

CLAIMS

What is claimed is:

1. A peptide comprising an amino acid sequence of SEQ. ID. NO: 27.
2. The peptide of claim 1, further comprising a N-terminal leader peptide having the sequence of SEQ. ID. No: 7.
3. The peptide of claim 1, further comprising a linker peptide at the C-terminus.
4. The peptide of claim 3, wherein the linker peptide comprises the sequence of (GGGS)_n, wherein n is 1, 2, 3, or 4.
5. The peptide of claim 4, wherein n is 1.
6. The peptide of claim 4, wherein n is 2.
7. The peptide of claim 4, wherein n is 3.
8. The peptide of claim 4, wherein n is 4.
9. The peptide of claim 1, further comprising a Fc peptide.
10. The peptide of claim 9, wherein the Fc peptide comprises the sequence of SEQ ID NO: 8 or SEQ ID NO: 15.
11. The peptide of claim 9, further comprising a leader peptide having the sequence of SEQ. ID. No: 7 at the N-terminus.
12. The peptide of claim 9, wherein the Fc peptide is at the C-terminus.
13. The peptide of claim 9, wherein the Fc peptide is at the N-terminus.
14. The peptide of claim 1, further comprising a linker peptide that links the peptide of SEQ ID NO: 27 and a Fc peptide.
15. The peptide of claim 14, further comprising a leader peptide having the sequence of SEQ. ID. No: 7 at the N-terminus.
16. The peptide of claim 14, wherein the linker peptide is (GGGS)_n, n is 1, 2, 3, or 4.
17. The peptide of claim 16, wherein n is 4.

18. The peptide of claim 14, wherein the Fc peptide comprises the sequence of SEQ ID NO: 8 or SEQ ID NO: 15.
19. The peptide of claim 14, wherein the Fc peptide is at the C-terminus.
20. The peptide of claim 14, wherein the Fc peptide is at the N-terminus.
21. The peptide of claim 14, wherein the peptide comprises a peptide comprising the sequence of SEQ ID NO: 40.
22. A pharmaceutical composition comprising a peptide of claim 1.
23. A pharmaceutical composition comprising a peptide of claim 14.
24. A pharmaceutical composition comprising a peptide of claim 19.
25. A pharmaceutical composition comprising a peptide of claim 24.
26. A peptide comprising an amino acid sequence of SEQ. ID. NO: 26.
27. The peptide of claim 16, further comprising a N-terminal leader peptide having the sequence of SEQ. ID. No: 7.
28. The peptide of claim 26, further comprising a linker peptide at the C-terminus.
29. The peptide of claim 28, wherein the linker peptide comprises the sequence of (GGGGS)_n, wherein n is 1, 2, 3, or 4.
30. The peptide of claim 29, wherein n is 1.
31. The peptide of claim 29, wherein n is 2.
32. The peptide of claim 29, wherein n is 3.
33. The peptide of claim 29, wherein n is 4.
34. The peptide of claim 26, further comprising a Fc peptide.
35. The peptide of claim 34, wherein the Fc peptide comprises the sequence of SEQ ID NO: 8 or SEQ ID NO: 15.
36. The peptide of claim 34, further comprising a leader peptide having the sequence of SEQ. ID. No: 7 at the N-terminus.
37. The peptide of claim 34, wherein the Fc peptide is at the C-terminus.

38. The peptide of claim 34, wherein the Fc peptide is at the N-terminus.
39. The peptide of claim 26, further comprising a linker peptide that links the peptide of SEQ ID NO: 26 and a Fc peptide.
40. The peptide of claim 39, further comprising a leader peptide having the sequence of SEQ. ID. No: 7 at the N-terminus.
41. The peptide of claim 49, wherein the linker peptide is (GGGS)_n, n is 1, 2, 3, or 4.
42. The peptide of claim 42, wherein n is 4.
43. The peptide of claim 39, wherein the Fc peptide comprises the sequence of SEQ ID NO: 8 or SEQ ID NO: 15.
44. The peptide of claim 39, wherein the Fc peptide is at the C-terminus.
45. The peptide of claim 39, wherein the Fc peptide is at the N-terminus.
46. The peptide of claim 39, wherein the peptide comprises a peptide comprising the sequence of SEQ ID NO: 39.
47. A pharmaceutical composition comprising a peptide of claim 25.
48. A pharmaceutical composition comprising a peptide of claim 39.
49. A pharmaceutical composition comprising a peptide of claim 43.
50. A pharmaceutical composition comprising a peptide of claim 46.
51. A method of activating T regulatory cells, the method comprising contacting a T regulatory cell with a peptide of any one of claims 1-47 or the pharmaceutical composition of any one of claims 47-50.
52. A method of treating an inflammatory disorder in a subject, said method comprising administering to a subject in need thereof a therapeutically effective amount of a peptide of any one of claims 1-47 or the pharmaceutical composition of any one of claims 48-50.
53. The method of claim 52, wherein the inflammatory disorder is alopecia areata, atopic dermatitis, dermatitis herpetiformis, psoriasis, lupus, graft versus host disease (GVHD), inflammation, autoimmune disease, atopic diseases, paraneoplastic autoimmune diseases, cartilage inflammation, arthritis, rheumatoid arthritis, juvenile arthritis, juvenile rheumatoid

arthritis, pauciarticular juvenile rheumatoid arthritis, polyarticular juvenile rheumatoid arthritis, systemic onset juvenile rheumatoid arthritis, juvenile ankylosing spondylitis, juvenile enteropathic arthritis, juvenile reactive arthritis, juvenile Reiter's Syndrome, SEA Syndrome (Seronegativity, Enthesopathy, Arthropathy Syndrome), juvenile dermatomyositis, juvenile psoriatic arthritis, juvenile scleroderma, juvenile systemic lupus erythematosus, juvenile vasculitis, pauciarticular rheumatoid arthritis, polyarticular rheumatoid arthritis, systemic onset rheumatoid arthritis, ankylosing spondylitis, enteropathic arthritis, reactive arthritis, Reiter's Syndrome, SEA Syndrome (Seronegativity, Enthesopathy, Arthropathy Syndrome), dermatomyositis, psoriatic arthritis, scleroderma, vasculitis, myolitis, polymyolitis, dermatomyolitis, polyarteritis nodosa, Wegener's granulomatosis, arteritis, polymyalgia rheumatica, sarcoidosis, sclerosis, primary biliary sclerosis, sclerosing cholangitis, Sjogren's syndrome, plaque psoriasis, guttate psoriasis, inverse psoriasis, pustular psoriasis, erythrodermic psoriasis, dermatitis, atherosclerosis, Still's disease, Systemic Lupus Erythematosus (SLE), myasthenia gravis, inflammatory bowel disease (IBD), Crohn's disease, ulcerative colitis, celiac disease, multiple sclerosis (MS), asthma, COPD, rhinosinusitis, rhinosinusitis with polyps, eosinophilic esophagitis, eosinophilic bronchitis, Guillain-Barre disease, Type I diabetes mellitus, thyroiditis(e.g., Graves' disease), Addison's disease, Raynaud's phenomenon, autoimmune hepatitis, steroid refractory chronic graft versus host disease, transplantation rejection(e.g. kidney, lung, heart, skin, and the like), kidney damage, hepatitis C-induced vasculitis, spontaneous loss of pregnancy, alopecia, vitiligo, focal segmental glomerulosclerosis (FSGS), Minimal Change Disease, Membranous Nephropathy, ANCA Associated Glomerulonephropathy, Membranoproliferative Glomerulonephritis, IgA Nephropathy, lupus nephritis, and the like.

54. A method of promoting or stimulating STAT5 phosphorylation in T regulatory cells, said method administering to a subject in need thereof a therapeutically effective amount of a peptide of any one of claims 1-47 or the pharmaceutical composition of any one of claims 48-50.

55. Use of a peptide of any one of claims 1-47 or the pharmaceutical composition of any one of claims 48-50 in the preparation of a medicament for the treatment of an inflammatory disorder.

56. The use of claim 55, wherein the inflammatory disorder is alopecia areata, atopic dermatitis, dermatitis herpetiformis, psoriasis, lupus, graft versus host disease (GVHD),

inflammation, autoimmune disease, atopic diseases, paraneoplastic autoimmune diseases, cartilage inflammation, arthritis, rheumatoid arthritis, juvenile arthritis, juvenile rheumatoid arthritis, pauciarticular juvenile rheumatoid arthritis, polyarticular juvenile rheumatoid arthritis, systemic onset juvenile rheumatoid arthritis, juvenile ankylosing spondylitis, juvenile enteropathic arthritis, juvenile reactive arthritis, juvenile Reiter's Syndrome, SEA Syndrome (Seronegativity, Enthesopathy, Arthropathy Syndrome), juvenile dermatomyositis, juvenile psoriatic arthritis, juvenile scleroderma, juvenile systemic lupus erythematosus, juvenile vasculitis, pauciarticular rheumatoid arthritis, polyarticular rheumatoid arthritis, systemic onset rheumatoid arthritis, ankylosing spondylitis, enteropathic arthritis, reactive arthritis, Reiter's Syndrome, SEA Syndrome (Seronegativity, Enthesopathy, Arthropathy Syndrome), dermatomyositis, psoriatic arthritis, scleroderma, vasculitis, myolitis, polymyolitis, dermatomyolitis, polyarteritis nodosa, Wegener's granulomatosis, arteritis, polymyalgia rheumatica, sarcoidosis, sclerosis, primary biliary sclerosis, sclerosing cholangitis, Sjogren's syndrome, plaque psoriasis, guttate psoriasis, inverse psoriasis, pustular psoriasis, erythrodermic psoriasis, dermatitis, atherosclerosis, Still's disease, Systemic Lupus Erythematosus (SLE), myasthenia gravis, inflammatory bowel disease (IBD), Crohn's disease, ulcerative colitis, celiac disease, multiple sclerosis (MS), asthma, COPD, rhinosinusitis, rhinosinusitis with polyps, eosinophilic esophagitis, eosinophilic bronchitis, Guillain-Barre disease, Type I diabetes mellitus, thyroiditis(e.g., Graves' disease), Addison's disease, Raynaud's phenomenon, autoimmune hepatitis, steroid refractory chronic graft versus host disease, transplantation rejection(e.g. kidney, lung, heart, skin, and the like), kidney damage, hepatitis C-induced vasculitis, spontaneous loss of pregnancy, alopecia, vitiligo, focal segmental glomerulosclerosis (FSGS), Minimal Change Disease, Membranous Nephropathy, ANCA Associated Glomerulonephropathy, Membranoproliferative Glomerulonephritis, IgA Nephropathy, lupus nephritis, and the like.

57. A nucleic acid molecule encoding a peptide of any one of claims 1-47.
58. A vector comprising the nucleic acid molecule of claim 57.
59. A plasmid comprising the nucleic acid molecule of claim 57.
60. A cell comprising the nucleic acid molecule of embodiment 57.
61. A cell comprising the plasmid of claim 59.
62. A cell comprising the vector of claim 58.

63. A cell comprising or expressing a peptide of any one of claims 1-47 or a peptide as described herein.