sinusitis, asthma, cystic fibrosis, bronchiectasis, bacterial infection, fungal infection, parasite infection, viral infection, chronic obstructive pulmonary disease (COPD), bronchiolitis obliterans syndrome (BOS), primary ciliary dyskinesia (PCD), alveolar protienosis, idiopathic pulmonary fibrosis, eosinophilic pneumonia, eosinophilic bronchitis, acute respiratory distress syndrome (ARDS), inflammation and/or infection associated with mechanical ventilation, ventilator-associated pneumonia, asbestos-related airway disorder or disease, dust-related airway~~

~~disorder or disease, silicosis, and radiation or chemical agent related airway disease or disorder, and any combination thereof.~~

~~17. The method of claim 25, wherein the pulmonary or airway disease or disorder is selected from the group consisting of chronic inflammatory lung disease, an inflammation and/or infection associated with lung transplantation, acute or chronic lung rejection or dysfunction, asthma, cystic fibrosis, bronchiectasis, or chronic obstructive pulmonary disease (COPD), or any combination thereof.~~

~~18. The method of claim 27, wherein the pulmonary or airway disease or disorder is cystic fibrosis, non-cystic fibrosis bronchiectasis or cystic fibrosis bronchiectasis.~~

~~19. The method of claim 27, wherein the subject is a lung transplant patient.~~

~~20. The method of any one of claim 24-29, wherein the subject has a biofilm infection.~~

~~21. The method of any one of claims 24-30 further comprising administering an additional therapeutic agent to the subject.~~

~~22. The method of claim 31, wherein the additional therapeutic agent is an antibiotic.~~

~~23. The method of any one of claims 22-32, wherein the clinical isolate comprises two or more clinical isolates.~~

~~24. The method of claim 22-33, wherein the clinical isolate is Gram negative or Gram positive.~~

~~25. The method of claim 34, wherein the two or more clinical isolates comprise a combination of Gram negative and Gram positive clinical isolates.~~

~~26. The method of any one of claims 22-35, wherein the clinical isolate is mucoid or non-mucoid.~~

~~27. The method of any one of claims 22-36, wherein the clinical isolate is aerobic, anaerobic, or aerotolerant.~~

~~28. The method of claim 37, wherein the aerobic, anaerobic, or aerotolerant condition is with nitrate.~~

~~29. The method of any one of claims 23-38, wherein the clinical isolate is multidrug resistant.~~

11. A method of upregulating mucociliary clearance in a subject suffering from or at risk of impaired mucociliary clearance comprising administering to the subject a composition of ~~any one of claims 1-21~~claim 1.

12. The method of claim ~~40~~11, wherein administering said composition decreases mucus viscosity of the subject.

13. The method of claim ~~40~~11, wherein administering said composition increases ciliary beat frequency of the subject's airway epithelial cells.

~~30. The method of claim 40, wherein administering said composition increases the mucociliary transport rate of the subject's airway epithelial cells.~~

~~31. The method of claim 40, wherein administering said composition increases the airway surface liquid height of the subject.~~

~~32. The method of any one of claims 40-44, wherein the subject suffers from or is at risk of suffering from a pulmonary or airway disease or disorder.~~

~~33. The method of claim 45, wherein the pulmonary or airway disorder is selected from the group consisting of chronic inflammatory lung disease, pulmonary fibrosis, pulmonary vasculitis, pulmonary sarcoidosis, inflammation and/or infection associated with lung transplantation, acute or lung rejection and/or dysfunction, pulmonary artery hypertension, bronchitis, sinusitis, asthma, cystic fibrosis, bronchiectasis, bacterial infection, fungal infection, parasite infection, viral infection, chronic obstructive pulmonary disease (COPD), bronchiolitis obliterans syndrome (BOS), primary ciliary dyskinesia (PCD), alveolar proticnosis, idiopathic pulmonary fibrosis, eosinophilic pneumonia, eosinophilic bronchitis, acute respiratory distress syndrome (ARDS),~~

~~inflammation and/or infection associated with mechanical ventilation, ventilator-associated pneumonia, asbestos-related airway disorder or disease, dust-related airway disorder or disease, silicosis, and radiation or chemical agent-related airway disease or disorder, and any combination thereof.~~

~~34. The method of claim 46, wherein the pulmonary or airway disease or disorder is cystic fibrosis, non-cystic fibrosis bronchiectasis, or cystic fibrosis bronchiectasis.~~

~~35. The method of any one of claims 45-47, wherein the airway epithelial cells of said subject lack mucociliary clearance ability prior to administration of said composition.~~

~~36. The method of claim 48, wherein the airway epithelial cells of said subject lack mucociliary clearance ability due to a genetic deficiency.~~

~~37. The method of claim 45, wherein the subject has received a lung transplant.~~

~~38. The method of any one of claims 45-50, wherein the airway epithelium of the subject is not colonized by bacteria.~~

~~39. The method of any one of claims 45-50, wherein the airway epithelium of the subject is colonized by bacteria.~~

~~40. The method of claim 52, wherein the subject suffers from an active bacterial infection.~~

~~41. The method of claim 52, wherein the subject does not suffer from an active bacterial infection.~~

~~42. The method of any one of claims 51-54, wherein the subject is a pediatric patient.~~

~~43. The method of any one of claims 51-54, wherein the subject is an adult patient.~~

~~44.~~ 14. A method of reducing airway inflammation in a subject suffering from or at risk of airway inflammation comprising administering to the subject a composition of ~~any one of claims~~claim 1~~-21.~~

~~45. The method of claim 57, wherein administering said composition inhibits myeloperoxidase activity of the subject's neutrophils.~~

~~46. The method of claims 57 or 58, wherein administering said composition decreases the formation of neutrophil extracellular traps.~~

~~47. The method of any one of claims 57-59, wherein administering said composition downregulates the production of nitric oxide from the subject's neutrophils.~~

~~The method of claim 60~~, wherein administering said composition reduces the subject's fractional exhaled nitric oxide by at least 20%.

~~48. The method of any one of claims 57-61, wherein administering said composition downregulates the production of at least one inflammatory cytokine.~~

~~49.~~ 15. The method of claim ~~62, wherein said at least one inflammatory cytokine comprises a cytokine associated with macrophage activation and/or neutrophil and T cell recruitment.~~

~~50. The method of claim 63, wherein said at least one inflammatory cytokine comprises TNF-α.~~

~~51. The method of claim 63, wherein said at least one inflammatory cytokine comprises IL-6.~~

~~52. The method of claim 63, wherein said at least one inflammatory cytokine comprises IL-8.~~

~~53. The method of any one of claims 57-66, wherein the subject suffers from or is at risk of suffering from a~~ 14, wherein the pulmonary or airway disease or disorder~~.~~

~~54. The method of claim 67, wherein the pulmonary or airway disorder is selected from the group consisting of chronic inflammatory lung disease, pulmonary fibrosis, pulmonary vasculitis, pulmonary sarcoidosis, inflammation and/or infection associated with lung transplantation, acute or lung rejection and/or dysfunction, pulmonary artery hypertension, bronchitis, sinusitis, asthma, cystic fibrosis, bronchiectasis, bacterial infection, fungal infection, parasite infection, viral infection,~~ is chronic obstructive

pulmonary disease (COPD), ~~bronchiolitis obliterans syndrome (BOS), primary ciliary dyskinesia (PCD), alveolar protienosis, idiopathic pulmonary fibrosis, eosinophilic pneumonia, eosinophilic bronchitis,~~ pulmonary fibrosis, viral infection, radiation or chemical agent-related airway disease or disorder, acute respiratory distress syndrome (ARDS), ~~inflammation and/or infection associated with mechanical ventilation,~~ ventilator-associated pneumonia, ~~asbestos-related airway disorder or disease, dust-related airway disorder or disease, silicosis, and radiation or chemical agent-related airway disease or disorder, and any combination thereof.~~

~~The method of claim 68, wherein the pulmonary or airway disease or disorder is~~ cystic fibrosis, non-cystic fibrosis bronchiectasis, or cystic fibrosis bronchiectasis.

16. The method of claim ~~67~~14, wherein the subject has received a lung transplant.

~~55. The method of any one of claims 67-70, wherein the airway epithelium of the subject is not colonized by bacteria.~~

~~56. The method of any one of claims 67-71, wherein the airway epithelium of the patient is colonized by bacteria.~~

~~57. The method of claim 72, wherein the subject suffers from an active bacterial infection.~~

~~58. The method of claim 72, wherein the subject does not suffer from an active bacterial infection.~~

~~59. The method of any one of claims 67-74, wherein the subject is a pediatric patient.~~

~~60. The method of any one of claims 67-74, wherein the subject is an adult patient~~

~~61. The method of any one of claims 40-76, which does not significantly alter the pH of the subject's airway endothelium.~~

17. A method of decreasing mucus viscosity in a subject suffering from or at risk of suffering from ~~decreased~~increased mucus viscosity comprising administering to the subject a composition of ~~any one of claims~~ claim 1~~-21~~.

~~62. A method of activating cystic fibrosis transmembrane receptor (CFTR) function in a subject suffering from decreased CFTR function comprising administering to the subject a composition of any one of claims 1-21.~~

18. A method of enhancing the expression of cystic fibrosis transmembrane receptor (CFTR) in a subject suffering from decreased expression of CFTR comprising administering to the subject a composition of ~~any one of claims 1-21~~claim 1.

19. The method of ~~any one of claims 24-80~~claim 18 further comprising administering a CFTR therapy selected from the group consisting of a CFTR amplifer, a CFTR corrector, a CFTR potentiator/modulator, a CFTR RNA modifier, or any combination thereof.

~~The method of claim 81, wherein the CFTR corrector is selected from the group consisting of VX-809 (lumacaftor), VX-661 (tezacaftor), VX-445, VX-659, VX-152, FDL169, GLPG2222, PT-801, and a combination thereof.~~

~~63. The method of claims 81 or 82, wherein the CFTR potentiator/modulator is selected from the group consisting of VX-770 (ivacaftor), QBW-251, VX-561, PT1-808, and a combination thereof.~~

~~64. The method of any of claims 81-83, wherein the CFTR amplifer is PTI-428.~~

~~65. The method of any of claims 81-84, wherein the CFTR RNA modifier is QR-100, MRT5005, or the combination thereof.~~

~~66. The method of claim 81, wherein the CFTR therapy comprises the CFTR corrector and the CFTR potentiator/modulator.~~

~~67. The method of claim 86, wherein, the CFTR therapy comprises VX-770 (ivacaftor), VX-809 (lumacaftor), or the combination thereof.~~

~~68. The method of any one of claims 81-87, wherein the mucus viscosity in the airway of the subject decreases more than administering the composition alone.~~

~~69. The method of any one of claims 81-88, wherein the ciliary beat frequency of the subject's airway epithelial cells increases more than administering the composition alone.~~

~~70. The method of any one of claims 81-89, wherein the mucociliary transport rate of the subject's airway epithelial cells increases more than administering the composition alone.~~

~~71. The method of any of claims 81-90, wherein the composition and the CFTR are administered simultaneously or consecutively to the subject in any order.~~

~~72. The method of any of claims 24-91, wherein subject's fractional exhaled nitric oxide (FeNO) is reduced by at least 20% after 1 month of administration of the composition.~~

~~73. The method of claim 92, wherein the subject is a lung transplant patient.~~

~~74. The method of any of claims 24-93, wherein the compositon is administered by nebulization twice daily.~~

~~The composition of any of claims 1-24 or the method of any of claims 24-94~~

20. The composition of claim 1, wherein the composition after storage at 2-8°C for at least 72 hours comprises any one or more of the following: (a) essentially free of precipitation, (b) comprises less than 4% impurities, (c) maintains a pH of 6.0-7.0, and (d) minimal loss of solubility.

21. The composition of claim 8, wherein the bicarbonate is about 1-30% by weight.

22. The composition of claim 1 which comprises about 0.49 M glutathione, about 0.50 M ascorbic acid, and about 1 M sodium bicarbonate.