cutaneous scar formation by utilizing a cell-penetrating, peptide-based inhibitor of MK2.

SUMMARY OF THE INVENTION

In one embodiment, there is provided a pharmaceutical composition for use in treating a cutaneous scar in a subject in need thereof, comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2), and a pharmaceutically acceptable carrier, wherein

the subject in need thereof has suffered a wound, and

the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

In one embodiment, there is provided a use of pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2), and a pharmaceutically acceptable carrier in the manufacture of a medicament for treating a cutaneous scar in a subject in need thereof, wherein the subject in need thereof has suffered a wound, wherein the need is to be administered to the subject, and wherein

the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

In one embodiment, there is provided a dressing for use in treating a cutaneous scar in a

subject in need thereof, wherein

the subject in need thereof has suffered a wound,

the dressing comprises a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2), and a pharmaceutically acceptable carrier,

and the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

According to one ~~aspect~~embodiment, the described ~~invention~~ disclosure provides, a pharmaceutical composition for use in treating a cutaneous scar in a subject in need thereof, comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof, and a pharmaceutically acceptable carrier, wherein the subject in need thereof has suffered a wound, and the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

[00202] According to one embodiment, the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof. According to another embodiment, the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof. According to another embodiment, the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof. According to another embodiment, the pathological scar results from a high-tension wound located in close proximity to a joint

comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof. According to another embodiment, the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof. According to another embodiment, the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

[00203] According to another embodiment, the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated

pyrrolopyridone analogue or a multicyclic lactam analogue. According to another embodiment, the therapeutic amount of the MK2 polypeptide inhibitor of the pharmaceutical composition is of an amount from about 0.000001 mg/kg body weight to about 100 mg/kg body weight.

According to another ~~aspect~~embodiment, the described ~~invention~~ disclosure provides a method for treating a cutaneous scar in a subject in need thereof, wherein the subject in need thereof has suffered a wound, wherein the method comprises administering to the subject a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof, and a pharmaceutically acceptable carrier, wherein the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

[00208] According to one embodiment, the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof. According to another embodiment, the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof. According to another embodiment, the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof. According to another embodiment, the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof. According to another embodiment, the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof. According to another embodiment, the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

[00209] According to another embodiment, the administering is topically. According to another embodiment, the administering is by means of a dressing comprising the pharmaceutical

substantially inhibiting an off-target protein. According to another embodiment, the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1), Tumor Necrosis Factor-α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

[00217] According to another embodiment, the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both. According to another embodiment, the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof. According to another embodiment, the progenitor cell is selected from the group consisting of a hematopoitic stem cell, a mesenchymal stem cell, or a combination thereof.

[00218] According to another embodiment, the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a pyrrolopyridone analogue or a multicyclic lactam analogue.

According to another ~~aspect~~embodiment, the described ~~invention~~ disclosure provides a dressing for use in treating a cutaneous scar in a subject in need thereof, wherein the subject in need thereof has suffered a wound, wherein the dressing comprises a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof, and a pharmaceutically acceptable carrier, wherein the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

[00219] According to one embodiment, the dressing is selected from the group consisting

CLAIMS

What is claimed is:

1. A pharmaceutical composition for use in treating a cutaneous scar in a subject in need thereof, comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2), and a pharmaceutically acceptable carrier, wherein

the subject in need thereof has suffered a wound, and

the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

2. The pharmaceutical composition according to claim 1, wherein the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof.

3. The pharmaceutical composition according to claim 1, wherein the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof.

4. The pharmaceutical composition according to claim 3, wherein the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof.

5. The pharmaceutical composition according to claim 3, wherein the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof.

6. The pharmaceutical composition according to claim 3, wherein the pathological scar

results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof.

7. The pharmaceutical composition according to claim 6, wherein the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

8. The pharmaceutical composition according to claim 1, wherein the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated Protein Kinase-Activated Protein Kinase 3 (MK3),.calcium/calmodulin-dependent protein kinase I (CaMKI), BDNF/NT-3 growth factors receptor (TrkB), or a combination thereof without substantially inhibiting an off-target protein.

9. The pharmaceutical composition according to claim 1, wherein the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both.

10. The pharmaceutical composition according to claim 9, wherein the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof.

11. The pharmaceutical composition according to claim 9, wherein the progenitor cell is selected from the group consisting of a hematopoietic stem cell, a mesenchymal stem cell, or a combination thereof.

12. The pharmaceutical composition according to claim 1, wherein the pharmaceutical composition further comprises at least one additional therapeutic agent selected from the group consisting of an anti-inflammatory agent, an analgesic agent, an anti-infective agent, or a combination thereof.

13. The pharmaceutical composition according to claim 12, wherein the additional

therapeutic agent comprises EXC001 (an anti-sense RNA against connective tissue growth factor (CTGF)), AZX100 (a phosphopeptide analog of Heat Shock Protein 20 (HSP20)), PRM-151 (recombinant human serum amyloid P/Pentaxin 2), PXL01 (a synthetic peptide derived from human lactoferrin), DSC127 (an angiotensin analog), RXI-109 (a self-delivering RNAi compound that targets connective tissue growth factor (CTGF)), TCA (trichloroacetic acid), Botulium toxin type A, or a combination thereof.

14. The pharmaceutical composition according to claim 12, wherein the additional therapeutic agent is selected from the group consisting of rose hip oil, vitamin E, 5-fluorouracil, bleomycin, onion extract, pentoxifylline, prolyl-4-hydroxylase, verapamil, tacrolimus, tamoxifen, tretinoin, colchicine, tranilst, zinc, an antibiotic, and a combination thereof.

15. The pharmaceutical composition according to claim 1, wherein the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide, wherein

the first polypeptide comprises a protein transduction domain functionally equivalent to YARAAARQARA (SEQ ID NO: 11) and is a polypeptide of amino acid sequence selected from the group consisting of WLRRIKAWLRRIKA (SEQ ID NO: 12), WLRRIKA (SEQ ID NO: 13), YGRKKRRQRRR (SEQ ID NO: 14), WLRRIKAWLRRI (SEQ ID NO: 15), FAKLAARLYR (SEQ ID NO: 16), KAFAKLAARLYR (SEQ ID NO: 17), and HRRIKAWLKKI (SEQ ID NO: 18); and

the second polypeptide is of amino acid sequence KALARQLGVAA (SEQ ID NO: 2).

16. The pharmaceutical composition according to claim 1, wherein the pharmaceutically acceptable carrier is a controlled release carrier.

17. The pharmaceutical composition according to claim 1, wherein the pharmaceutically acceptable carrier comprises particles.

18. The pharmaceutical composition according to claim 1, wherein the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1),

Tumor Necrosis Factor-α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

19. The pharmaceutical composition according to claim 1, wherein the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a pyrrolopyridone analogue or a multicyclic lactam analogue.

20. The pharmaceutical composition according to claim 1, wherein the therapeutic amount of the MK2 polypeptide inhibitor of the pharmaceutical composition is of an amount from about 0.000001 mg/kg body weight to about 100 mg/kg body weight.

21. Use of a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2), and a pharmaceutically acceptable carrier in the manufacture of a medicament for treating a cutaneous scar in a subject in need thereof, wherein the subject in need thereof has suffered a wound, wherein the medicament is to be administered to the subject, and wherein

the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

22. The use according to claim 21, wherein the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof.

23. The use according to claim 21, wherein the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof.

consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof.

25. The use according to claim 23, wherein the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof.

26. The use according to claim 23, wherein the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof.

27. The use according to claim 26, wherein the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

28. The use according to claim 21, wherein the medicament is to be admistered topically.

29. The use according to claim 28, wherein the medicament is to be admistered by means of a dressing comprising the medical composition.

30. The use according to claim 29, wherein at least one surface of the dressing is impregnated with the medical composition.

31. The use according to claim 29, wherein the dressing is selected from the group consisting of a gauze dressing, a tulle dressing, an alginate dressing, a polyurethane dressing, a silicone foam dressing, a synthetic polymer scaffold dressing, or a combination thereof.

32. The use according to claim 29, wherein the dressing is an occlusive dressing selected from the group consisting of a film dressing, a semi-permeable film dressing, a hydrogel dressing, a hydrocolloid dressing, and a combination thereof.

33. The use according to claim 28, wherein the medicament is to be admistered by means of a dermal substitute, wherein the medical composition is embedded in a dermal substitute that provides a three dimensional scaffold.

34. The use according to claim 33, wherein the dermal substitute is made of a natural biological material, a constructive biological material, or a synthetic material.

35. The use according to claim 34, wherein the natural biological material comprises human cadaver skin, porcine cadaver skin, or porcine small intestine submucosa.

36. The method according to claim 34, wherein the natural biological material comprises a matrix.

37. The use according to claim 34, wherein the natural biological material consists essentially of a matrix that is sufficiently devoid of cell remnants.

38. The use according to claim 34, wherein the constructive biological material comprises collagen, glycosaminoglycan, fibronectin, hyaluonic acid, elastine, or a combination thereof.

39. The use according to claim 34, wherein the constructive biological material is a bilayer, non-cellularized dermal regeneration template or a single layer, cellularized dermal regeneration template.

40. The use according to claim 34, wherein the synthetic dermal substitute comprises a hydrogel.

41. The use according to claim 34, wherein the synthetic dermal substitute further comprises an RGD peptide with amino acid sequence Arginine-Glycine-Aspartate.

42. The use according to claim 21, wherein the medicament is to be admistered intraperitoneally, intravenously, intradermally, intramuscularly, or a combination thereof.

43. The use according to claim 42, wherein the medicament is to be admistered via an injection device, wherein the injection device is soaked with the pharmaceutical composition prior to administration.

44. The use according to claim 43, wherein the injection device is selected from the group consisting of a needle, a cannula, a catheter, a suture, or a combination thereof.

45. The use according to claim 42, wherein the therapeutic amount of the MK2 polypeptide

inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof for intradermal injection ranges from 50 ng/100 µl/linear centimeter of wound margin to 500 ng/100 µl/linear centimeter of wound margin.

46. The use according to claim 42, wherein the therapeutic amount of the MK2 polypeptide *inhibitor of the amino acid sequence* YARAAARQARAKALARQLGVAA *(SEQ ID NO: 1) or a* functional equivalent thereof for intraperitoneal administration ranges from 70 µg/kg to 80 µg/kg.

47. The use according to claim 21, wherein the medicament is to be admistered in a single dose at one time.

48. The use according to claim 21, wherein the medicament is to be admistered in a plurality of doses for a period of at least one day, at least one week, at least one month, at least one year, or a combination thereof.

49. The use according to claim 48, wherein the medicament is to be admistered at least once daily, at least once weekly, or at least once monthly.

50. The use according to claim 21, wherein the medical composition further comprises at least one additional therapeutic agent selected from the group consisting of an anti-inflammatory agent, an analgesic agent, an anti-infective agent, or a combination thereof.

51. The use according to claim 50, wherein the additional therapeutic agent comprises EXC001 (an anti-sense RNA against connective tissue growth factor (CTGF)), AZX100 (a phosphopeptide analog of Heat Shock Protein 20 (HSP20)), PRM-151 (recombinant human serum amyloid P/Pentaxin 2), PXL01 (a synthetic peptide derived from human lactoferrin), DSC127 (an angiotensin analog), RXI-109 (a self-delivering RNAi compound that targets connective tissue growth factor (CTGF)), TCA (trichloroacetic acid), Botulium toxin type A, or a combination thereof.

52. The use according to claim 50, wherein the additional therapeutic agent is selected from the group consisting of rose hip oil, vitamin E, 5-fluorouracil, bleomycin, onion extract, pentoxifylline, prolyl-4-hydroxylase, verapamil, tacrolimus, tamoxifen, tretinoin, colchicine,

tranilst, zinc, an antibiotic, and a combination thereof.

53. The use according to claim 21, wherein the administering is before, during, or after closing of the wound.

54. The use according to claim 53, wherein the closing of the wound is by means of at least one subcutaneous suture, at least one staple, at least one adhesive tape, a surgical adhesive, or a combination thereof.

55. The use according to claim 54, wherein the surgical adhesive comprises octyl-2-cyanoacrylate or fibrin tissue adhesive.

56. The use according to claim 21, wherein

the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide, wherein the first polypeptide comprises a protein transduction domain functionally equivalent to YARAAARQARA (SEQ ID NO: 11) and is a polypeptide of amino acid sequence selected from the group consisting of WLRRIKAWLRRIKA (SEQ ID NO: 12), WLRRIKA (SEQ ID NO: 13), YGRKKRRQRRR (SEQ ID NO: 14), WLRRIKAWLRRI (SEQ ID NO: 15), FAKLAARLYR (SEQ ID NO: 16), KAFAKLAARLYR (SEQ ID NO: 17), and HRRIKAWLKKI (SEQ ID NO: 18); and

the second polypeptide is of amino acid sequence KALARQLGVAA (SEQ ID NO: 2).

57. The use according to claim 21, wherein the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated Protein Kinase-Activated Protein Kinase 3 (MK3),.calcium/calmodulin-dependent protein kinase I (CaMKI), BDNF/NT-3 growth factors receptor (TrkB), or a combination thereof without substantially inhibiting an off-target protein.

58. The use according to claim 21, wherein the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1), Tumor Necrosis Factor-

α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

59. The use according to claim 21, wherein the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both.

60. The use according to claim 59, wherein the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof.

61. The use according to claim 21, wherein the progenitor cell is selected from the group consisting of a hematopoitic stem cell, a mesenchymal stem cell, or a combination thereof.

62. The use according to claim 21, wherein the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a pyrrolopyridone analogue or a multicyclic lactam analogue.

63. A dressing for use in treating a cutaneous scar in a subject in need thereof, wherein

the subject in need thereof has suffered a wound,

the dressing comprises a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof whose thereapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2), and a pharmaceutically acceptable carrier,

and the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

64. The dressing according to claim 63, wherein the dressing is selected from the group consisting of a gauze dressing, a tulle dressing, an alginate dressing, a polyurethane dressing, a silicone foam dressing, a collagen dressing, a synthetic polymer scaffold, peptide-soaked sutures or a combination thereof.

65. The dressing according to claim 63, wherein the dressing is an occlusive dressing selected from the group consisting of a film dressing, a semi-permeable film dressing, a hydrogel dressing, a hydrocolloid dressing, and a combination thereof.

66. The dressing according to claim 63, wherein the dressing further comprises a dermal substitute embedded in or on a surface of the dressing with the pharmaceutical composition, and wherein the dermal substitute provides a three-dimensional extracellular scaffold.

67. The dressing according to claim 66, wherein the dermal substitute is made of a natural biological material, a constructive biological material, or a synthetic material.

68. The dressing according to claim 67, wherein the natural biological material comprises human cadaver skin, porcine cadaver skin, or porcine small intestine submucosa.

69. The dressing according to claim 67, wherein the natural biological material comprises a matrix.

70. The dressing according to claim 67, wherein the natural biological material consists essentially of a matrix that is sufficiently devoid of cell remnants.

71. The dressing according to claim 67, wherein the constructive biological material comprises collagen, glycosaminoglycan, fibronectin, hyaluonic acid, elastine, or a combination thereof.

72. The dressing according to claim 67, wherein the constructive biological material is a bilayer, non-cellularized dermal regeneration template or a single layer, cellularized dermal regeneration template.

73. The dressing according to claim 67, wherein the synthetic dermal substitute comprises a hydrogel.

74. The dressing according to claim 67, wherein the synthetic dermal substitute further comprises an RGD peptide with amino acid sequence Arginine-Glycine-Aspartate.

75. The dressing according to claim 63, wherein the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof.

76. The dressing according to claim 63, wherein the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof.

77. The dressing according to claim 76, wherein the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof.

78. The dressing according to claim 76, wherein the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof.

79. The dressing according to claim 76, wherein the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof.

80. The dressing according to claim 79, wherein the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

81. The dressing according to claim 63, wherein the dressing is a mechano-active dressing further comprising an anti-infective agent, a growth factor, a vitamin, a clotting agent, or a combination thereof.

82. The dressing according to claim 63, wherein the pharmaceutical composition further comprises at least one additional therapeutic agent selected from the group consisting of an anti-inflammatory agent, an analgesic agent, an anti-infective agent, or a combination thereof.

83. The dressing according to claim 82, wherein the additional therapeutic agent comprises

EXC001 (an anti-sense RNA against connective tissue growth factor (CTGF)), AZX100 (a phosphopeptide analog of Heat Shock Protein 20 (HSP20)), PRM-151 (recombinant human serum amyloid P/Pentaxin 2), PXL01 (a synthetic peptide derived from human lactoferrin), DSC127 (an angiotensin analog), RXI-109 (a self-delivering RNAi compound that targets connective tissue growth factor (CTGF)), TCA (trichloroacetic acid), Botulium toxin type A, or a combination thereof.

84. The dressing according to claim 82, wherein the additional therapeutic agent is selected from the group consisting of rose hip oil, vitamin E, 5-fluorouracil, bleomycin, onion extract, pentoxifylline, prolyl-4-hydroxylase, verapamil, tacrolimus, tamoxifen, tretinoin, colchicine, tranilst, zinc, an antibiotic, and a combination thereof.

85. The dressing according to claim 63, wherein the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide, wherein

the first polypeptide comprises a protein transduction domain functionally equivalent to YARAAARQARA (SEQ ID NO: 11) and is a polypeptide of amino acid sequence selected from the group consisting of WLRRIKAWLRRIKA (SEQ ID NO: 12), WLRRIKA (SEQ ID NO: 13), YGRKKRRQRRR (SEQ ID NO: 14), WLRRIKAWLRRI (SEQ ID NO: 15), FAKLAARLYR (SEQ ID NO: 16), KAFAKLAARLYR (SEQ ID NO: 17), and HRRIKAWLKKI (SEQ ID NO: 18); and

the second polypeptide is of amino acid sequence KALARQLGVAA (SEQ ID NO: 2).

86. The dressing according to claim 63, wherein the pharmaceutically acceptable carrier is a controlled release carrier.

87. The dressing according to claim 63, wherein the pharmaceutically acceptable carrier comprises particles.

88. The dressing according to claim 63, wherein the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated

Protein Kinase-Activated Protein Kinase 3 (MK3),.calcium/calmodulin-dependent protein kinase I (CaMKI), BDNF/NT-3 growth factors receptor (TrkB), or a combination thereof without substantially inhibiting an off-target protein.

89. The dressing according to claim 63, wherein the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1), Tumor Necrosis Factor-α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

90. The dressing according to claim 63, wherein the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both.

91. The dressing according to claim 90, wherein the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof.

92. The dressing according to claim 90, wherein the progenitor cell is selected from the group consisting of a hematopoitic stem cell, a mesenchymal stem cell, or a combination thereof.

93. The dressing according to claim 63, wherein the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a pyrrolopyridone analogue or a multicyclic lactam analogue.

94. The pharmaceutical composition according to claim 1, wherein the functional equivalent whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2) is selected from the group consisting of FAKLAARLYRKALARQLGVAA (SEQ ID NO: 3), KAFAKLAARLYRKALARQLGVAA (SEQ ID NO: 4) and HRRIKAWLKKIKALARQLGVAA (SEQ ID NO: 7).

95. The pharmaceutical composition according to claim 21, wherein the functional equivalent

whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2) is selected from the group consisting of FAKLAARLYRKALARQLGVAA (SEQ ID NO: 3), KAFAKLAARLYRKALARQLGVAA (SEQ ID NO: 4) and HRRIKAWLKKIKALARQLGVAA (SEQ ID NO: 7).

96. The dressing according to claim 63, wherein the functional equivalent whose therapeutic domain has an amino acid sequence KALARQLGVAA (SEQ ID NO: 2) is selected from the group consisting of FAKLAARLYRKALARQLGVAA (SEQ ID NO: 3), KAFAKLAARLYRKALARQLGVAA (SEQ ID NO: 4) and HRRIKAWLKKIKALARQLGVAA (SEQ ID NO: 7).

CLAIMS

What is claimed is:

1. A pharmaceutical composition for use in treating a cutaneous scar in a subject in need thereof, comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof, and a pharmaceutically acceptable carrier, wherein

the subject in need thereof has suffered a wound, and

the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

2. The pharmaceutical composition according to claim 1, wherein the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof.

3. The pharmaceutical composition according to claim 1, wherein the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof.

4. The pharmaceutical composition according to claim 3, wherein the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof.

5. The pharmaceutical composition according to claim 3, wherein the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof.

6. The pharmaceutical composition according to claim 3, wherein the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a

burn, an ulcer, an autoimmune skin disorder, or a combination thereof.

7. The pharmaceutical composition according to claim 6, wherein the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

8. The pharmaceutical composition according to claim 1, wherein the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated Protein Kinase-Activated Protein Kinase 3 (MK3),.calcium/calmodulin-dependent protein kinase I (CaMKI), BDNF/NT-3 growth factors receptor (TrkB), or a combination thereof without substantially inhibiting an off-target protein.

9. The pharmaceutical composition according to claim 1, wherein the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both.

10. The pharmaceutical composition according to claim 9, wherein the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof.

11. The pharmaceutical composition according to claim 9, wherein the progenitor cell is selected from the group consisting of a hematopoitic stem cell, a mesenchymal stem cell, or a combination thereof.

12. The pharmaceutical composition according to claim 1, wherein the pharmaceutical composition further comprises at least one additional therapeutic agent selected from the group consisting of an anti-inflammatory agent, an analgesic agent, an anti-infective agent, or a combination thereof.

13. The pharmaceutical composition according to claim 12, wherein the additional therapeutic agent comprises EXC001 (an anti-sense RNA against connective tissue growth factor

(CTGF)), AZX100 (a phosphopeptide analog of Heat Shock Protein 20 (HSP20)), PRM-151 (recombinant human serum amyloid P/Pentaxin 2), PXL01 (a synthetic peptide derived from human lactoferrin), DSC127 (an angiotensin analog), RXI-109 (a self-delivering RNAi compound that targets connective tissue growth factor (CTGF)), TCA (trichloroacetic acid), Botulium toxin type A, or a combination thereof.

14. The pharmaceutical composition according to claim 12, wherein the additional therapeutic agent is selected from the group consisting of rose hip oil, vitamin E, 5-fluorouracil, bleomycin, onion extract, pentoxifylline, prolyl-4-hydroxylase, verapamil, tacrolimus, tamoxifen, tretinoin, colchicine, tranilst, zinc, an antibiotic, and a combination thereof.

15. The pharmaceutical composition according to claim 1, wherein the functional equivalent of the MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) has at least 80 percent sequence identity to amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1); and is a polypeptide of amino acid sequence selected from the group consisting of YARAAARQARAKALNRQLGVA (SEQ ID NO: 19), FAKLAARLYRKALARQLGVAA (SEQ ID NO: 3), KAFAKLAARLYRKALARQLGVAA (SEQ ID NO: 4), YARAAARQARAKALARQLAVA (SEQ ID NO: 5), YARAAARQARAKALARQLGVA (SEQ ID NO: 6), or HRRIKAWLKKIKALARQLGVAA (SEQ ID NO: 7).

16. The pharmaceutical composition according to claim 1, wherein

the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide,

the first polypeptide is of amino acid sequence YARAAARQARA (SEQ ID NO: 11), and

the second polypeptide comprises a therapeutic domain whose sequence has at least 70 percent sequence identity to amino acid sequence KALARQLGVAA (SEQ ID NO: 2) and is selected from the group consisting of a polypeptide of amino acid sequence KALARQLAVA (SEQ ID NO: 8), a polypeptide of amino acid sequence KALARQLGVA (SEQ ID NO: 9), a polypeptide of amino acid sequence KALARQLGVAA (SEQ ID NO: 10).

17. The pharmaceutical composition according to claim 1, wherein the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide, wherein

the first polypeptide comprises a protein transduction domain functionally equivalent to YARAAARQARA (SEQ ID NO: 11) and is a polypeptide of amino acid sequence selected from the group consisting of WLRRIKAWLRRIKA (SEQ ID NO: 12), WLRRIKA (SEQ ID NO: 13), YGRKKRRQRRR (SEQ ID NO: 14), WLRRIKAWLRRI (SEQ ID NO: 15), FAKLAARLYR (SEQ ID NO: 16), KAFAKLAARLYR (SEQ ID NO: 17), and HRRIKAWLKKI (SEQ ID NO: 18); and

the second polypeptide is of amino acid sequence KALARQLGVAA (SEQ ID NO: 2).

18. The pharmaceutical composition according to claim 1, wherein the pharmaceutically acceptable carrier is a controlled release carrier.

19. The pharmaceutical composition according to claim 1, wherein the pharmaceutically acceptable carrier comprises particles.

20. The pharmaceutical composition according to claim 1, wherein the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1), Tumor Necrosis Factor-α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

21. The pharmaceutical composition according to claim 1, wherein the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a pyrrolopyridone analogue or a multicyclic lactam analogue.

22. The pharmaceutical composition according to claim 1, wherein the therapeutic amount of the MK2 polypeptide inhibitor of the pharmaceutical composition is of an amount from about 0.000001 mg/kg body weight to about 100 mg/kg body weight.

23. A method for treating a cutaneous scar in a subject in need thereof, wherein the subject in need thereof has suffered a wound, comprising

administering to the subject a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof, and a pharmaceutically acceptable carrier, wherein

the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

24. The method according to claim 23, wherein the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof.

25. The method according to claim 23, wherein the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof.

26. The method according to claim 25, wherein the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof.

27. The method according to claim 25, wherein the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof.

28. The method according to claim 25, wherein the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof.

29. The method according to claim 28, wherein the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis

(scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

30. The method according to claim 23, wherein the administering is topically.

31. The method according to claim 30, wherein the administering is by means of a dressing comprising the pharmaceutical composition.

32. The method according to claim 31, wherein at least one surface of the dressing is impregnated with the pharmaceutical composition.

33. The method according to claim 31, wherein the dressing is selected from the group consisting of a gauze dressing, a tulle dressing, an alginate dressing, a polyurethane dressing, a silicone foam dressing, a synthetic polymer scaffold dressing, or a combination thereof.

34. The method according to claim 31, wherein the dressing is an occlusive dressing selected from the group consisting of a film dressing, a semi-permeable film dressing, a hydrogel dressing, a hydrocolloid dressing, and a combination thereof.

35. The method according to claim 30, wherein the administering is by means of a dermal substitute, wherein the pharmaceutical composition is embedded in a dermal substitute that provides a three dimensional scaffold.

36. The method according to claim 35, wherein the dermal substitute is made of a natural biological material, a constructive biological material, or a synthetic material.

37. The method according to claim 36, wherein the natural biological material comprises human cadaver skin, porcine cadaver skin, or porcine small intestine submucosa.

38. The method according to claim 36, wherein the natural biological material comprises a matrix.

39. The method according to claim 36, wherein the natural biological material consists essentially of a matrix that is sufficiently devoid of cell remnants.

40. The method according to claim 36, wherein the constructive biological material comprises collagen, glycosaminoglycan, fibronectin, hyaluonic acid, elastine, or a combination

thereof.

41. The method according to claim 36, wherein the constructive biological material is a bilayer, non-cellularized dermal regeneration template or a single layer, cellularized dermal regeneration template.

42. The method according to claim 36, wherein the synthetic dermal substitute comprises a hydrogel.

43. The method according to claim 36, wherein the synthetic dermal substitute further comprises an RGD peptide with amino acid sequence Arginine-Glycine-Aspartate.

44. The method according to claim 23, wherein the administering is intraperitoneally. intravenously, intradermally, intramuscularly, or a combination thereof.

45. The method according to claim 44, wherein the administering is via an injection device, wherein the injection device is soaked with the pharmaceutical composition prior to administration.

46. The method according to claim 45, wherein the injection device is selected from the group consisting of a needle, a cannula, a catheter, a suture, or a combination thereof.

47. The method according to claim 44, wherein the therapeutic amount of the MK2 polypeptide inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof for intradermal injection ranges from 50 ng/100 µl/linear centimeter of wound margin to 500 ng/100 µl/linear centimeter of wound margin.

48. The method according to claim 44, wherein the therapeutic amount of the MK2 polypeptide inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof for intraperitoneal administration ranges from 70 µg/kg to 80 µg/kg.

49. The method according to claim 23, wherein the administering is in a single dose at one time.

50. The method according to claim 23, wherein the administering is in a plurality of doses for a period of at least one day, at least one week, at least one month, at least one year, or a combination thereof.

51. The method according to claim 50, wherein the administering is at least once daily, at least once weekly, or at least once monthly.

52. The method according to claim 23, wherein the pharmaceutical composition further comprises at least one additional therapeutic agent selected from the group consisting of an anti-inflammatory agent, an analgesic agent, an anti-infective agent, or a combination thereof.

53. The method according to claim 52, wherein the additional therapeutic agent comprises EXC001 (an anti-sense RNA against connective tissue growth factor (CTGF)), AZX100 (a phosphopeptide analog of Heat Shock Protein 20 (HSP20)), PRM-151 (recombinant human serum amyloid P/Pentaxin 2), PXL01 (a synthetic peptide derived from human lactoferrin), DSC127 (an angiotensin analog), RXI-109 (a self-delivering RNAi compound that targets connective tissue growth factor (CTGF)), TCA (trichloroacetic acid), Botulium toxin type A, or a combination thereof.

54. The method according to claim 52, wherein the additional therapeutic agent is selected from the group consisting of rose hip oil, vitamin E, 5-fluorouracil, bleomycin, onion extract, pentoxifylline, prolyl-4-hydroxylase, verapamil, tacrolimus, tamoxifen, tretinoin, colchicine, tranilst, zinc, an antibiotic, and a combination thereof.

55. The method according to claim 23, wherein the administering is before, during, or after closing of the wound.

56. The method according to claim 55, wherein the closing of the wound is by means of at least one subcutaneous suture, at least one staple, at least one adhesive tape, a surgical adhesive, or a combination thereof.

57. The method according to claim 56, wherein the surgical adhesive comprises octyl-2-cyanoacrylate or fibrin tissue adhesive.

58. The method according to claim 23, wherein the functional equivalent of the MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) has at least 80 percent sequence identity to amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1); and is a polypeptide of amino acid sequence selected from the group consisting of YARAAARQARAKALNRQLGVA (SEQ ID NO: 19), FAKLAARLYRKALARQLGVAA (SEQ ID NO: 3), KAFAKLAARLYRKALARQLGVAA (SEQ ID NO: 4), YARAAARQARAKALARQLAVA (SEQ ID NO: 5), YARAAARQARAKALARQLGVA (SEQ ID NO: 6), or HRRIKAWLKKIKALARQLGVAA (SEQ ID NO: 7).

59. The method according to claim 23, wherein

the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide,

the first polypeptide is of amino acid sequence YARAAARQARA (SEQ ID NO: 11), and

the second polypeptide comprises a therapeutic domain whose sequence has at least 70 percent sequence identity to amino acid sequence KALARQLGVAA (SEQ ID NO: 2) and is selected from the group consisting of a polypeptide of amino acid sequence KALARQLAVA (SEQ ID NO: 8), a polypeptide of amino acid sequence KALARQLGVA (SEQ ID NO: 9), a polypeptide of amino acid sequence KALARQLGVAA (SEQ ID NO: 10).

60. The method according to claim 23, wherein

the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide, wherein the first polypeptide comprises a protein transduction domain functionally equivalent to YARAAARQARA (SEQ ID NO: 11) and is a polypeptide of amino acid sequence selected from the group consisting of WLRRIKAWLRRIKA (SEQ ID NO: 12), WLRRIKA

(SEQ ID NO: 13), YGRKKRRQRRR (SEQ ID NO: 14), WLRRIKAWLRRI (SEQ ID NO: 15), FAKLAARLYR (SEQ ID NO: 16), KAFAKLAARLYR (SEQ ID NO: 17), and HRRIKAWLKKI (SEQ ID NO: 18); and

the second polypeptide is of amino acid sequence KALARQLGVAA (SEQ ID NO: 2).

61. The method according to claim 23, wherein the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated Protein Kinase-Activated Protein Kinase 3 (MK3),.calcium/calmodulin-dependent protein kinase I (CaMKI), BDNF/NT-3 growth factors receptor (TrkB), or a combination thereof without substantially inhibiting an off-target protein.

62. The method according to claim 23, wherein the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1), Tumor Necrosis Factor-α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

63. The method according to claim 23, wherein the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both.

64. The method according to claim 42, wherein the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof.

65. The method according to claim 23, wherein the progenitor cell is selected from the group consisting of a hematopoitic stem cell, a mesenchymal stem cell, or a combination thereof.

66. The method according to claim 23, wherein the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a

pyrrolopyridone analogue or a multicyclic lactam analogue.

67. A dressing for use in treating a cutaneous scar in a subject in need thereof, wherein

the subject in need thereof has suffered a wound,

the dressing comprises a pharmaceutical composition comprising a therapeutic amount of a Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2) inhibitor comprising an MK2 polypeptide inhibitor of the amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) or a functional equivalent thereof, and a pharmaceutically acceptable carrier,

and the therapeutic amount is effective (a) to reduce incidence, severity, or both, of the cutaneous scar without impairing normal wound healing and (b) to treat the cutaneous scar in the subject, such that at least one of the wound size, scar area, and collagen whorl formation in the wound is reduced compared to the control.

68. The dressing according to claim 67, wherein the dressing is selected from the group consisting of a gauze dressing, a tulle dressing, an alginate dressing, a polyurethane dressing, a silicone foam dressing, a collagen dressing, a synthetic polymer scaffold, peptide-soaked sutures or a combination thereof.

69. The dressing according to claim 67, wherein the dressing is an occlusive dressing selected from the group consisting of a film dressing, a semi-permeable film dressing, a hydrogel dressing, a hydrocolloid dressing, and a combination thereof.

70. The dressing according to claim 67, wherein the dressing further comprises a dermal substitute embedded in or on a surface of the dressing with the pharmaceutical composition, and wherein the dermal substitute provides a three-dimensional extracellular scaffold.

71. The dressing according to claim 70, wherein the dermal substitute is made of a natural biological material, a constructive biological material, or a synthetic material.

72. The dressing according to claim 71, wherein the natural biological material comprises human cadaver skin, porcine cadaver skin, or porcine small intestine submucosa.

73. The dressing according to claim 71, wherein the natural biological material comprises a matrix.

74. The dressing according to claim 71, wherein the natural biological material consists essentially of a matrix that is sufficiently devoid of cell remnants.

75. The dressing according to claim 71, wherein the constructive biological material comprises collagen, glycosaminoglycan, fibronectin, hyaluonic acid, elastine, or a combination thereof.

76. The dressing according to claim 71, wherein the constructive biological material is a bilayer, non-cellularized dermal regeneration template or a single layer, cellularized dermal regeneration template.

77. The dressing according to claim 71, wherein the synthetic dermal substitute comprises a hydrogel.

78. The dressing according to claim 71, wherein the synthetic dermal substitute further comprises an RGD peptide with amino acid sequence Arginine-Glycine-Aspartate.

79. The dressing according to claim 67, wherein the wound is an abrasion, a laceration, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an incisional wound, a high-tension wound, or a combination thereof.

80. The dressing according to claim 67, wherein the cutaneous scar is a pathological scar, an incisional scar, or a combination thereof.

81. The dressing according to claim 80, wherein the pathological scar is selected from the group consisting of a hypertrophic scar, a keloid, an atrophic scar, a scar contracture, or a combination thereof.

82. The dressing according to claim 80, wherein the pathological scar results from a high-tension wound located in close proximity to a joint comprising a knee, an elbow, a wrist, a shoulder, a hip, a spine, or a combination thereof.

83. The dressing according to claim 80, wherein the pathological scar results from an abrasion, a laceration, an incision, a crush, a contusion, a puncture, an avulsion, a burn, an ulcer, an autoimmune skin disorder, or a combination thereof.

84. The dressing according to claim 83, wherein the autoimmune skin disorder is selected from the group consisting of systemic lupus erythematosus (SLE), systemic sclerosis (scleroderma), pemphigus, vitiligo, dermatitis herpetiformis, psoriasis, or a combination thereof.

85. The dressing according to claim 67, wherein the dressing is a mechano-active dressing further comprising an anti-infective agent, a growth factor, a vitamin, a clotting agent, or a combination thereof.

86. The dressing according to claim 67, wherein the pharmaceutical composition further comprises at least one additional therapeutic agent selected from the group consisting of an anti-inflammatory agent, an analgesic agent, an anti-infective agent, or a combination thereof.

87. The dressing according to claim 86, wherein the additional therapeutic agent comprises EXC001 (an anti-sense RNA against connective tissue growth factor (CTGF)), AZX100 (a phosphopeptide analog of Heat Shock Protein 20 (HSP20)), PRM-151 (recombinant human serum amyloid P/Pentaxin 2), PXL01 (a synthetic peptide derived from human lactoferrin), DSC127 (an angiotensin analog), RXI-109 (a self-delivering RNAi compound that targets connective tissue growth factor (CTGF)), TCA (trichloroacetic acid), Botulium toxin type A, or a combination thereof.

88. The dressing according to claim 65, wherein the additional therapeutic agent is selected from the group consisting of rose hip oil, vitamin E, 5-fluorouracil, bleomycin, onion extract, pentoxifylline, prolyl-4-hydroxylase, verapamil, tacrolimus, tamoxifen, tretinoin, colchicine, tranilst, zinc, an antibiotic, and a combination thereof.

89. The dressing according to claim 67, wherein the functional equivalent of the MK2 polypeptide inhibitor of amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) has at least 80 percent sequence identity to amino acid sequence YARAAARQARAKALARQLGVAA (SEQ ID NO: 1); and is a polypeptide of amino acid sequence selected from the group consisting of YARAAARQARAKALNRQLGVA (SEQ ID

NO: 19), FAKLAARLYRKALARQLGVAA (SEQ ID NO: 3), KAFAKLAARLYRKALARQLGVAA (SEQ ID NO: 4), YARAAARQARAKALARQLAVA (SEQ ID NO: 5), YARAAARQARAKALARQLGVA (SEQ ID NO: 6), or HRRIKAWLKKIKALARQLGVAA (SEQ ID NO: 7).

90. The dressing according to claim 67, wherein

the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide,

the first polypeptide is of amino acid sequence YARAAARQARA (SEQ ID NO: 11), and

the second polypeptide comprises a therapeutic domain whose sequence has at least 70 percent sequence identity to amino acid sequence KALARQLGVAA (SEQ ID NO: 2) and is selected from the group consisting of a polypeptide of amino acid sequence KALARQLAVA (SEQ ID NO: 8), a polypeptide of amino acid sequence KALARQLGVA (SEQ ID NO: 9), a polypeptide of amino acid sequence KALARQLGVAA (SEQ ID NO: 10).

91. The dressing according to claim 67, wherein the functional equivalent of the polypeptide YARAAARQARAKALARQLGVAA (SEQ ID NO: 1) is a fusion peptide comprising a first polypeptide operatively linked to a second polypeptide, wherein

the first polypeptide comprises a protein transduction domain functionally equivalent to YARAAARQARA (SEQ ID NO: 11) and is a polypeptide of amino acid sequence selected from the group consisting of WLRRIKAWLRRIKA (SEQ ID NO: 12), WLRRIKA (SEQ ID NO: 13), YGRKKRRQRRR (SEQ ID NO: 14), WLRRIKAWLRRI (SEQ ID NO: 15), FAKLAARLYR (SEQ ID NO: 16), KAFAKLAARLYR (SEQ ID NO: 17), and HRRIKAWLKKI (SEQ ID NO: 18); and

the second polypeptide is of amino acid sequence KALARQLGVAA (SEQ ID NO: 2).

92. The dressing according to claim 67, wherein the pharmaceutically acceptable carrier is a

controlled release carrier.

93. The dressing according to claim 67, wherein the pharmaceutically acceptable carrier comprises particles.

94. The dressing according to claim 67, wherein the therapeutic amount is effective to inhibit at least 65% of a kinase activity of at least one kinase selected from the group consisting of Mitogen-Activated Protein Kinase-Activated Protein Kinase 2 (MK2), Mitogen-Activated Protein Kinase-Activated Protein Kinase 3 (MK3),.calcium/calmodulin-dependent protein kinase I (CaMKI), BDNF/NT-3 growth factors receptor (TrkB), or a combination thereof without substantially inhibiting an off-target protein.

95. The dressing according to claim 67, wherein the therapeutic amount is effective to modulate an expression level of at least one scar-related gene or scar-related protein in a wound selected from the group consisting of Transforming Growth Factor-β1 (TGF-β1), Tumor Necrosis Factor-α (TNF-α), a collagen, Interleukin-6 (IL-6), chemokine (C-C motif) ligand 2 (CCL2) (or monocyte chemotactic protein-1 (MCP-1)), chemokine (C-C motif) receptor 2 (CCR2), EGF-like module-containing mucin-like hormone receptor-like 1 (EMR1), or a sma/mad-related protein (SMAD).

96. The dressing according to claim 67, wherein the therapeutic amount is effective to reduce either a level of transforming growth factor-β (TGF-β) expression in the wound; or number of at least one immunomodulatory cell or a progenitor cell infiltrating into the wound, or both.

97. The dressing according to claim 96, wherein the immunomodulatory cell is selected from the group consisting of a monocyte, a mast cell, a dendritic cell, a macrophage, a T-lymphocyte, a fibrocyte, or a combination thereof.

98. The dressing according to claim 96, wherein the progenitor cell is selected from the group consisting of a hematopoitic stem cell, a mesenchymal stem cell, or a combination thereof.

99. The dressing according to claim 67, wherein the pharmaceutical composition further comprises a small molecule MK2 inhibitor, wherein the small molecule MK2 inhibitor is a pyrrolopyridone analogue or a multicyclic lactam analogue.