CLAIMS:

1. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain binds to domain 1 or 2 of human serum albumin with a K_D of 1 uM or less, and wherein the serum half-life of the polypeptide in the presence of albumin is at least 5-fold greater than the serum half-life of the polypeptide in the absence of serum albumin.

2. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a modified amino acid sequence in one or more of the BC, DE and FG loops relative to the wild-type ^{10}Fn3 domain.

3. The polypeptide of claim 1 or 2, wherein the ^{10}Fn3 domain binds to serum albumin at a pH range of 5.5 to 7.4.

4. The polypeptide any one of claims 1-3, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 200 nM or less at pH 5.5.

5. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain binds to human serum albumin and comprises an amino acid sequence at least 70% identical to SEQ ID NO: 2.

6. The polypeptide of claim 5, wherein the ^{10}Fn3 domain comprises one or more of a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 5, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 6, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 7.

7. The polypeptide of claim 5, wherein the ^{10}Fn3 domain comprises a sequence selected from SEQ ID NO: 8, 12, 16, 20, and 24-44.

8. The polypeptide of any one of claims 5-7, wherein the ^{10}Fn3 domain also binds to one or more of rhesus serum albumin (RhSA), cynomolgous monkey serum albumin (CySA), or murine serum albumin (MuSA).

9. The polypeptide of any one of claims 5-7, wherein the ^{10}Fn3 domain does not cross-react with one or more of RhSA, CySA or MuSA.

10. The polypeptide of any one of claims 5-9, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 1 uM or less.

11. The polypeptide of any one of claims 5-10, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 500 nM or less.

12. The polypeptide of any one of claims 5-11, wherein the ^{10}Fn3 domain binds to domain I or II of HSA.

13. The polypeptide of any one of claims 5-12, wherein the ^{10}Fn3 domain binds to serum albumin at a pH range of 5.5 to 7.4.

14. The polypeptide of any one of claims 5-13, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 200 nM or less at pH 5.5.

15. The polypeptide of any one of claims 5-14, wherein the serum half-life of the polypeptide in the presence of serum albumin is at least 5-fold greater than the serum half-life of the polypeptide in the absence of serum albumin.

16. The polypeptide of any one of claims 5-15, wherein the serum half-life of the polypeptide in the presence of serum albumin is at least 2 hours.

17. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain binds to human serum albumin and comprises a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 5, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 6, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO:7.

18. The polypeptide of claim 17, wherein the ^{10}Fn3 domain also binds to one or more of rhesus serum albumin (RhSA), cynomolgous monkey serum albumin (CySA), or murine serum albumin (MuSA).

19. The polypeptide of claim 17, wherein the ^{10}Fn3 domain does not cross-react with one or more of RhSA, CySA or MuSA.

20. The polypeptide of any one of claims 17-19, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 1 uM or less.

21. The polypeptide of any one of claims 17-20, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 500 nM or less.

22. The polypeptide of any one of claims 17-21, wherein the ^{10}Fn3 domain binds to domain I or II of HSA.

23. The polypeptide of any one of claims 17-22, wherein the ^{10}Fn3 domain binds to serum albumin at a pH range of 5.5 to 7.4.

24. The polypeptide of any one of claims 17-23, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 200 nM or less at pH 5.5.

25. The polypeptide of any one of claims 17-24, wherein the serum half-life of the polypeptide in the presence of serum albumin is at least 5-fold greater than the serum half-life of the polypeptide in the absence of serum albumin.

26. The polypeptide of any one of claims 17-25, wherein the serum half-life of the polypeptide in the presence of serum albumin is at least 2 hours.

27. A fusion polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain and a heterologous protein, wherein the ^{10}Fn3 domain binds to human serum albumin with a K_D of 1 uM or less.

28. The fusion polypeptide of claim 27, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 70% identical to SEQ ID NO: 4.

29. The fusion polypeptide of claim 27 or 28, wherein the ^{10}Fn3 domain comprises an amino acid sequence selected from SEQ ID NO: 8, 12, 16, 20, and 24-44.

30. The fusion polypeptide of claim 27 or 28, wherein the ^{10}Fn3 domain comprises a BC loop having the amino acid sequence set forth in SEQ ID NO: 5, a DE loop having the amino acid sequence set forth in SEQ ID NO: 6, and an FG loop having the amino acid sequence set forth in SEQ ID NO: 7.

31. The fusion polypeptide of any one of claims 27-30, wherein the heterologous protein is selected from fibroblast growth factor 21 (FGF21), insulin, insulin receptor peptide, (bone morphogenetic protein 9 (BMP-9), amylin, peptide YY (PYY_{3-36}), pancreatic polypeptide (PP), interleukin 21 (IL-21), glucagon-like peptide 1 (GLP-1), Plectasin, Progranulin, Atstrrin, Osteocalcin (OCN), Apelin, or a polypeptide comprising a ^{10}Fn3 domain.

32. The fusion polpeptide of claim 31, wherein the heterologous protein is FGF21.

33. The fusion polypeptide of claim 32, wherein the heterologous protein comprises the sequence set forth in SEQ ID NO: 118.

34. The fusion polypeptide of any one of claims 27-30, wherein the heterologous protein comprises a second ^{10}Fn3 domain that binds to a target protein other than HSA.

35. The fusion polypeptide of claim 34, further comprising a third ^{10}Fn3 domain that binds to a target protein.

36. The fusion polypeptide of claim 35, wherein the third ^{10}Fn3 domain binds to the same target as the second ^{10}Fn3 domain.

37. The fusion polypeptide of claim 35, wherein the third ^{10}Fn3 domain binds to a different target than the first and second ^{10}Fn3 domains.

38. The fusion polypeptide of any one of claims 27-37, wherein the ^{10}Fn3 domain also binds to one or more of rhesus serum albumin (RhSA), cynomolgous monkey serum albumin (CySA), or murine serum albumin (MuSA).

39. The polypeptide of any one of claims 27-37, wherein the ^{10}Fn3 domain does not cross-react with one or more of RhSA, CySA or MuSA.

40. The fusion polypeptide of any one of claims 27-39, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 1 uM or less.

41. The fusion polypeptide of any one of claims 27-40, wherein the ^{10}Fn3 domain binds to domain I or II of HSA.

42. The fusion polypeptide of any one of claims 27-41, wherein the ^{10}Fn3 domain binds to serum albumin at a pH range of 5.5 to 7.4.

43. The fusion polypeptide of any one of claims 27-42, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 200 nM or less at pH 5.5.

44. The fusion polypeptide of any one of claims 27-43, wherein half-life of the fusion in the presence of serum albumin is at least 5-fold greater than half-life of the heterologous protein alone.

45. The fusion polypeptide of any one of claims 27-44, wherein the serum half-life of the polypeptide in the presence of serum albumin is at least 2 hours.

46. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain (i) comprises a modified amino acid sequence in one or more of the AB, BC, CD, DE, EF and FG loops relative to the wild-type ^{10}Fn3 domain, (ii) binds to a target molecule not bound by the wild-type ^{10}Fn3 domain, and (iii) comprises a C-terminal tail having a sequence $(ED)_n$, wherein n is an integer from 3 to 7.

47. The polypeptide of claim 46, wherein the ^{10}Fn3 domain comprises an amino acid sequence having at least 60% identity with the amino acid sequence set forth in residues 9-94 of SEQ ID NO: 1.

48. The polypeptide of claim 46 or 47, wherein the C-terminal tail further comprises an E, I or EI at the N-terminus.

49. The polypeptide of any one of claims 46-48, wherein the C-terminal tail enhances solubility or reduces aggregation, or both.

50. The polypeptide of any one of claims 46-49, wherein the ^{10}Fn3 domain comprises a modified amino acid sequence in each of the BC, DE and FG loops relative to the wild-type ^{10}Fn3 domain.

51. The polypeptide of any one of claims 46-50, wherein the polypeptide binds to the target with a K_D of 1 uM or less.

52. The fusion polypeptide of claim 32, wherein the polypeptide comprises a sequence selected from SEQ ID NOs: 132-174.

53. The fusion polypeptide of claim 31, wherein the heterologous protein is PYY_{3-36}, PP or amylin.

54. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain binds to human serum albumin and comprises an amino acid sequence at least 70% identical to SEQ ID NO: 8, 12, 16, 20, and 24-44.

55. A pharmaceutical composition comprising the polypeptide of any one of claims 1-54.

56. The pharmaceutical composition of claim 55, further comprising a physiologically acceptable carrier.

57. A method for treating diabetes, treating or lowering insulin resistance, treating obesity, reducing weight or preventing weight gain, treating dyslipidemia, increasing glucose uptake in adipose tissue, or slowing the progression of diabetes, comprising administering to a subject a therapeutically effective amount of a fusion polypeptide of any one of claims 32-33 or 52.

58. A method for treating hypoglycemia, obesity, diabetes, eating disorders, insulin-resistance syndrome, or cardiovascular disease, comprising administering to a subject a therapeutically effective amount of a fusion polypeptide of claim 53.

59. A nucleic acid encoding a polypeptide of any one of claims 1-26, 45-51 or 53, or a fusion polypeptide of any one of claims 27-45 or 52.

60. The nucleic acid of claim 58, wherein the nucleic acid comprises a sequence set forth in Table 3.

61. A vector comprising a nucleic acid of claim 59 or 60.

62. The vector of claim 61, wherein the vector is an expression vector.

63. A host cell comprising the vector of claim 61 or 62.

64. The host cell of claim 63, wherein the cell is a bacterial cell.

65. The host cell of claim 63, wherein the cell is a mammalian cell.

CLAIMS:

1. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain binds to human serum albumin with a K_D of 1 μM or less, wherein the ^{10}Fn3 domain comprises a modified amino acid sequence in one or more of the BC, DE and FG loops relative to the wild-type human ^{10}Fn3 domain (SEQ ID NO: 1), and wherein the polypeptide comprises an amino acid sequence at least 75% identical to an amino acid sequence selected from SEQ ID NOs: 4, 8, 12, 16, 20, and 24-44.

2. The polypeptide of claim 1, wherein the ^{10}Fn3 domain binds to domain 1 or 2 of human serum albumin with a KD of 1 μM or less.

3. The polypeptide of claim 1, wherein the ^{10}Fn3 domain binds to serum albumin at a pH range of 5.5 to 7.4.

4. The polypeptide claim 1, wherein the ^{10}Fn3 domain binds to HSA with a K_D of 200 nM or less at pH 5.5.

5. The polypeptide of claim 1, wherein the ^{10}Fn3 domain also binds to one or more of rhesus serum albumin (RhSA), cynomolgous monkey serum albumin (CySA), or murine serum albumin (MuSA).

6. The polypeptide of claim 1, wherein the serum half-life of the polypeptide in the presence of serum albumin is at least 2 hours.

7. A fusion polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain and a heterologous protein, wherein the ^{10}Fn3 domain binds to human serum albumin with a K_D of 1 μM or less and comprises an amino acid sequence at least 75% identical to an amino acid sequence selected from the group consisting of SEQ ID NOs: 4, 8, 12, 16, 20, and 24-44.

8. The fusion polypeptide of claim 7, wherein the ^{10}Fn3 domain comprises an amino acid sequence selected from SEQ ID NOs: 4, 8, 12, 16, 20, and 24-44.

9. The fusion polypeptide of claim 7, wherein the ^{10}Fn3 domain comprises a BC loop having the amino acid sequence set forth in SEQ ID NO: 5, a DE loop having the amino acid sequence set forth in SEQ ID NO: 6, and an FG loop having the amino acid sequence set forth in SEQ ID NO: 7.

10. The fusion polypeptide of claim 7, wherein the heterologous protein is selected from fibroblast growth factor 21 (FGF21), insulin, insulin receptor peptide, (bone morphogenetic protein 9 (BMP-9), amylin, peptide YY (PYY3-36), pancreatic polypeptide (PP), interleukin 21 (IL-21), glucagon- like peptide 1 (GLP-1), Plectasin, Progranulin, Atstrrin, Osteocalcin (OCN), Apelin, or a polypeptide comprising a ^{10}Fn3 domain.

11. The fusion polypeptide of claim 10, wherein the heterologous protein is FGF21.

12. A polypeptide comprising a fibronectin type III tenth (^{10}Fn3) domain, wherein the ^{10}Fn3 domain (i) comprises a modified amino acid sequence in one or more of the AB, BC, CD, DE, EF and FG loops relative to the wild-type ^{10}Fn3 domain, (ii) binds to a target molecule not bound by the wild-type ^{10}Fn3 domain, and (iii) comprises a C-terminal tail having a sequence (ED)n, wherein n is an integer from 3 to 7.

13. A pharmaceutical composition comprising the polypeptide of claim 1.

14. The polypeptide of claim 1, wherein the BC, DE and FG loops of the ^{10}Fn3 domain are selected from the group consisting of :

(a) a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 5, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 6, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 7,

(b) a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 9, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 10, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 11,

(c) a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 13, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 14, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 15,

(d) a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 17, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 18, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 19, and

(e) a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 21, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 22, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 23.

15. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 80% identical to an amino acid sequence selected from SEQ ID NOs: 4, 8, 12, 16, 20, and 24-44.

16. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 90% identical to an amino acid sequence selected from SEQ ID NOs: 4, 8, 12, 16, 20, and 24-44.

17. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a amino sequence selected from SEQ ID NOs: 4, 8, 12, 16, 20, and 24-44.

18. The polypeptide of claim 1, wherein the serum half-life of the polypeptide in the presence of albumin is at least 5-fold greater than the serum half-life of the polypeptide in the absence of serum albumin.

19. The polypeptide of claim 1, wherein the ^{10}Fn3 domain further comprises an N-terminal extension sequence selected from any one of the amino acid sequences set forth in SEQ ID NOs: 45-53.

20. The polypeptide of claim 1, wherein the ^{10}Fn3 domain further comprises a C-terminal extension sequence selected from any one of the amino acid sequences set forth in SEQ ID NOs: 54-64 and 215.

21. The polypeptide of claim 18, wherein the ^{10}Fn3 domain comprises an amino acid sequence selected from SEQ ID NOs: 89-116 and 222-225.

22. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 5, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 6, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 7.

23. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 9, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 10, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 11.

24. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 13, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 14, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 15.

25. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 17, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 18, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 19.

26. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises a BC loop comprising the amino acid sequence set forth in SEQ ID NO: 21, a DE loop comprising the amino acid sequence set forth in SEQ ID NO: 22, and an FG loop comprising the amino acid sequence set forth in SEQ ID NO: 23.

27. The polypeptide of claim 1, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 75% identical to the amino acid sequence of SEQ ID NO: 4.

28. The polypeptide of claim 15, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 80% identical to the amino acid sequence of SEQ ID NO: 4.

29. The polypeptide of claim 16, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 90% identical to the amino acid sequence of SEQ ID NO: 4.

30. The polypeptide of claim 17, wherein the ^{10}Fn3 domain comprises the amino sequence of SEQ ID NO: 4.

31. The polypeptide of claim 7, wherein the ^{10}Fn3 domain comprises an amino acid sequence at least 75% identical to the amino acid sequence of SEQ ID NO: 4.

32. The polypeptide of claim 8, wherein the ^{10}Fn3 domain comprises the amino acid sequence of SEQ ID NO: 4.

33. The polypeptide of claim 21, wherein the ^{10}Fn3 domain comprises the amino acid sequence of SEQ ID NO: 90.