CLAIMS

1. A method of rejuvenating cells, the method comprising transfecting cells with one or more non-integrative messenger RNAs encoding one or more cellular reprogramming factors for not more than five (5) continuous days, thereby producing rejuvenated cells.
2. The method of claim 1, wherein a transcriptomic profile of the rejuvenated cells becomes more similar to a transcriptomic profile of young cells.
3. The method of claim 2, wherein the transcriptomic profile of the rejuvenated cells comprises an increase in gene expression of one or more genes selected from RPL37, RHOA, SRSF3, EPHB4, ARHGAP18, RPL31, FKBP2, MAP1LC3B2, Elf1, Phf8, Pol2s2, Taf1 and Sin3a.
4. The method of claim 1, wherein the rejuvenated cells exhibit increased gene expression of one or more nuclear and/or epigenetic markers compared to a reference value.
5. The method of claim 4, wherein the marker is selected from HP1gamma, H3K9me3, lamina support protein LAP2alpha, and SIRT1 protein.
6. The method of claim 1, wherein the rejuvenated cells exhibit increased proteolytic activity compared to a reference value.
7. The method of claim 6, wherein increased proteolytic activity is measured as increased cell autophagosome formation, increased chymotrypsin-like proteasome activity, or a combination thereof.
8. The method of claim 1, wherein the rejuvenated cells exhibit improved mitochondria health and function compared to a reference value.
9. The method of claim 8, wherein improved mitochondria health and function is measured as increased mitochondria membrane potential, decreased reactive oxygen species (ROS), or a combination thereof.
10. The method of claim 1, wherein the rejuvenated cells exhibit decreased expression of one or more SASP cytokines compared to a reference value.
11. The method of claim 10, wherein the SASP cytokines comprise one or more of IL18, IL1A, GROA, IL22, and IL9.
12. The method of claims 1, wherein the rejuvenated cells exhibit reversal of the methylation landscape.

13. The method of claim 12, wherein reversal of the methylation landscape is measured by Horvath clock estimation.
14. The method of claim 4, wherein the reference value is obtained from an aged cell.
15. The method of claim 1, wherein transfecting the cells with the messenger RNAs comprises a method selected from lipofectamine and LT-1 mediated transfection, dextran-mediated transfection, calcium phosphate precipitation, polybrene mediated transfection, electroporation, encapsulation of the mRNAs in liposomes, and direct microinjection.
16. The method of claim 1, wherein the one or more cellular reprogramming factors are selected from OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG.
17. The method of claim 1, wherein the one or more cellular reprogramming factors comprise OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG.
18. The method of claim 1, wherein the cells are mammalian cells.
19. The method of claim 18, wherein the cells are human cells.
20. The method of claim 19, wherein the cells are from an elderly subject.
21. The method of 18, wherein the cells are selected from fibroblasts, endothelial cells, chondrocytes, skeletal muscle stem cells, keratinocytes, mesenchymal stem cells and corneal epithelial cells.
22. The method of claim 21 wherein the cells are mesenchymal stem cells.
23. The method of claim 22, wherein rejuvenated mesenchymal stem cells exhibit a reduction in senescence parameters (p16, p21 and positive SAβGal staining), increased cell proliferation, and/or a decrease in ROS levels.
24. The method of claim 1, wherein the method is performed *in vitro*, *ex vivo*, or *in vivo*.
25. The method of claim 24 wherein the method is performed *in vivo*.
26. The method of claim 25, wherein the cells are within a tissue or organ.
27. The method of claim 26, wherein the method reduces numbers of senescent cells within the tissue or organ.
28. The method of claim 27, wherein the method decreases expression of one or more of IL18, IL1A, GROA, IL22, and IL9.

29. The method of claim 1, wherein the method restores function, increases potency, enhances viability, increases replicative capacity or life span of the cells, or a combination thereof.
30. The method of claim 1, wherein said transfecting is performed once daily for 5 days.
31. The method of claim 1, wherein said transfecting is performed once daily for 4 days.
32. The method of claim 1, wherein said transfecting is performed once daily for 3 days.
33. The method of claim 1, wherein said transfecting is performed once daily for 2 days.
34. A method for treating a subject for an age-related disease or condition, a cartilage degeneration disorder, a neurodegenerative disorder, and/or musculoskeletal dysfunction, the method comprising administering a therapeutically effective amount of cells, wherein the cells comprise one or more non-integrative messenger RNAs encoding one or more cellular reprogramming factors.
35. The method of claim 34, wherein said one or more cellular reprogramming factors are selected from OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG.
36. The method of a claim 35, wherein the one or more cellular reprogramming factors comprise OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG.
37. The method of claim 34, wherein the subject has an age-related disease or condition.
38. The method of claim 34, wherein the age-related disease or condition is selected from an eye, skin, or musculoskeletal dysfunction.
39. The method of claim 34, wherein the subject has a cartilage degeneration disorder.
40. The method of claim 39, wherein the disorder is selected from arthritis, chondrophasia, spondyloarthropathy, ankylosing spondylitis, lupus erythematosus, relapsing polychondritis, and Sjogren's syndrome.
41. The method of claim 34, wherein treating reduces expression of inflammatory factors and/or and increases ATP and collagen metabolism.

42. The method of claim 41, wherein the inflammatory factors are selected from RANKL, iNOS2, IL6, IFNα, MCP3 and MIP1A.
43. The method of claim 42, wherein ATP and collagen metabolism is measured by one or more of increased ATP levels, decreased ROS and increased SOD2, increased COL2A1 and overall proliferation by the chondrocytes.
44. The method of claim 34, wherein the subject has a musculoskeletal dysfunction.
45. The method of claim 34, wherein administering a therapeutically effective amount of cells comprises injection or surgical implantation.
46. The method of claim 34, wherein the therapeutically effective amount of rejuvenated cells is selected from fibroblasts, endothelial cells, chondrocytes, skeletal muscle stem cells, keratinocytes, mesenchymal stem cells and corneal epithelial cells.
47. The method of claim 46 wherein the therapeutically effective amount of rejuvenated cells are corneal epithelial cells.
48. The method of claim 47, wherein the rejuvenated corneal epithelial exhibit a reduction in senescence parameters.
49. The method of claim 48, wherein the senescence parameters include one or more of expression of p21 and p16, mitochondria biogenesis PGC1α, and expression of inflammatory factor IL8.
50. A method for treating a subject for an age-related disease or condition, a cartilage degeneration disorder, and/or subject has a musculoskeletal dysfunction, the method comprising administering a therapeutically effective amount of one or more non-integrative messenger RNAs encoding one or more cellular reprogramming factors.
51. The method of claim 50, wherein said one or more cellular reprogramming factors are selected from OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG.
52. The method of claim 51, wherein the one or more cellular reprogramming factors comprise OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG.
53. The method of claim 50, wherein the subject has an age-related disease or condition.
54. The method of claim 53, wherein the age-related disease or condition is selected from an eye, skin, or musculoskeletal dysfunction.

55. The method of claim 50, wherein the subject has a cartilage degeneration disorder.
56. The method of claim 55, wherein the disorder is selected from arthritis, chondrophasia, spondyloarthropathy, ankylosing spondylitis, lupus erythematosus, relapsing polychondritis, and Sjogren's syndrome.
57. The method of claim 50, wherein the subject has a subject has a musculoskeletal dysfunction
58. The method of claim 50, wherein administering a therapeutically effective amount of one or more non-integrative messenger RNAs comprises direct injection into a target cell.
59. The method of claim 58 wherein the target cell is selected from epithelial cells, endothelial cells, connective tissue cells, muscle cells, and nervous system cells.
60. A method of rejuvenating engineered tissue *ex vivo*, the method comprising transfecting the tissue with one or more non-integrative messenger RNAs encoding one or more cellular reprogramming factors for not more than five (5) continuous days, thereby producing rejuvenated engineered tissue.
61. The method of claim 60, wherein the engineered tissue exhibits a reduction in senescence parameters, pro-inflammatory factors, improvements in histological score, or a combination thereof.
62. The method of claim 60, wherein the engineered tissue is engineered skin tissue.
63. The method of claim 61, wherein the senescence parameters are selected from p16 and positive SaβGal staining and pro-inflammatory factors IL8 and MMP1
64. The method of claim 61, wherein the histological score includes morphology, organization, and/or quality.
65. A pharmaceutical composition comprising rejuvenated cells, wherein the rejuvenated cells are obtained by transfecting cells with one or more non-integrative messenger RNAs encoding one or more cellular reprogramming factors for not more than five (5) continuous days.
66. The composition of claim 65, wherein the one or more cellular reprogramming factors are selected from OCT4, SOX2, KLF4, c-MYC, LIN28 and NANOG

67. The composition of claim 65, wherein the cells display one or more of the following: increased expression of HP1 gamma, H3K9me3, LAP2alpha, SIRT1, increased mitochondrial membrane potential and decreased reactive oxygen species, and decreased expression of SASP cytokines.

68. The composition of claim 67, wherein the SASP cytokines comprise one or more of IL18, IL1A, GROA, IL22, and IL9.

69. The composition of claim 65, further comprising one or more additional components selected from nutrients, cytokines, growth factors, extracellular matrix (ECM) components, antibiotics, anti-oxidants, and immunosuppressive agents.

70. The composition of claim 65, further comprising a pharmaceutically acceptable carrier.

71. The composition of claim 65, wherein the cells are autologous or allogeneic.