ANTIMICROBIAL PEPTIDE, COMPOSITIONS, AND METHODS OF USE

This Application claims priority to US Provisional Application No. 60/952,059 filed July 26, 2007, which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The invention relates to antimicrobial peptides for use in pharmaceutical and cosmetic applications, to treat or prevent microbial infections, and/or prevent the recurrence of a microbial infection after treatment.

BACKGROUND OF THE INVENTION

Small, cationic antimicrobial peptides (AMPs) are naturally occurring antibiotics of the innate immune system. AMPs are widely distributed in animals and plants and are among the most ancient host defense factors. Their spectrum of activity may include Gram-positive and Gram-negative bacteria as well as fungi and certain viruses. As resistance of pathogenic microbes to conventional antibiotics increases, these endogenous antibiotics are an important source for designing new therapies against a variety of infectious diseases, including therapies for chronic microbial infections as well as for routine and/or prophylactic use. However, for many applications, such peptides must be, in addition to effective, sufficiently safe and stable so as to allow long term and/or routine use without negatively impacting the affected area.

SUMMARY ~~OF THE INVENTION~~

The present ~~invention~~disclosure provides antimicrobial peptides that exhibit a broad range of antimicrobial activity against gram positive and gram negative bacteria, as well as fungi,

mold, and certain viruses. The peptides of the ~~invention~~disclosure are cationic, containing positively charged amino acids such as lysine, arginine, and histidine, along with other non-charged amino acids such as glycine or glutamine. The peptides of the ~~invention~~disclosure are safe, effective, and sufficiently stable to allow long-term or routine use.

In one aspect, there is provided a cationic peptide comprising the amino acid sequence of SEQ ID NO: 3.

In one aspect, there is provided a cationic peptide comprising the amino acid sequence of SEQ ID NO: 4.

In one aspect, there is provided a cationic peptide comprising the amino acid sequence of SEQ ID NO: 5.

The present ~~invention~~disclosure further provides antimicrobial compositions containing the antimicrobial peptide. The compositions are stable, and thus may be formulated in a variety of forms including for routine use. Such compositions are especially useful for topical application to the skin, hair, nail, vagina, urethra, ear, oral cavity, nasal passage, respiratory system, opthalmic region, various mucosal regions, and other affected areas, to treat, prevent, or prevent the reoccurrence of, a microbial infection. The compositions of the present ~~invention~~disclosure, by reducing, inhibiting, or preventing microbial infection, improve the condition and/or appearance of the treated region, even with long term or routine use.

In one aspect, there is provided a pharmaceutical composition comprising a cationic peptide, wherein the cationic peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NO. 3 and SEQ ID NO. 4; and

a pharmaceutically or cosmetically acceptable carrier and/or diluent.

The present ~~invention~~disclosure further provides kits for use in improving the condition or appearance of skin, nail, or other treated area. These kits may contain components that facilitate dispensing and applying the compositions of the ~~invention~~disclosure, and may be designed for convenient application and long-term storage of the compositions.

In one aspect, there is provided a kit for administering a composition, the kit comprising the composition as defined herein and a dispenser.

DETAILED DESCRIPTION OF THE INVENTION

Peptide fragments of HIV-TAT were used in conjunction with botulinum toxin to produce more stable, more effective, and safer botulinum toxin compositions for therapeutic, aethetic, and/or cosmetic purposes. These botulinum toxin containing compositions are disclosed in a U.S. Provisional Application filed December 29, 2006, entitled "Compositions and Methods of Topical Application And Transdermal Delivery of Botulinum Toxins Stabilized With Polypeptide Fragments Derived From HIV-TAT," which is hereby

CLAIMS

1. A pharmaceutical composition comprising a cationic peptide, wherein the cationic peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NO. 3, and SEQ ID NO. 4; and

a pharmaceutically or cosmetically acceptable carrier and/or diluent.

2. The composition according to claim 1, wherein the cationic peptide comprises an amino acid sequence according to SEQ ID NO. 3.

3. The composition according to claim 1, wherein the cationic peptide comprises an amino acid sequence according to SEQ ID NO. 4.

4. The composition according to claim 2, wherein the composition is a topical composition.

5. The composition according to claim 3, wherein the composition is a topical composition.

6. The composition according to claim 4 or 5, wherein the composition is selected from the group consisting of solid compositions, liquid compositions, solutions, emulsions, microemulsions, suspensions, creams, lotions, gels, and powders.

7. The composition according to claim 6, wherein the composition is a solution.

8. The composition according to claim 6, wherein the composition is a cream.

9. The composition according to claim 6, wherein the composition is a lotion.

10. The composition according to claim 6, wherein the composition is a gel.

11. The composition according to claim 6, wherein the composition is a nasal spray.

12. The composition according to claim 2, wherein the composition contains from about 0.01% to about 20% cationic peptide.

13. The composition according to claim 3, wherein the composition contains from about 0.01% to about 20% cationic peptide.

14. The composition according to claim 4, wherein the composition contains from about 0.01% to about 20% cationic peptide.

15. The composition according to claim 5, wherein the composition contains from about 0.01% to about 20% cationic peptide.

16. A kit for administering a composition, the kit comprising the composition according to claim 2 and a dispenser.

17. A kit for administering a composition, the kit comprising the composition according to claim 3 and a dispenser.

18. A kit for administering a composition, the kit comprising the composition according to claim 4 and a dispenser.

19. A kit for administering a composition, the kit comprising the composition according to claim 5 and a dispenser.

20. The kit according to any of claims 16-19, further comprising a component to facilitate application of the composition.

21. The kit according to claim 20, wherein said component to facilitate application is selected from the group consisting of a brush, a sponge, and a cotton swab.

22. A composition comprising a cationic peptide, wherein the cationic peptide is SEQ ID NO. 3 or is SEQ ID NO:4.

23. The composition according to claim 22, wherein the composition is a topical composition.

24. A kit for administering a composition, the kit comprising the composition according to claim 22 and a dispenser.

25. A kit for administering a composition, the kit comprising the composition according to claim 23 and a dispenser.

26. The composition according to claim 23, wherein the composition is selected from the group consisting of solid compositions, liquid compositions, solutions, emulsions, microemulsions, suspensions, creams, lotions, gels, and powders.

27. The composition according to claim 26, wherein the composition is a solution.

28. The composition according to claim 26, wherein the composition is a cream.

29. The composition according to claim 26, wherein the composition is a lotion.

30. The composition according to claim 26, wherein the composition is a gel.

31. The composition according to claim 26, wherein the composition is a nasal spray.

32. The composition according to claim 22, wherein the composition contains from about 0.01% to about 20% cationic peptide.

33. The composition according to claim 23, wherein the composition contains from about 0.01% to about 20% cationic peptide.

34. The kit according to claim 24, further comprising a component to facilitate application of the composition.

35. The kit according to claim 25, further comprising a component to facilitate application of the composition.

36. The kit according to claim 34 or 35, wherein said component to facilitate application is selected from the group consisting of a brush, a sponge, and a cotton swab.

CLAIMS

1. A pharmaceutical composition comprising a cationic peptide, wherein the cationic peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NO. 3 and SEQ ID NO. 4; and

a pharmaceutically or cosmetically acceptable carrier and/or diluent.

2. The composition according to claim 1, wherein the cationic peptide comprises an amino acid sequence according to SEQ ID NO. 3.

3. The composition according to claim 1, wherein the cationic peptide comprises an amino acid sequence according to SEQ ID NO. 4.

4. The composition according to claim 2, wherein the composition is a topical composition.

5. The composition according to claim 3, wherein the composition is a topical composition.

6. The composition according to claim 4, wherein the composition is selected from the group consisting of solid compositions, liquid compositions, solutions, emulsions, microemulsions, suspensions, creams, lotions, gels, powders, and nasal sprays.

7. The composition according to claim 6, wherein the composition is a solution.

8. The composition according to claim 6, wherein the composition is a cream.

9. The composition according to claim 6, wherein the composition is a lotion.

10. The composition according to claim 6, wherein the composition is a gel.

11. The composition according to claim 6, wherein the composition is a nasal spray.

12. The composition according to claim 5, wherein the composition is selected from the group consisting of solid compositions, liquid compositions, solutions, emulsions, microemulsions, suspensions, creams, lotions, gels, powders, and nasal sprays.

13. The composition according to claim 12, wherein the composition is a solution.

14. The composition according to claim 12, wherein the composition is a cream.

15. The composition according to claim 12, wherein the composition is a lotion.

16. The composition according to claim 12, wherein the composition is a gel.

17. The composition according to claim 12, wherein the composition is a nasal spray.

18. The composition according to claim 2, wherein the composition contains from about 0.01% w/v to about 20% w/v cationic peptide.

19. The composition according to claim 3, wherein the composition contains from about 0.01% w/v to about 20% w/v cationic peptide.

20. The composition according to claim 4, wherein the composition contains from about 0.01% w/v to about 20% w/v cationic peptide.

21. The composition according to claim 5, wherein the composition contains from about 0.01% w/v to about 20% w/v cationic peptide.

22. A kit for administering a composition, the kit comprising the composition according to claim 2 and a dispenser.

23. A kit for administering a composition, the kit comprising the composition according to claim 3 and a dispenser.

24. A kit for administering a composition, the kit comprising the composition according to claim 4 and a dispenser.

25. A kit for administering a composition, the kit comprising the composition according to claim 5 and a dispenser.

26. The kit according to any of claims 22, further comprising a component to facilitate application of the composition.

27. The kit according to claim 26, wherein said component to facilitate application is selected from the group consisting of a brush, a sponge, and a cotton swab.

28. The kit according to claim 23, further comprising a component to facilitate application of the composition.

29. The kit according to claim 28, wherein said component to facilitate application is selected from the group consisting of a brush, a sponge, and a cotton swab.

30. The kit according to claim 24, further comprising a component to facilitate application of the composition.

31. The kit according to claim 30, wherein said component to facilitate application is selected from the group consisting of a brush, a sponge, and a cotton swab.

32. The kit according to claim 25, further comprising a component to facilitate application of the composition.

33. The kit according to claim 32, wherein said component to facilitate application is selected from the group consisting of a brush, a sponge, or a cotton swab.

34. A cationic peptide comprising the amino acid sequence of SEQ ID NO: 3.

35. The cationic peptide according to claim 34, wherein said peptide consists of the amino acid sequence of SEQ ID NO: 3.

36. A cationic peptide comprising the amino acid sequence of SEQ ID NO: 4.

37. The cationic peptide according to claim 36, wherein said peptide consists of the amino acid sequence of SEQ ID NO: 4.

38. A cationic peptide comprising the amino acid sequence of SEQ ID NO: 5.

39. The cationic peptide according to claim 38, wherein said peptide consists of the amino acid sequence of SEQ ID NO: 5.