We claim:

1. A tetanus toxin protein variant, comprising the segment C of the tetanus toxin protein and the partial segment of the translocation region of the tetanus toxin protein.

2. The tetanus toxin protein variant according to claim 1, wherein the partial segment of the translocation region comprises the T cell epitope P2 of the translocation region of the tetanus toxin protein.

3. The tetanus toxin protein variant according to ~~any one of claims~~claim 1~~-2~~, wherein the partial segment of the translocation region comprises amino acids 829-864 of the tetanus toxin protein.

4. The tetanus toxin protein variant according to ~~any one of claims~~claim 1~~-3~~, wherein the partial segment of the translocation region comprises the amino acid sequence shown in any one of SEQ ID NO: 7-8.

5. The tetanus toxin protein variant according to ~~any one of claims~~claim 1~~-4~~, wherein the segment C of the tetanus toxin protein comprises the amino acid sequence shown in SEQ ID NO:3.

6. The tetanus toxin protein variant according to ~~any one of claims~~claim 1~~-5~~, comprising the amino acid sequence shown in any one of SEQ ID NO: 1-2.

7. A polysaccharide protein conjugate comprising a polysaccharide from Streptococcus pneumoniae and a truncated tetanus toxin protein ~~(TTD)~~.

~~8. The polysaccharide protein conjugate according to claim 7, wherein the polysaccharide is derived from Streptococcus pneumoniae capsular polysaccharide.~~

~~9. The polysaccharide protein conjugate according to any one of claims 7-8, wherein the polysaccharide has more than one serotype of Streptococcus pneumoniae.~~

~~10~~8. The polysaccharide protein conjugate according to ~~any one of claims~~claim 7-~~9~~, wherein the polysaccharide is selected from any one or more serotype of the group of Streptococcus pneumoniae serotype consisting of: 1, 2, 3, 4, 5, 6A , 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19A, 19F, 20, 22F, 23F, and 33F.

~~11~~9. The polysaccharide protein conjugate according to ~~any one of claims~~claim 7-~~10~~, wherein the truncated tetanus toxin protein comprises a segment C of the tetanus toxin protein, or comprises a segment C of the tetanus toxin protein and a

partial segment of the translocation region of the tetanus toxin protein.

~~12. The polysaccharide protein conjugate according to any one of claims 7-11, wherein the truncated tetanus toxin protein comprises the segment C of the tetanus toxin protein, wherein the polysaccharide selected from any serotype of the group of Streptococcus pneumoniae serotype consisting of: 1, 3, 5, 6A, 6B, 7F, 10A, 12F, 15B, 19A, 19F, and 33F.~~

~~13~~10. The polysaccharide protein conjugate according to ~~any one of claims~~claim 7-~~12~~, wherein the segment C of the tetanus toxin protein comprises the amino acid sequence shown in SEQ ID NO:3.

~~14. The polysaccharide protein conjugate according to any one of claims 7-13, wherein the truncated tetanus toxin protein comprises the segment C of the tetanus toxin protein and a partial segment of the translocation region of the tetanus toxin protein.~~

~~15. The polysaccharide protein conjugate according to claim 14, wherein the partial segment of the translocation region comprises the universal T cell epitope P2 of the translocation region of the tetanus toxin protein.~~

~~16. The polysaccharide protein conjugate according to any one of claims 14-15, wherein the partial segment of the translocation region comprises amino acids 829-864 of the tetanus toxin protein.~~

~~17. The polysaccharide protein conjugate according to any one of claims 14-16, wherein the partial segment of the translocation region comprises the amino acid sequence shown in any one of SEQ ID NO: 7-8.~~

~~18~~11. The polysaccharide protein conjugate according to ~~any one of claims~~claim 7-~~17~~, wherein the truncated tetanus toxin protein comprises the amino acid sequence shown in SEQ ID NO:1-3.

~~19~~12. The polysaccharide protein conjugate according to ~~any one of claims~~claim 7-~~18~~, wherein the mass ratio of the polysaccharide to the truncated tetanus toxin protein is 0.4-2.5.

~~20. The polysaccharide protein conjugate according to any one of claims 10-19, wherein the mass ratio of the Streptococcus pneumoniae serotype 1 polysaccharide to the truncated protein is 0.4-2.5.~~

~~21. The polysaccharide protein conjugate according to any one of claims 10-20, wherein the mass ratio of the Streptococcus pneumoniae serotype 3 polysaccharide to the truncated protein is 0.4-2.5.~~

~~22. The polysaccharide protein conjugate according to any one of claims 10-21, wherein the mass ratio of the Streptococcus pneumoniae serotype 5 polysaccharide to the truncated protein is 0.4-2.5.~~

~~23. The polysaccharide protein conjugate according to any one of claims 10-22, wherein the mass ratio of the Streptococcus pneumoniae serotype 6A polysaccharide to the truncated protein is 0.4-2.5.~~

~~24. The polysaccharide protein conjugate according to any one of claims 10-23, wherein the mass ratio of the Streptococcus pneumoniae serotype 6B polysaccharide to the truncated protein is 0.4-2.5.~~

~~25. The polysaccharide protein conjugate according to any one of claims 10-24, wherein the mass ratio of the Streptococcus pneumoniae serotype 7F polysaccharide to the truncated protein is 0.4-2.5.~~

~~26. The polysaccharide protein conjugate according to any one of claims 10-25, wherein the mass ratio of the Streptococcus pneumoniae serotype 10A polysaccharide to the truncated protein is 0.4-2.5.~~

~~27. The polysaccharide protein conjugate according to any one of claims 10-26, wherein the mass ratio of the Streptococcus pneumoniae serotype 12F polysaccharide to the truncated protein is 0.4-2.5.~~

~~28. The polysaccharide protein conjugate according to any one of claims 10-27, wherein the mass ratio of the Streptococcus pneumoniae serotype 15B polysaccharide to the truncated protein is 0.4-2.5.~~

~~29. The polysaccharide protein conjugate according to any one of claims 10-28, wherein the mass ratio of the Streptococcus pneumoniae serotype 19A polysaccharide to the truncated protein is 0.4-2.5.~~

~~30. The polysaccharide protein conjugate according to any one of claims 10-29, wherein the mass ratio of the Streptococcus pneumoniae serotype 19F polysaccharide to the truncated protein is 0.4-2.5.~~

~~31. The polysaccharide protein conjugate according to any one of claims 10-30, wherein the mass ratio of the Streptococcus pneumoniae serotype 33F polysaccharide to the truncated protein is 0.4-2.5.~~

~~32. The polysaccharide protein conjugate according to any one of claims 7-31, wherein the polysaccharide and the protein variant can be conjugated by a conjugation method.~~

~~33. The polysaccharide protein conjugate according to claim 32, wherein the conjugation method comprises any one of the following methods: hydrogen bromide method, CDAP method, reducing amine method.~~

~~34~~13. A method for improving immunogenicity, comprising the step of: providing a polysaccharide protein conjugate according to any one of claims 7-12 ~~comprising the polysaccharide from Streptococcus pneumoniae and the truncated tetanus toxin protein~~.

~~35. The method according to claim 34, wherein the polysaccharide is derived from Streptococcus pneumoniae capsular polysaccharide.~~

~~36. The method according to any one of claims 34-35, wherein the polysaccharide has more than one serotype of Streptococcus pneumoniae.~~

~~37. The polysaccharide protein conjugate according to any one of claims 34-36, wherein the polysaccharide is any serotype of Streptococcus pneumoniae selected from the group consisting of: 1, 2, 3, 4, 5, 6A , 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19A, 19F, 20, 22F, 23F, and 33F.~~

~~38. The polysaccharide protein conjugate according to any one of claims 34-37, wherein the truncated tetanus toxin protein comprises a segment C of the tetanus toxin protein.~~

~~39. The method according to claims 34-38, wherein the truncated tetanus toxin protein comprises the segment C of the tetanus toxin protein, wherein the polysaccharide is any serotype of Streptococcus pneumoniae selected from the group consisting of: 1, 3, 5, 6A, 6B, 7F, 10A, 12F, 15B, 19A, 19F, and 33F.~~

~~40. The method according to any one of claims 38-39, wherein the segment C of the tetanus toxin protein comprises the amino acid sequence shown in SEQ ID NO:3.~~

41. The method according to any one of claims 34-40, wherein the truncated tetanus toxin protein comprises a segment C of the tetanus toxin protein and a partial segment of the translocation region of the tetanus toxin protein.

42. The method according to claim 41, wherein the partial segment of the translocation region comprises the universal T cell epitope P2 of the translocation region of the tetanus toxin protein.

43. The method according to any one of claims 41-42, wherein the partial segment of the translocation region comprises amino acids 829-864 of the tetanus toxin protein.

44. The method according to any one of claims 34-43, wherein the truncated tetanus toxin protein comprises the amino acid sequence shown in SEQ ID NO:1-3.

45. The method according to any one of claims 34-44, wherein the mass ratio of the Streptococcus pneumoniae polysaccharide to the truncated tetanus toxin protein is 0.4-2.5.

46. The method according to any one of claims 37-45, wherein the mass ratio of the Streptococcus pneumoniae serotype 1 polysaccharide to the truncated protein is 0.4-2.5.

47. The method according to any one of claims 37-46, wherein the mass ratio of the Streptococcus pneumoniae serotype 3 polysaccharide to the truncated protein is 0.4-2.5.

48. The method according to any one of claims 37-47, wherein the mass ratio of the Streptococcus pneumoniae serotype 5 polysaccharide to the truncated protein is 0.4-2.5.

49. The method according to any one of claims 37-48, wherein the mass ratio of the Streptococcus pneumoniae serotype 6A polysaccharide to the truncated protein is 0.4-2.5.

50. The method according to any one of claims 37-49, wherein the mass ratio of the Streptococcus pneumoniae serotype 6B polysaccharide to the truncated protein is 0.4-2.5.

51. The method according to any one of claims 37-50, wherein the mass ratio of the

~~Streptococcus pneumoniae serotype 7F polysaccharide to the truncated protein is 0.4-2.5.~~

~~52. The method according to any one of claims 37-51, wherein the mass ratio of the Streptococcus pneumoniae serotype 10A polysaccharide to the truncated protein is 0.4-2.5.~~

~~53. The method according to any one of claims 37-52, wherein the mass ratio of the Streptococcus pneumoniae serotype 12F polysaccharide to the truncated protein is 0.4-2.5.~~

~~54. The method according to any one of claims 37-53, wherein the mass ratio of the Streptococcus pneumoniae serotype 15B polysaccharide to the truncated protein is 0.4-2.5.~~

~~55. The method according to any one of claims 37-54, wherein the mass ratio of the Streptococcus pneumoniae serotype 19A polysaccharide to the truncated protein is 0.4-2.5.~~

~~56. The method according to any one of claims 37-55, wherein the mass ratio of the Streptococcus pneumoniae serotype 19F polysaccharide to the truncated protein is 0.4-2.5.~~

~~57. The method according to any one of claims 37-56, wherein the mass ratio of the Streptococcus pneumoniae serotype 33F polysaccharide to the truncated protein is 0.4-2.5.~~

~~58. The method according to any one of claims 34-57, wherein the method comprises conjugating the polysaccharide and the protein variant by a conjugation method.~~

~~59. The method according to claim 58, wherein the conjugation method comprises any one of the following methods: hydrogen bromide method, CDAP method, reductive amination method.~~

~~60. The method according to any one of claims 34-59, wherein the improving the immunogenicity of the bacterial polysaccharide comprises that the polysaccharide protein conjugate has a higher immunogenicity than the polysaccharide-CRM197 conjugate.~~

~~61. The method according to any one of claims 34-60, wherein the higher~~

~~immunogenicity is detected after an animal immunization experiment.~~

~~62. The method according to claim 61, wherein the animal immunization experiment comprises the following steps: preparing the polysaccharide protein conjugate and adjuvant according to any of claims 7-33 into an immune antigen.~~

~~63. The method according to claim 62, wherein the injection method of the immune antigen comprises intraperitoneal injection, subcutaneous injection, intramuscular injection and/or intravenous injection.~~

~~64. The method according to any one of claims 61-63, wherein the animal immunization experiment comprises the following steps: detecting the antibodies in the sera of the obtained immunized animals by ELISA.~~

~~65. The method according to any one of claims 61-64, wherein the animal immunization experiment comprises the following steps: performing an opsonophagocytic killing assay on the serum of the obtained immunized animals.~~

~~66. The method of any one of claims 61-65, wherein the animal comprises a mouse, a rat and/or a rabbit.~~

~~67. The method according to any one of claims 62-66, wherein the adjuvant comprises aluminum hydroxide, aluminum phosphate and/or Freund's adjuvant and the like.~~

~~68~~14. A nucleic acid molecule, comprising a sequence encoding the tetanus toxin protein variant of any one of claims 1-6.

~~69. The nucleic acid molecule according to claim 68, comprising the nucleotide sequences shown in SEQ ID NO: 4-6.~~

15~~70~~. A vector, comprising the nucleic acid molecule of ~~any one of claims~~claim 14~~68-69~~.

~~71~~16. A cell, comprising the nucleic acid molecule of ~~any one of claims~~claim ~~68-69~~14 or the vector of claim ~~70~~15.

~~72. A carrier protein, comprising the tetanus toxin protein variant according to any one of claims 1-6.~~

~~73~~17. A pharmaceutical composition, comprising the polysaccharide protein conjugate of any one of claims 7-~~33~~ 12 and optionally a pharmaceutically acceptable adjuvant.

~~74. Use of the tetanus toxin protein variant according to any one of claims 1-6 for the preparation of a medicament.~~

~~75. Use of the polysaccharide conjugate according to any one of claims 7-33 for the preparation of a medicament.~~

~~76. The use according to any one of claims 74-75, wherein the medicament is used for preventing and/or treating Streptococcus pneumoniae disease.~~

~~77. The use according to claim 76, wherein the Streptococcus pneumoniae disease comprises pneumonia, sepsis, meningitis and/or otitis media.~~

~~78~~18. A vaccine, comprising the polysaccharide protein conjugate of any one of claims 7-~~33~~12, the pharmaceutical composition of claim ~~73~~ 17 and~~/or~~ optionally a pharmaceutically acceptable adjuvant.

19. The polysaccharide protein conjugate of any one of claims 7-12, the nucleic acid molecule of claim 14, the vector of claim 15, the cell of claim 16, the pharmaceutical composition of claim 17 and/or the vaccine of claim 18 for use in the prevention of disease caused by Streptococcus pneumoniae infection in a subject.

~~79~~19. ~~A method for preventing disease caused by Streptococcus pneumoniae infection, comprising administering the polysaccharide protein conjugate of any one of claims 7-33~~12, ~~the nucleic acid molecule of any one of claims 68-69~~14, ~~the vector of claim 70~~15, ~~the cell of claim 71~~16, ~~the carrier protein of claim 72, the pharmaceutical composition of claim 73~~ 17 ~~and/or the vaccine of claim 78~~ 18 ~~to a subject in need.~~

20. Use of the polysaccharide protein conjugate of any one of claims 7-12, the nucleic acid molecule of claim 14, the vector of claim 15, the cell of claim 16, the pharmaceutical composition of claim 17 and/or the vaccine of claim 18 in the manufacture of a medicament for the prevention of disease caused by Streptococcus pneumoniae infection in a subject.

~~80. The method of claim 79, wherein the Streptococcus pneumoniae disease comprises pneumonia, sepsis, meningitis and/or otitis media.~~

~~81. Use of the polysaccharide conjugate according to any one of claims 7-33 as an~~

~~antigen for the preparation of a antibody.~~

~~82. The use according to claim 81, wherein the antibody is used for diagnostic typing of an isolated bacterial strain.~~

~~83~~20~~2~~1. A kit, comprising the polysaccharide protein conjugate of any one of claims 7-~~33~~11.

~~84. The kit according to claim 83, wherein the kit is used for the diagnostic typing of an isolated bacterial strain.~~