**Claims**

[Claim 1] A chimeric polypeptide comprising a protein selected from the group consisting of:

(a) an isolated lysin protein from phage F87s/06, or a fragment thereof having antimicrobial and/or targeting activity against *S. aureus*;

(b) an isolated lysin protein from phage F87s/06, or a fragment thereof having antimicrobial and/or targeting activity against *S. aureus*, said protein comprising the amino acid sequence of SEQ ID NO:2, or a fragment thereof having antimicrobial and/or targeting activity against *S. aureus*;

(c) an isolated first protein having at least 85% sequence identity to a second protein of the same size, wherein said first protein has antimicrobial and/or targeting activity against *S. aureus* and said second protein has the amino acid sequence of SEQ ID NO:2 or a fragment thereof; and

(d) an isolated first protein having at least 95% sequence identity to a second protein of the same size, wherein said first protein has antimicrobial and/or targeting activity against *S. aureus* and said second protein has the amino acid sequence of SEQ ID NO:2 or a fragment thereof,

wherein a catalytic domain of said protein is substituted with a catalytic domain of a heterologous lysin protein.

[Claim 2] The chimeric polypeptide of claim 1 wherein said hetorologous lysin protein comprises a lysin protein from phage F170/08 or phage F168/08 having antimicrobial activity against *S. aureus*.

[Claim 3] The chimeric polypeptide of claim 2, said chimeric polypeptide comprising the amino acid sequence of SEQ ID NO:4 or a fragment thereof having antimicrobial activity against *S. aureus*.

[Claim 4] The chimeric polypeptide of claim 2, said chimeric polypeptide comprising the amino acid sequence of SEQ ID NO:6 or a fragment thereof having antimicrobial activity against *S. aureus*.

[Claim 5] A chimeric third polypeptide having at least 85% sequence identity to a fourth polypeptide of the same size wherein said third polypeptide has antimicrobial activity against *S. aureus* and said fourth polypeptide has the amino acid sequence of SEQ ID NO:4 or a fragment thereof.

[Claim 6] The chimeric polypeptide of claim 5 wherein said third polypeptide has at least 95% sequence identity to said fourth polypeptide.

[Claim 7] A chimeric fifth polypeptide having at least 85% sequence identity to a sixth polypeptide of the same size wherein said fifth polypeptide has antimicrobial activity against *S. aureus* and said sixth polypeptide has the amino acid sequence of SEQ ID NO:6 or a fragment thereof.

[Claim 8] The chimeric polypeptide of claim 7 wherein said fifth polypeptide has at least 95% sequence identity to said sixth polypeptide.

[Claim 9] A nucleic acid comprising a nucleotide sequence encoding the chimeric polypeptide of any one of claims 1-8.

[Claim 10] The nucleic acid of claim 9 comprising the nucleotide sequence of SEQ ID NO:3 or a fragment thereof.

[Claim 11] The nucleic acid of claim 9 comprising the nucleotide sequence of SEQ ID NO:5 or a fragment thereof.

[Claim 12] A vector comprising the nucleic acid of claim 9.

[Claim 13] The vector of claim 12 that is an expression vector.

[Claim 14] A host cell comprising the vector of claim 13.

[Claim 15] A pharmaceutical composition comprising a pharmaceutically acceptable carrier and the chimeric polypeptide of any one of claims 1-8.

[Claim 16] The pharmaceutical composition of claim 15 wherein said hetorologous lysin protein comprises a lysin protein from phage F170/08 or phage F168/08 having antimicrobial activity against *S. aureus*.

[Claim 17] The pharmaceutical composition of claim 16 wherein said chimeric polypeptide comprises the amino acid sequence of SEQ ID NO:4 or a fragment thereof having antimicrobial activity against *S. aureus*.

[Claim 18] The pharmaceutical composition of claim 16 wherein said chimeric polypeptide comprises the amino acid sequence of SEQ ID NO:6 or a fragment thereof having antimicrobial activity against *S. aureus*.

[Claim 19] A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a chimeric third polypeptide having at least 85% sequence identity to a fourth polypeptide of the same size, wherein said third polypeptide has antimicrobial activity against *S. aureus* and said fourth polypeptide has the amino acid sequence of SEQ ID NO:4 or a fragment thereof.

[Claim 20] The pharmaceutical composition of claim 19 wherein said third polypeptide has at least 95% sequence identity to said fourth polypeptide.

[Claim 21] A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a chimeric fifth polypeptide having at least 85% sequence identity to a sixth polypeptide of the same size wherein said fifth polypeptide has antimicrobial activity against *S. aureus* and said sixth polypeptide has the amino acid sequence of SEQ ID NO:6 or a fragment thereof.

[Claim 22] The pharmaceutical composition of claim 21 wherein said fifth polypeptide has at least 95% sequence identity to said sixth polypeptide.

[Claim 23] Use of the pharmaceutical composition of any one of claims 15-22 in the manufacture of a medicament for treating a bacterial infection in a subject in need thereof.

[Claim 24] The use of claim 23 wherein said bacterial infection is an infection by a Gram-positive bacteria.

[Claim 25] The use of claim 24 wherein said Gram-positive bacteria is a *Staphylococcus, Micrococcus, Bacillus,* or *Enterococcus*.

[Claim 26] The use of claim 25 wherein said Gram-positive bacteria is a *Staphylococcus*.

[Claim 27] The use of claim 26, wherein said *Staphylococcus* is *Staphylococcus aureus*.

[Claim 28] A method of screening peptides for antibiotic activity, said method comprising screening sequences of contiguous amino acids at least 6 residues in length from SEQ ID NO:4 or SEQ ID NO:6 for antimicrobial activity against liquid cultures of *S. aureus*.

[Claim 29] The method of claim 28 wherein said sequences of contiguous amino acids are at least 10 residues in length.

[Claim 30] A method for recombinantly producing the chimeric polypeptide of any one of claims 1-8, said method comprising: (i) constructing a chimeric nucleic acid encoding said polypeptide; (ii) culturing in a medium a host cell comprising said chimeric nucleic acid, under conditions suitable for the expression of said polypeptide; and (iii) recovery of said polypeptide from said medium.

**Claims**

1. A chimeric polypeptide comprising a protein selected from the group consisting of:

(a) an isolated lysin protein comprising a domain, said domain comprising the 104 C-terminal amino acids of SEQ ID NO:2 and having targeting activity against *S. aureus*;

(b) an isolated lysin protein comprising the amino acid sequence of SEQ ID NO:2, or a fragment thereof having antimicrobial and/or targeting activity against *S. aureus*;

(c) an isolated first protein having at least 85% sequence identity to a second protein of the same size, wherein said first protein has antimicrobial and/or targeting activity against *S. aureus* and said second protein has the amino acid sequence of SEQ ID NO:2, or a fragment thereof; and

(d) an isolated first protein having at least 95% sequence identity to a second protein of the same size, wherein said first protein has antimicrobial and/or targeting activity against *S. aureus* and said second protein has the amino acid sequence of SEQ ID NO:2, or a fragment thereof,

wherein a catalytic domain of said protein is substituted with a catalytic domain of a heterologous lysin protein.

2. The chimeric polypeptide of claim 1, wherein said catalytic domain of said heterologous lysin protein comprises the 182 N-terminal amino acids of SEQ ID NO:4, or the 159 N-terminal amino acids of SEQ ID NO:6, and has antimicrobial activity against *S. aureus*.

3. The chimeric polypeptide of claim 2, wherein said chimeric polypeptide comprises the amino acid sequence of SEQ ID NO:4 or a fragment thereof having antimicrobial activity against *S. aureus*.

4. The chimeric polypeptide of claim 2, wherein said chimeric polypeptide comprises the amino acid sequence of SEQ ID NO:6 or a fragment thereof having antimicrobial activity against *S. aureus*.

5. A chimeric third polypeptide having at least 85% sequence identity to a fourth polypeptide of the same size wherein said third polypeptide has antimicrobial activity against *S. aureus* and fourth polypeptide has the amino acid sequence of SEQ ID NO:4 or a fragment thereof.

6. The chimeric polypeptide of claim 5 wherein said third polypeptide has at least 95% sequence identity to said fourth polypeptide.

7. A chimeric fifth polypeptide having at least 85% sequence identity to a sixth polypeptide of the same size wherein said fifth polypeptide has antimicrobial activity against *S. aureus* and sixth polypeptide has the amino acid sequence of SEQ ID NO:6 or a fragment thereof.

8. The chimeric polypeptide of claim 7 wherein said fifth polypeptide has at least 95% sequence identity to said sixth polypeptide.

9. A nucleic acid comprising a nucleotide sequence encoding the chimeric polypeptide of any one of claims 1-8.

10. The nucleic acid of claim 9 comprising the nucleotide sequence of SEQ ID NO:3 or a fragment thereof.

11. The nucleic acid of claim 9 comprising the nucleotide sequence of SEQ ID NO:5 or a fragment thereof.

12. A vector comprising the nucleic acid of claim 9.

13. The vector of claim 12 that is an expression vector.

14. A host cell comprising the vector of claim 13.

15. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and the chimeric polypeptide of any one of claims 1-8.

16. The pharmaceutical composition of claim 15 wherein said catalytic domain of said

heterologous lysin protein comprises the 182 N-terminal amino acids of SEQ ID NO:4, or the 159 N-terminal amino acids of SEQ ID NO:6, and has antimicrobial activity against S. *aureus*.

17. The pharmaceutical composition of claim 16 wherein said chimeric polypeptide comprises the amino acid sequence of SEQ ID NO:4 or a fragment thereof having antimicrobial activity against *S. aureus*.

18. The pharmaceutical composition of claim 16 wherein said chimeric polypeptide comprises the amino acid sequence of SEQ ID NO:6 or a fragment thereof having antimicrobial activity against *S. aureus*.

19. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a chimeric third polypeptide having at least 85% sequence identity to a fourth polypeptide of the same size wherein said third polypeptide has antimicrobial activity against *S. aureus* and fourth polypeptide has the amino acid sequence of SEQ ID NO:4 or a fragment thereof.

20. The pharmaceutical composition of claim 19 wherein said third polypeptide has at least 95% sequence identity to said fourth polypeptide.

21. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a chimeric fifth polypeptide having at least 85% sequence identity to a sixth polypeptide of the same size wherein said fifth polypeptide has antimicrobial activity against *S. aureus* and sixth polypeptide has the amino acid sequence of SEQ ID NO:6 or a fragment thereof.

22. The pharmaceutical composition of claim 21 wherein said fifth polypeptide has at least 95% sequence identity to said sixth polypeptide.

23. Use of the pharmaceutical composition of any one of claims 15-22 in the manufacture of a medicament for treating a bacterial infection in a subject in need thereof.

24. The use of claim 23 wherein said bacterial infection is an infection by a Gram-positive

bacteria.

25. The use of claim 24 wherein said Gram-positive bacteria is a *Staphylococcus*, *Micrococcus*, *Bacillus*, or *Enterococcus*.

26. The use of claim 25 wherein said Gram-positive bacteria is a *Staphylococcus*.

27. The use of claim 26, wherein said *Staphylococcus* is *Staphylococcus aureus*.

28. A method of screening peptides for antibiotic activity, said method comprising screening sequences of contiguous amino acids at least 6 residues in length from SEQ ID NO:4 or SEQ ID NO:6 for antimicrobial activity against liquid cultures of *S. aureus*.

29. The method of claim 28 wherein said sequences of contiguous amino acids are at least 10 residues in length.

30. A method for recombinantly producing the chimeric polypeptide of any one of claims 1-8, said method comprising: (i) constructing a chimeric nucleic acid encoding said polypeptide; (ii) culturing in a medium a host cell comprising said chimeric nucleic acid, under conditions suitable for the expression of said polypeptide; and (iii) recovery of said polypeptide from said medium.