CLAIMS

~~1. A mutant v3 or v2 fHbp which is:~~

~~(A) a polypeptide comprising a mutant fHbp v2 amino acid sequence, wherein: (a) the amino acid sequence has at least 80% sequence identity to SEQ ID NO: 5 and/or comprises a fragment of SEQ ID NO: 5 which is at least 7 amino acids long and contains S32 from SEQ ID NO: 5; but (b) the amino acid sequence differs from SEQ ID NO: 5 at residue S32, provided that if the mutant fHbp v2 amino acid sequence includes a substitution at residue 32 alone, either this substitution is not with alanine or at least one of the following residues is substituted: V33, L39, L41, F69, V100, I113, F122, L123, V124, S125, G126, L127, G128, S151, H239, and/or E240;~~

~~or~~

~~(B) a polypeptide comprising a mutant fHbp v3 amino acid sequence, wherein: (a) the amino acid sequence has at least 80% sequence identity to SEQ ID NO: 17 and/or comprises a fragment of SEQ ID NO: 17 which is at least 7 amino acids long and contains S32 from SEQ ID NO: 17; but (b) the amino acid sequence differs from SEQ ID NO: 17 at residue S32, provided that if the mutant fHbp v3 amino acid sequence includes a substitution at residue 32 alone, either this substitution is not with alanine or at least one of the following residues is substituted: I33, L39, L41, F72, V103, T116, F125, L126, V127, S128, G129, L130, G131, S154, H242, and/or E243.~~

~~2. The polypeptide of claim 1, wherein: (A) the amino acid sequence differs from SEQ ID NO: 5 by substitution at S32 and one or more of V33, L39, L41, F69, V100, I113, F122, L123, V124, S125, G126, L127, G128, S151, H239, and/or E240; for instance, where the substitution(s) are selected from the group consisting of: S32V; V33C; L39C; L41C; F69C; V100T; I113S; F122C; L123R; V124I; S125G or S125T; G126D; L127I; G128A; S151C; H239R; E240H; or (B) the amino acid sequence differs from SEQ ID NO: 17 by substitution at S32 and one or more of I33, L39, L41, F72, V103, T116, F125, L126, V127, S128, G129, L130, G131, S154, H242, and/or E243; for instance, where the substitution(s) are selected from the group consisting of: S32V; I33C; L39C; L41C; F72C; V103T; T116S; F125C; L126R; V127I; S128G or S128T; G129D; L130I; G131A; S154C; H242R; and E243H.~~

~~3. The polypeptide of claim 1(A), comprising substitutions at multiple residues, wherein the multiple residues are selected from groups 2B, 2I, 2J or 2O as follows:~~

~~2B: residues 32 and 123;~~

~~2I: residues 32 and 125;~~

~~2J: residues 32, 123 and 125; or~~

~~2O: residues 32, 123, 124, 125, 126, 127 and 128.~~

4. The polypeptide of claim 3, comprising substitutions S32V and L123R relative to SEQ ID NO: 5; optionally further comprising substitutions V124I, S125G, G126D, L127I, G128A; for instance, comprising SEQ ID NO: 20 or SEQ ID NO: 45 or SEQ ID NO: 58.

5. The polypeptide of claim 1(B), comprising substitutions at multiple residues, wherein the multiple residues are selected from groups 3B, 3I, 3J or 3O as follows:

3B: residues 32 and 126;

3I: residues 32 and 128;

3J: residues 32, 126 and 128; or

3O: residues 32, 126, 127, 128, 129, 130 and 131.

6. The polypeptide of claim 5, comprising substitutions S32V and L126R relative to SEQ ID NO: 17; optionally further comprising substitutions V127I, S128G, G129D, L130I, G131A; for instance, comprising SEQ ID NO: 44 or SEQ ID NO: 61.

7. The polypeptide of any preceding claim, also including one or more further mutation(s) which disrupt(s) the polypeptide's ability to bind to human factor H; for instance, in v2 including a substitution at one or more of residues R73, D203, E210, G228, S121, F122, A192, E194, V199, I200, L201, T213, H215, F219, T231, and E240, or in v3 including a substitution at one or more of residues Q35, I178, L87, A88, V127, V202, E213, T216, H218, T234, V241, E243, and G248.

8. A polypeptide comprising:

- amino acid sequence SEQ ID NO: 45, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 2 (for example, comprising amino acid sequence SEQ ID NO: 45 with 1, 2, or 3 single amino acid substitutions), but not mutated at residue V32 or R123;

- amino acid sequence SEQ ID NO: 44, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 40 (for example, comprising amino acid sequence SEQ ID NO: 44 with 1, 2, or 3 single amino acid substitutions), but not mutated at residue V32 or R126;

- amino acid sequence SEQ ID NO: 58, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 2 (for example, comprising amino acid sequence SEQ ID NO: 58 with 1, 2, or 3 single amino acid substitutions), but not mutated at residue V32;

- amino acid sequence SEQ ID NO: 61, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID

~~NO: 2 (for example, comprising amino acid sequence SEQ ID NO: 61 with 1, 2, or 3 single amino acid substitutions), but not mutated at residue V32;~~

- ~~a fHbp v3 amino acid sequence, wherein the v3 amino acid sequence is identical to a v3 wild-type amino acid sequence except for a mutation at the amino acid position corresponding to Leu 126 of SEQ ID NO: 17, provided that the mutation is not a substitution to alanine (*e.g.* wherein the mutation is a substitution to arginine);~~
- ~~a fHbp v2 amino acid sequence, wherein the v2 amino acid sequence is identical to a v2 wild-type amino acid sequence except for a mutation at the amino acid position corresponding to Leu 123 of SEQ ID NO: 5, provided that the mutation is not a substitution to alanine (*e.g.* wherein the mutation is a substitution to arginine); or~~
- ~~amino acid sequence SEQ ID NO: 47, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to each of: a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 46; a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 4; and a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 40 (for instance, consisting of SEQ ID NO: 48).~~

~~9. A plasmid or other nucleic acid comprising a nucleotide sequence encoding the polypeptide of any of claims 1 to 8.~~

~~10. A host cell transformed with the plasmid of claim 9; for example, wherein the cell is a meningococcal bacterium, such as a meningococcal bacterium having down regulation or knockout of *mltA* and also optionally has down regulation or knockout of: (i) at least one gene involved in rendering the lipid A portion of LPS toxic, particularly of *lpxl1;* and/or (ii) at least one gene involved in the capsular polysaccharide synthesis or export, particularly of *synX* and/or *ctrA*..~~

~~11. Membrane vesicles prepared from the host cell of claim 9, wherein the vesicles include a polypeptide of any one of claims 1 to 8.~~

~~12. An immunogenic composition comprising a polypeptide of any one of claims 1 to 8, or a vesicle of claim 11.~~

~~13. The composition of claim 12, further comprising a second polypeptide that, when administered to a mammal, elicits an antibody response that is bactericidal against meningococcus.~~

~~14. The composition of claim 12 or claim 13, further comprising (i) a conjugated capsular saccharide from *N.meningitidis* serogroup A, C, W135 and/or Y and/or (ii) a conjugated capsular saccharide from *S.pneumoniae*~~

~~15. A method for raising an antibody response in a mammal, comprising administering an immunogenic composition of any of claims 12 to 14.~~

1. A mutant v3 or v2 fHbp which is:

(A) a polypeptide comprising a mutant fHbp v2 amino acid sequence, wherein:

(i) the amino acid sequence has at least 80% sequence identity to SEQ ID NO: 5 and/or comprises a fragment of SEQ ID NO: 5 which is at least 7 amino acids long and includes a residue corresponding to residue 32 from SEQ ID NO: 5; but

(ii) the amino acid sequence differs from SEQ ID NO: 5 at residue 32 by the substitution S32V,

wherein the polypeptide can elicit antibodies which can recognise a wild-type meningococcal polypeptide consisting of SEQ ID NO. 4,

or

(B) a polypeptide comprising a mutant fHbp v3 amino acid sequence, wherein:

(i) the amino acid sequence has at least 80% sequence identity to SEQ ID NO: 17 and/or comprises a fragment of SEQ ID NO: 17 which is at least 7 amino acids long and includes a residue corresponding to residue 32 from SEQ ID NO: 17; but

(ii) the amino acid sequence differs from SEQ ID NO: 17 at residue 32 by the substitution S32V,

wherein the polypeptide can elicit antibodies which can recognise a wild-type meningococcal polypeptide consisting of SEQ ID NO. 40.

2. The polypeptide of claim 1, wherein:

(A) the amino acid sequence further differs from SEQ ID NO: 5 by substitution at one or more of L123, V124, S125, G126, L127 and/or G128; where the substitution(s) are selected from the group consisting of: L123R; V124I; S125G or S125T; G126D; L127I; G128A; or

(B) the amino acid sequence further differs from SEQ ID NO: 17 by substitution at L126, where the substitution is L126R.

3. The polypeptide of any preceding claim, also including one or more further mutation(s) which disrupt(s) the polypeptide's ability to bind to human factor H; for instance, in v2 including a substitution at one or more of residues R73, D203, E210, G228, S121, F122, A192, E194, V199, I200, L201, T213, H215, F219, T231, and E240, or in v3 including a substitution at one or more of residues Q35, 178, L87, A88, V127, V202, E213, T216, H218, T234, V241, E243, and G248.

4. A polypeptide comprising:

i. amino acid sequence SEQ ID NO: 45, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 2 (for example, comprising amino acid sequence SEQ ID NO: 45 with 1, 2, or 3 single amino acid substitutions), but not mutated at residue V32 or R123; and/or

ii. amino acid sequence SEQ ID NO: 44, optionally with 1, 2, 3, 4, or 5 single amino acid substitutions, deletions and/or insertions, wherein the polypeptide can elicit antibodies which bind to a meningococcal fHbp polypeptide consisting of the amino acid sequence of SEQ ID NO: 40 (for example, comprising amino acid sequence SEQ ID NO: 44 with 1, 2, or 3 single amino acid substitutions), but not mutated at residue V32 or R126.

5. The polypeptide according to claim 4 comprising or consisting of the amino acid sequence of SEQ ID NO: 45.

6. The polypeptide according to claim 4 comprising or consisting of the amino acid sequence of SEQ ID NO: 44.

7. A plasmid or other nucleic acid comprising a nucleotide sequence encoding the polypeptide of any of claims 1 to 6.

8. A host cell transformed with the plasmid of claim 7; for example, wherein the cell is a meningococcal bacterium, such as a meningococcal bacterium having down-regulation or knockout of *mltA* and also optionally has down-regulation or knockout of: (i) at least one gene involved in rendering the lipid A portion of LPS toxic, particularly of *IpxI1;* and/or (ii) at least one gene involved in the capsular polysaccharide synthesis or export, particularly of *synX* and/or *ctrA*.

9. Membrane vesicles prepared from the host cell of claim 8, wherein the vesicles include a polypeptide of any one of claims 1 to 6.

10. An immunogenic composition comprising a polypeptide of any one of claims 1 to 6, or a vesicle of claim 9.

11. The composition of claim 10, further comprising a second polypeptide that, when administered to a mammal, elicits an antibody response that is bactericidal against meningococcus.

12. The composition of claim 10 or claim 11, further comprising (i) a conjugated capsular saccharide from *N. meningitidis* serogroup A, C, W135 and/or Y and/or (ii) a conjugated capsular saccharide from *S. pneumoniae*.

13. The immunogenic composition of any of claims 10 to 12 for use in a method for raising an antibody response in a mammal.

14. The composition of any of claims 10 to 12 for use as a medicament.

15. Use of the composition of any of claims 10 to 12 in the manufacture of a medicament for raising an antibody response in a mammal.