

The claims:

1. An N-terminal extension comprising the amino acid sequence of SEQ ID NO: 1.
2. A nucleic acid encoding the N-terminal extension as claimed in claim 1.
3. The nucleic acid as claimed in claim 2, wherein the nucleic acid is selected from a group comprising SEQ ID NO: 4, SEQ ID NO: 7, SEQ ID NO: 10 and SEQ ID NO: 13.
4. A vector comprising the modified nucleic acid as claimed in 3.
5. The vector as claimed in claim 4, wherein the vector is pD912.
6. The vector as claimed in claim 4, wherein the vector comprises a modified TEV cleavage site selected from a group comprising SEQ ID NO: 5, SEQ ID NO: 8, SEQ ID NO: 11 and SEQ ID NO: 14.
7. A vector for recombinant expression of lirapeptide comprising:
 - a. a modified gene sequence encoding the N-terminal extension sequence (NE-3) selected from a group comprising SEQ ID NO: 4, SEQ ID NO: 7, SEQ ID NO: 10 and SEQ ID NO: 13;
 - b. a modified gene sequence encoding *TEV (Tobacco Etch Virus)* cleavage site selected from a group comprising SEQ ID NO: 5, SEQ ID NO: 8, SEQ ID NO: 11 and SEQ ID NO: 14; and
 - c. a modified gene sequence encoding Lirapeptide selected from a group comprising SEQ ID NO: 6, SEQ ID NO: 9, SEQ ID NO: 12 and SEQ ID NO: 15.
8. The vector as claimed in claim 7, wherein the vector is modified for high level expression of lirapeptide in *Pichia pastoris* comprising:
 - a. a modified gene sequence encoding the N-terminal extension sequence (NE-3) comprising the nucleotide sequence of SEQ ID NO: 4;
 - b. a modified gene sequence encoding *TEV (Tobacco Etch Virus)* cleavage site comprising the nucleotide sequence of SEQ ID NO: 5; and
 - c. a modified gene sequence encoding Lirapeptide comprising the nucleotide sequence of SEQ ID NO: 6.
9. The vector as claimed in claim 7, wherein the vector is modified for high level expression of lirapeptide in *Corynebacterium glutamicum* comprising:
 - a. a modified gene sequence encoding the N-terminal extension sequence (NE-3) comprising the nucleotide sequence of SEQ ID NO: 7;
 - b. a modified gene sequence encoding *TEV (Tobacco Etch Virus)* cleavage site comprising the nucleotide sequence of SEQ ID NO: 8; and

- c. a modified gene sequence encoding Lirapeptide comprising the nucleotide sequence of SEQ ID NO: 9.
10. The vector as claimed in claim 7, wherein the vector is modified for high level expression of lirapeptide in *Escherichia coli* comprising:
- 5 a. a modified gene sequence encoding the N-terminal extension sequence (NE-3) comprising the nucleotide sequence of SEQ ID NO:10;
- b. a modified gene sequence encoding *TEV (Tobacco Etch Virus)* cleavage site comprising the nucleotide sequence of SEQ ID NO: 11; and
- c. a modified gene sequence encoding Lirapeptide comprising the nucleotide sequence of SEQ ID NO: 12.
- 10 11. The vector as claimed in claim 7, wherein the vector is modified for high level expression of lirapeptide in *Bacillus subtilis* comprising:
- a. a modified gene sequence encoding the N-terminal extension sequence (NE-3) comprising the nucleotide sequence of SEQ ID NO:13;
- 15 b. a modified gene sequence encoding *TEV (Tobacco Etch Virus)* cleavage site comprising the nucleotide sequence of SEQ ID NO: 14; and
- c. a modified gene sequence encoding Lirapeptide comprising the nucleotide sequence of SEQ ID NO: 15.
12. A recombinant host cell comprising the vector as claimed in claim 7.
- 20 13. The recombinant host cell as claimed in claim 12, wherein the recombinant host cell is selected from a group comprising *Pichia pastoris*, *Saccharomyces cerevisiae*, *Corynebacterium glutamicum*, *Escherichia coli* and *Bacillus subtilis*.
14. A modified lirapeptide comprising the amino acid sequence of SEQ ID NO: 19, wherein the lirapeptide is operably fused to *TEV (Tobacco Etch Virus)* cleavage site and an N-terminal extension sequence (NE-3).
- 25 15. The method for expressing lirapeptide using recombinant host cells as claimed in claim 12, wherein the fermentation process comprises:
- a. culturing the recombinant host cells in BMGY media for about 24 hrs;
- b. harvesting the recombinant host cells by centrifugation;
- 30 c. resuspending the recombinant host cells to an OD_{600nm} of about 10 in BMMY medium;
- d. incubating the host cells in a shaker incubator for about 24 hrs at 30°C; and
- e. harvesting and purifying the culture supernatants to obtain lirapeptide.
16. A method for preparation of liraglutide, said method comprising the steps of:

- c. culturing the recombinant host cell as claimed in claim 12 in a suitable culture medium to obtain lirapeptide;
- d. converting lirapeptide to liraglutide, wherein the method comprises conjugation of lirapeptide obtained in step (a) with a palmityl glutamate derivative.