

hKd and the cKd of the single domain serum albumin binding protein are between about 1 nM and about 5 nM. In some embodiments, the single domain serum albumin binding protein comprises an amino acid sequence wherein amino acid position 6 of CDR 1 (SEQ ID NO:11) is mutated to lysine, amino acid position 7 of CDR2 (SEQ ID NO: 12) is mutated to threonine, and wherein the hKd and the cKd of the single domain serum albumin binding protein are between about 1 nM and about 5 nM. In some embodiments, the single domain serum albumin binding protein comprises an amino acid sequence wherein amino acid position 6 of CDR 1 (SEQ ID NO:11) is mutated to lysine, amino acid positions 7 and 13 of CDR2 (SEQ ID NO: 12) are mutated to threonine and glutamic acid, respectively, and wherein the hKd and the cKd of the single domain serum albumin binding protein are between about 1 nM and about 5 nM. In some embodiments, the single domain serum albumin binding protein comprises an amino acid sequence wherein amino acid position 6 of CDR1 (SEQ ID NO:11) is mutated to arginine, amino acid position 6 of CDR3 (SEQ ID NO: 12) is mutated to lysine, and wherein the hKd and the cKd of the single domain serum albumin binding protein are between about 5 nM and about 10 nM. In some embodiments, the single domain serum albumin binding protein comprises an amino acid sequence wherein amino acid position 6 of CDR 1 (SEQ ID NO:11) is mutated to lysine, amino acid position 7 of CDR2 (SEQ ID NO: 12) is mutated to arginine, amino acid position 6 of CDR3 (SEQ ID NO: 13) is mutated to valine, and wherein the hKd and the cKd of the single domain serum albumin binding protein are between about 1 nM and about 5 nM. In some embodiments, the single domain serum albumin binding protein comprises an amino acid sequence wherein amino acid position 6 of CDR 1 (SEQ ID NO:11) is mutated to lysine, amino acid positions 7 and 13 of CDR2 (SEQ ID NO: 12) is mutated to arginine and glutamic acid, respectively, and amino acid position 6 of CDR3 (SEQ ID NO: 13) is mutated to valine, and wherein the hKd and the cKd of the single domain serum albumin binding protein are between about 1 nM and about 5 nM.

[0010a] Provided herein in another embodiment is a single domain serum albumin binding protein, comprising complementarity determining regions CDR1, CDR2, and CDR3, wherein

- (a) the amino acid sequence of CDR1 is as set forth in GFTFSRFGMS (SEQ ID NO. 14);
- (b) the amino acid sequence of CDR2 is as set forth in SISGSGSDTLYADSVK (SEQ ID NO. 12); and
- (c) the amino acid sequence of CDR3 is as set forth in GGSLSR (SEQ ID NO. 13).

[0011] Provided herein in another embodiment, a polynucleotide encoding a single domain serum albumin binding protein according to the present disclosure. A further embodiment describes a vector comprising the polynucleotide as disclosed herein. Another embodiment describes a host cell transformed with the vector according to the present disclosure. In one embodiment is provided a pharmaceutical composition comprising (i) a single domain serum albumin binding protein according to the present disclosure, a polynucleotide according to the present disclosure, a vector according to the present disclosure or a host cell according to the present disclosure, and (ii) a pharmaceutically acceptable carrier.

CLAIMS

WHAT IS CLAIMED IS:

1. A single domain serum albumin binding protein, comprising complementarity determining regions CDR1, CDR2, and CDR3, wherein
 - (a) the amino acid sequence of CDR1 is as set forth in GFTFSRFGMS (SEQ ID NO. 14);
 - (b) the amino acid sequence of CDR2 is as set forth in SISGSGSDTLYADSVK (SEQ ID NO. 12); and
 - (c) the amino acid sequence of CDR3 is as set forth in GGSLSR (SEQ ID NO. 13).
2. The single domain serum albumin binding protein of claim 1, wherein said protein comprises the following formula:
$$f1-r1-f2-r2-f3-r3-f4$$
wherein, r1 is SEQ ID NO. 14; r2 is SEQ ID NO. 12; and r3 is SEQ ID NO. 13; and wherein f₁, f₂, f₃ and f₄ are framework residues selected so that said protein is at least eighty percent identical to the amino acid sequence set forth in SEQ ID NO. 10.
3. The single domain serum albumin binding protein of claim 1, wherein said protein has an amino acid sequence set forth as SEQ ID NO. 4.
4. The single domain serum albumin binding protein of any one of claims 1-3, wherein said protein binds to serum albumin selected from human serum albumin, cynomolgus serum albumin, and mouse serum albumin.
5. The single domain serum albumin binding protein of any one of claims 1-4, wherein said protein binds to human serum albumin and cynomolgus serum albumin with comparable binding affinity (K_d).
6. The single domain serum albumin binding protein of any one of claims 1-5, wherein said protein binds to mouse serum albumin with a binding affinity (K_d) that about 1.5 fold to about 20 fold weaker than the binding affinity (K_d) of said protein towards human and cynomolgus serum albumin.
7. The single domain serum albumin binding protein of any one of claims 1-6, wherein said protein binds to human serum albumin with a human K_d (hK_d) between about 1 nM and about 100 nM and to cynomolgus serum albumin with a cynomolgus K_d (cK_d) between 1 nM and 100 nM.

8. The single domain serum albumin binding protein of claim 7, wherein the hKd and cKd are between 1 nM and about 5 nM, or about 5 nM and about 10 nM.
9. The single domain serum albumin binding protein of claim 8, wherein the hKd and cKd are between about 1 nM and about 2 nM, about 2 nM and about 3 nM, about 3 nM and about 4 nM, about 4 nM and about 5 nM, about 5 nM and about 6 nM, about 6 nM and about 7 nM, about 7 nM and about 8 nM, about 8 nM and about 9 nM, or about 9 nM and about 10 nM.
10. The single domain serum albumin binding protein of any one of claims 4-9, wherein the ratio between the hKd and cKd (hKd: cKd) ranges from about 20:1 to about 1: 2.
11. The single domain serum albumin binding protein of any one of claims 1-22, wherein said protein comprises the amino acid sequence set forth as SEQ ID NO. 4, and wherein the hKd and the cKd are between about 1 nM and about 5 nM.
12. The domain serum albumin binding protein any one of claims 1-12, wherein said protein has an elimination half-time of at least 12 hours, at least 20 hours, at least 25 hours, at least 30 hours, at least 35 hours, at least 40 hours, at least 45 hours, at least 50 hours, or at least 100 hours.
13. A polynucleotide encoding a single domain serum albumin binding protein according to any one of claims 1-12.
14. A vector comprising the polynucleotide of claim 13.
15. A host cell transformed with the vector according to claim 14.
16. A pharmaceutical composition comprising (i) a single domain serum albumin binding protein according to any one of claims 1-12, the polynucleotide according to claim 13, the vector according to claim 14 or the host cell according to claim 15, and (ii) a pharmaceutically acceptable carrier.
17. A process for the production of a single domain serum albumin binding protein according to any one of claims 1-12, said process comprising culturing a host transformed or transfected with a vector comprising a nucleic acid sequence encoding a single domain serum albumin binding protein according to any one of claims 1-12 under conditions allowing the expression of the serum albumin binding protein and recovering and purifying the produced protein from the culture.
18. The single domain serum albumin binding protein according to any one of claims 1-12 for use in therapy.
19. Use of the single domain serum albumin binding protein according to any one of claims 1-101 in the manufacture of a medicament for the treatment or amelioration of a proliferative

disease, a tumorous disease, an inflammatory disease, an immunological disorder, an autoimmune disease, an infectious disease, a viral disease, an allergic reaction, a parasitic reaction, a graft-versus-host disease or a host-versus-graft disease, wherein the medicament is to be administered to a subject in need thereof.

20. The use of claim 19, wherein the subject is human.

21. The use of claim 20, wherein the method further comprises administration of an agent in combination with the single domain serum albumin binding protein according to any one of claims 1-12.

22. A multispecific binding protein comprising the single domain serum albumin binding protein according to any one of claims 1-12.

23. An antibody comprising the single domain serum albumin binding protein according to claim 1.

24. A multispecific antibody, a bispecific antibody, an sdAb, a variable heavy domain, a peptide, or a ligand, comprising the single domain serum albumin binding protein according to claim 1.

25. An antibody comprising the single domain serum albumin binding protein according to claim 1, wherein said antibody is a single domain antibody.

26. The single domain antibody of claim 25, wherein said antibody is derived from a heavy chain variable region of IgG.

27. A multispecific binding protein or antibody comprising the single domain serum albumin binding protein according to claim 1 and a CD3 binding domain.

28. The multispecific antibody according to any one of claims 23-27 for use in therapy.

29. Use of the multispecific antibody according to any one of claims 23-27 in the manufacture of a medicament for the treatment or amelioration of a proliferative disease, a tumorous disease, an inflammatory disease, an immunological disorder, an autoimmune disease, an infectious disease, a viral disease, an allergic reaction, a parasitic reaction, a graft-versus-host disease or a host-versus-graft disease, wherein the medicament is to be administered to a subject in need thereof.