As such, there is a need in the art for antibiotic compositions that are effective in the treatment of infections by multi-drug resistant bacteria, and the subsequent reduction in the prevalent rates of drug resistance.

Summary of invention

In one embodiment, there is provided a dry powder composition comprising: a polymyxin antibiotic; and at least one further antibiotic selected from the group consisting of an aminoglycoside, an ansamycin, a carbacephem, a carbapenem, a cephalosporin, a glycopeptide, a lincosamide, a lipopeptide, a macrolide, a monobactam, a nitrofuran, a oxazolidonone, a penicillin, a polypeptide, a quinolone, a sulfonamide, a tetracycline, a chloramphenicol, a phosphonic acid antibiotic and a mycobacteria antibiotic.

In another embodiment, there is provided the use of a dry powder composition as described herein in the manufacture of a medicament for treating a subject infected, suspected to be infected, or at risk of infection, with a multidrug resistant bacterium.

In another embodiment, there is provided the use of a dry powder composition as described herein in the manufacture of a medicament for treating a respiratory system infection by a bacterium.

In another embodiment, there is provided the use of a dry powder composition as described herein in the manufacture of a medicament for treating a pulmonary disease or condition.

In another embodiment, there is provided a spray-dried powder composition comprising: a polymyxin antibiotic, and at least a tetracycline antibiotic and an ansamycin antibiotic; or a polymyxin antibiotic, and at least a tetracycline antibiotic and a carbapenum antibiotic.

In another embodiment, there is provided a use of a spray-dried powder composition as disclosed herein in the manufacture of a medicament for treating a subject infected, suspected to be infected, or at risk of infection, with a multidrug resistant bacterium.

In another embodiment, there is provided a use of a spray-dried powder composition as disclosed herein in the manufacture of a medicament for treating a respiratory system infection by a bacterium.

In another embodiment, there is provided a use of a spray-dried powder composition as disclosed herein in the manufacture of a medicament for treating a pulmonary disease or condition.

Brief description of drawings

The invention will be better understood with reference to the detailed description when considered in conjunction with the non-limiting examples and the accompanying drawings, in which:

Fig.1 shows the different mechanisms of action of the antibiotic combinations of the present invention.

Claims

1. A spray-dried powder composition comprising:
a polymyxin antibiotic, and at least a tetracycline antibiotic and an ansamycin antibiotic; or
a polymyxin antibiotic, and at least a tetracycline antibiotic and a carbapenum antibiotic.

2. The spray-dried powder composition of claim 1, wherein the polymyxin is colistin; wherein the carbapenem is selected from the group consisting of ertapenem, doripenem, imipenem and meropenem; wherein the ansamycin is rifampicin; and wherein the tetracycline is selected from the group consisting of demeclocycline, doxycycline, minocycline, oxytetracycline and tetracycline analogues.

3. The spray-dried powder composition of any one of claims 1 or 2, wherein the composition comprises colistin, tigecycline and rifampicin.

4. The spray-dried powder composition of any one of claims 1 or 2, wherein the composition comprises colistin, meropenem and tigecycline.

5. The spray-dried powder composition according to claim 3, wherein the weight ratio of colistin, tigecycline and rifampicin is 5:4:12.

6. The spray-dried powder composition according to claim 4, wherein the weight ratio of colistin, meropenem and tigecycline is 5:4:4.

7. The spray-dried powder composition of any one of claims 1-6, wherein the spray-dried powder has a fine particle fraction of at least 50%.

8. The spray-dried powder composition of claim 7, wherein the particle size is in the range of 1 to10 μm.

9. The spray-dried powder composition of any one of claims 1-8, wherein the composition is formulated to be administered nasally, orally, transdermally, subcutaneously or intravenously; optionally wherein the composition is formulated to be administered by an inhaler, a syringe, an implantable device, a medically inserted device or a biomaterial.

10. The spray-dried powder composition of any one of claims 1-9, wherein the composition comprises one or more components selected from the group consisting of excipients, antibiotics, a pharmaceutically acceptable carrier, a mucolytic agent, an anti-inflammatory agent, and pharmaceutically active ingredients.

11. The use of a spray-dried powder composition of any one of claims 1-10 in the manufacture of a medicament for treating a subject infected, suspected to be infected, or at risk of infection, with a multidrug resistant bacterium.

12. The use of claim 11, wherein the bacterium is a Gram-negative bacteria; optionally wherein the Gram-negative bacteria is selected from the group consisting of, Enterobacteriaceae, Pseudomonas aeruginosa, Acinetobacter baumannii-calcoaceticus complex and Mycobacterium species.

13. The use of a spray-dried powder composition of any one of claims 1-10 in the manufacture of a medicament for treating a respiratory system infection by a bacterium.

14. The use of claim 13, wherein the bacterium is a multidrug resistant bacterium; optionally wherein the multidrug resistant bacterium is selected from the group consisting of Pseudomonas aeruginosa, Acinetobacter baumannii, Klebsiella pneumonia and Escherichia coli.

15. The use of any one of claims 13 or 14, wherein the bacterial respiratory system infection is laryngitis, bronchitis, pneumonia, or sinusitis

16. The use of a spray-dried powder composition of any one of claims 1-10 in the manufacture of a medicament for treating a pulmonary disease or condition.

17. The use of claim 16, wherein the pulmonary disease or condition is cystic fibrosis, bronchiectasis, or chronic obstructive pulmonary disease (COPD).