Claims

1. A fusion protein comprising: a. the amino acid sequence of SEQ ID NO: 2; b. a linker having a length of 35-48 amino acids and comprising the amino acid sequence of (GGGGS)n, wherein n is 7 or 8 (SEQ ID NO: 42 or 43); and c. a truncated GDF15 consisting of the amino acid sequence of SEQ ID NO: 8; wherein the fusion protein is arranged from N-terminus to C-terminus in the order (a)-(b)-(c), and the C-terminus of the amino acid sequence of SEQ ID NO: 2 is fused to the N-terminus of the truncated GDF15 through the linker.

2. The fusion protein of claim 1, wherein the linker comprises the sequence (GGGGS)n, wherein n is 8 (SEQ ID NO: 43).

3. A fusion protein of claim 1, wherein the linker consists of the amino acid sequence of SEQ ID NO: 12.

4. An isolated nucleic acid molecule comprising a nucleotide sequence encoding the fusion protein of claim 1.

5. The isolated nucleic acid molecule of claim 4 comprising a nucleotide sequence selected from the group consisting of SEQ ID NOs: 97-99.

6. A vector comprising a nucleic acid molecule encoding the fusion protein of claim 1.

7. The vector of claim 6 comprising a nucleotide sequence selected from the group consisting of SEQ ID NOs: 97-99.

8. A host cell comprising a nucleic acid molecule encoding the fusion protein of claim 1.

9. A method of producing the fusion protein of claim 1, comprising: (1) culturing a host cell comprising a nucleic acid molecule encoding the fusion protein under a condition that the fusion protein is produced; and (2) recovering the fusion protein produced by the host cell.

10. A pharmaceutical composition comprising the fusion protein of claim 1 and a pharmaceutically acceptable carrier.

11. A fusion protein comprising the amino acid sequence of SEQ ID NO: 92.

12. A pharmaceutical composition comprising the fusion protein of claim 11 and a pharmaceutically acceptable carrier.

13. An isolated nucleic acid molecule comprising a nucleotide sequence encoding the fusion protein of claim 11.

14. The isolated nucleic acid molecule of claim 13, comprising the nucleotide sequence of SEQ ID NO: 95.

15. A vector comprising a nucleic acid molecule encoding the fusion protein of claim 11.

16. A host cell comprising a nucleic acid molecule encoding the fusion protein of claim 11.

17. A method of producing the fusion protein of claim 11, comprising: (1) culturing a host cell comprising a nucleic acid molecule encoding the fusion protein under a condition that the fusion protein is produced; and (2) recovering the fusion protein produced by the host cell.

18. The isolated nucleic acid molecule of claim 13, comprising the nucleotide sequence of SEQ ID NO: 110.