**WHAT IS CLAIMED IS:**

1. A single-cycle adenovirus (SC-Ad), wherein said SC-Ad comprises a genome lacking at least a portion of a nucleic acid sequence that encodes an adenovirus polypeptide, wherein said SC-Ad comprises said adenovirus polypeptide, and wherein said SC-Ad comprises a nucleic acid sequence encoding a coronavirus immunogen.

2. The SC-Ad of claim 1, wherein said adenovirus polypeptide is selected from the group consisting of a fiber polypeptide, a V polypeptide, a hexon polypeptide, a penton base polypeptide, and a pIIIa polypeptide.

3. The SC-Ad of any one of claims 1-2, wherein said coronavirus immunogen comprises a coronavirus Spike polypeptide or an immunogenic fragment thereof.

4. The SC-Ad of claim 3, wherein said coronavirus immunogen consists of or consists essentially of an amino acid sequence set forth in any one of SEQ ID NOs:1-4.

5. The SC-Ad of any one of claims 1-4, wherein said SC-Ad further comprises a nucleic acid sequence encoding an adjuvant polypeptide.

6. The SC-Ad of claim 5, wherein said adjuvant polypeptide is selected from the group consisting of a granulocyte-macrophage colony-stimulating factor (GM-CSF) polypeptide, an interleukin 4 (IL-4) polypeptide, an interleukin 21 (IL-21) polypeptide, a CD40 ligand (CD40L) polypeptide, a 4-1BB ligand (4-1BBL) polypeptide, a transforming growth factor beta (TGF-β) polypeptide, a *Clostridium difficile* TcdA polypeptide, a *C. difficile* TcdB polypeptide, and biologically active fragments thereof.

7. The SC-Ad of claim 5 or claim 6, wherein said coronavirus Spike polypeptide is fused to said adjuvant polypeptide.

1. A single-cycle adenovirus (SC-Ad), wherein said SC-Ad comprises a genome lacking at least a portion of a nucleic acid sequence that encodes an adenovirus polypeptide, wherein said SC-Ad comprises said adenovirus polypeptide, and wherein said SC-Ad comprises a nucleic acid sequence encoding a coronavirus immunogen.

2. The SC-Ad of claim 1, wherein said adenovirus polypeptide is selected from the group consisting of a fiber polypeptide, a V polypeptide, a hexon polypeptide, a penton base polypeptide, and a pIIIa polypeptide.

3. The SC-Ad of claim 1 or 2, wherein said coronavirus immunogen comprises a coronavirus Spike polypeptide or an immunogenic fragment thereof.

4. The SC-Ad of claim 3, wherein said coronavirus immunogen consists of or consists essentially of an amino acid sequence set forth in any one of SEQ ID NOs:1-4.

5. The SC-Ad of any one of claims 1 to 4, wherein said SC-Ad further comprises a nucleic acid sequence encoding an adjuvant polypeptide.

6. The SC-Ad of claim 5, wherein said adjuvant polypeptide is selected from the group consisting of a granulocyte-macrophage colony-stimulating factor (GM-CSF) polypeptide, an interleukin 4 (IL-4) polypeptide, an interleukin 21 (IL-21) polypeptide, a CD40 ligand (CD40L) polypeptide, a 4-1BB ligand (4-1BBL) polypeptide, a transforming growth factor beta (TGF-β) polypeptide, a *Clostridium difficile* TcdA polypeptide, a *C. difficile* TcdB polypeptide, and biologically active fragments thereof.

7. The SC-Ad of claim 5 or 6, wherein said coronavirus Spike polypeptide is fused to said adjuvant polypeptide.

8. The SC-Ad of claim 7, wherein said coronavirus Spike polypeptide fused to said adjuvant polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:5.

~~8. The SC-Ad of claim 7, wherein said coronavirus Spike polypeptide fused to said adjuvant polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:5.~~

~~9. The SC-Ad of any one of claims 1-4, wherein said SC-Ad further comprises a nucleic acid sequence encoding a chaff polypeptide.~~

~~10. The SC-Ad of claim 9, wherein said chaff polypeptide is a fragment of an ACE2 polypeptide.~~

~~11. The SC-Ad of claim 10, wherein said fragment of an ACE2 polypeptide comprises the extracellular region of an ACE2 polypeptide and lacks a transmembrane domain.~~

~~12. The SC-Ad of claim 11, wherein said chaff polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:8 or SEQ ID NO:9.~~

~~13. The SC-Ad of any one of claims 9-12, wherein said coronavirus Spike polypeptide is fused to said chaff polypeptide.~~

~~14. A composition comprising the SC-Ad of any one of claims 1-13.~~

~~15. A method for inducing an immune response against a coronavirus in a mammal, wherein said method comprises administering the SC-Ad of any one of claims 1-13 or the composition of claim 14 to said mammal under conditions wherein said SC-Ad infects a cell of said mammal, and wherein expression of said immunogen in said cell leads to induction of said immune response.~~

~~16. The method of claim 15, wherein said mammal is a human.~~

9. The SC-Ad of any one of claims 1 to 4, wherein said SC-Ad further comprises a nucleic acid sequence encoding a chaff polypeptide.

10. The SC-Ad of claim 9, wherein said chaff polypeptide is a fragment of an ACE2 polypeptide.

11. The SC-Ad of claim 10, wherein said fragment of an ACE2 polypeptide comprises the extracellular region of an ACE2 polypeptide and lacks a transmembrane domain.

12. The SC-Ad of claim 11, wherein said chaff polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:8 or SEQ ID NO:9.

13. The SC-Ad of any one of claims 9 to 12, wherein said coronavirus Spike polypeptide is fused to said chaff polypeptide.

14. A composition comprising the SC-Ad of any one of claims 1 to 13.

15. A single-cycle adenovirus (SC-Ad) of any one of claims 1 to 13 for use in the prevention of a coronavirus caused disease in a mammal, wherein said SC-Ad is to be administered to said mammal under conditions where said SC-Ad infects a cell of said mammal to induce an immune response against said coronavirus.

16. The SC-Ad of claim 15, wherein said mammal is a human.

17. The SC-Ad of claim 15 or 16, wherein said coronavirus is a betacoronavirus.

18. The SC-Ad of claim 17, wherein said betacoronavirus is SARS-CoV-2.

19. The SC-Ad of any one of claims 15 to 18, wherein said SC-Ad is to be administered to said mammal via mucosal delivery.

20. Use of a single-cycle adenovirus (SC-Ad) of any one of claims 1 to 13 in the manufacture of a pharmaceutical composition for preventing a coronavirus caused disease in a mammal, wherein said pharmaceutical composition is to be administered to said mammal via

17. The method of any one of claims 15-16, wherein said coronavirus is a betacoronavirus.

18. The method of claim 17, wherein said betacoronavirus is SARS-CoV-2.

19. The method of any one of claims 15-18, wherein said administering comprising mucosal delivery of said SC-Ad.

20. A SC-Ad, wherein said SC-Ad comprises a genome lacking at least a portion of a nucleic acid sequence that encodes an adenovirus polypeptide, wherein said SC-Ad comprises said adenovirus polypeptide, and wherein said SC-Ad comprises (a) a nucleic acid sequence encoding an immunogen and (b) a nucleic acid sequence encoding an adjuvant polypeptide.

21. The SC-Ad of claim 20, wherein said adenovirus polypeptide is selected from the group consisting of a fiber polypeptide, a V polypeptide, a hexon polypeptide, a penton base polypeptide, and a pIIIa polypeptide.

22. The SC-Ad of any one of claims 20-21, wherein said immunogen is a coronavirus immunogen.

23. The SC-Ad of claim 22, wherein said coronavirus immunogen comprises a coronavirus Spike polypeptide or an immunogenic fragment thereof.

24. The SC-Ad of claim 23, wherein said coronavirus immunogen consists of or consists essentially of an amino acid sequence set forth in any one of SEQ ID NOs:1-4.

25. The SC-Ad of any one of claims 20-24, wherein said adjuvant polypeptide is selected from the group consisting of a GM-CSF polypeptide, an IL-4 polypeptide, an IL-21 polypeptide, a CD40L polypeptide, a 4-1BBL polypeptide, a TGF-β polypeptide, a

mucosal delivery under conditions where said SC-Ad infects a cell of said mammal to induce an immune response against said coronavirus.

~~*Clostridium difficile* TcdA polypeptide, a *C. difficile* TcdB polypeptide, and biologically active fragments thereof.~~

~~26. The SC-Ad of claim 25, wherein said coronavirus Spike polypeptide is fused to said adjuvant polypeptide.~~

~~27. The SC-Ad of claim 26, wherein said coronavirus Spike polypeptide fused to said adjuvant polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:5.~~

~~28. The SC-Ad of any one of claims 20-27, wherein said SC-Ad further comprises a nucleic acid sequence encoding a chaff polypeptide.~~

~~29. The SC-Ad of claim 28, wherein said chaff polypeptide is a fragment of an ACE2 polypeptide.~~

~~30. The SC-Ad of claim 29, wherein said fragment of an ACE2 polypeptide comprises the extracellular region of an ACE2 polypeptide and lacks a transmembrane domain.~~

~~31. The SD-Ac of claim 30, wherein said chaff polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:8 or SEQ ID NO:9.~~

~~32. A composition comprising the SC-Ad of any one of claims 20-31.~~

~~33. A method for inducing an immune response against a virus in a mammal, wherein said method comprises administering the SC-Ad of any one of claims 20-31 or the composition of claim 32 to said mammal under conditions wherein said SC-Ad infects a cell of said mammal, and wherein expression of said immunogen in said cell leads to induction of said immune response.~~

~~34. The method of claim 33, wherein said mammal is a human.~~

~~35. The method of any one of claims 33-34, wherein said virus is a coronavirus, and wherein said immunogen is associated with said coronavirus.~~

~~36. The method of any one of claims 33-35, wherein said coronavirus is a betacoronavirus.~~

~~37. The method of claim 36, wherein said betacoronavirus is SARS-CoV-2.~~

~~38. The method of any one of claims 33-37, wherein said administering comprising mucosal delivery of said SC-Ad.~~

~~39. A SC-Ad, wherein said SC-Ad comprises a genome which lacks at least a portion of a nucleic acid sequence that encodes an adenovirus polypeptide, wherein said SC-Ad comprises said adenovirus polypeptide, and wherein said SC-Ad comprises (a) a nucleic acid sequence encoding an immunogen and (b) a nucleic acid sequence encoding a chaff polypeptide.~~

~~40. The SC-Ad of claim 39, wherein said adenovirus polypeptide is selected from the group consisting of a fiber polypeptide, a V polypeptide, a hexon polypeptide, a penton base polypeptide, and a pIIIa polypeptide.~~

~~41. The SC-Ad of any one of claims 39-40, wherein said immunogen is a coronavirus immunogen.~~

~~42. The SC-Ad of claim 41, wherein said coronavirus immunogen comprises a coronavirus Spike polypeptide or an immunogenic fragment thereof.~~

~~43. The SC-Ad of claim 42, wherein said coronavirus immunogen consists of or consists essentially of an amino acid sequence set forth in any one of SEQ ID NOs:1-4.~~

~~44. The SC-Ad of claim 43, wherein said chaff polypeptide is a fragment of an ACE2 polypeptide.~~

~~45. The SC-Ad of claim 44, wherein said fragment of an ACE2 polypeptide comprises the extracellular region of an ACE2 polypeptide and lacks a transmembrane domain.~~

~~46. The SD-Ac of claim 45, wherein said chaff polypeptide consists essentially of or consists of an amino acid sequence set forth in SEQ ID NO:8 or SEQ ID NO:9.~~

~~47. The SC-Ad of any one of claims 39-46, wherein said coronavirus Spike polypeptide is fused to said chaff polypeptide.~~

~~48. The SC-Ad of any one of claims 39-47, wherein said SC-Ad further comprises a nucleic acid sequence encoding an adjuvant polypeptide.~~

~~49. The SC-Ad of claim 48, wherein said adjuvant polypeptide is selected from the group consisting of a GM-CSF polypeptide, an IL-4 polypeptide, an IL-21 polypeptide, a CD40L polypeptide, a 4-1BBL polypeptide, a TGF-β polypeptide, a *Clostridium difficile* TcdA polypeptide, a *C. difficile* TcdB polypeptide, and biologically active fragments thereof.~~

~~50. A composition comprising the SC-Ad of any one of claims 39-49.~~

~~51. A method for inducing an immune response against a virus in a mammal, wherein said method comprises administering the SC-Ad of any one of claims 39-49 or the composition of claim 50 to said mammal under conditions wherein said SC-Ad infects a cell of said mammal, and wherein expression of said immunogen in said cell leads to induction of said immune response.~~

~~52. The method of claim 51, wherein said mammal is a human.~~

~~53. The method of any one of claims 51-52, wherein said virus is a coronavirus, and wherein said immunogen is associated with said coronavirus.~~

~~54. The method of claim 53, wherein said coronavirus is a betacoronavirus.~~

~~55. The method of claim 54, wherein said betacoronavirus is SARS-CoV-2.~~

~~56. The method of any one of claims 51-55, wherein said administering comprising mucosal delivery of said SC-Ad.~~