CLAIMS

What is claimed is:

1. Use of a therapeutically effective amount of an LDN in the manufacture of a medicament for treating a gram-positive bacterial infection in a subject in need thereof, wherein the LDN selectively inhibits the gram-positive bacteria by reducing and/or inhibiting at least one virulence factor.

2. The use of claim 1, wherein the LDN selectively inhibits the gram-positive bacteria and maintains and/or increases healthy bacteria in the gut microbiome.

3. The use of claim 1, wherein the LDN selectively inhibits the gram-positive bacteria via attenuating flagellar gene expression.

4. The use of claim 3, wherein the LDN reduces expression of the flagellar genes *fliA, flgB* and *fliC*.

5. The use of claim 3, wherein the LDN reduces the expression of the flagellar genes by up to around about 50% reduction and/or reduces bacterial motility by up to around about 50%.

6. The use of claim 1, wherein the LDN selectively inhibits the gram-positive bacteria via inhibiting formation of a biofilm.

7. The use of claim 1, wherein the LDN reduces bacterial fitness via modulation of morphology.

8. The use of claim 7, wherein the modulation of morphology inhibits cell division.

9. Use of a therapeutically effective amount of an LDN in the manufacture of a medicament for treating a *C. difficile* infection (CDI) in a subject in need thereof, wherein the

LDN selectively inhibits the gram-positive bacteria by reducing and/or inhibiting at least one virulence factor.

10. The use of claim 9, wherein the LDN selectively inhibits *C. difficile* and maintains and/or increases healthy bacteria in the gut microbiome.

11. The use of claim 9, wherein the *C. difficile* strain has reduced susceptibility to current CDI antibiotics.

12. The use of claim 11, wherein the current CDI antibiotics comprise metronidazole, vancomycin, and/or fidaxomicin.

13. The use of claim 9, wherein the LDN selectively inhibits *C. difficile* via attenuating flagellar gene expression.

14. The use of claim 13, wherein the LDN reduces expression of the flagellar genes *fliA, flgB* and *fliC*.

15. The use of claim 13, wherein the LDN reduces the expression of *C. difficile* flagellar genes by up to around about 50% reduction and/or reduces *C. difficile* motility by up to around about 50%.

16. The use of claim 9, wherein the LDN selectively inhibits *C. difficile* via reducing production of toxin A and/or toxin B.

17. The use of claim 9, wherein the LDN selectively *C. difficile* via inhibiting formation of a biofilm.

18. The use of claim 9, wherein the LDN reduces bacterial fitness via modulation of morphology

19. The use of claim 18, wherein the modulation of morphology inhibits cell division.

20. A method of inhibiting the growth of gram-positive bacteria, the method comprising contacting a medium with an effective amount of an LDN, wherein the LDN inhibits at least one virulence factor.

21. The method of claim 20, wherein the medium is a surface of a medical device and/or hospital supplies.

22. The method of claim 20, wherein the medium is eukaryotic cell cultures.

23. The method of claim 20, wherein the medium is food or cosmetic.

24. Use of an effective amount of a Low G+C Directed Nucleoside (LDN) Analog in the manufacture of a medicament to a subject suffering from dysbiosis of the gut;

wherein the LDN analog simultaneously reduces harmful Gram-positive bacteria which genomes comprise low guanine and cytosine (low G+C) content in the gut microbiome while maintaining and/or increasing beneficial microorganisms in the gut microbiome, and

wherein the LDN selectively inhibits the gram-positive bacteria via attenuating flagellar gene expression and/or the LDN selectively inhibits the gram-positive bacteria via inhibiting formation of a biofilm.

25. The use of claim 24, wherein the LDN reduces expression of the flagellar genes *fliA, flgB* and *fliC*.

26. The use of claim 24, wherein the LDN reduces the expression of the flagellar genes by up to around about 50% reduction and/or reduces bacterial motility by up to around about 50%.

27. The use of claims 24, wherein the LDN reduces bacterial fitness via modulation of morphology.

28. The use of claim 27, wherein the modulation of morphology inhibits cell division.

29. The use of claim 24, wherein the LDN analog is a small-molecule inhibitor of DNA pol IIIC enzyme.

30. The use of claim 29, wherein LDN analog is directed to the DNA pol IIIC of low G+C class bacteria whose genomes contain <50% guanine (G)+cytosine (C).

31. The use of claim 24, wherein the LDN analog selectively targets physiologically harmful species belonging to *Streptococcus*, *Enterococcus*, *Staphylococcus*, *Bacillus*, *Clostridioides*, *Pneumococcus*, *Listeria*, *Mycoplasma*, and/or *Lactobacillus*.

32. The use of claim 24, wherein the beneficial microorganisms comprise Firmicutes and include *Lachnospiraceae* and *Lactobacillaceae*.

33. The use of claim 24, wherein the effective amount of the LDN analog reduces the growth or prevents regrowth of low G+C content Gram-positive pathobionts in the gut microbiome within 30 days.

34. A method of achieving and/or maintaining healthy proportions of gut microflora in an intestinal milieu of a subject, comprising:

administering an effective amount of a compound directed against DNA pol IIIC enzyme in low G+C content Gram-positive pathobionts to the subject;

reducing or eliminating physiologically harmful pathogenic microorganisms belonging to phylum Bacillota; and

increasing and/or maintaining physiologically beneficial microorganisms in the intestinal milieu,

wherein the compound selectively inhibits the gram-positive bacteria via attenuating flagellar gene expression and/or selectively inhibits the gram-positive bacteria via attenuating biofilm formation.

35. The method of claim 34, wherein the compound reduces expression of the flagellar genes *fliA, flgB* and *fliC*.

36. The method of claim 35, wherein the compound reduces the expression of the flagellar genes by up to around about 50% reduction and/or reduces bacterial motility by up to around about 50%.

37. The method of claim 36, wherein the compound reduces bacterial fitness via modulation of morphology.

38. The method of claim 37, wherein the modulation of morphology inhibits cell division.

39. The method of claim 34, wherein the compound is Low G+C Directed Nucleoside (LDN) Analog.

40. The method of claim 34, wherein the physiologically harmful pathogenic microorganisms include species belonging to Firmicutes and/or Bacillales.

41. The method of claim 34, wherein the physiologically beneficial microorganisms in the intestinal milieu comprise members of phylum Actinomycetota and include *Lachnospiraceae* and/or *Lactobacillaceae.*

42. The method of claim 34, wherein the compound is to be administered prophylactically, the subject is healthy, and the compound restores or maintains a mutualistic relationship between the subject and microorganisms in the intestinal milieu.

43. The method of claim 34, wherein the proportions of phyla of bacteria in the subject's gut microbiome are adjusted to a healthier balance compared to the subject's gut microbiome prior to the administration of the compound.

44. The method of claim 34, wherein the physiologically beneficial microorganisms in the intestinal milieu comprise anaerobic Gram-positive bacterium belonging to genus Clostridium and include *C. coccoides*.

45. The method of claim 34, wherein the compound is to be administered until a majority proportion of bacterial species is from the Actinobacteria, Firmicute or Bacteroidetes phylum with a minority from the Proteobacteria phylum.