CLAIMS

1. A pharmaceutical composition comprising a compound, salt, solvate, or stereoisomer of a synthetic c-di-AMP, and a pharmaceutically acceptable carrier.
2. The pharmaceutical composition of claim 1 further comprising at least one or more other compounds enhancing immunogenicity.
3. The pharmaceutical composition of claim 2 wherein the at least one or more other compounds enhancing immunogenicity is selected from the group consisting of mycobacterial DNA, IFN, or combinations thereof.
4. A compound, salt, solvate, or stereoisomer of synthetic c-di-AMP for use in treating a bacterial infection in a subject.
5. Use of a compound, salt, solvate, or stereoisomer of synthetic c-di-AMP in the manufacture of a medicament for treating a bacterial infection in a subject.
6. A compound, salt, solvate, or stereoisomer of c-di-AMP for use in treating TB in a subject.
7. Use of a compound, salt, solvate, or stereoisomer of c-di-AMP in the manufacture of a medicament for treating TB in a subject.
8. A pharmaceutical composition comprising a strain of Mycobacterium comprising an expression vector encoding a di-adenylate cyclase enzyme or a functional part thereof, and a pharmaceutically acceptable carrier.
9. The pharmaceutical composition of claim 8 further comprising at least one or more compounds enhancing immunogenicity.
10. A strain of Mycobacterium comprising an expression vector encoding a di-adenylate cyclase enzyme or a functional part thereof and a pharmaceutically acceptable carrier for use in vaccinating a subject against TB.
11. Use of a strain of Mycobacterium comprising an expression vector encoding a di-adenylate cyclase enzyme or a functional part thereof and a pharmaceutically acceptable carrier in the manufacture of a medicament for vaccinating a subject against TB.
12. A strain of Mycobacterium over-expressing diadenylate cyclase (disA), and at least one or more other compounds enhancing immunogenicity, and a pharmaceutically acceptable carrier for use in vaccinating a subject against TB.
13. Use of a strain of Mycobacterium over-expressing diadenylate cyclase (disA), and at least one or more other compounds enhancing immunogenicity, and a pharmaceutically

acceptable carrier in the manufacture of a medicament for vaccinating a subject against TB.

14. Use of a strain of Mycobacterium comprising an expression vector encoding a di-adenylate cyclase enzyme or a functional part thereof and a pharmaceutically acceptable carrier in the manufacture of a medicament for treating or preventing cancer in a subject.
15. The use of claim 14 wherein the cancer is nonmuscle invasive bladder cancer.
16. Use of a strain of Mycobacterium over-expressing diadenylate cyclase (disA), and at least one or more other compounds enhancing immunogenicity, and a pharmaceutically acceptable carrier in the manufacture of a medicament for treating or preventing cancer in a subject.
17. The pharmaceutical composition of claim 9, the strain of claim 12 or the use of claim 13 or 16 wherein the at least one or more other compounds enhancing immunogenicity is c-di-AMP.
18. The pharmaceutical composition of claim 9, the strain of claim 12 or the use of claim 13 or 16 wherein the at least one or more compounds enhancing immunogenicity is selected from the group consisting of mycobacterial DNA, IFN, or combinations thereof.
19. A strain of Mycobacterium comprising an expression vector encoding a di-adenylate cyclase enzyme.
20. The pharmaceutical composition of claim 8, 9, 17 or 18, the strain of any one of claims 10, 12, 17, 18 or 19, or the use of any one of claims 11, 13, 14, 15, 16, 17 or 18, wherein the strain of Mycobacterium is selected from the group consisting of Mycobacterium tuberculosis, Mycobacterium bovis, or a combination thereof.
21. The pharmaceutical composition, strain or use of claim 20 wherein the strain of Mycobacterium is BCG.
22. The pharmaceutical composition of claim 8, 9, 17 or 18, the strain of any one of claims 10, 12, 17, 18 or 19, or the use of any one of claims 11, 13, 14, 15, 16, 17 or 18, wherein the expression vector is a mycobacterial expression vector.
23. The pharmaceutical composition, strain or use of claim 22 wherein the expression vector comprises the DNA sequence of diadenylate cyclase (disA), or a functional part thereof.
24. The pharmaceutical composition, strain or use of claim 23, wherein the disA is that of M.tuberculosis (Rv3586).
25. The pharmaceutical composition of claim 8, 9, 17 or 18, the strain of any one of claims 10, 12, 17, 18 or 19, or the use of any one of claims 11, 13, 14, 15, 16, 17 or 18, wherein the expression vector comprises a hsp60 promoter.

26. The pharmaceutical composition, strain or use of claim 25 wherein the expression of di-adenylate cyclase enzyme or the functional part thereof is regulated by the hsp60 promoter.