CLAIMS

What is claimed is:

1. A modified peptide, 20-60 amino acids in length, comprising:

(i) an insulin-like-growth-factor-binding-protein-derived immodulator core amino acid sequence comprising an amino acid sequence corresponding to SEQ ID NO:1 or SEQ ID NO:2; and

(ii) a small molecule of molecular mass less than one thousand daltons linked covalently to the amino terminus of the amino acid sequence.

wherein said small molecule is a carboxylic acid that is not an amino acid or biotin.

2. The modified peptide according to claim 1, wherein said terminally-linked carboxylic acid is selected from the group consisting of: oleic acid, eicosapentanoic acid, lauric acid, decanoic acid, lignoceric acid, docosahexanoic acid, 2-hydroxy-2-decenoic acid, phenolic acids, anthraquinones, pentacyclic triterpenoids, retinoic acids, adapalene, bexarotene, rhein, proprionic acids, keto acids, cinnamic acids, aromatic carboxylic acids, indoleacetic acids, xanthenes, xanthones, fenofibric acid, valproic acid, 2-hexyl-4-pentynoic acid, 2,7-dichlorodihydro-fluorescein diacetate, indolyl-carboxylic acids, ibuprofen, artemisinic acid, metallocene carboxylic acids, and bromopyruvic acid.

3. The modified peptide according to claim 1 or claim 2, wherein the amino acid sequence of said immodulator core amino acid sequence consists of the amino acid sequence of any of SEQ ID NOs:3-8.

4. The modified peptide according to any one of claims 1 to 3, wherein the amino acid sequence of said immodulator core amino acid sequence is carboxyterminally extended by the amino acid sequence ZV, wherein Z is any amino acid except L-cysteine or L-alanine.

5. The modified peptide according to claim 1, further comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs:10-22.

6. The modified peptide according to any one of claims 1 to 5, wherein the modified peptide is complexed with a metal selected from the group consisting of: ferrous iron, ferric iron, ferrocene, ferrocene derivative, zinc, copper, vanadium, ruthenium, cobalt, titanium, manganese, and calcium.

7. The modified peptide according to any one of claims 1 to 6, wherein the modified peptide is complexed with a glycosaminogycan selected from the group consisting of: heparin, heparan sulfate, chondroitin sulfate, keratan sulfate, dermatan sulfate, and hyaluronate.

8. A pharmaceutical composition comprising a therapeutically effective amount of the modified peptide according to any one of claims 1 to 7 and a pharmaceutically acceptable excipient.

9. A method for treating a subject suffering from immune dysfunction or perturbation, said method comprising administering to said subject a therapeutically effective dose of the modified peptide according to any one of claims 1 to 7, or the pharmaceutical composition according to claim 8, wherein said therapeutically effective dose of the modified peptide is from about 0.01 mg/kg/day to about 50 mg/kg/day.

10. The method according to claim 9, wherein the administration is via an intramuscular, subcutaneous, parenteral, transdermal, intranasal, intravenous, or intrathecal route.

11. The method according to claim 9, further comprising co-administration of a helper molecule that modulates the activity of cellular antiviral defenses, said helper selected from the group consisting of modulators of RIG-I, MDA5, MAVS, STING, IRF3, STAT1, STAT3, TBK1, PACT, LGP2, NFkappaB, DNA methylases and toll-like receptors.

12. Use of the modified peptide according to any one of claims 1 to 7, or the pharmaceutical composition according to claim 8 in the treatment of a subject suffering from immune dysfunction or perturbation.

13. Use of the modified peptide according to any one of claims 1 to 7, or the pharmaceutical composition according to claim 8 in the manufacture of a medicament for treatment of a subject suffering from immune dysfunction or perturbation.

14. Use of the modified peptide according to claim 12, further comprising co-administration of a helper molecule that modulates the activity of cellular antiviral defenses, said helper selected from the group consisting of modulators of RIG-I, MDA5, MAVS, STING, IRF3, STAT1, STAT3, TBK1, PACT, LGP2, NFkappaB, DNA methylases and toll-like receptors.

15. An in vitro method for measuring the potency of the modified peptide according to any one of claims 1 to 7, the method comprising determining the ability of the modified peptide or modified peptide conjugate to modulate Toll-like receptor (TLR) signaling, retinoic acid-inducible gene I (RIG-I) signaling, apoptosis, or collagen synthesis in cultured cells.