CLAIMS

1. 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, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
2. The pharmaceutical composition of claim 1 further comprising at least one or more compounds enhancing immunogenicity.
3. 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, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
4. 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, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
5. 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, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
6. 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, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
7. 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 nonmuscle invasive bladder cancer in a subject, wherein the strain of Mycobacterium is selected from the group

consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.

8. 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 nonmuscle invasive bladder cancer in a subject, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
9. The pharmaceutical composition of claim 2, the strain of Mycobacterium over-expressing diadenylate cyclase (disA), and at least one or more other compounds enhancing immunogenicity, and a pharmaceutically acceptable carrier of claim 5, or the use of claim 6 or claim 8, wherein the at least one or more other compounds enhancing immunogenicity is c-di-AMP.
10. The pharmaceutical composition of claim 2, the strain of Mycobacterium over-expressing diadenylate cyclase (disA), and at least one or more other compounds enhancing immunogenicity, and a pharmaceutically acceptable carrier of claim 5, or the use of claim 6 or claim 8, wherein the at least one or more compounds enhancing immunogenicity is selected from the group consisting of mycobacterial DNA, IFN, or combinations thereof.
11. A strain of Mycobacterium comprising an expression vector encoding a di-adenylate cyclase enzyme, wherein the strain of Mycobacterium is selected from the group consisting of *Mycobacterium tuberculosis*, *Mycobacterium bovis*, or a combination thereof.
12. The pharmaceutical composition of any one of claims 1, 2, 9 or 10, the strain or use of any one of claims 3 to 11, wherein the strain of Mycobacterium is BCG.
13. The pharmaceutical composition of any one of claims 1, 2, 9 or 10, the strain of claim 3, or the use of claim 4, wherein the expression vector is a mycobacterial expression vector.
14. The pharmaceutical composition, strain or use of claim 13 wherein the expression vector comprises the DNA sequence of diadenylate cyclase (disA), or a functional part thereof.
15. The pharmaceutical composition, strain or use of claim 14, wherein the disA is that of *M.tuberculosis* (Rv3586).
16. The pharmaceutical composition of claim 1, 2, 9 or 10, the strain of claim 3, or the use of claim 4, wherein the expression vector comprises a hsp60 promoter.

17. The pharmaceutical composition, strain or use of claim 16, wherein the expression of di-adenylate cyclase enzyme or the functional part thereof is regulated by the hsp60 promoter.