CLAIMS

1. A composition comprising *E. coli* O1, O2, O4, O15, O16, O18, O25, O75 and O6 antigen polysaccharides, wherein each of the antigen polysaccharides is independently covalently linked to a carrier protein, and wherein the concentration of each of O75 and O25 antigen polysaccharides is independently increased relative to the concentration of each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides, wherein the weight ratio of concentrations of O75 antigen polysaccharide independently to each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides is 1.5:1 to 2.5:1.

2. The composition of claim 1, wherein weight ratio of concentrations of O75 antigen polysaccharide independently to each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides is 2:1.

3. A composition comprising *E. coli* O1, O2, O4, O15, O16, O18, O25, O75 and O6 antigen polysaccharides, wherein each of the antigen polysaccharides is independently covalently linked to a carrier protein, and wherein the weight ratio of concentrations of O75 antigen polysaccharide to O1, O2, and/or O6 antigen polysaccharide is 1.5:1 to 4:1, preferably 2:1.

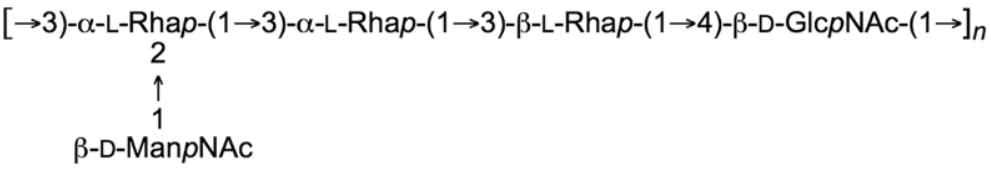
4. The composition of claim 3, wherein the weight ratio of concentrations of O75 antigen polysaccharide to O4, O15, O16 and/or O18 antigen polysaccharide is 1.5:1 to 4:1, preferably 2:1.

5. The composition of any one of claims 1-4, wherein the weight ratio of concentrations of O75 antigen polysaccharide to O25 antigen polysaccharide in the composition is 1:1.

6. The composition of any one of claims 1-5, wherein the weight ratio of concentrations of the *E. coli* antigen polysaccharides O1:O2:O4:O6:O15:O16:O18:O25:O75 is 1:1:1:1:1:1:1:2:2.

7. The composition of any one of claims 1-6, wherein the O1 antigen is O1A, the O4 is glucosylated, the O6 antigen is O6A, the O18 antigen is O18A, and the O25 antigen is O25B, wherein:

(i) the *E. coli* O1 antigen polysaccharide comprises the structure of Formula (O1A):



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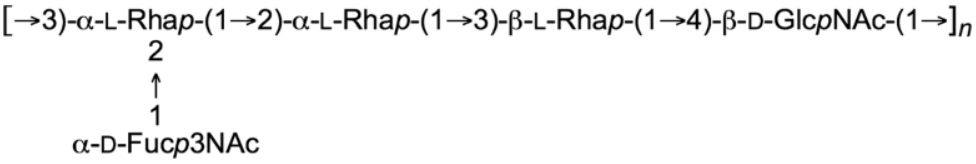
(ii) the *E. coli* O2 antigen polysaccharide comprises the structure of Formula (O2):



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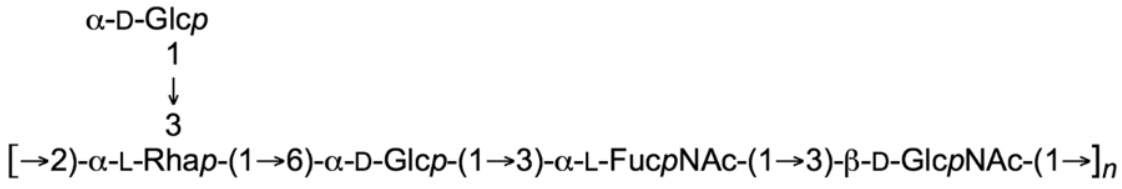
(iii) the *E. coli* O4 antigen polysaccharide comprises the structure of Formula (O4-Glc+):



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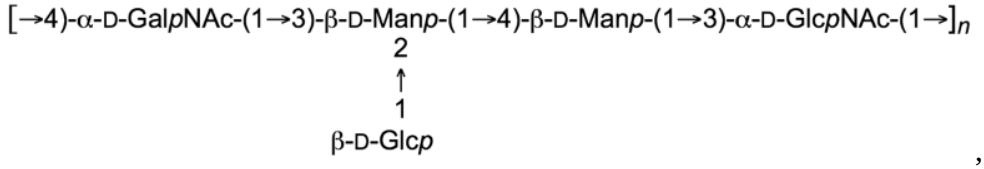
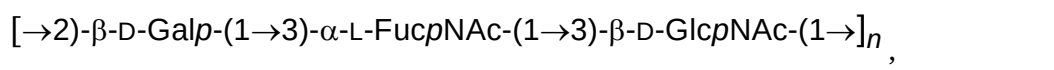
(iv) the *E. coli* O6 antigen polysaccharide comprises the structure of Formula (O6A):



,

(v) the *E. coli* O15 antigen polysaccharide comprises the structure of Formula (O15):



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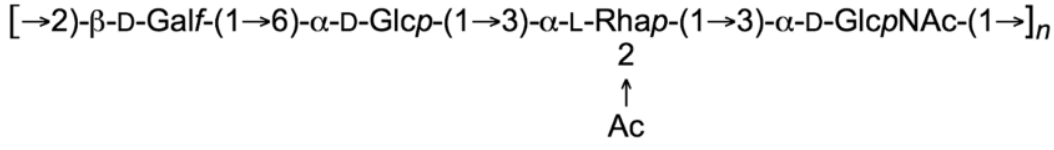
(vi) the *E. coli* O16 antigen polysaccharide comprises the structure of Formula (O16):



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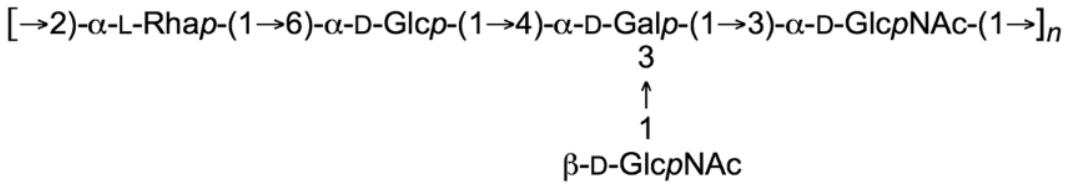
(vii) the *E. coli* O18 antigen polysaccharide comprises the structure of Formula (O18A):



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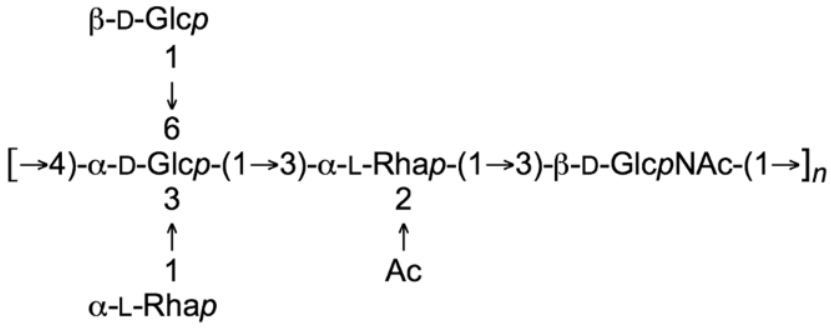
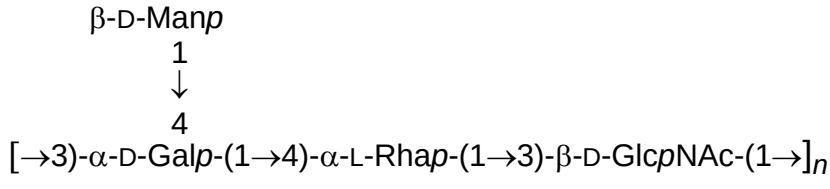
(viii) the *E. coli* O25 antigen polysaccharide comprises the structure of Formula (O25B):



, and

(ix) the *E. coli* O75 antigen polysaccharide comprises the structure of Formula (O75):



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wherein each n is independently an integer of 1 to 100, preferably of 3 to 50, for example 5 to 40, preferably of 5 to 30, for example 7 to 25, for example 10 to 20.

8. The composition of any one of claims 1-7, wherein the concentration of the O75 antigen polysaccharide is from 8 to 64 µg/mL, preferably 8 to 50 µg/mL, preferably 12 to 40 µg/mL, preferably 16 to 32 µg/mL, preferably 28 to 36 µg/mL, preferably 32 µg/mL.

9. The composition of any one of claims 1-8, wherein the *E. coli* O antigen polysaccharides present in the composition consist of O1, O2, O4, O15, O16, O18, O25, O75 and O6.

10. The composition of any one of claims 1-8, further comprising at least one additional *E. coli* antigen polysaccharide covalently linked to a carrier protein, preferably wherein the at least one additional *E. coli* antigen polysaccharide comprises O8 antigen polysaccharide with Formula (O8):

$$\alpha\text{-D-Man}p3\text{Me-}(1\rightarrow[3)\text{-}\beta\text{-D-Man}p\text{-}(1\rightarrow2)\text{-}\alpha\text{-D-Man}p\text{-}(1\rightarrow2)\text{-}\alpha\text{-D-Man}p\text{-}(1\rightarrow]_n,$$

wherein n is an integer of 1 to 100, preferably of 3 to 50, for example 5 to 40, preferably of 5 to 30, for example 7 to 25, for example 10 to 20.

11. The composition of any one of claims 1-10, wherein the carrier protein is detoxified exotoxin A of *Pseudomonas aeruginosa* (EPA) or CRM_{197}, preferably EPA, preferably wherein the carrier protein comprises 1 to 20, such as 1 to 10, or 2 to 4, glycosylation consensus sequences having the amino acid sequence of SEQ ID NO: 1, such as the consensus sequences having the amino acid sequence of SEQ ID NO: 2, more preferably the carrier protein comprises four of the glycosylation consensus sequences, most preferably each carrier protein is EPA comprising the amino acid sequence of SEQ ID NO: 3.

12. The composition of any one of claims 1-10, wherein the *E. coli* antigen polysaccharides are covalently linked to the carrier protein by bioconjugation or by chemical conjugation, preferably the *E. coli* antigen polysaccharides are covalently linked to the carrier protein by bioconjugation, preferably the polysaccharide is covalently linked to an Asn residue in a glycosylation site in the carrier protein.

13. Use of the composition of any one of claims 1-12 in the manufacture of a medicament for inducing an immune response to *E. coli*, preferably extra-intestinal pathogenic *E. coli* (ExPEC), in a subject, wherein an effective amount of the composition is to be administered to the subject.

14. Use of an effective amount of each of *E.coli* O1, O2, O4, O15, O16, O18, O25, O75 and O6 antigen polysaccharides in the manufacture of a medicament for inducing an immune response to *E. coli*, preferably extra-intestinal pathogenic *E. coli* (ExPEC), in a subject, wherein an effective amount of the *E.coli* O1, O2, O4, O15, O16, O18, O25, O75 and O6 antigen polysaccharides is to be administered to the subject, wherein each of the antigen polysaccharides is independently covalently linked to a carrier protein, wherein the effective

amount of each of O75 and O25 antigen polysaccharides is independently increased relative to each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides, wherein:

a) the effective amount of O75 antigen polysaccharide is to be administered at a weight ratio of independently 1.5:1 to 2.5:1, preferably 2:1, to each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides; or

b) the effective amount of O75 antigen polysaccharide is to be administered at a weight ratio of independently 1.5:1 to 4:1, preferably 2:1, to O1, O2, and/or O6 antigen polysaccharide, further wherein the effective amount of O75 antigen polysaccharide is to be administered at a weight ratio of 1:1 to O25 antigen polysaccharide.

15. The use of claim 13 or claim 14, wherein the immune response limits the severity of or prevents an invasive ExPEC disease in the subject, preferably wherein the invasive ExPEC disease comprises sepsis and/or bacteremia.

16. The use of claim 14 or claim 15, wherein the O1 antigen is O1A, the O4 is glucosylated, the O6 antigen is O6A, the O18 antigen is O18A, and the O25 antigen is O25B,
preferably wherein the O1A, O2, glucosylated O4, O6A, O15, O16, O18A, O25B, and O75 antigen polysaccharides comprise the structures of Formulas (O1A), (O2), (O4-Glc+), (O6A), (O15), (O16), (O18A), (O25B), and (O75), respectively, as shown in Table 1,
wherein each n is independently an integer of 1 to 100, preferably of 3 to 50, for example 5 to 40, preferably of 5 to 30, for example 7 to 25, for example 10 to 20,
wherein the weight ratio of O75 antigen polysaccharide to O6 antigen polysaccharide is 1.5:1 to 4:1, more preferably 2:1.

17. The use of any one of claims 14-16, wherein the *E. coli* O antigen polysaccharides to be administered to the subject:

a) consist of O1, O2, O4, O15, O16, O18, O25, O75 and O6; or

b) further comprise from 1 to 15 additional *E. coli* O antigen polysaccharides, each independently covalently linked to a carrier protein.

18. The use of any one of claims 13-17, wherein the subject is a human having or at risk of having an *E. coli* (preferably ExPEC) infection, preferably an invasive ExPEC disease.

19. The use of any one of claims 13-18, wherein 8-16 µg, preferably 16 µg, of the O75 antigen polysaccharide is to be administered per administration.

20. The use of any one of claims 13-19, wherein the effective amount of the *E. coli* antigen polysaccharides of O1:O2:O4:O6:O15:O16:O18:O25:O75 is to be administered at a weight ratio of 1:1:1:1:1:1:1:2:2.

21. The composition of any one of claims 1-12 for use in inducing an immune response to *E. coli*, preferably extra-intestinal pathogenic *E. coli* (ExPEC), in a subject, wherein an effective amount of the composition is to be administered to the subject.

22. An effective amount of each of *E.coli* O1, O2, O4, O15, O16, O18, O25, O75 and O6 antigen polysaccharides for use in inducing an immune response to *E. coli*, preferably extra-intestinal pathogenic *E. coli* (ExPEC), in a subject, wherein each of the antigen polysaccharides is independently covalently linked to a carrier protein, wherein the effective amount of each of O75 and O25 antigen polysaccharides is independently increased relative to each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides, wherein:

    a) the effective amount of O75 antigen polysaccharide is to be administered at a weight ratio of independently 1.5:1 to 2.5:1, preferably 2:1, to each of O1, O2, O4, O15, O16, O18 and O6 antigen polysaccharides; or

    b) the effective amount of O75 antigen polysaccharide is to be administered at a weight ratio of independently 1.5:1 to 4:1, preferably 2:1, to O1, O2, and/or O6 antigen polysaccharide, further wherein the effective amount of O75 antigen polysaccharide is to be administered at a weight ratio of 1:1 to O25 antigen polysaccharide

, wherein an effective amount of the *E.coli* O1, O2, O4, O15, O16, O18, O25, O75 and O6 antigen polysaccharides is to be administered to the subject.