

WHAT IS CLAIMED IS:

1. A method of treating an inflammatory bowel disease (IBD) in a subject in need thereof, comprising administering to the subject an $\alpha 4\beta 7$ integrin antagonist, wherein the antagonist is administered to the patient orally at a dose of about 100 mg to about 500 mg, once or twice daily, wherein the antagonist is a peptide dimer compound comprising two peptides, or a pharmaceutically acceptable salt thereof; wherein each of the two peptides comprises or consists of any of the sequences:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Glu)-(D-Lys)-OH (SEQ ID NO:1);

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-Gly-(D-Lys)-OH (SEQ ID NO:2);

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:3);

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:4);

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Lys)-OH (SEQ ID NO:5);

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Lys)-NH₂ (SEQ ID NO:5);

Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Lys)-OH (SEQ ID NO: 6);

Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Lys)-NH₂ (SEQ ID NO: 6);

Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:7);

Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-Pro-(D-Lys)-NH₂ (SEQ ID NO:7);

Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:8); or

Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β -homo-Glu)-(D-Pro)-(D-Lys)-NH₂ (SEQ ID NO:8);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen or a disulfide bond between the two Pens, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

2. The method of claim 1, wherein each of the two peptides consists of the sequence:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Glu)-(D-Lys)-OH (SEQ ID NO:1),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

3. The method of claim 1, wherein each of the two peptides consists of the sequence:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Gly-(D-Lys)-OH (SEQ ID NO:2);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

4. The method of claim 1, wherein each of the two peptides consists of the sequence:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:3);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

5. The method of claim 1, wherein each of the two peptides consists of the sequence:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:4);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

6. The method of claim 1, wherein each of the two peptides consists of the sequence:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-NH₂
(SEQ ID NO:5),

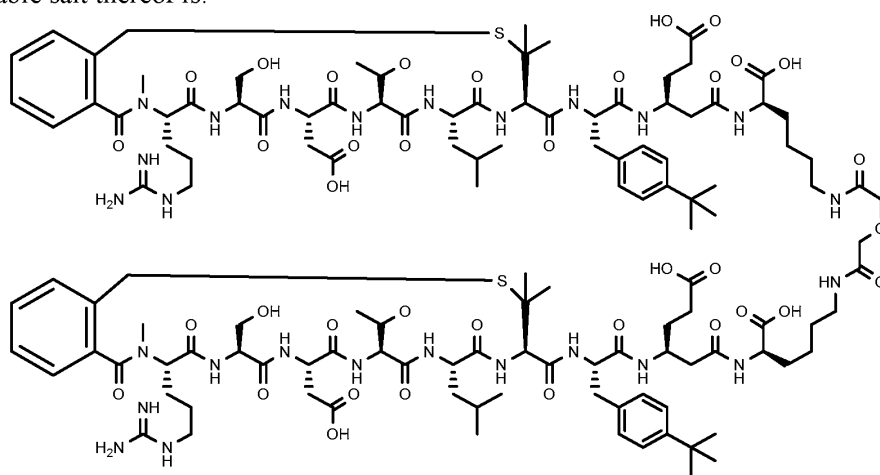
wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

7. The method of claim 1, wherein each of the two peptides consists of the sequence:

2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-OH
(SEQ ID NO:5),

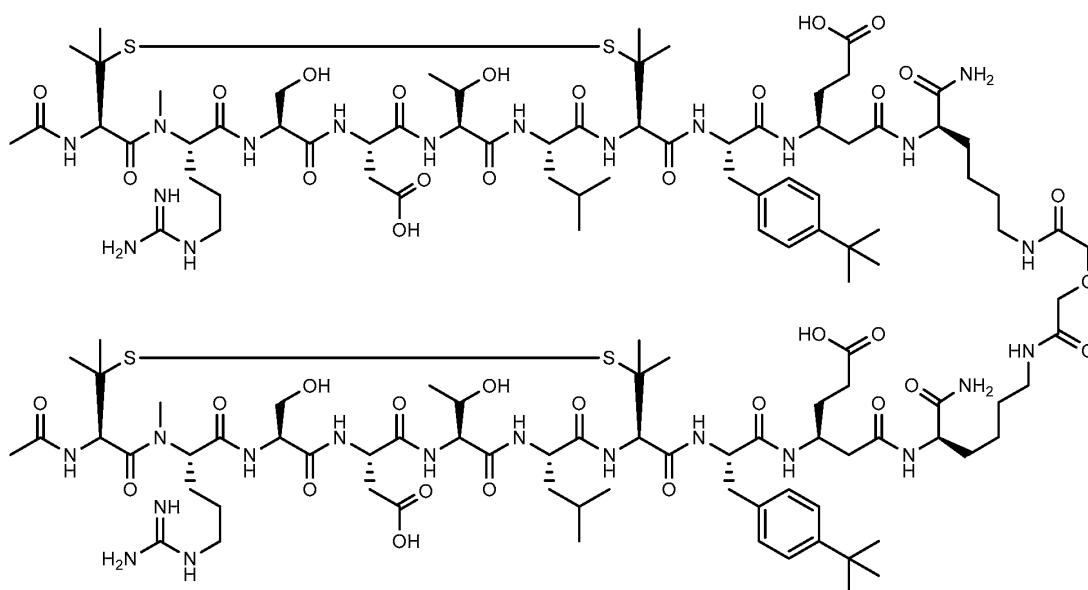
wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

8. The method of claim 1, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

9. The method of claim 1, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

10. The method of claim 1, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Glu)-(D-Lys)-OH (SEQ ID NO:1),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

11. The method of claim 1, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Gly-(D-Lys)-OH (SEQ ID NO:2);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

20. The method of claim 9, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:3);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

12. The method of claim 1, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:4);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

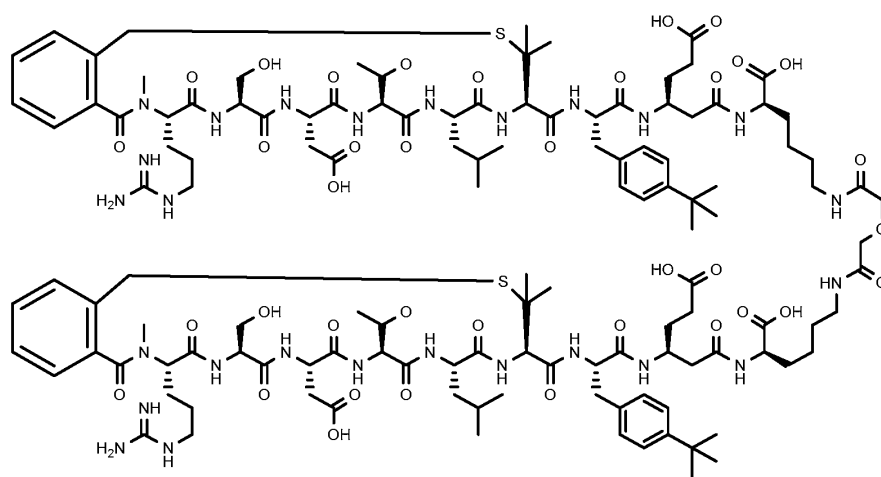
13. The method of claim 1, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-NH₂
(SEQ ID NO:5),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

14. The method of claim 1, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-OH
(SEQ ID NO:5),

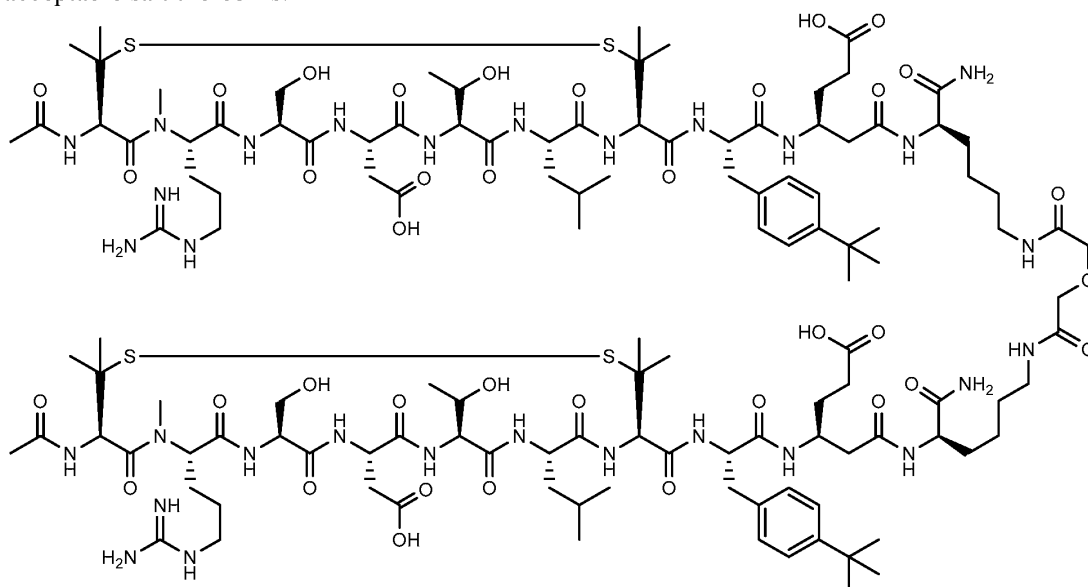
wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

15. The method of claim 1, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

16. The method of claim 1, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

17. The method according to any one of claims 1-16, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is administered to the subject at a dose of about 100.0, 112.5, 125.0, 137.5, 150.0, 162.5, 175, 187.5, 200.0, 212.5, 225.0, 237.5, 250.0, 262.5,

275, 287.5, 300.0, 312.5, 325.0, 337.5, 350.0, 362.5, 375, 387.5, 400.0, 412.5, 425.0, 437.5, 450.0, 462.5, 475, 487.5, or 500.0 mg.

18. The method according to claim 17, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is administered to the subject at a dose of about 150 mg.

19. The method according to claim 17, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is administered to the subject at a dose of about 450 mg.

20. The method according to claim 18 or claim 19, wherein the dose is administered to the subject twice daily.

21. The method according to any one of claims 1-20, wherein the pharmaceutically acceptable salt of the peptide dimer compound is an acetate salt.

22. The method according to any one of claims 1-21, wherein the dosage administered results in a non-saturating blood receptor occupancy (%RO), optionally when measured at peak blood or serum levels of the antagonist.

23. The method according to claim 22, wherein the dosage administered results in less than 90 %RO, less than 80 %RO, less than 70 %RO, less than 60 %RO, or less than 50 %RO, optionally when measured at peak blood or serum levels of the antagonist.

24. The method according to any one of claims 1-21, wherein the method inhibits MadCAM1-mediated T cell proliferation in the gastrointestinal tract.

25. The method according to any one of claims 1-21, wherein the method reduces cell surface expression of $\beta 7$ on CD4⁺ T cells in the gastrointestinal tract.

26. The method according to any one of claims 1-21, wherein the method:

- i) induces internalization of $\alpha 4\beta 7$ integrin on CD4⁺ T memory cells;
- ii) causes reduced adhesion of CD4⁺ T memory cells to MAdCAM1 in the gastrointestinal tract; and/or
- iii) inhibits homing of T cells to the gastrointestinal tract, optionally to the ileal lamina propria, Peyer's Patches, mesenteric lymph nodes, small intestine, and/or colon.

27. The method of any one of claims 1-26, wherein the IBD is ulcerative colitis.

28. The method of any one of claims 1-26, wherein the IBD is Crohn's disease.

29. The method of any one of claims, wherein the method results in one or more of the following pharmacokinetic parameters in plasma of the subject:

- C_{max} (ng/mL) of 1-25;
- T_{max} (h) of 1-5;
- AUC_t (ng.h/mL) of 10-250
- AUC_{inf} (ng.h/mL) of 10-300;
- t_{1/2} (h) of 3-10;
- AUC_{tau} (ng.h/mL) of 30-130;
- C_{trough} (ng/mL) of 1-5;
- accumulation C_{max} (ng.mL) of 0.5-2.5; and
- accumulation AUC_t (ng.h/mL) of .5-3.0.

30. The method of any one of claims, wherein the method results in one or more of the following pharmacodynamic parameters in plasma of the subject:

- RO_{max} (%) of 50-100;
- change in receptor expression_{max} (%) of -20 to -60;
- average change in receptor expression (%) of -10 to -55;
- steady state RO_{max} (%) of 80-100;
- average RO₀₋₂₄ (%h) of 50-95;
- average RO₀₋₁₂ (%h) of 80-95; and
- average RO₁₂₋₂₄ (%h) of 70-90.

31. A method of treating an inflammatory disease or disorder in a subject in need thereof, comprising administering to the subject an $\alpha 4\beta 7$ integrin antagonist, wherein the antagonist is administered at a dosage that results in a non-saturating blood receptor occupancy (%RO), optionally when measured at peak blood or serum levels of the antagonist.

32. The method of claim 11, wherein the antagonist is administered at a dosage that results in less than 90% blood RO, less than 80% blood RO, less than 70% blood RO, less than 60% blood RO, or less than 50% blood RO, optionally when measured at peak blood or serum levels of the antagonist.

33. The method of claim 31 or claim 32, wherein the antagonist is present in a pharmaceutical composition formulated for a route of administration selected from oral administration, parenteral administration, subcutaneous administration, buccal administration, nasal administration, administration by inhalation, topical administration, and rectal administration.

34. The method of any one of claims 31-33, wherein the antagonist is administered orally or rectally.

35. The method of any one of claims 31-34, wherein the disease or disorder is selected from the group consisting of: Inflammatory Bowel Disease (IBD), adult IBD, pediatric IBD, adolescent IBD, ulcerative colitis, Crohn's disease, Celiac disease (*nontropical Sprue*), enteropathy associated with seronegative arthropathies, microscopic colitis, collagenous colitis, eosinophilic gastroenteritis, radiotherapy, chemotherapy, pouchitis resulting after proctocolectomy and ileoanal anastomosis, gastrointestinal cancer, pancreatitis, insulin-dependent diabetes mellitus, mastitis, cholecystitis, cholangitis, pericholangitis, chronic bronchitis, chronic sinusitis, asthma, primary sclerosing cholangitis, human immunodeficiency virus (HIV) infection in the GI tract, eosinophilic asthma, eosinophilic esophagitis, gastritis, colitis, microscopic colitis, and graft versus host disease (GVHD).

36. The method of any one of claims 31-35, wherein the disease or disorder is an IBD.

37. The method of claim 36, wherein the IBD is ulcerative colitis.
38. The method of claim 36, wherein the IBD is Crohn's disease.
39. The method of any one of claims 31-38, wherein the antagonist is a peptide dimer compound comprising two peptides, or a pharmaceutically acceptable salt thereof; wherein each of the two peptides comprises or consists of any of the sequences:
- 2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Glu)-(D-Lys)-OH (SEQ ID NO:1);
- 2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Gly-(D-Lys)-OH (SEQ ID NO:2);
- 2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:3);
- 2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:4);
- 2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-OH (SEQ ID NO:5);
- 2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-NH₂ (SEQ ID NO:5);
- Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-OH (SEQ ID NO:6);
- Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-NH₂ (SEQ ID NO:6);
- Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:7);
- Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-NH₂ (SEQ ID NO:7);
- Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:8); or
- Pen-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-NH₂ (SEQ ID NO:8);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen; or a disulfide between the two Pens; wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

40. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Glu)-(D-Lys)-OH (SEQ ID NO:1),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

41. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Gly-(D-Lys)-OH (SEQ ID NO:2);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

42. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:3);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

43. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:4);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

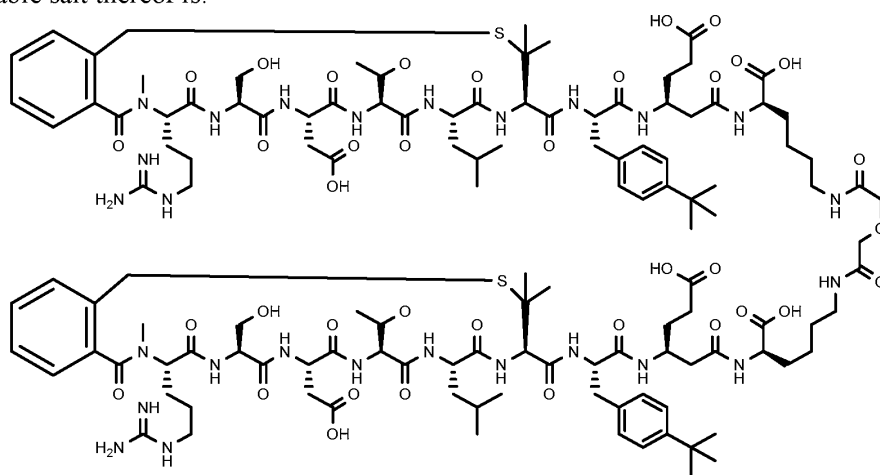
44. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-NH₂
(SEQ ID NO:5),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

45. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-OH
(SEQ ID NO:5),

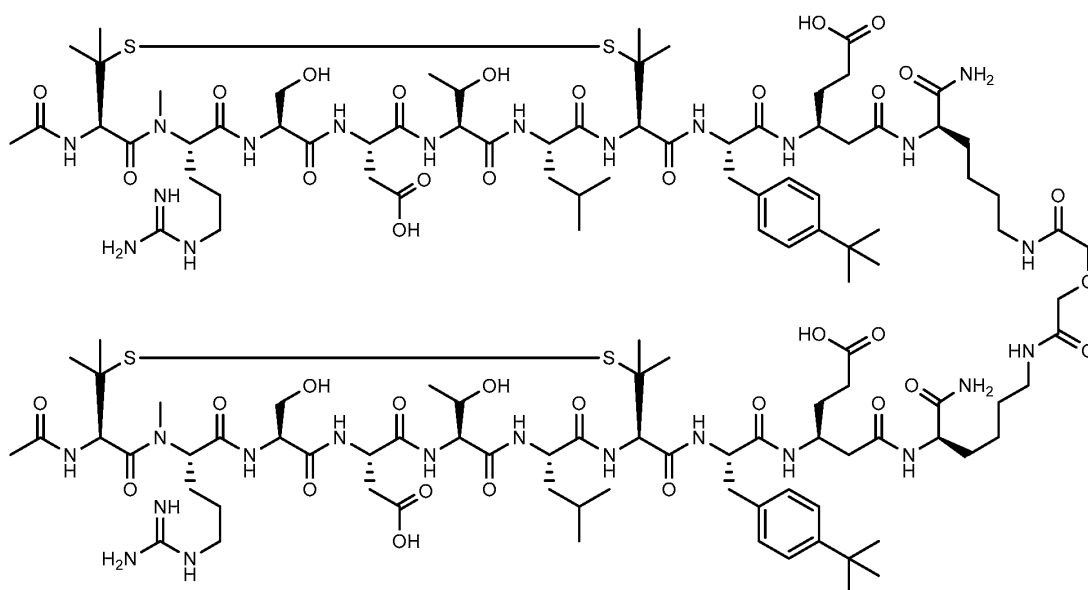
wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

46. The method of claim 39, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

47. The method of claim 39, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

48. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Glu)-(D-Lys)-OH (SEQ ID NO:1),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

49. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Gly-(D-Lys)-OH (SEQ ID NO:2);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

50. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-Pro-(D-Lys)-OH (SEQ ID NO:3);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

51. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Pro)-(D-Lys)-OH (SEQ ID NO:4);

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

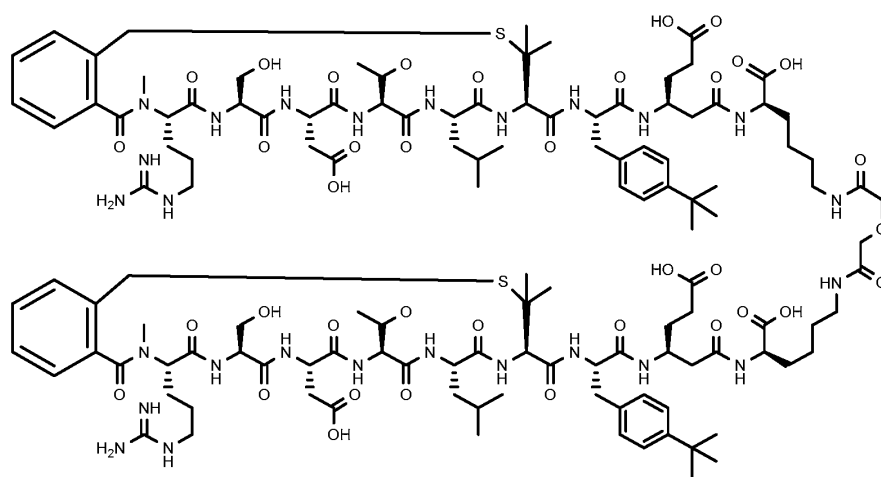
52. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-NH₂
(SEQ ID NO:5),

wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

53. The method of claim 39, wherein each of the two peptides consists of the sequence:
2-methylbenzoyl-(N-Me-Arg)-Ser-Asp-Thr-Leu-Pen-Phe(4-tBu)-(β-homo-Glu)-(D-Lys)-OH
(SEQ ID NO:5),

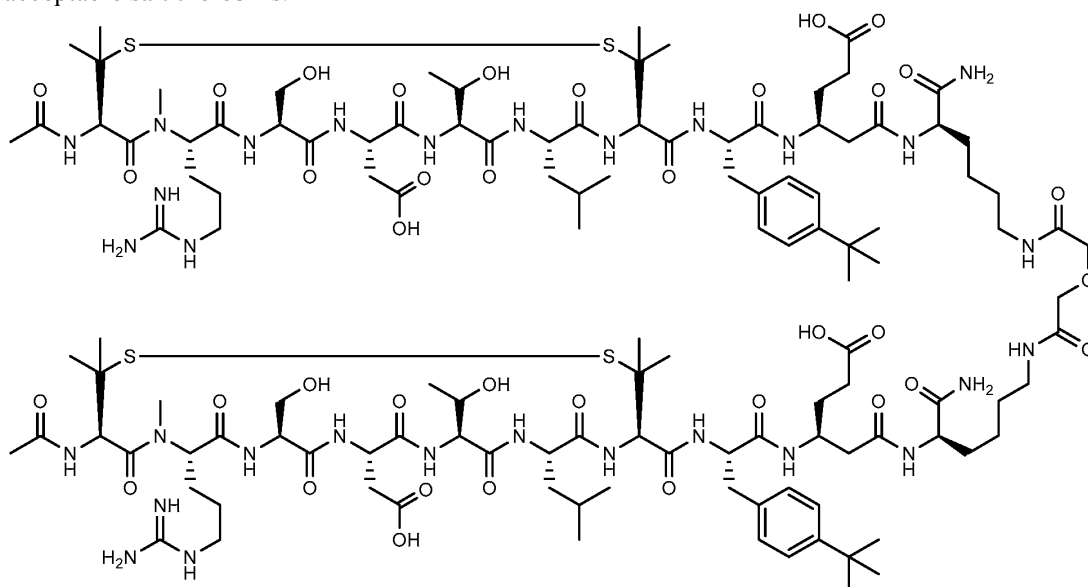
wherein each of the two peptides comprises a thioether bond between the 2-methylbenzoyl and the Pen, wherein the two peptides are linked by a linker moiety bound to the D-Lys amino acids of the two peptides, and wherein the linker moiety is diglycolic acid (DIG).

54. The method of claim 39, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

55. The method of claim 39, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is:



or a pharmaceutically acceptable salt thereof.

56. The method according to any one of claims 39-55, wherein the peptide dimer compound or pharmaceutically acceptable salt thereof is administered to the subject at a dose of about 5, 6, 7, 8, 9, 10, 12.5, 25.0, 37.5, 50.0, 62.5, 75, 87.5, 100.0, 112.5, 125.0, 137.5, 150.0, 162.5,

175, 187.5, 200.0, 212.5, 225.0, 237.5, 250.0, 262.5, 275, 287.5, 300.0, 312.5, 325.0, 337.5, 350.0, 362.5, 375, 387.5, 400.0, 412.5, 425.0, 437.5, 450.0, 462.5, 475, 487.5, or 500.0 mg.

57. The method of claim 56, wherein the dose is administered to the subject once a day or twice a day.

58. The method according to any one of claims 39-57, wherein the pharmaceutically acceptable salt of the peptide dimer compound is an acetate salt.

59. A pharmaceutical composition comprising a peptide dimer compound or pharmaceutically acceptable salt thereof disclosed in any one of claims 39-58.

60. The pharmaceutical composition of claim 59, wherein the composition is formulated for oral delivery, optionally wherein the composition comprises an enteric coating.

61. The method of any one of claims 39-58, wherein the method comprises administering to the subject the pharmaceutical composition of any one of claims 32-34.

62. The method of any one of claims 31-58 or 61, wherein the antagonist or pharmaceutically acceptable salt thereof inhibits binding of $\alpha 4\beta 7$ integrin to MAdCAM1.

63. The method of any one of claims 31-58 or 61-62, wherein the antagonist or pharmaceutically acceptable salt thereof or the pharmaceutical composition is provided to the subject in need thereof at an interval sufficient to improve or ameliorate the condition.

64. The method of claim 63, wherein the interval is selected from the group consisting of: around the clock, hourly, every four hours, once daily, twice daily, three times daily, four times daily, every other day, weekly, bi-weekly, and monthly.

65. The method of claim 63 or claim 64, wherein the antagonist or pharmaceutically acceptable salt thereof or pharmaceutical composition is provided as an initial dose followed by one or more subsequent doses, and the minimum interval between any two doses is a

period of less than 1 day, and wherein each of the doses comprises an effective amount of the antagonist.

66. The method of claim 65, wherein the effective amount of the antagonist or pharmaceutically acceptable salt thereof or the pharmaceutical composition is sufficient to achieve at least one of the following:

- a) about 50% or greater saturation of MAdCAM1 binding sites on $\alpha 4\beta 7$ integrin molecules;
- b) about 50% or greater inhibition of $\alpha 4\beta 7$ integrin expression on the cell surface; and
- c) about 50% or greater saturation of MAdCAM1 binding sites on $\alpha 4\beta 7$ molecules and about 50% or greater inhibition of $\alpha 4\beta 7$ integrin expression on the cell surface, wherein i) the saturation is maintained for a period consistent with a dosing frequency of no more than twice daily; ii) the inhibition is maintained for a period consistent with a dosing frequency of no more than twice daily; or iii) the saturation and the inhibition are each maintained for a period consistent with a dosing frequency of no more than twice daily.