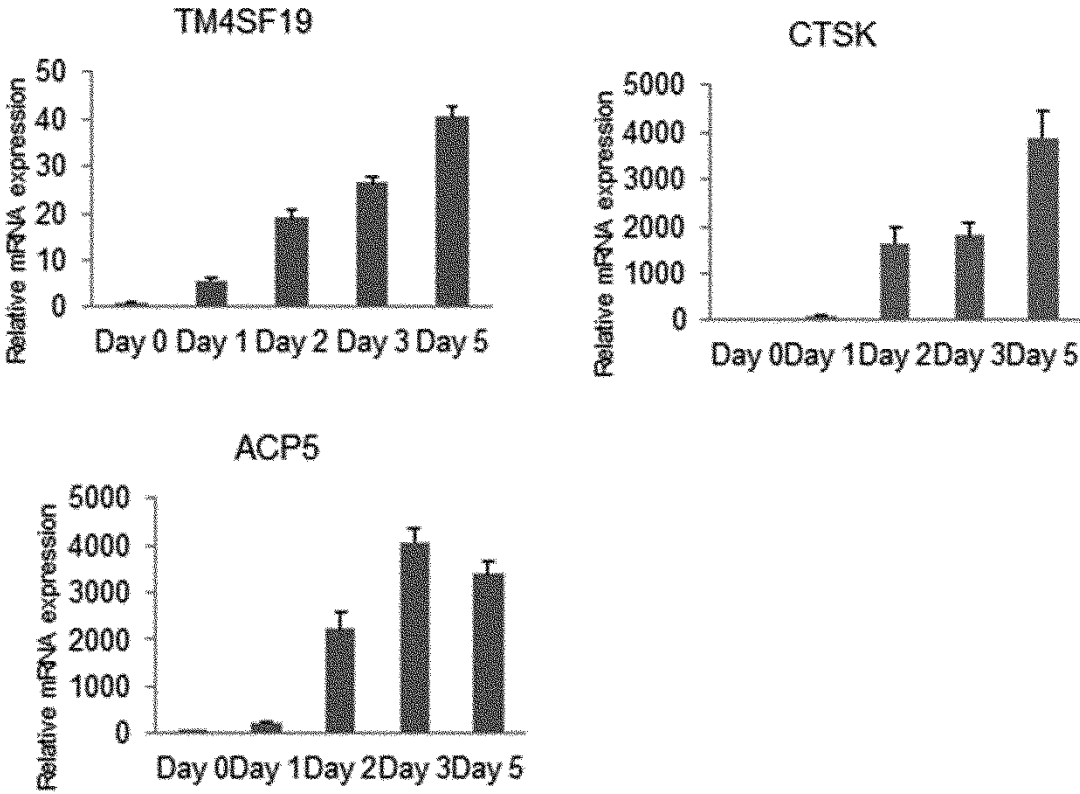
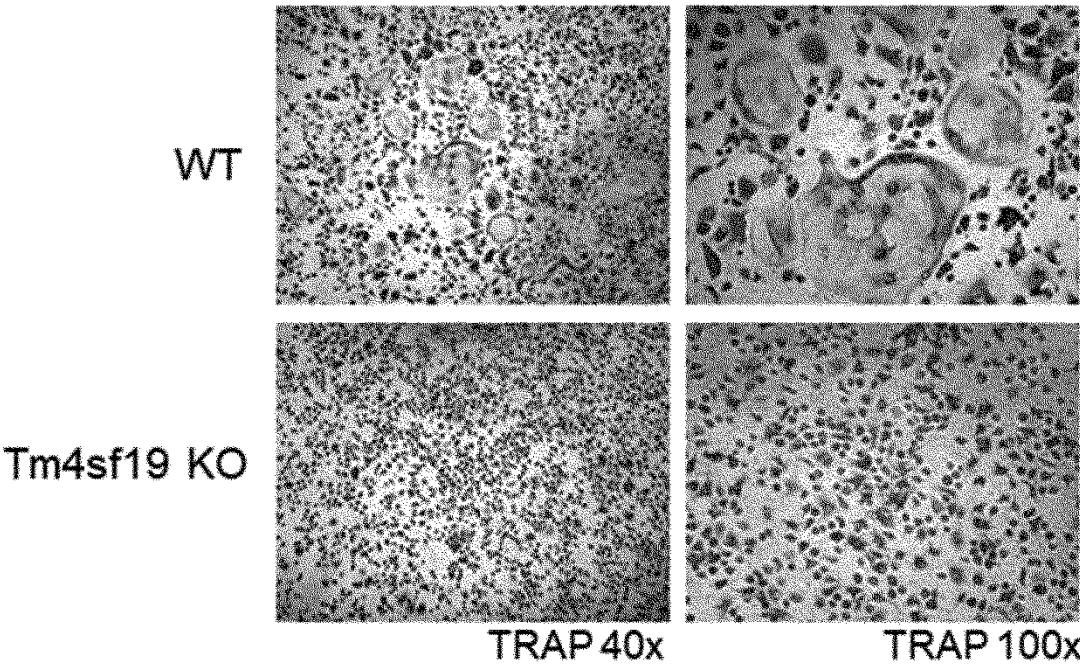


DRAWINGS

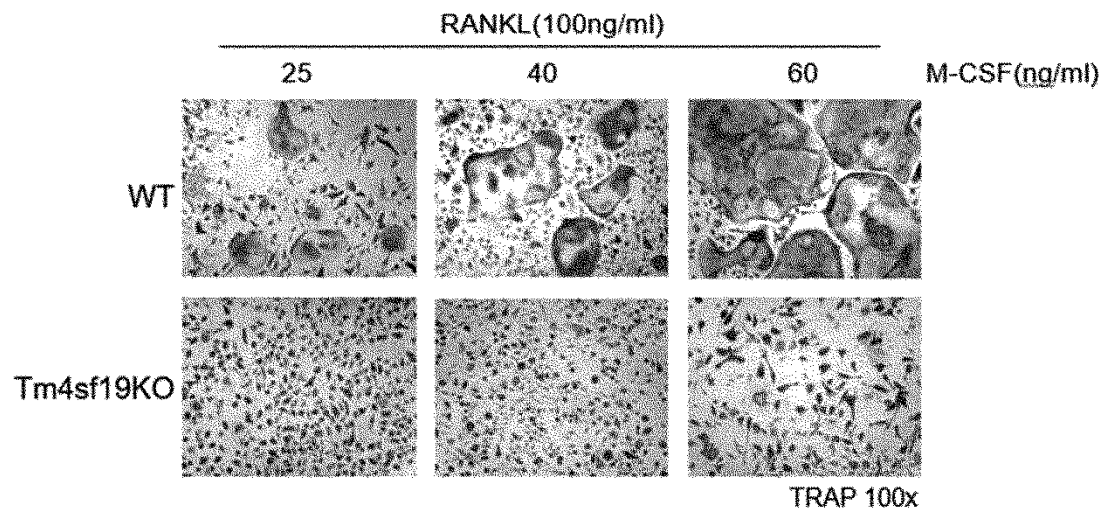
【FIG. 1】



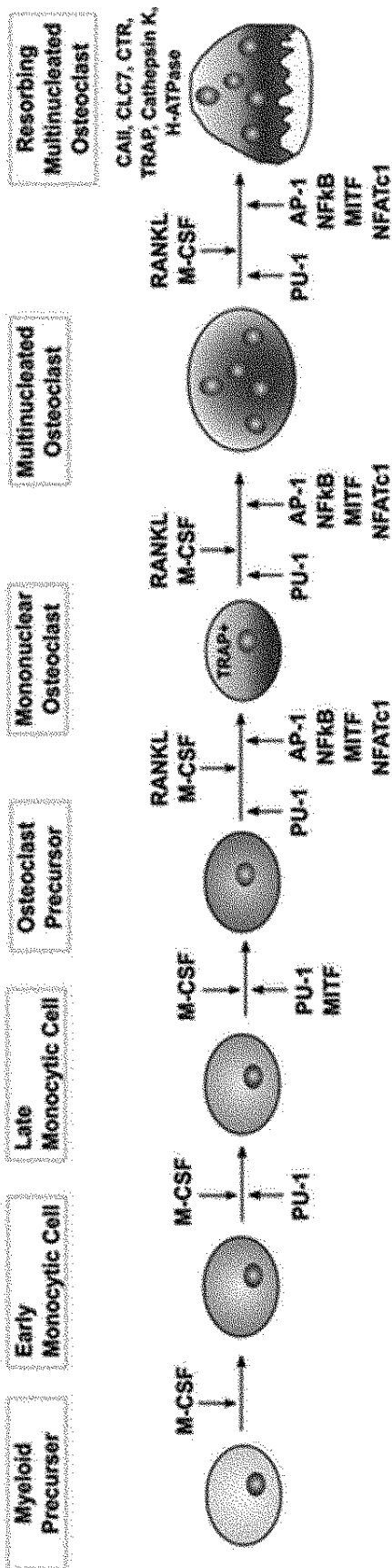
【FIG. 2A】



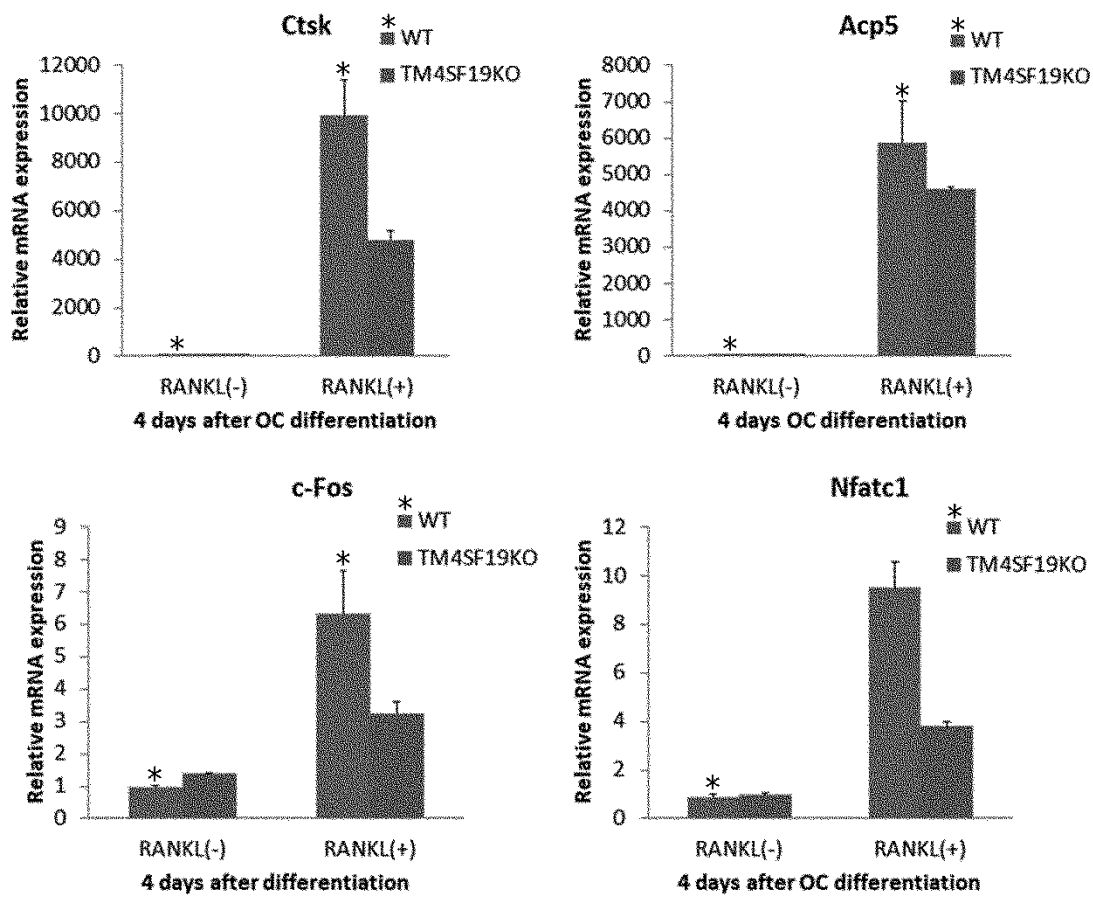
【FIG. 2B】



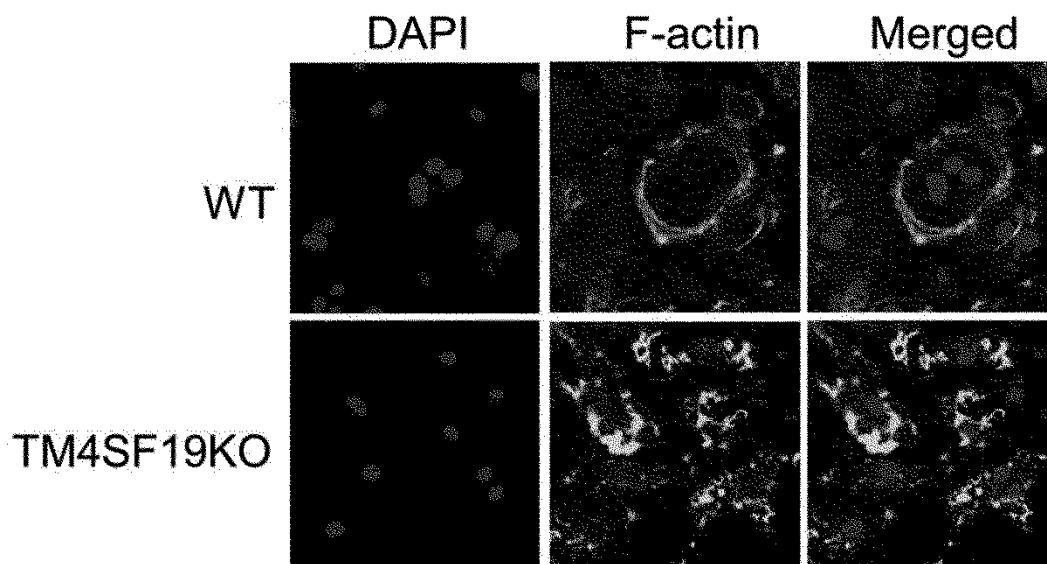
【FIG. 2c】



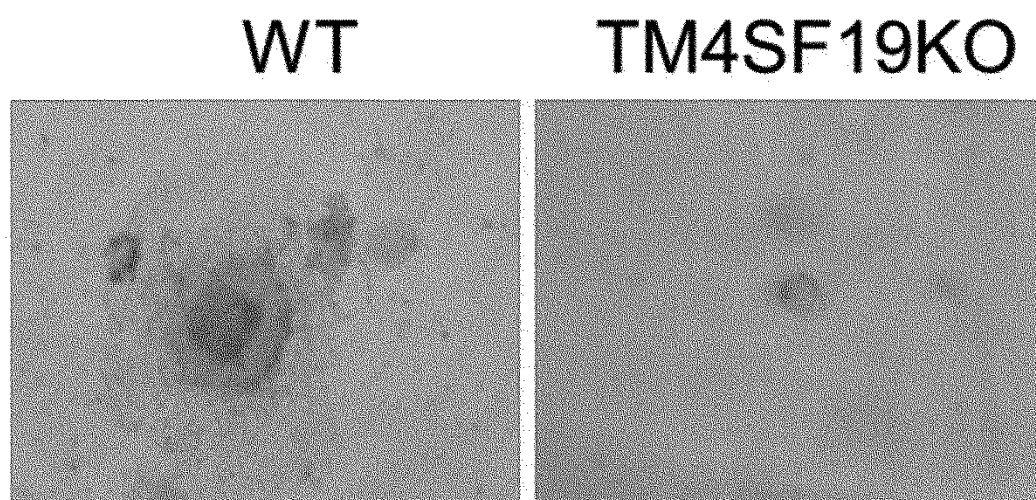
【FIG. 3】



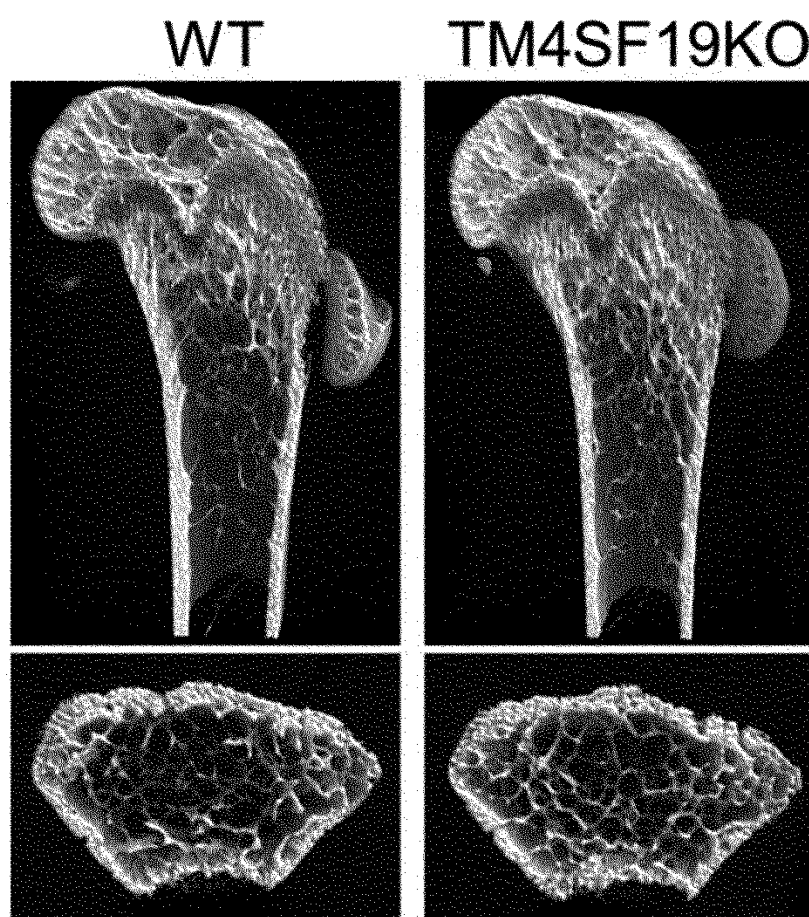
【FIG. 4A】



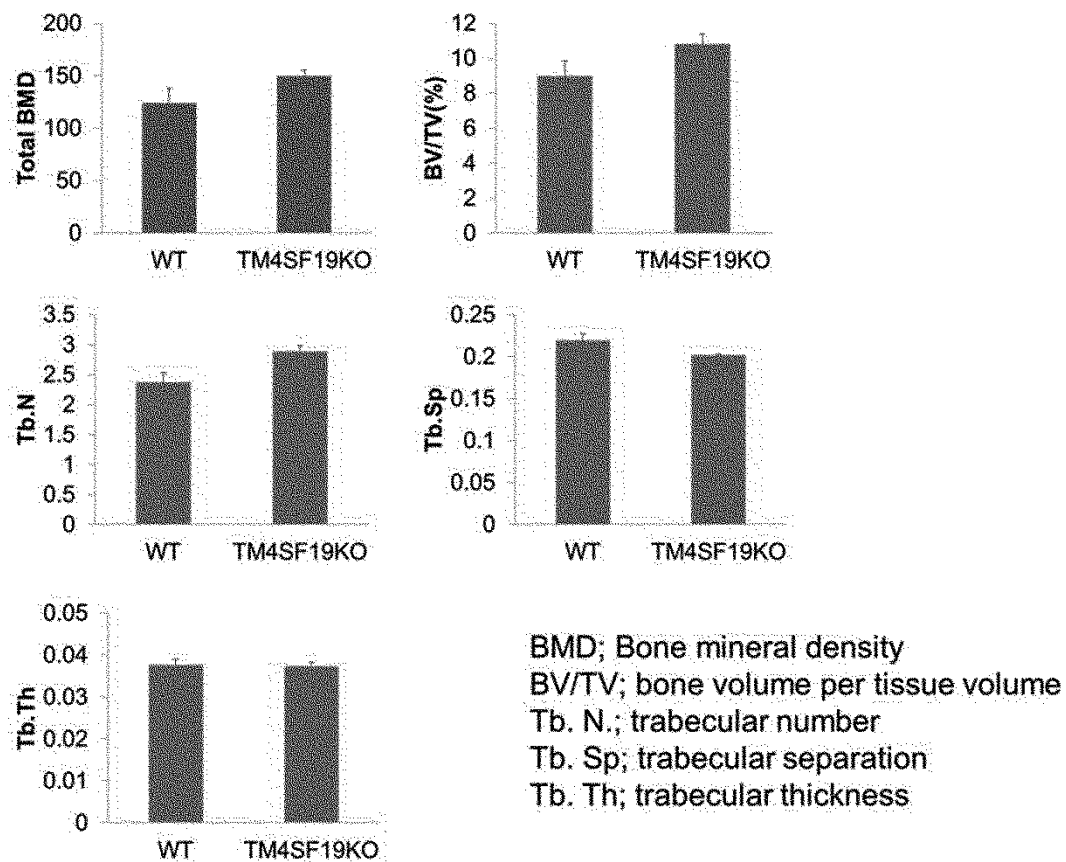
【FIG. 4B】



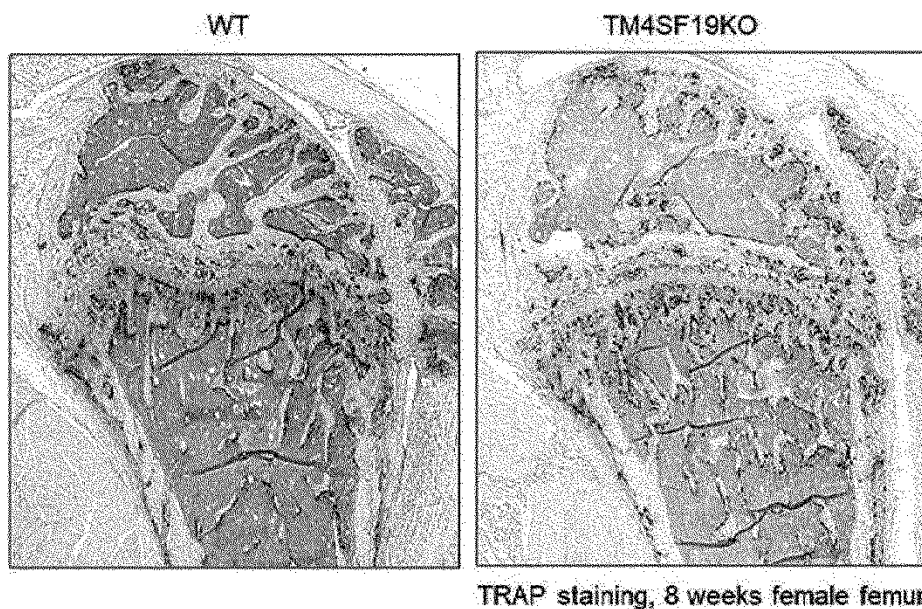
【FIG. 5A】



【FIG. 5B】

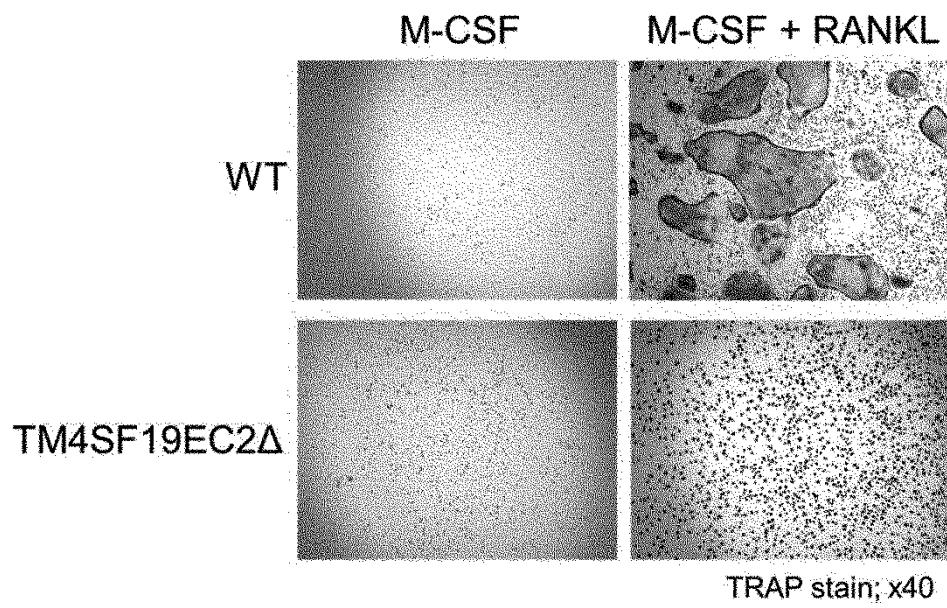


【FIG. 6】

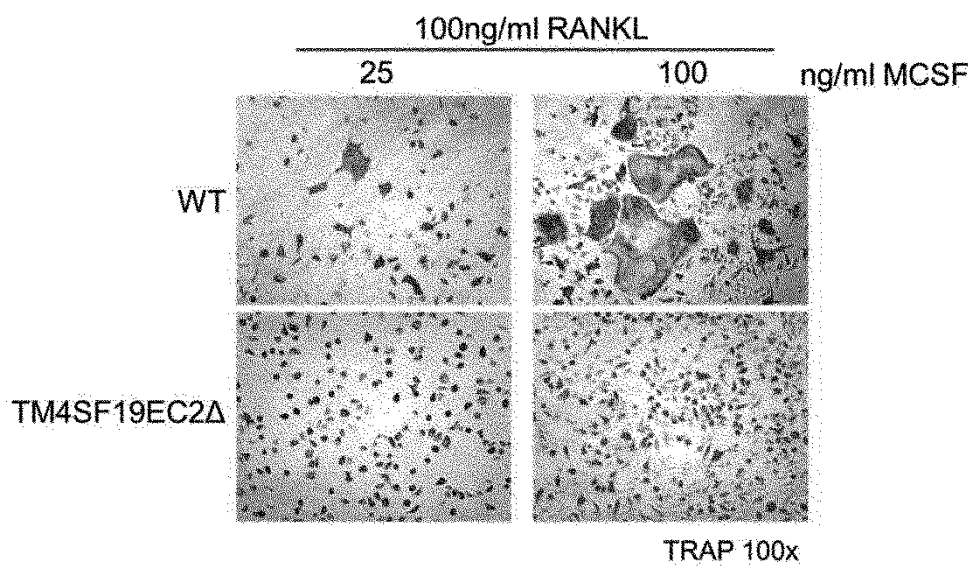


TRAP staining, 8 weeks female femur

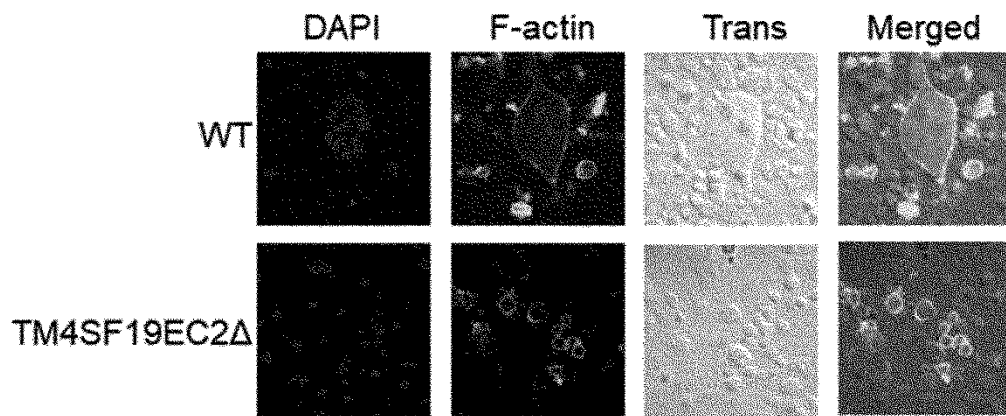
【FIG. 7A】



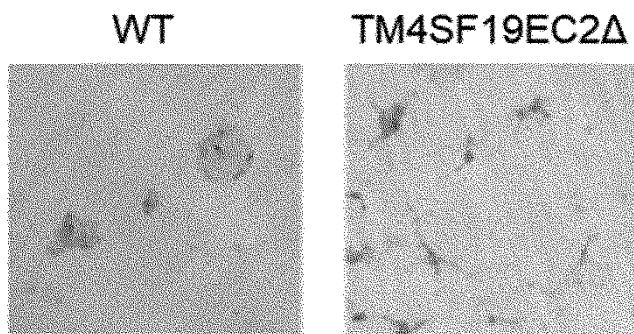
【FIG. 7B】



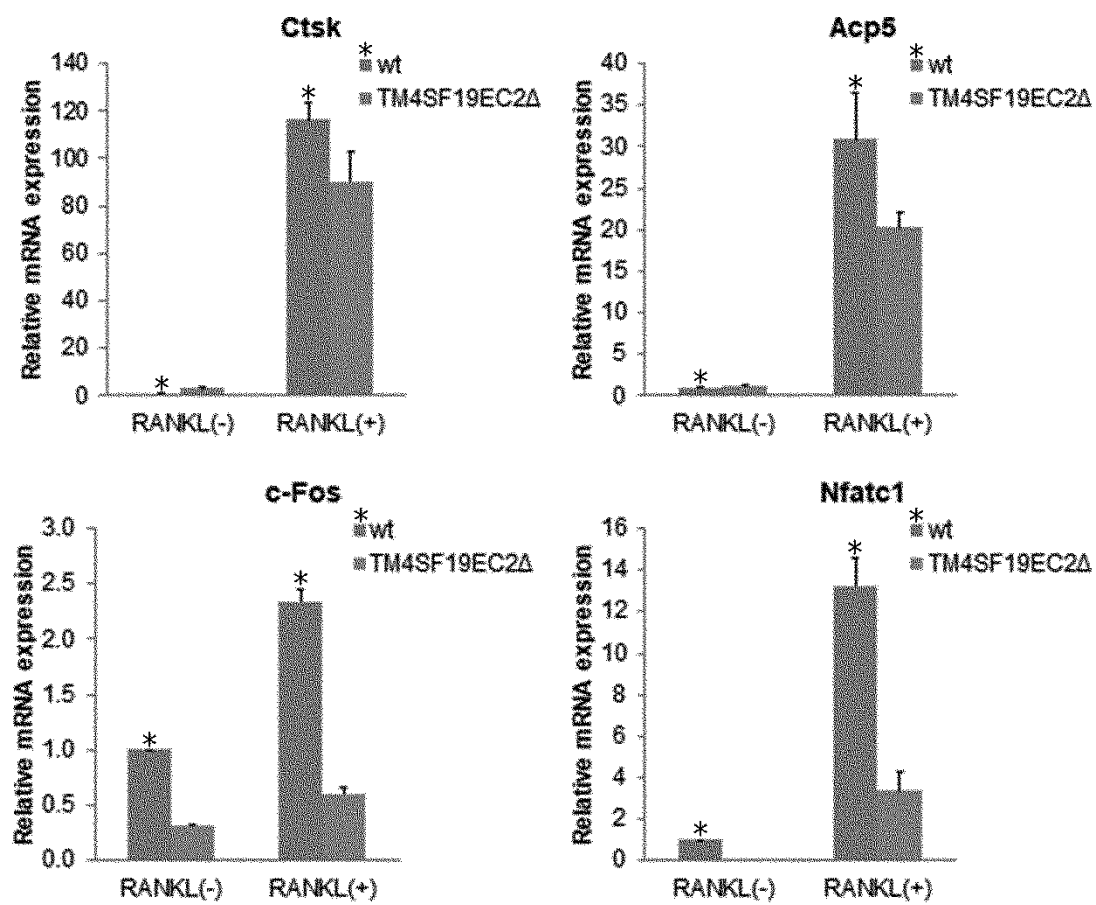
【FIG. 7C】



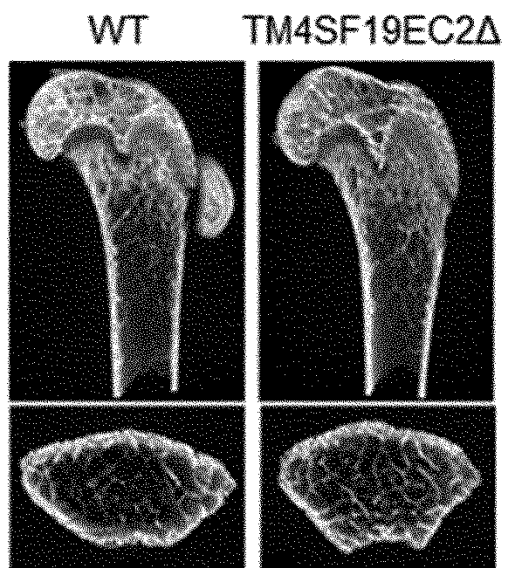
【FIG. 7D】



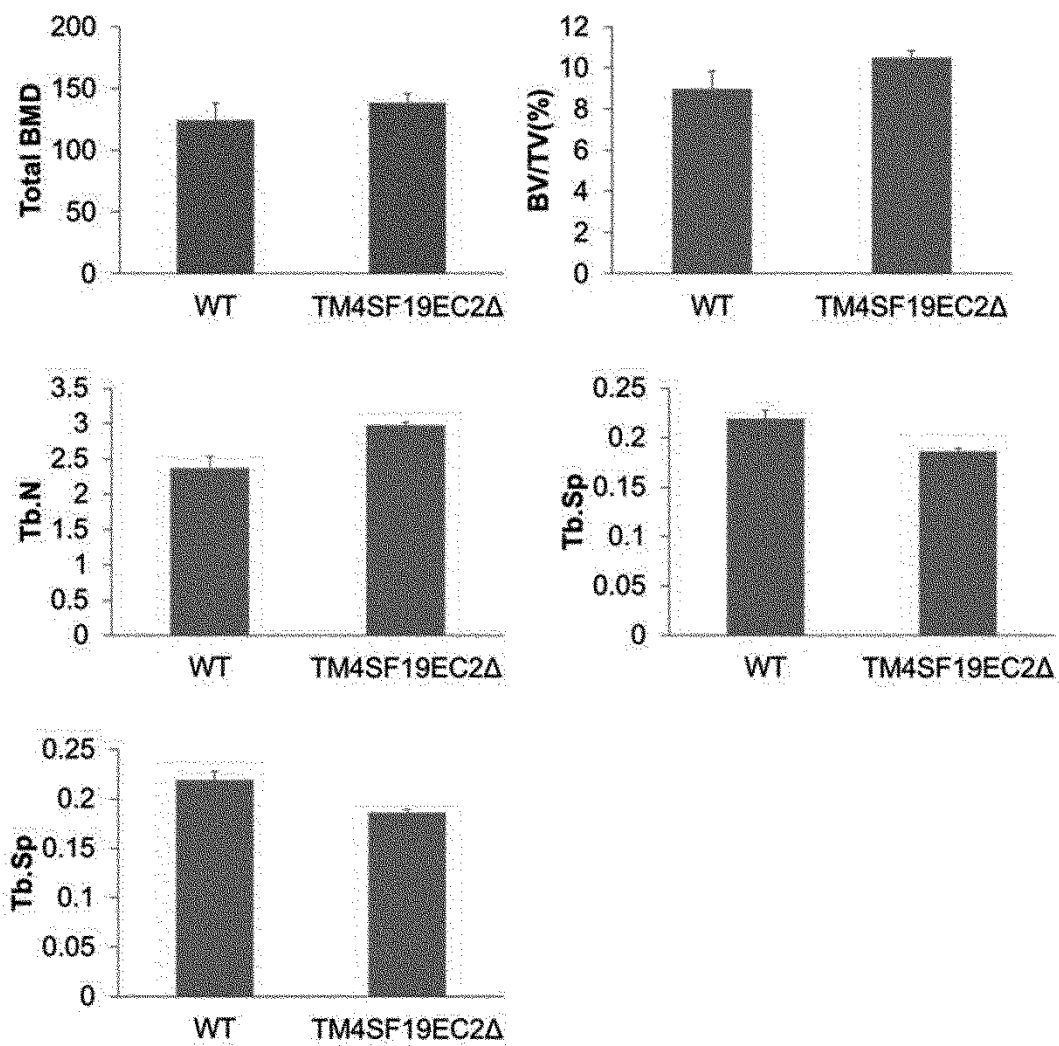
【FIG. 8】



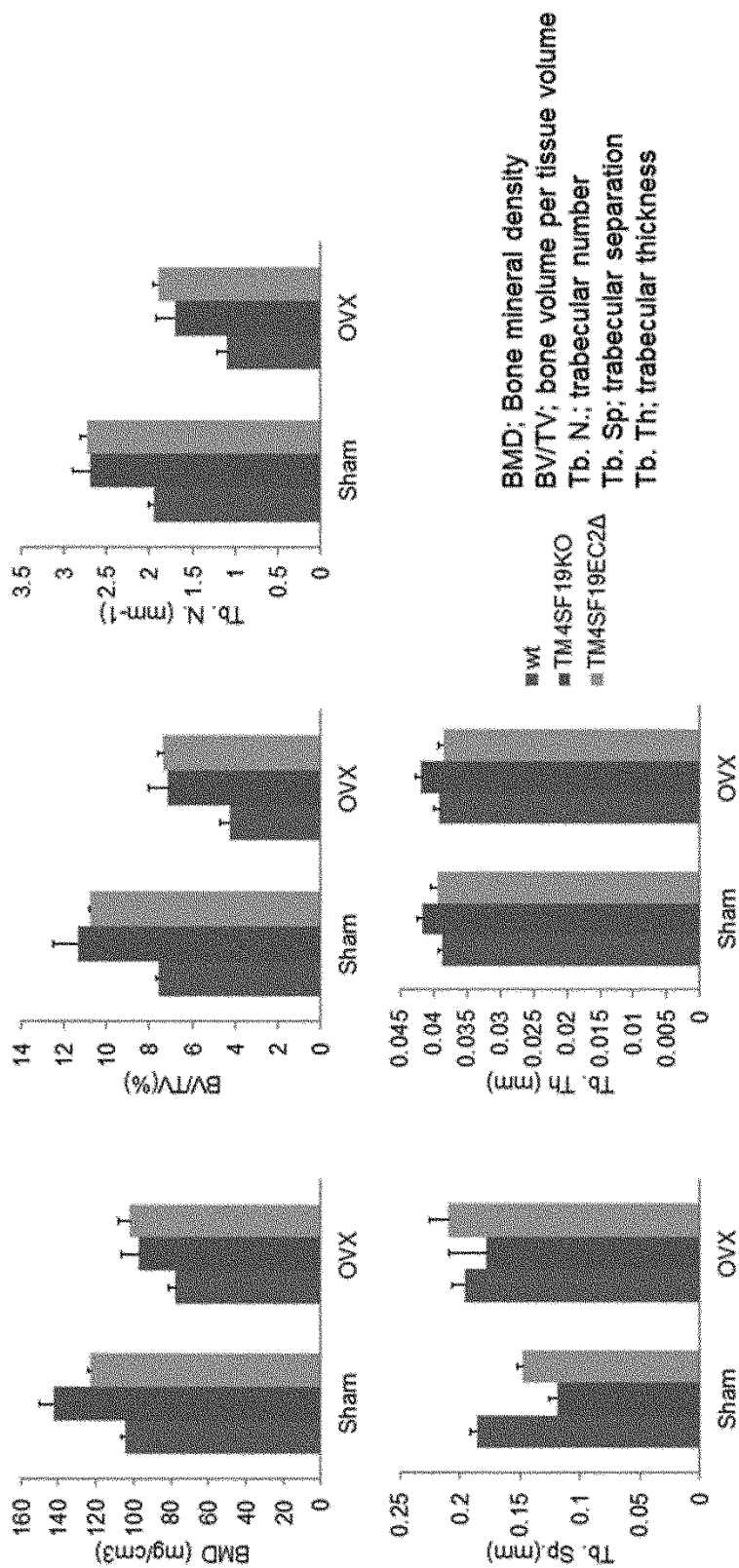
【FIG. 9A】



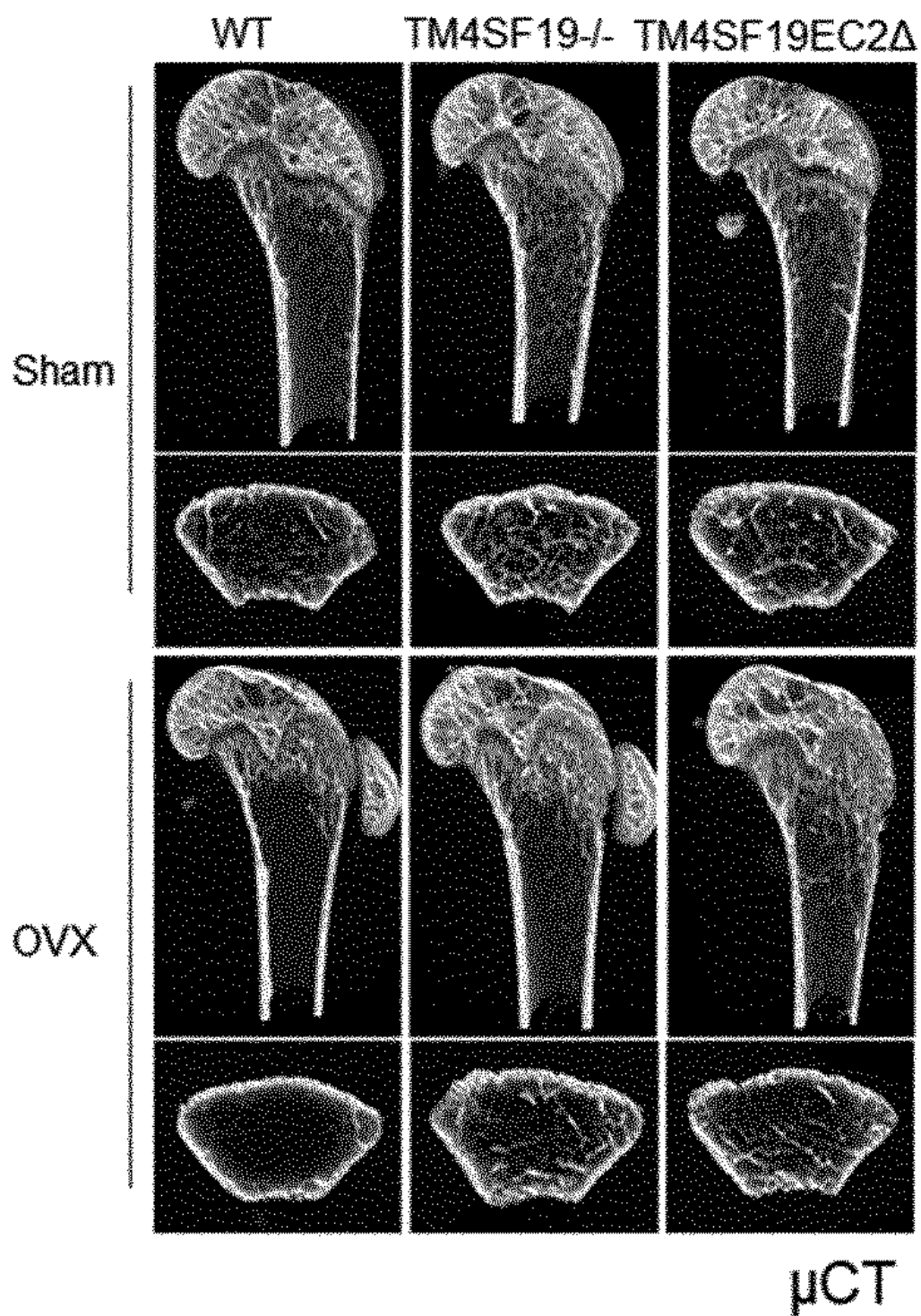
【FIG. 9B】



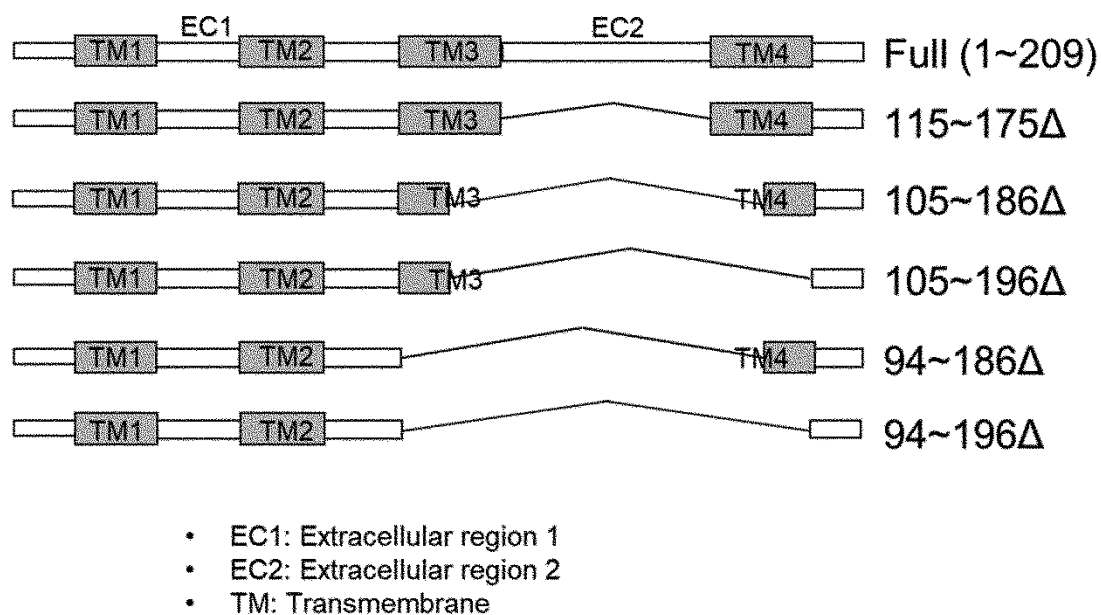
【FIG. 10】



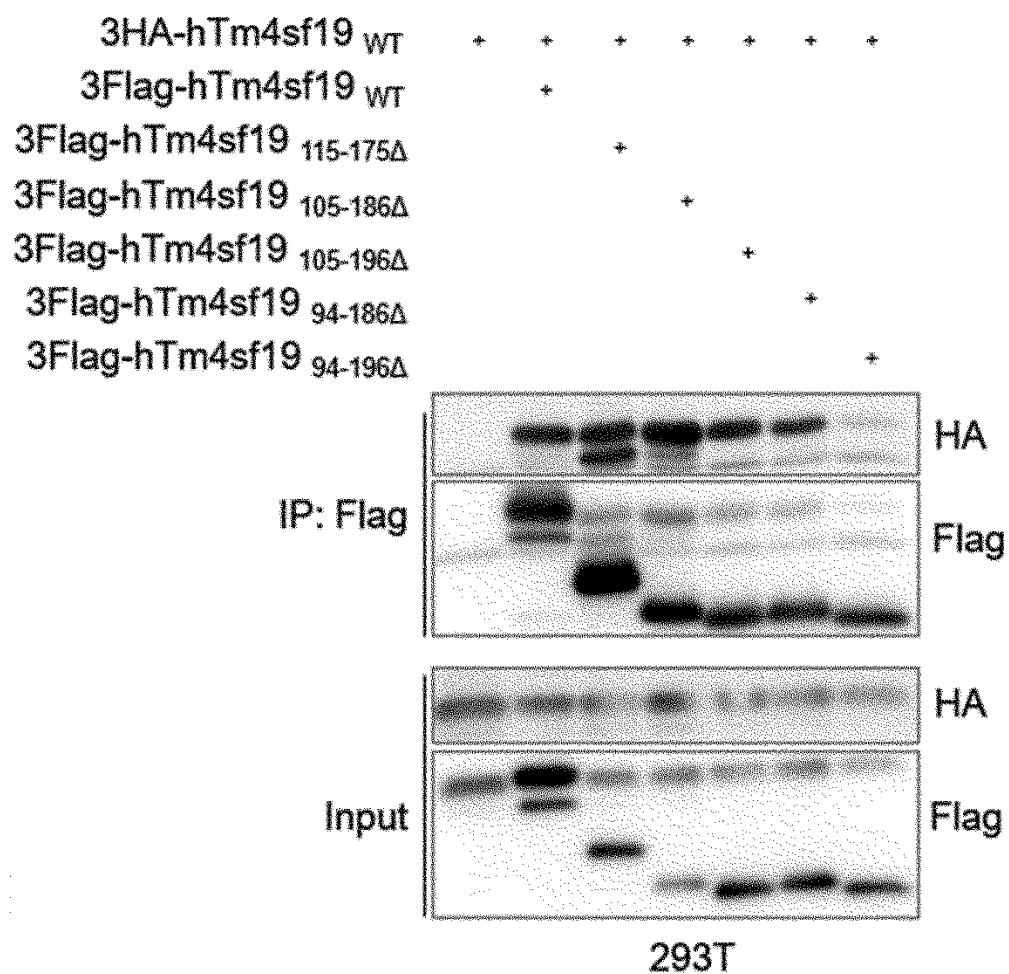
【FIG. 11】



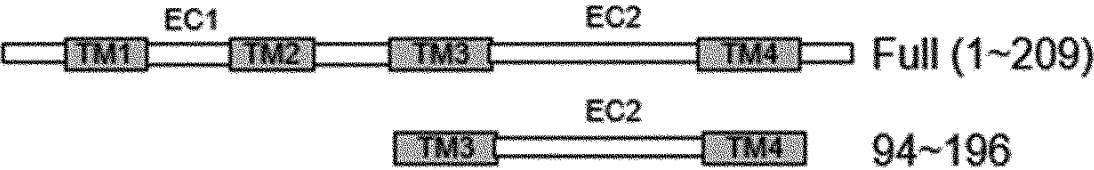
【FIG. 12A】



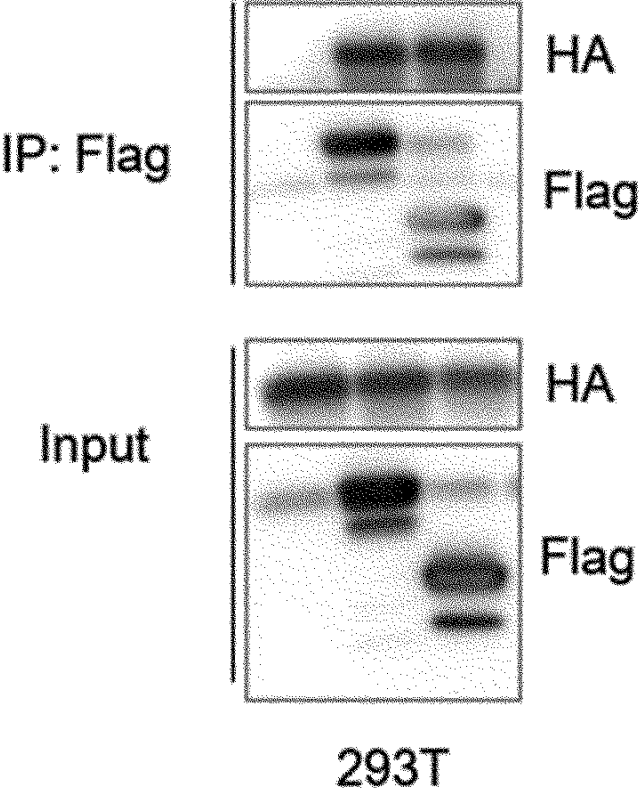
【FIG. 12B】



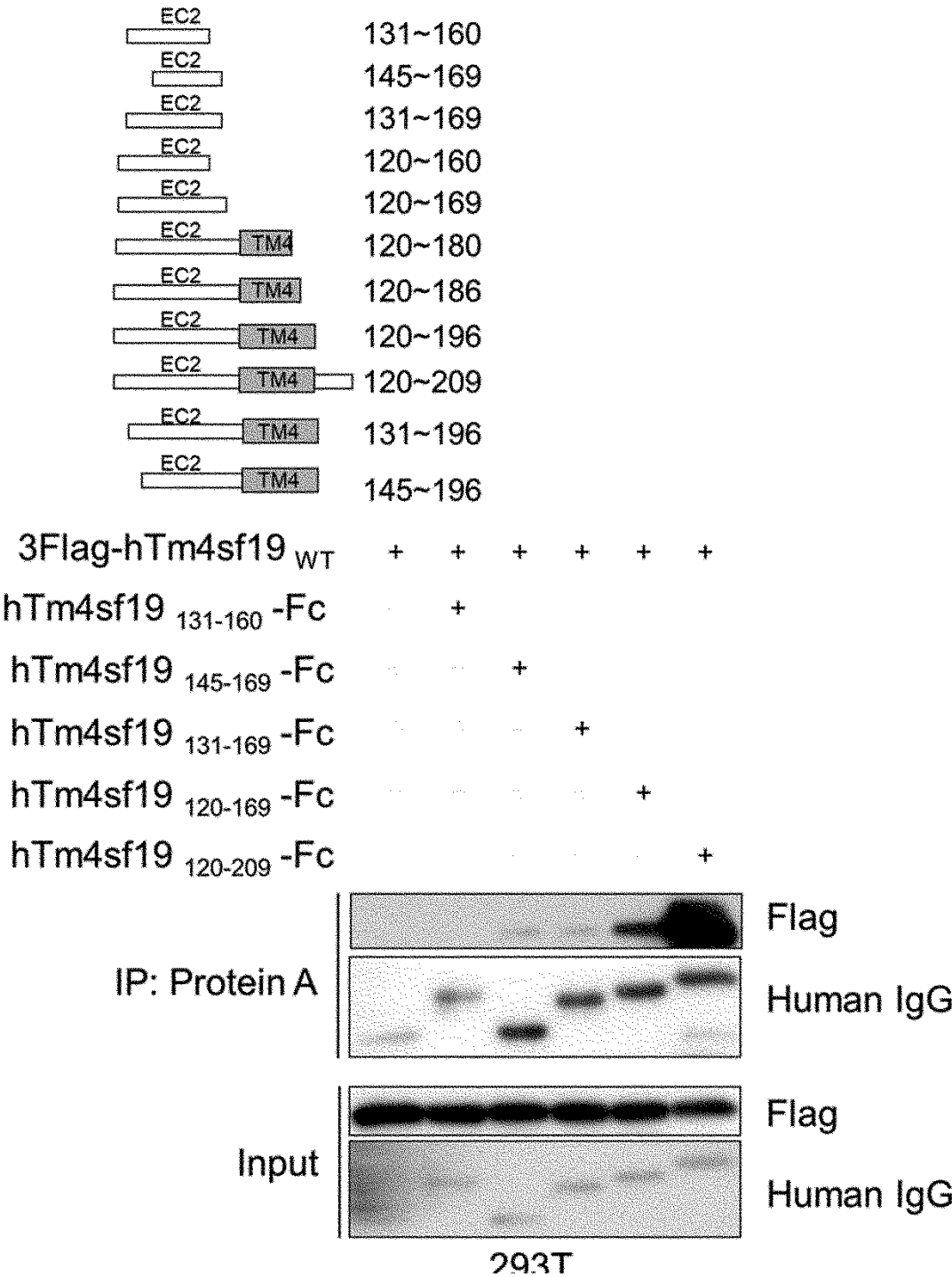
【FIG. 12C】



3HA-hTm4sf19 _{WT}	+	+	+
3Flag-hTm4sf19 _{WT}		+	
3Flag-hTm4sf19 ₉₄₋₁₉₆			+



【FIG. 12D】



IP: Protein A

Input

Flag

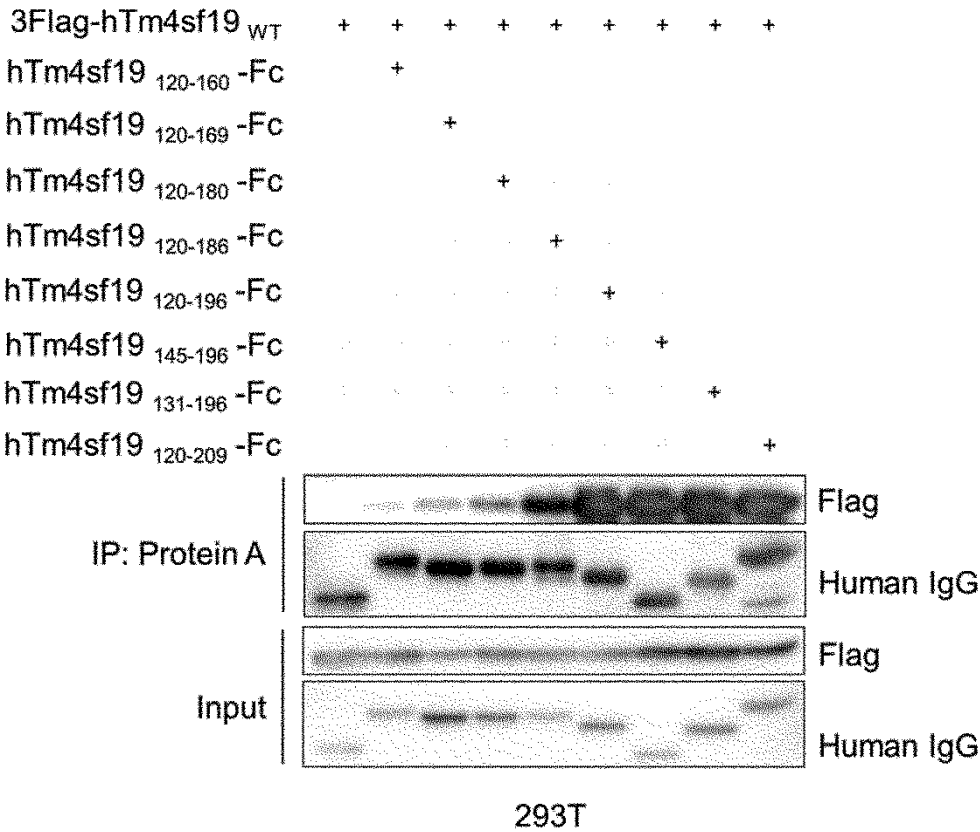
Human IgG

Flag

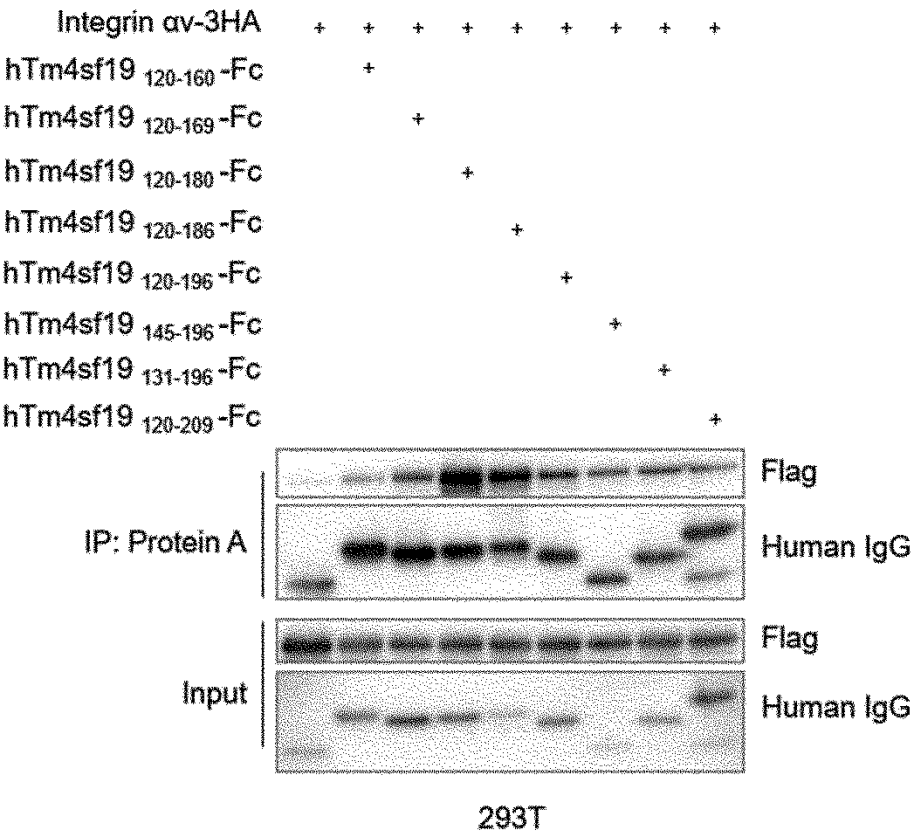
Human IgG

293T

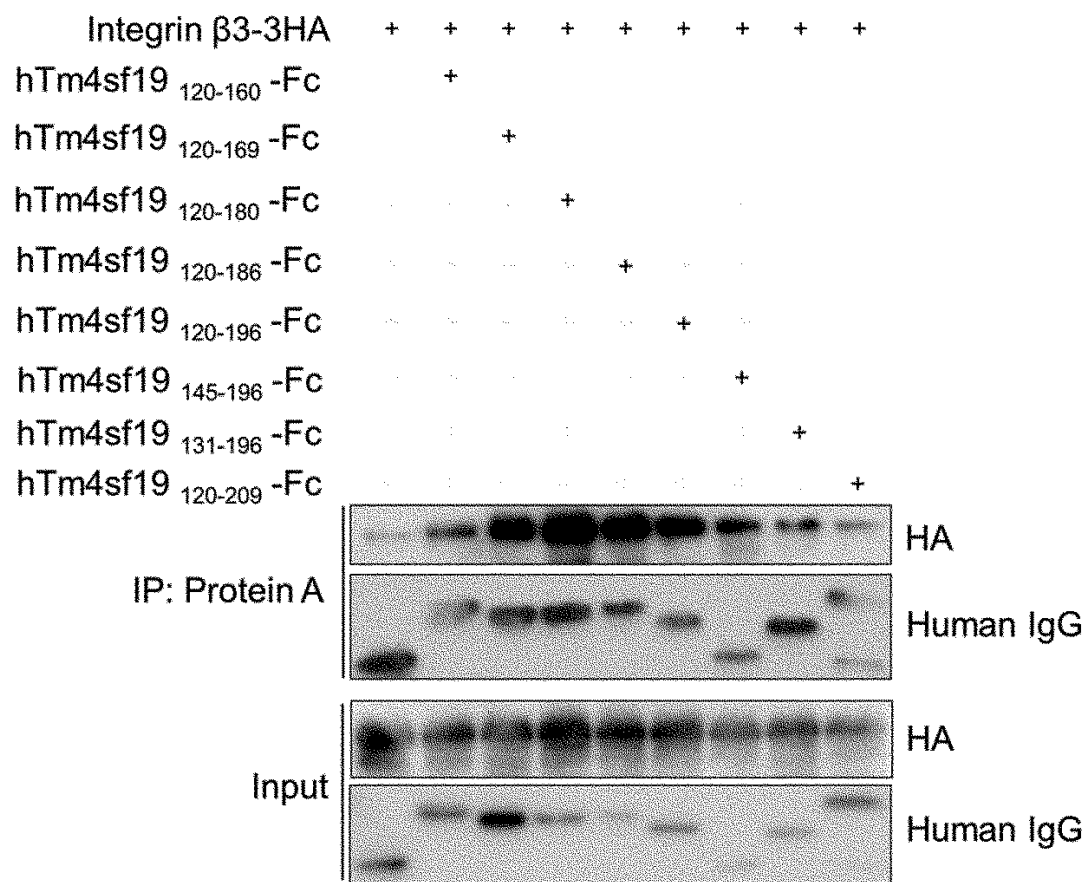
【FIG. 12E】



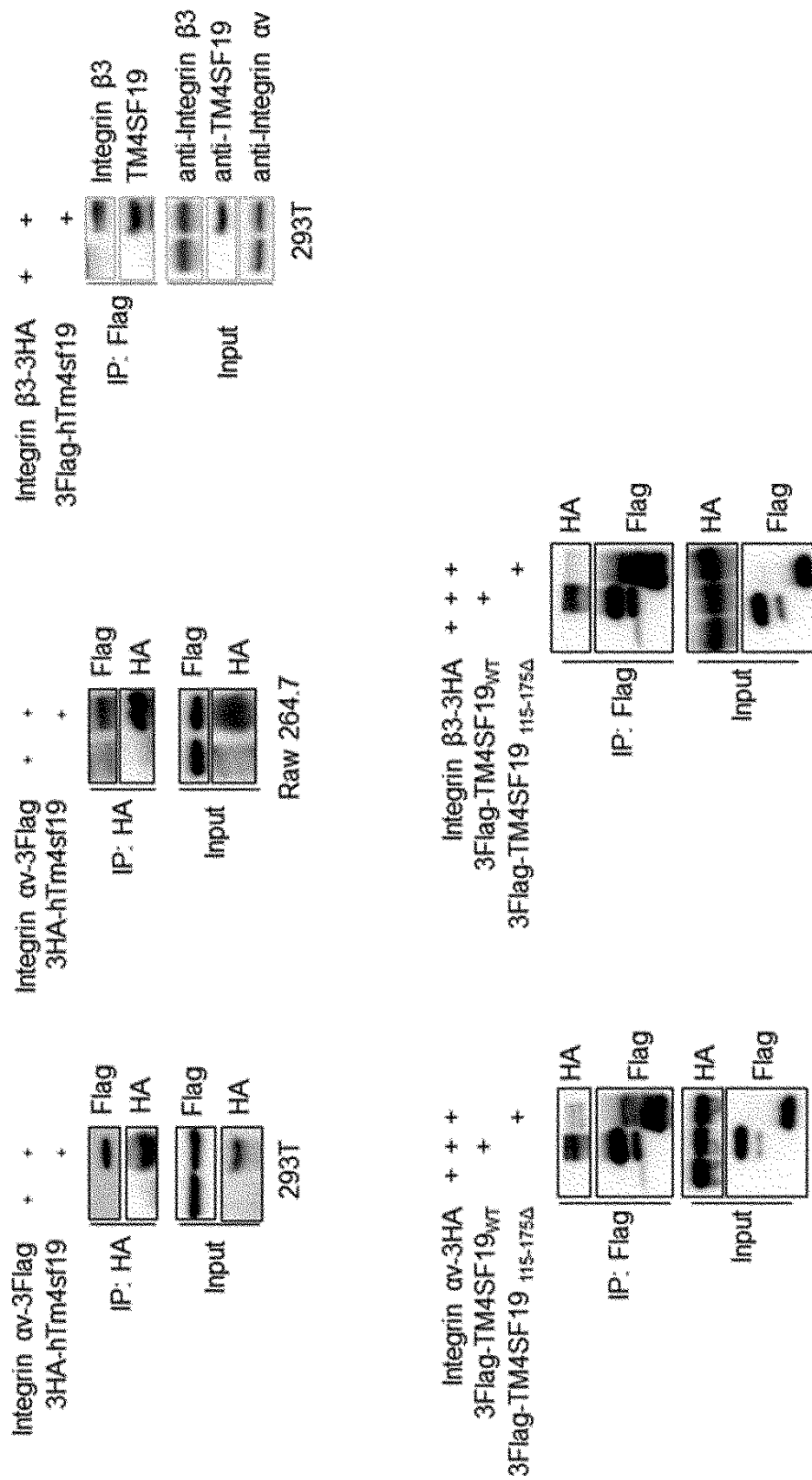
【FIG. 12F】



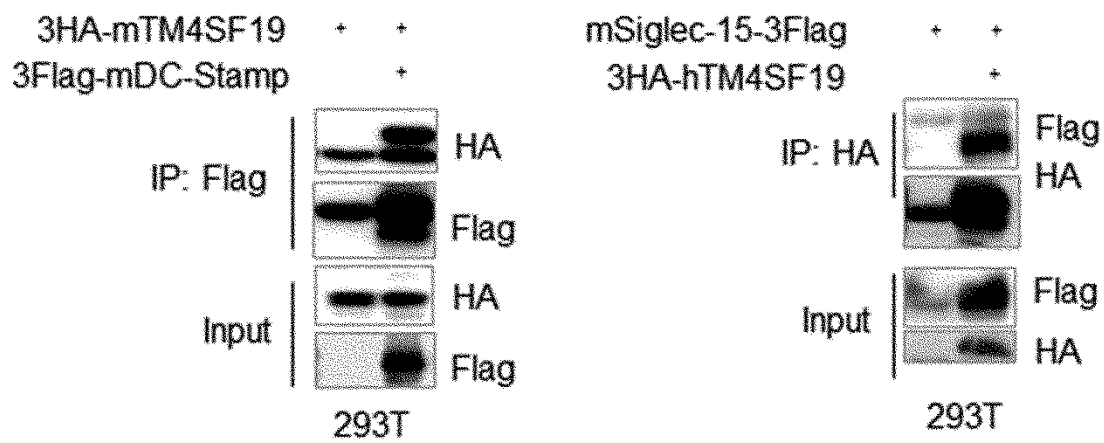
【FIG. 12G】



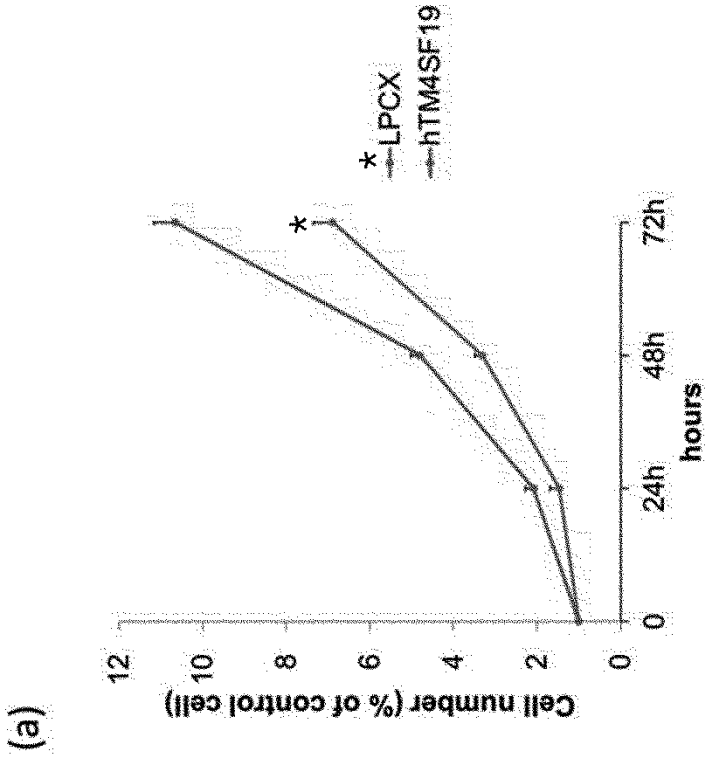
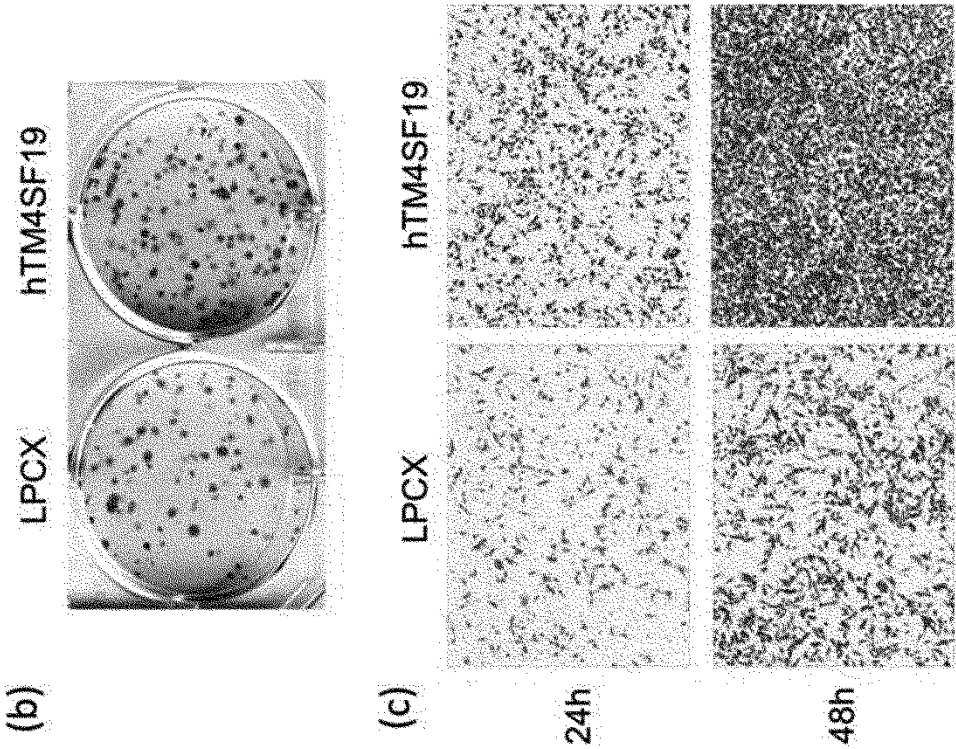
【FIG. 12H】



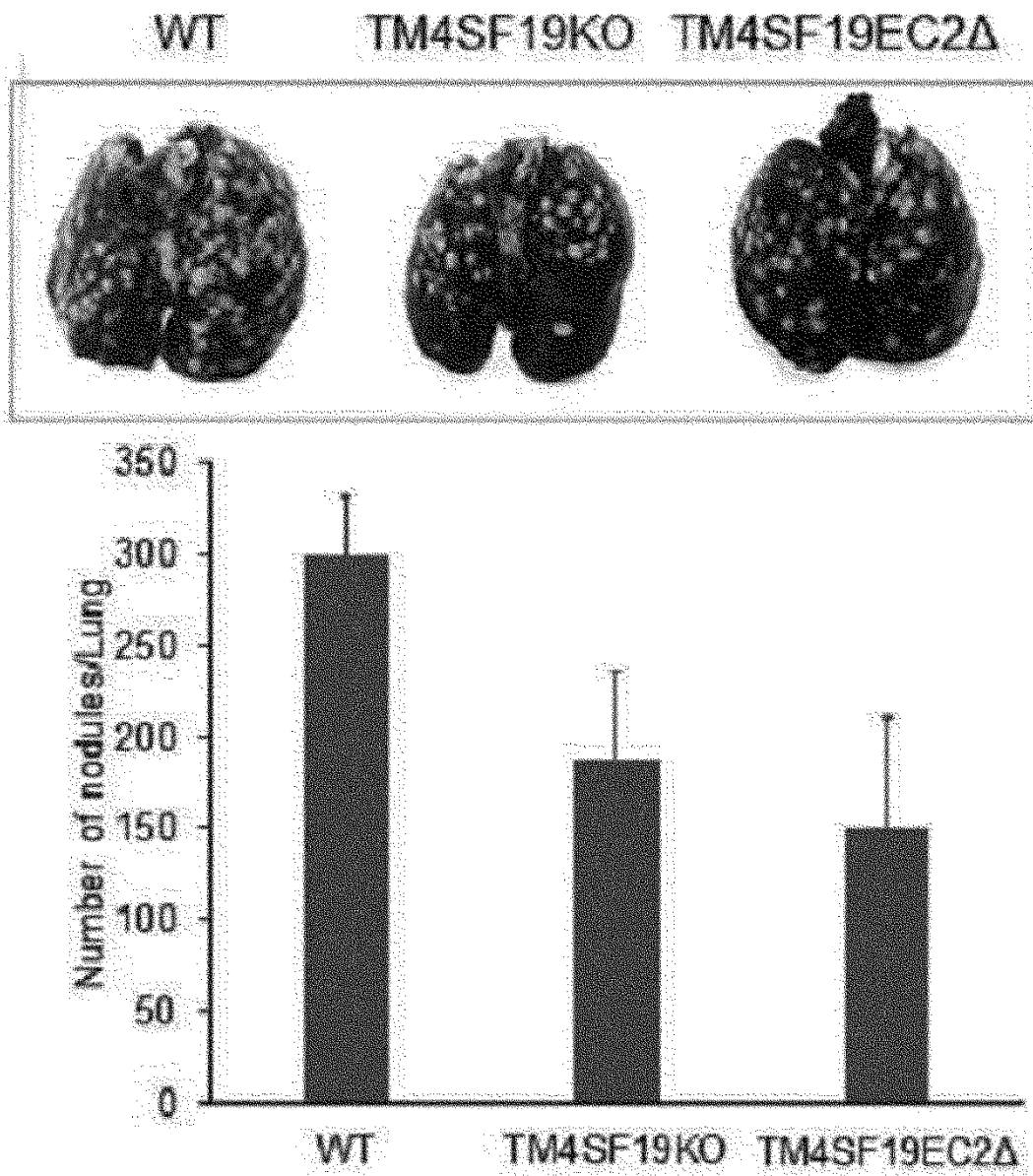
【FIG. 12I】



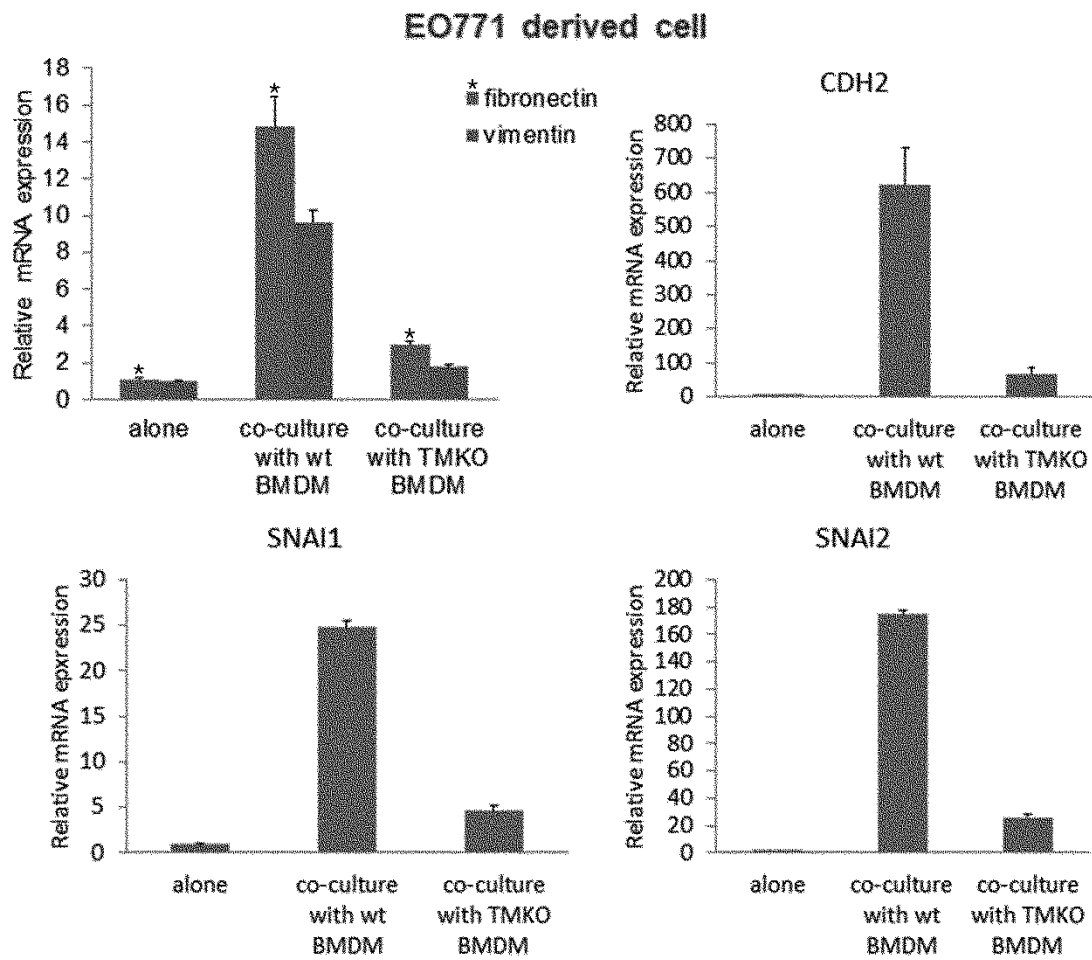
【FIG. 13】



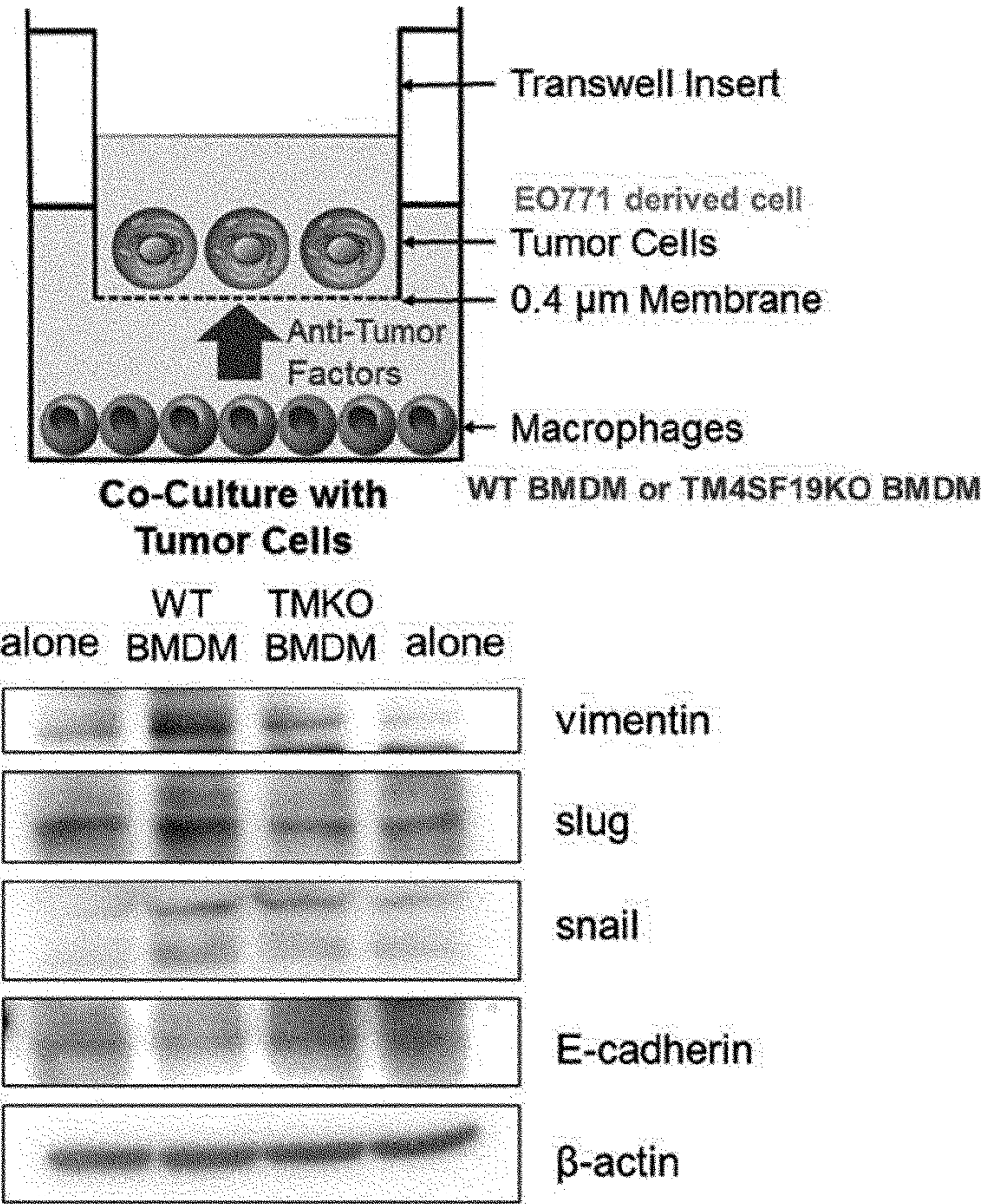
【FIG. 14】



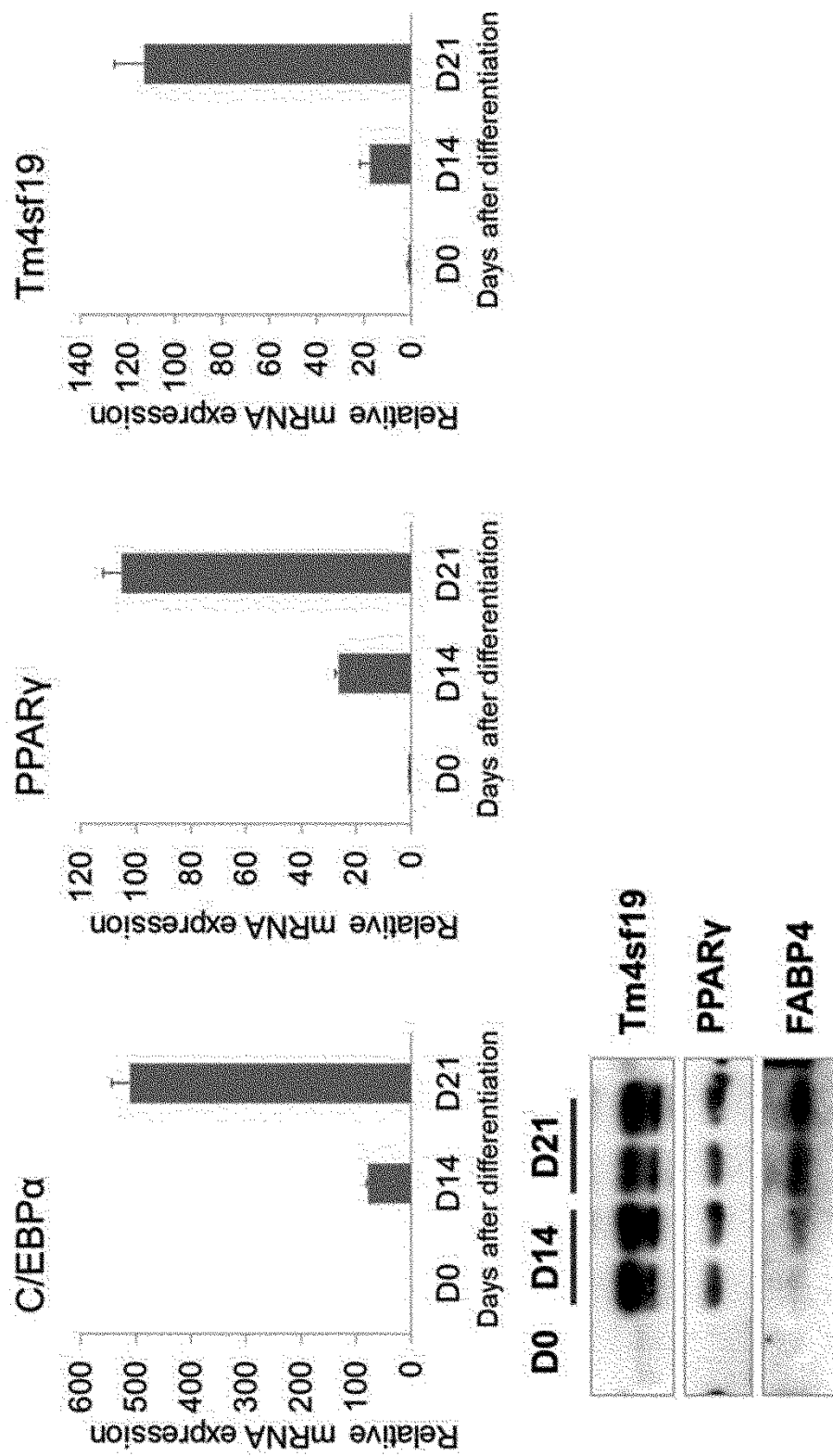
【FIG. 15A】



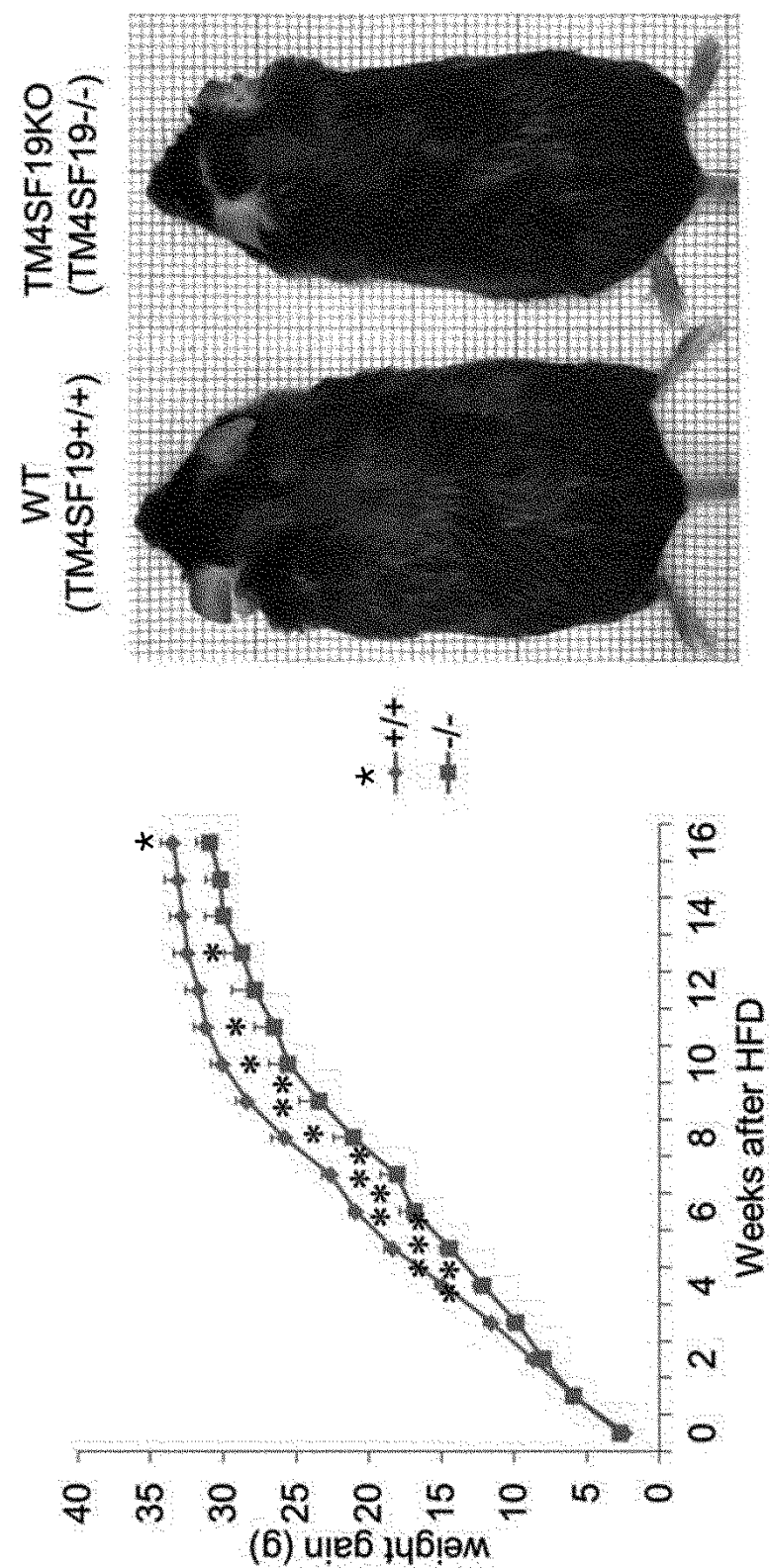
【FIG. 15B】



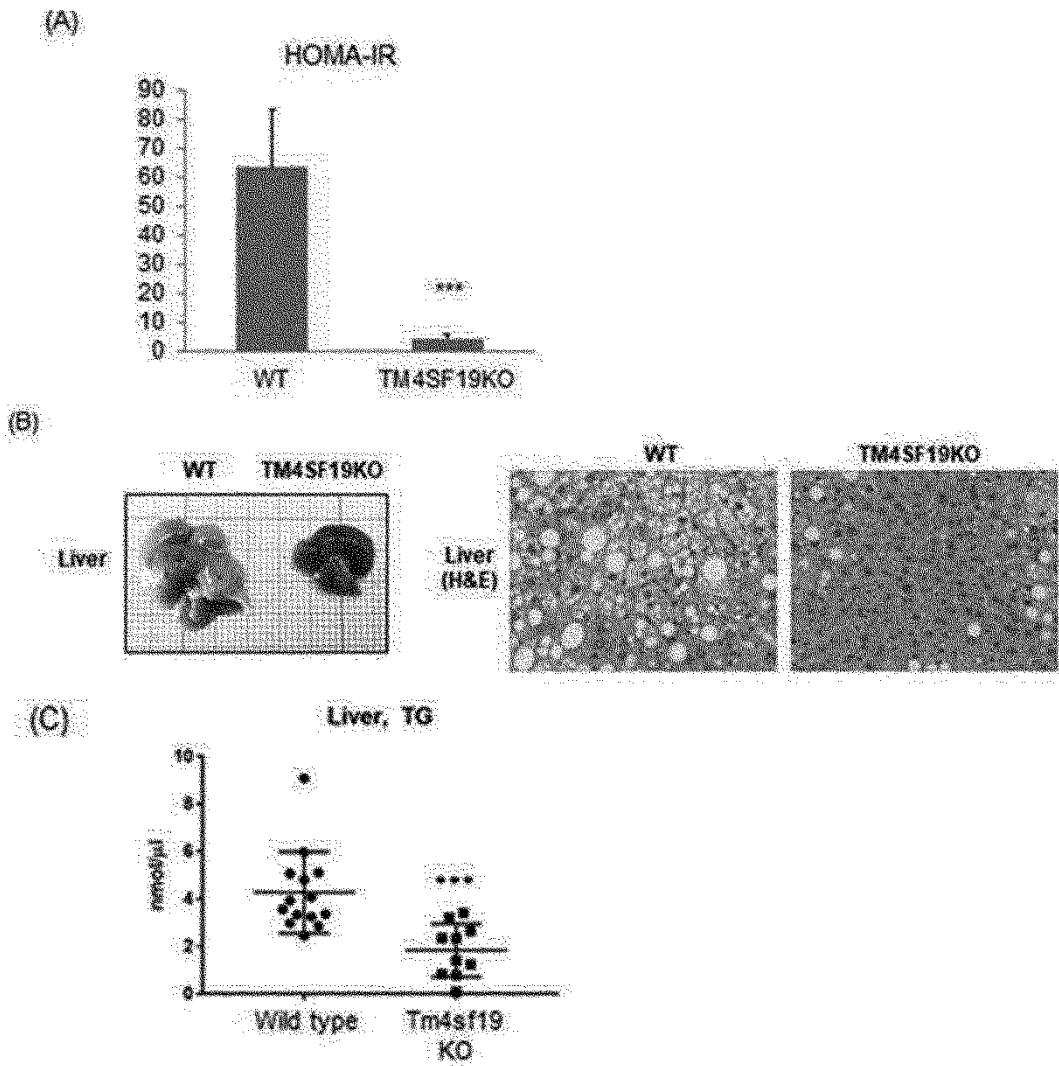
【FIG. 16】



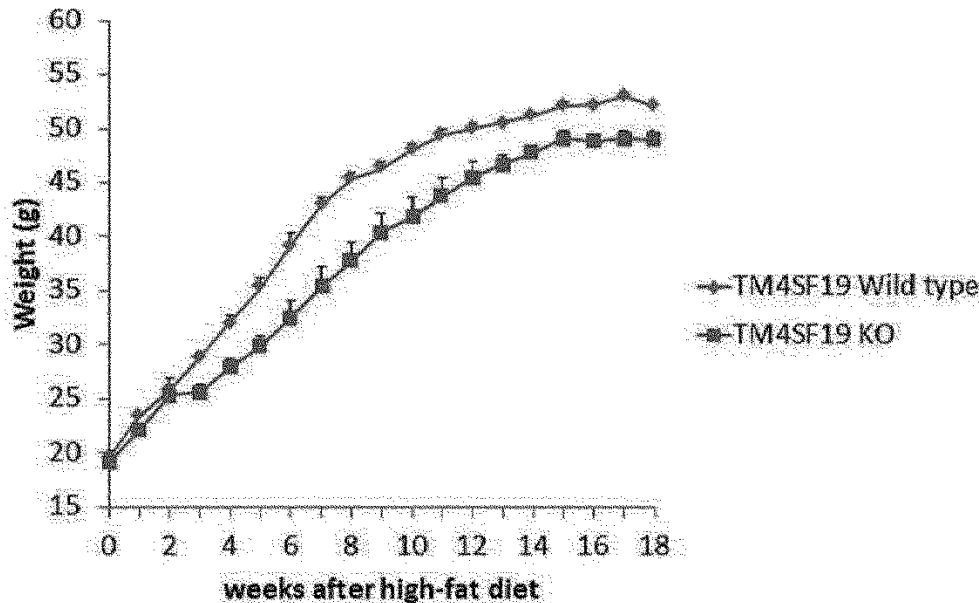
【FIG. 17】



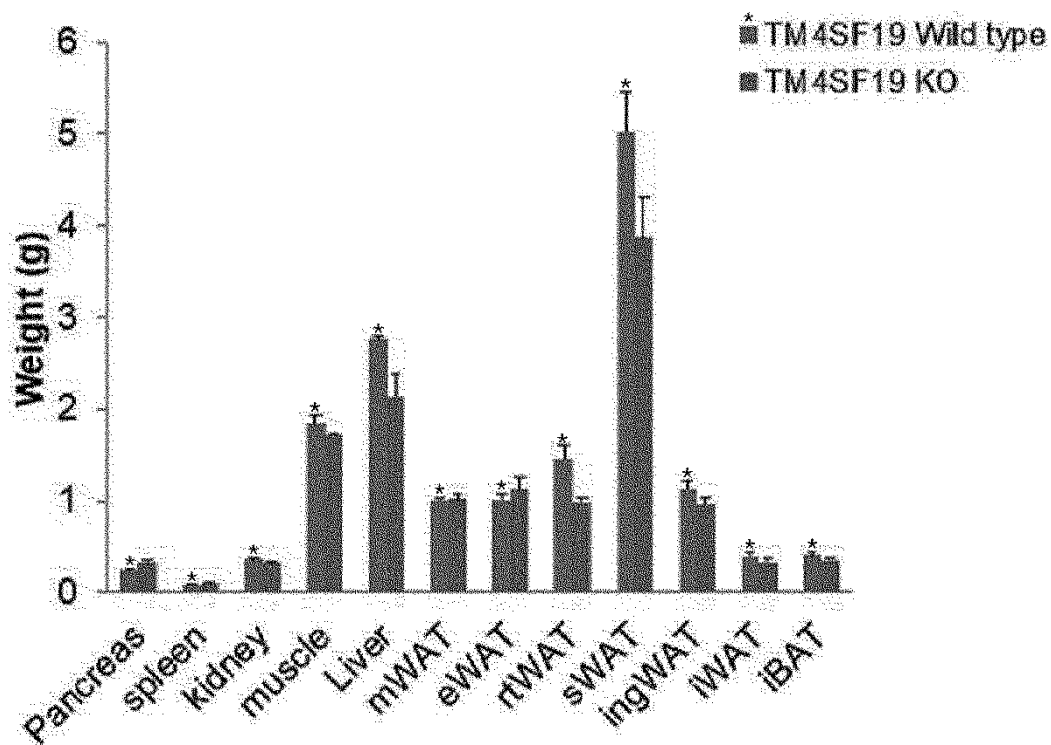
【FIG. 18】



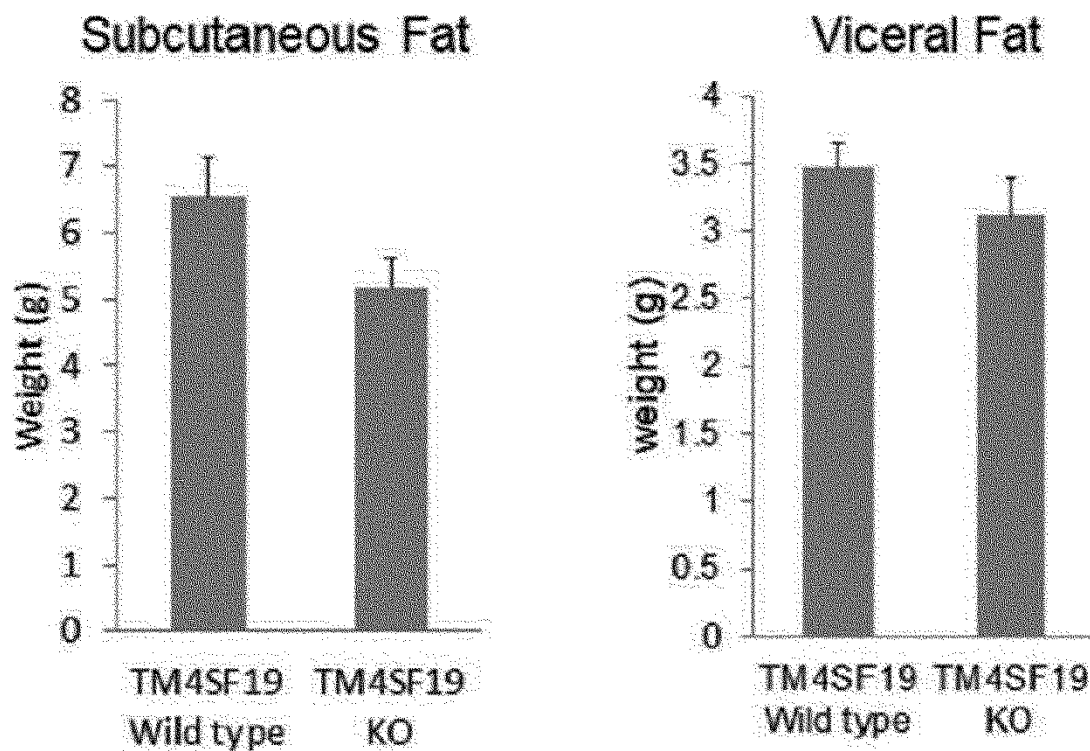
【FIG. 19A】



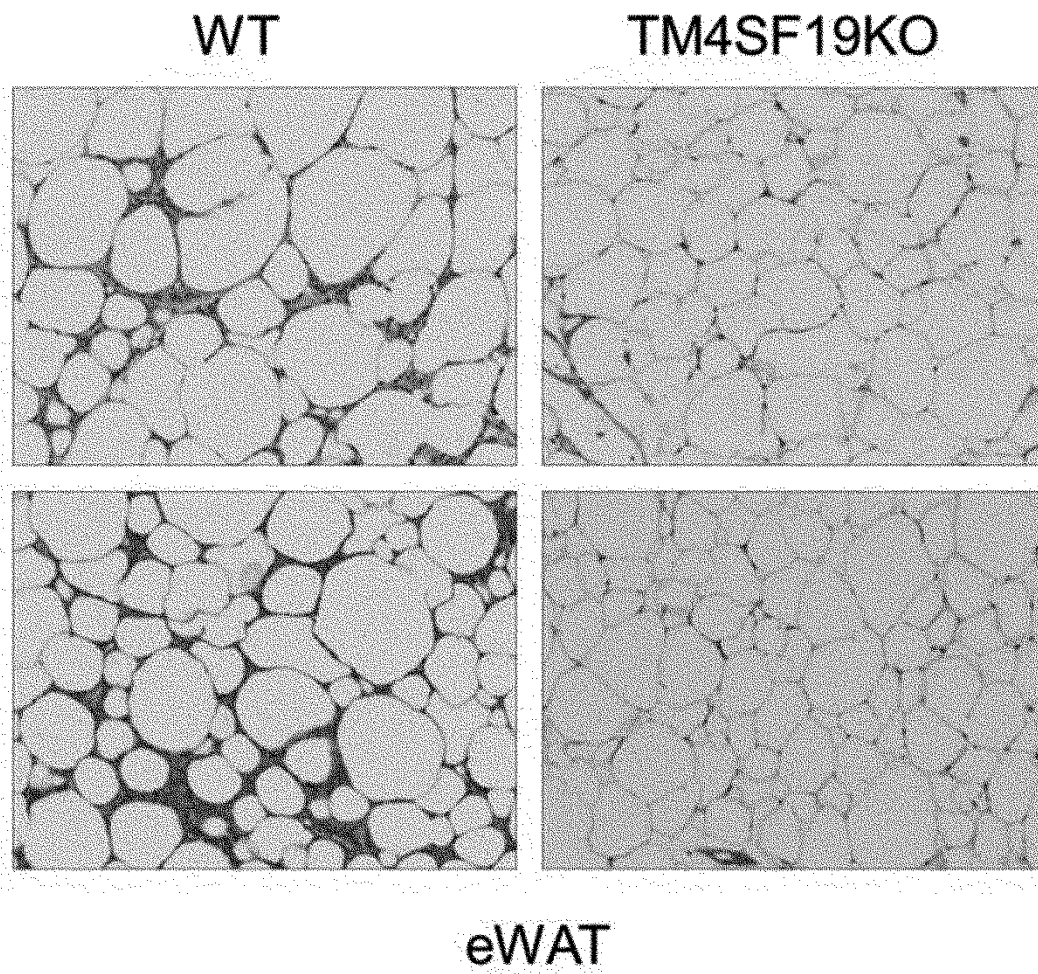
【FIG. 19B】



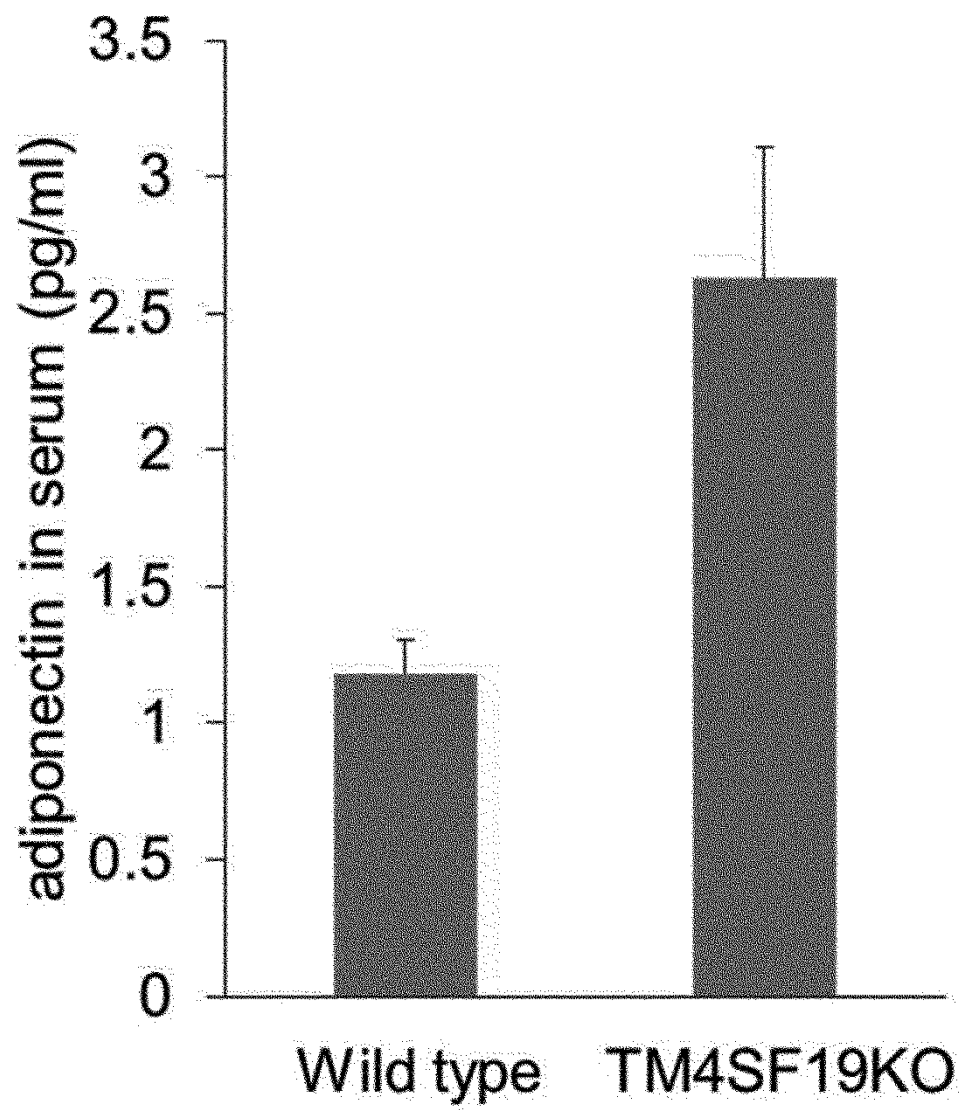
【FIG. 19C】



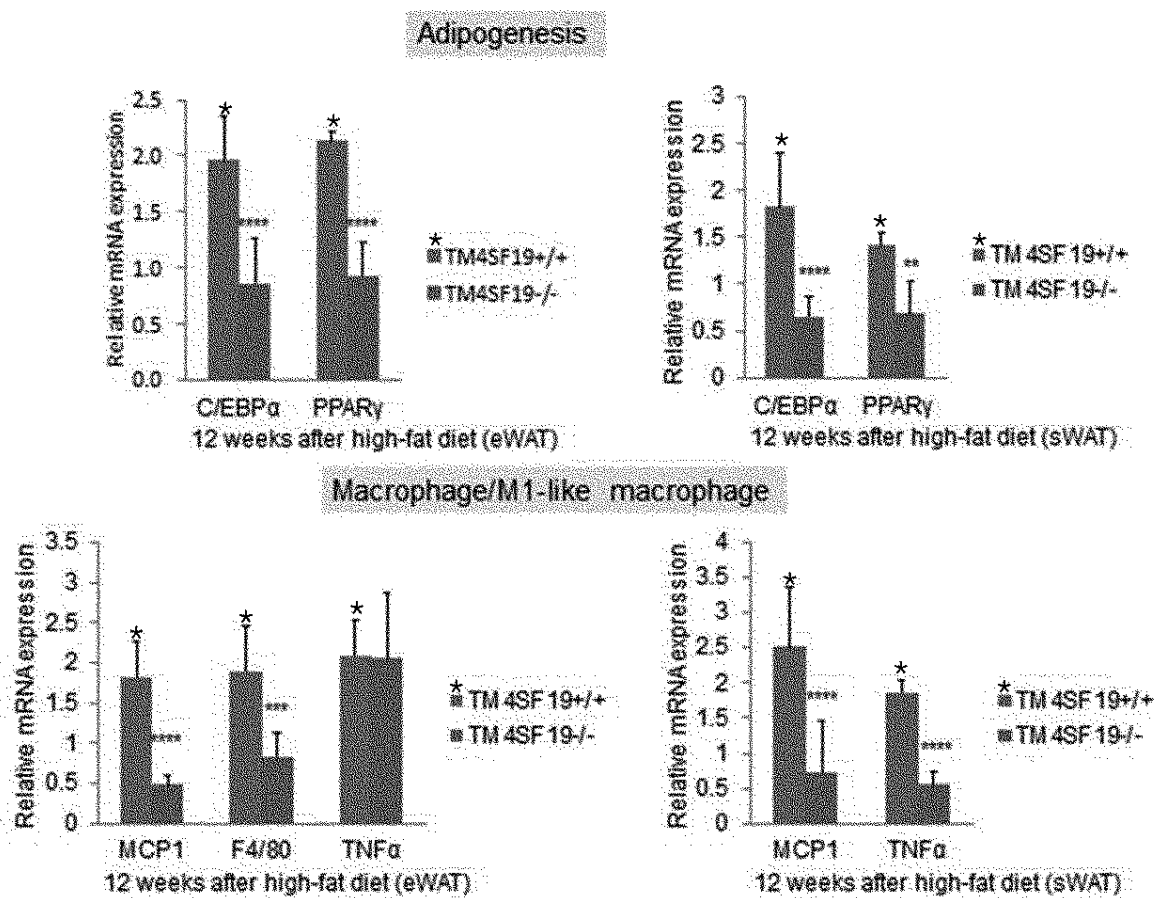
【FIG. 19D】



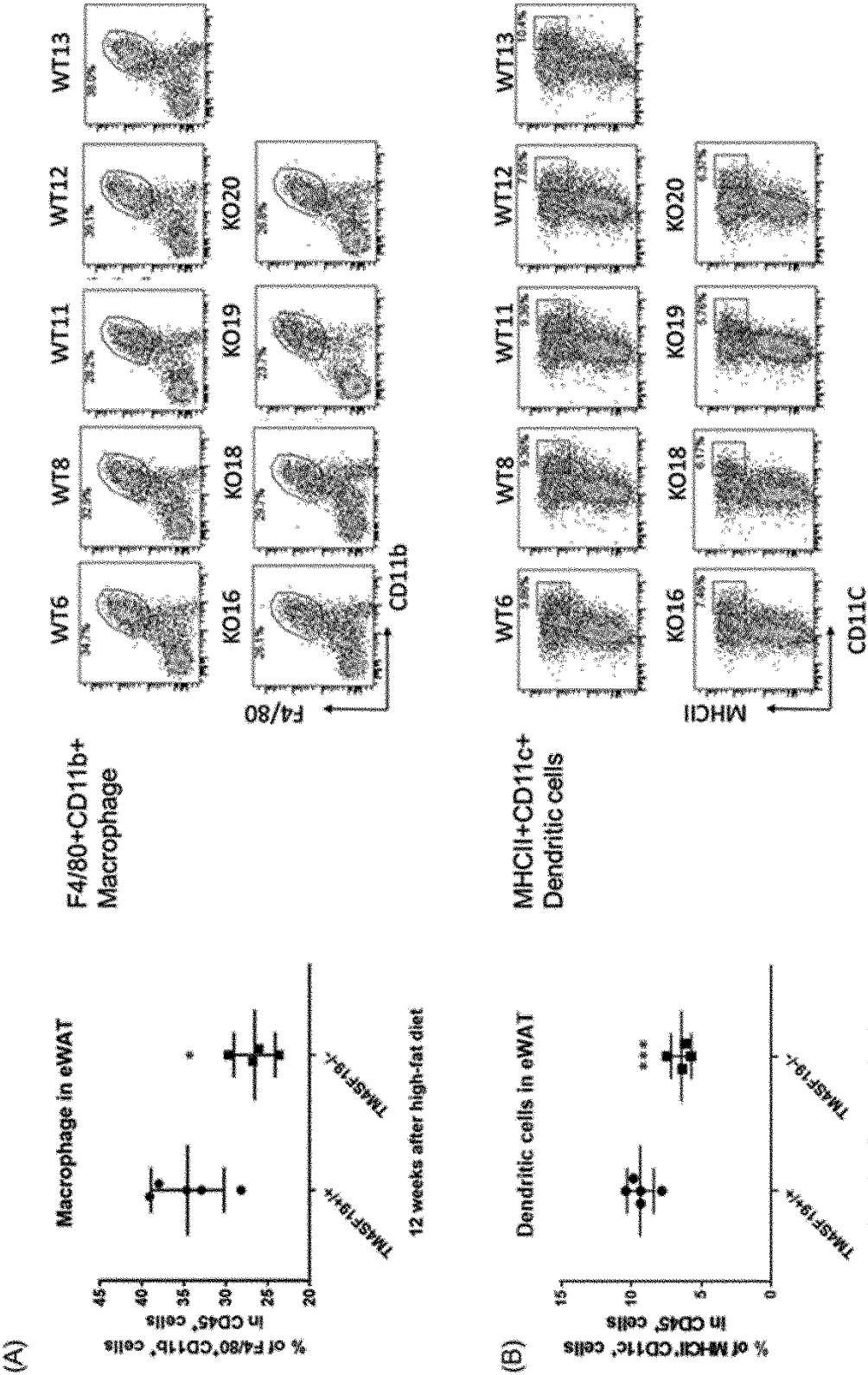
【FIG. 19E】



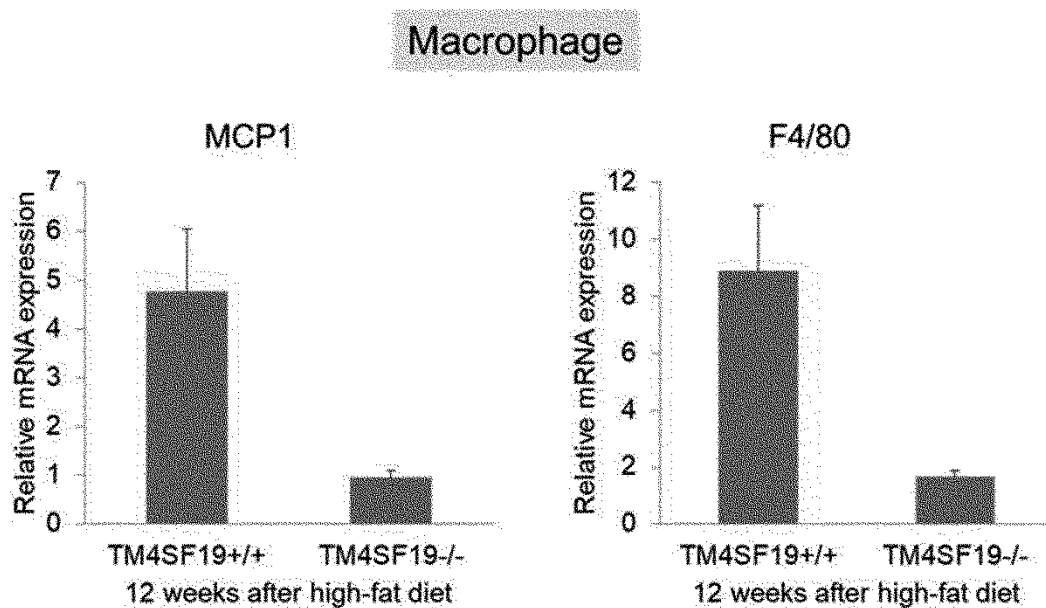
【FIG. 20】



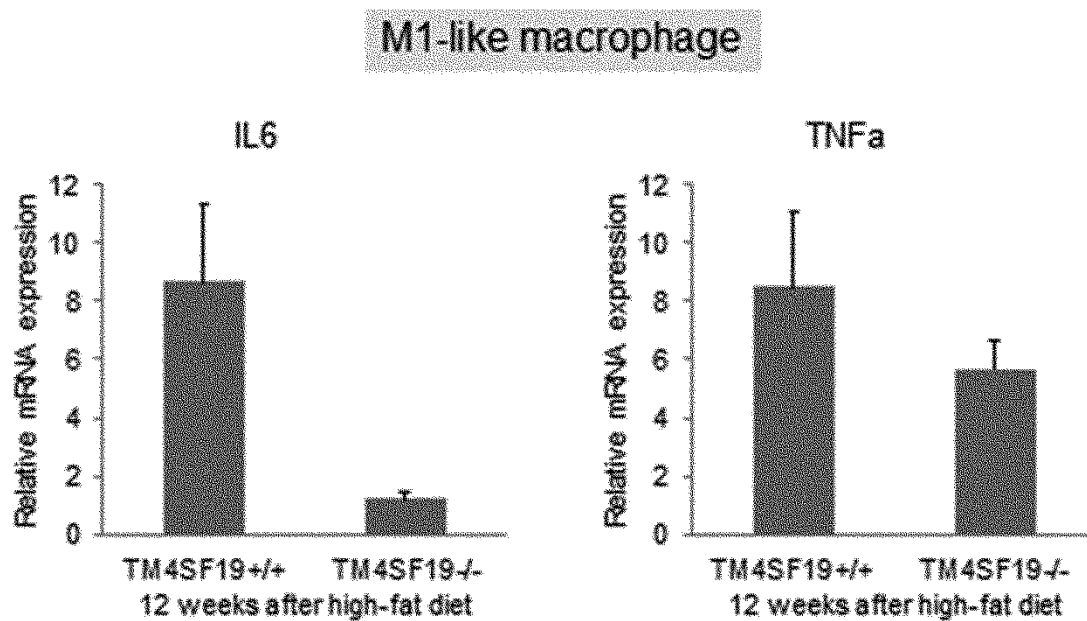
【FIG. 21】



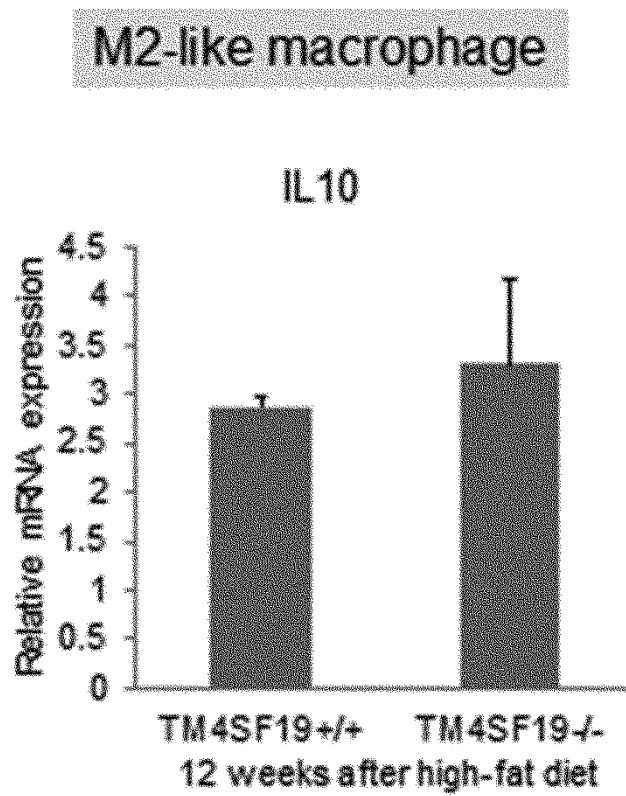
【FIG. 22A】



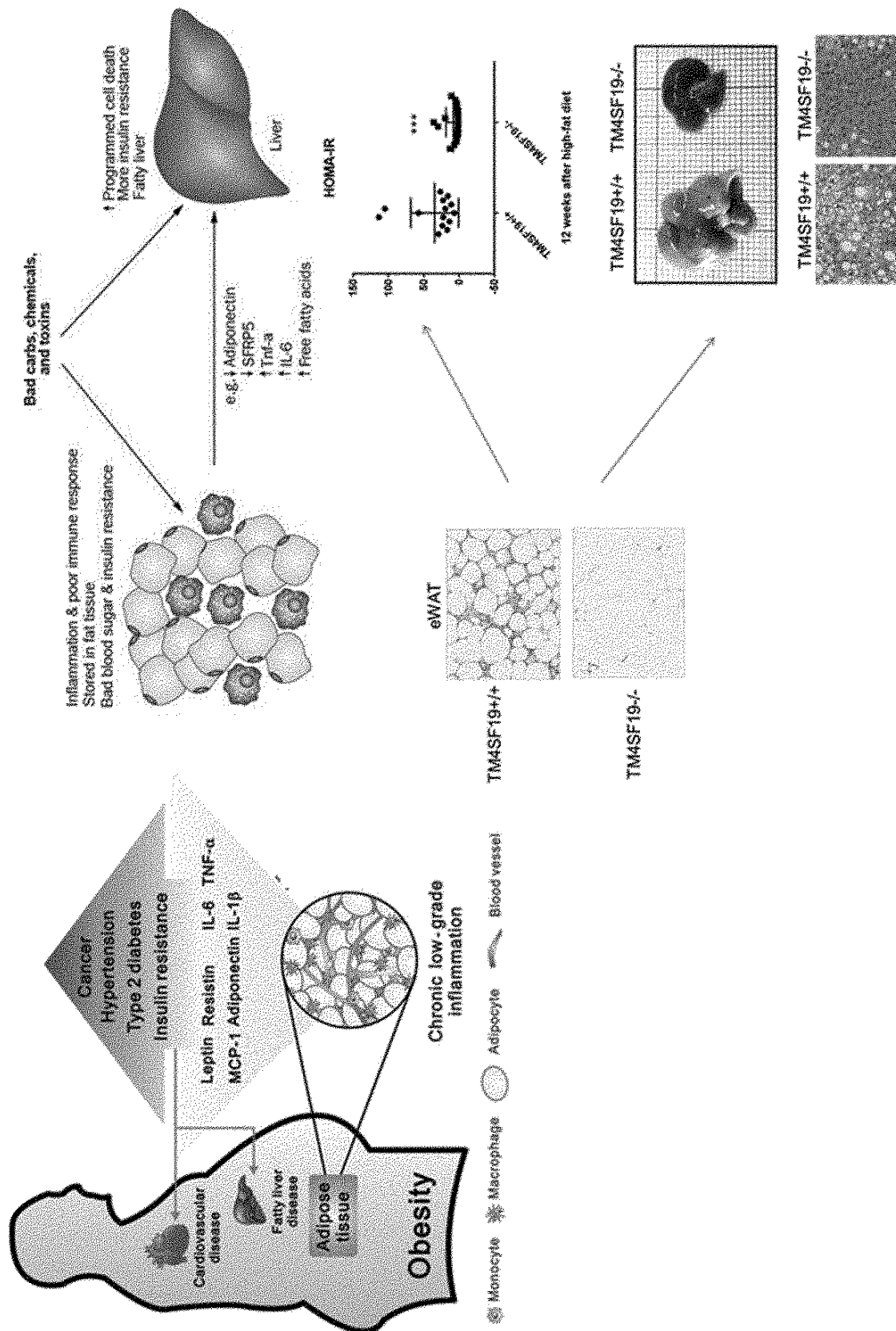
【FIG. 22B】



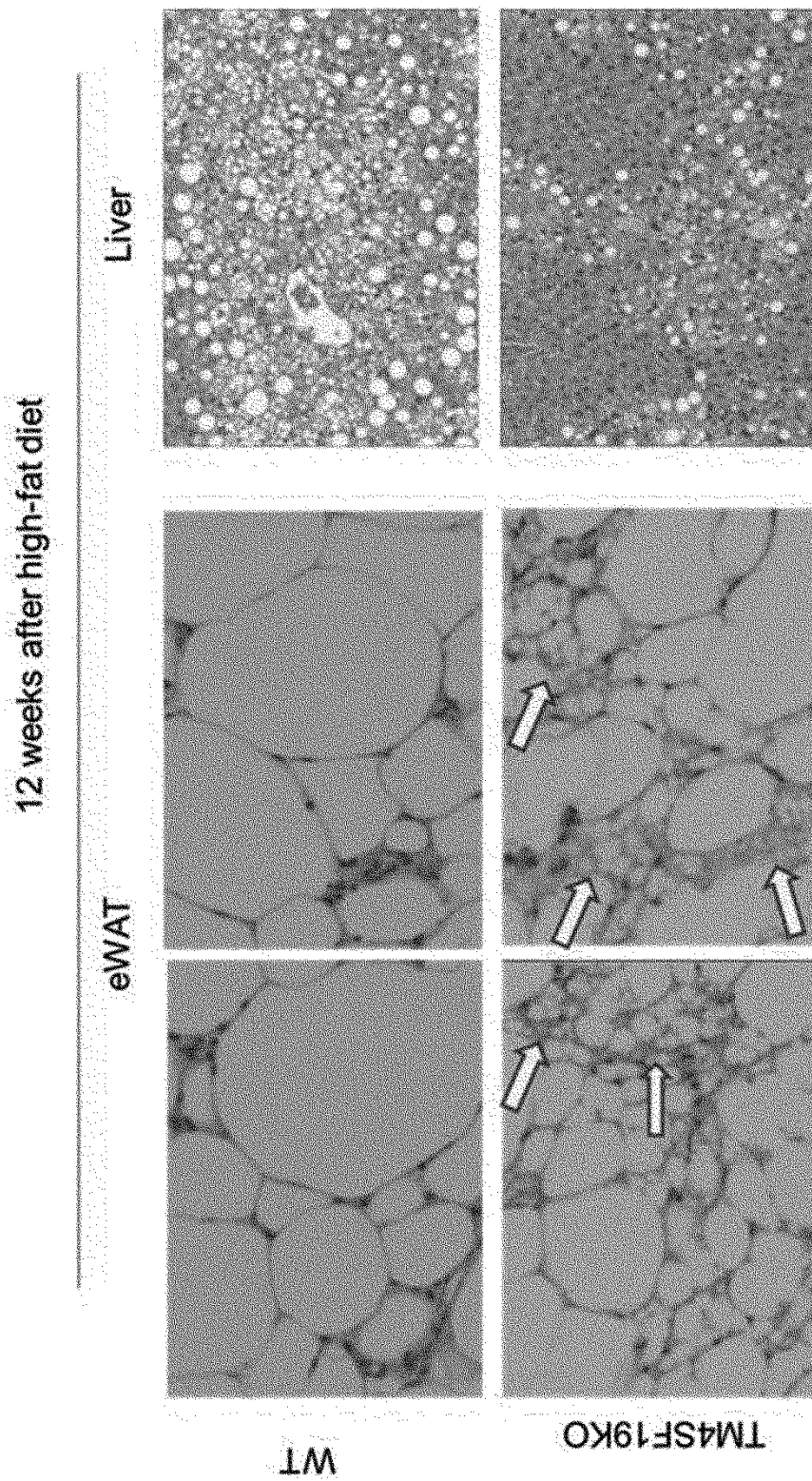
【FIG. 22C】



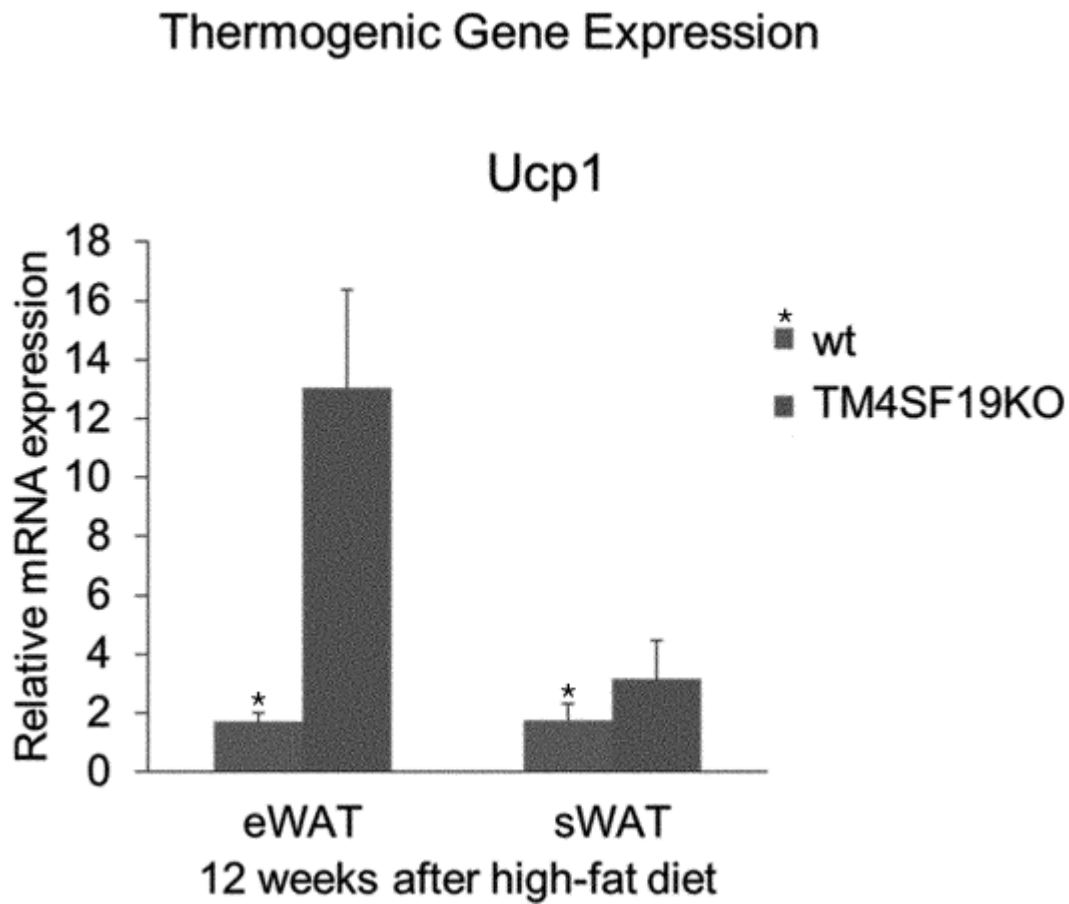
【FIG. 23】



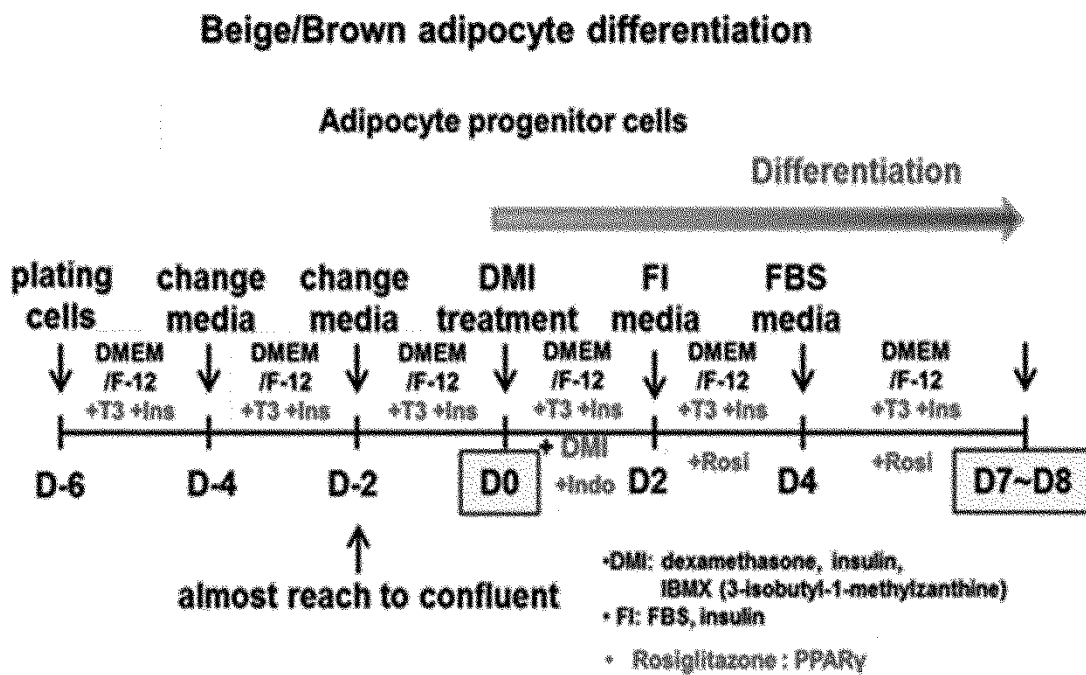
【FIG. 24A】



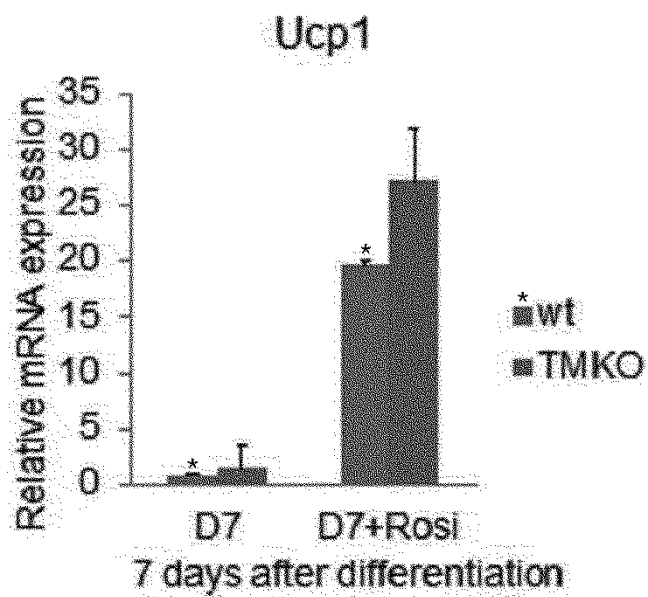
【FIG. 24B】



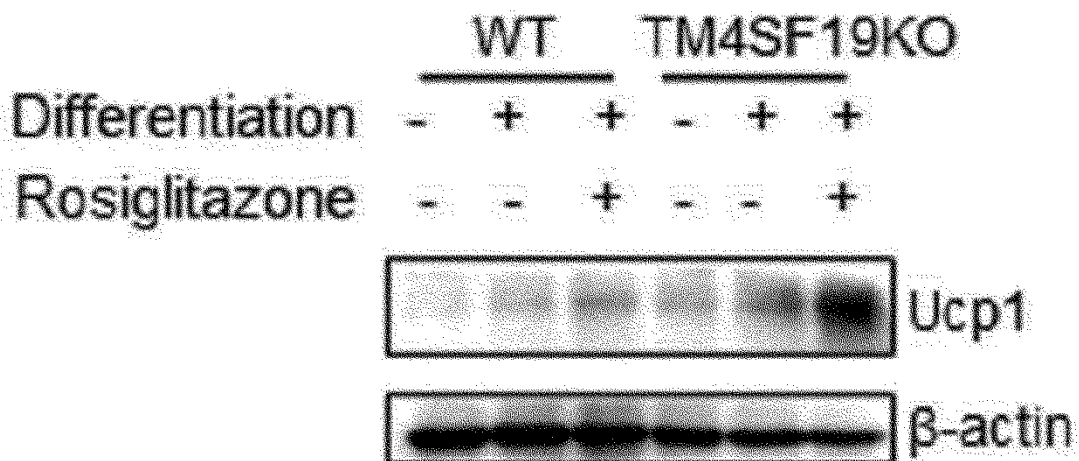
【FIG. 24C】



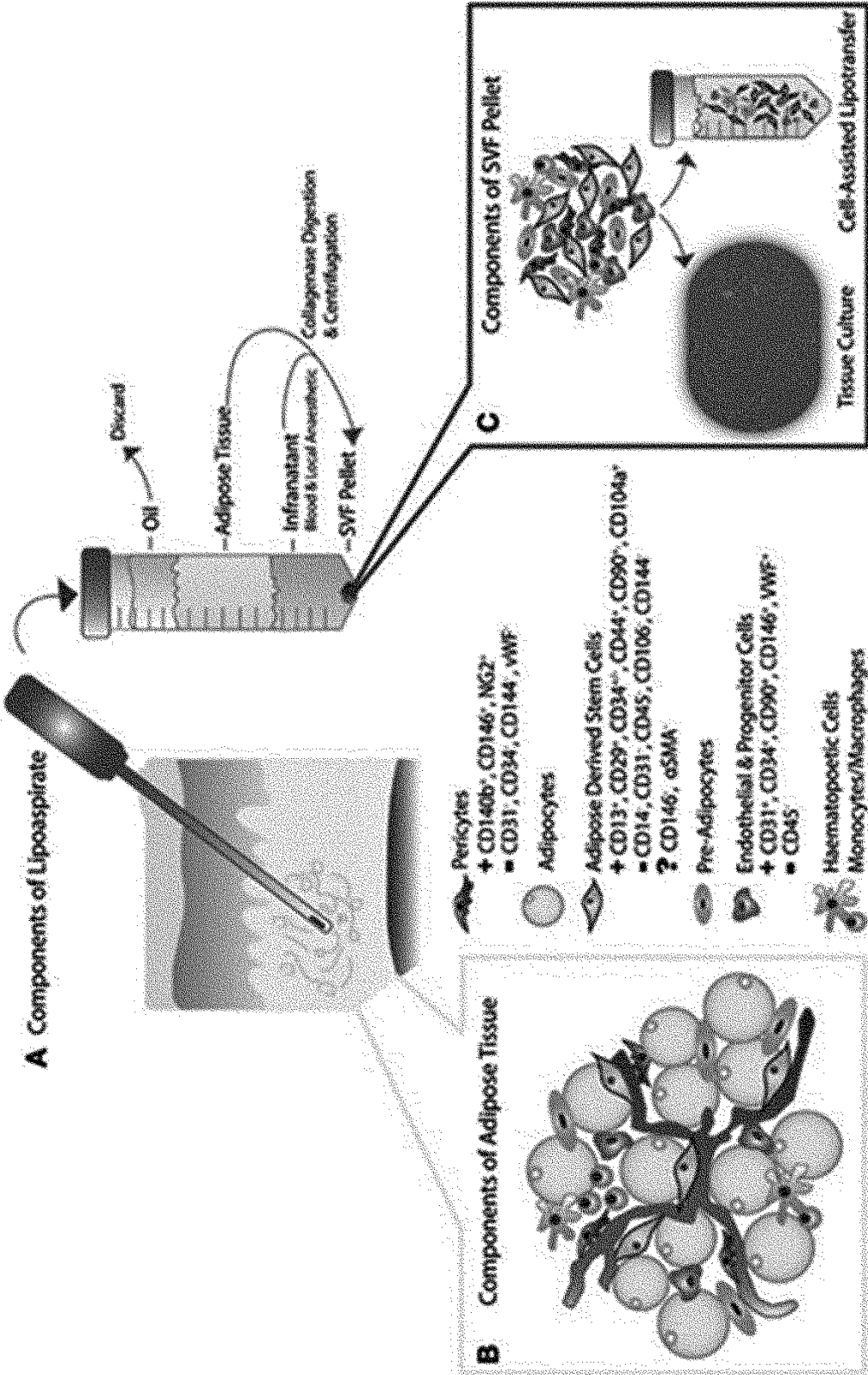
【FIG. 24D】



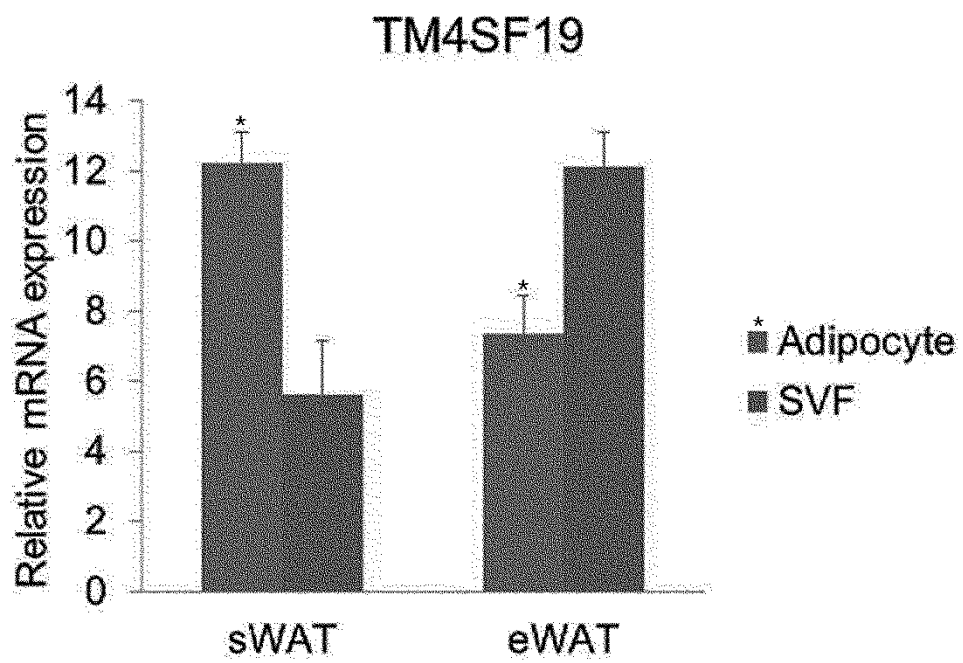
【FIG. 24E】



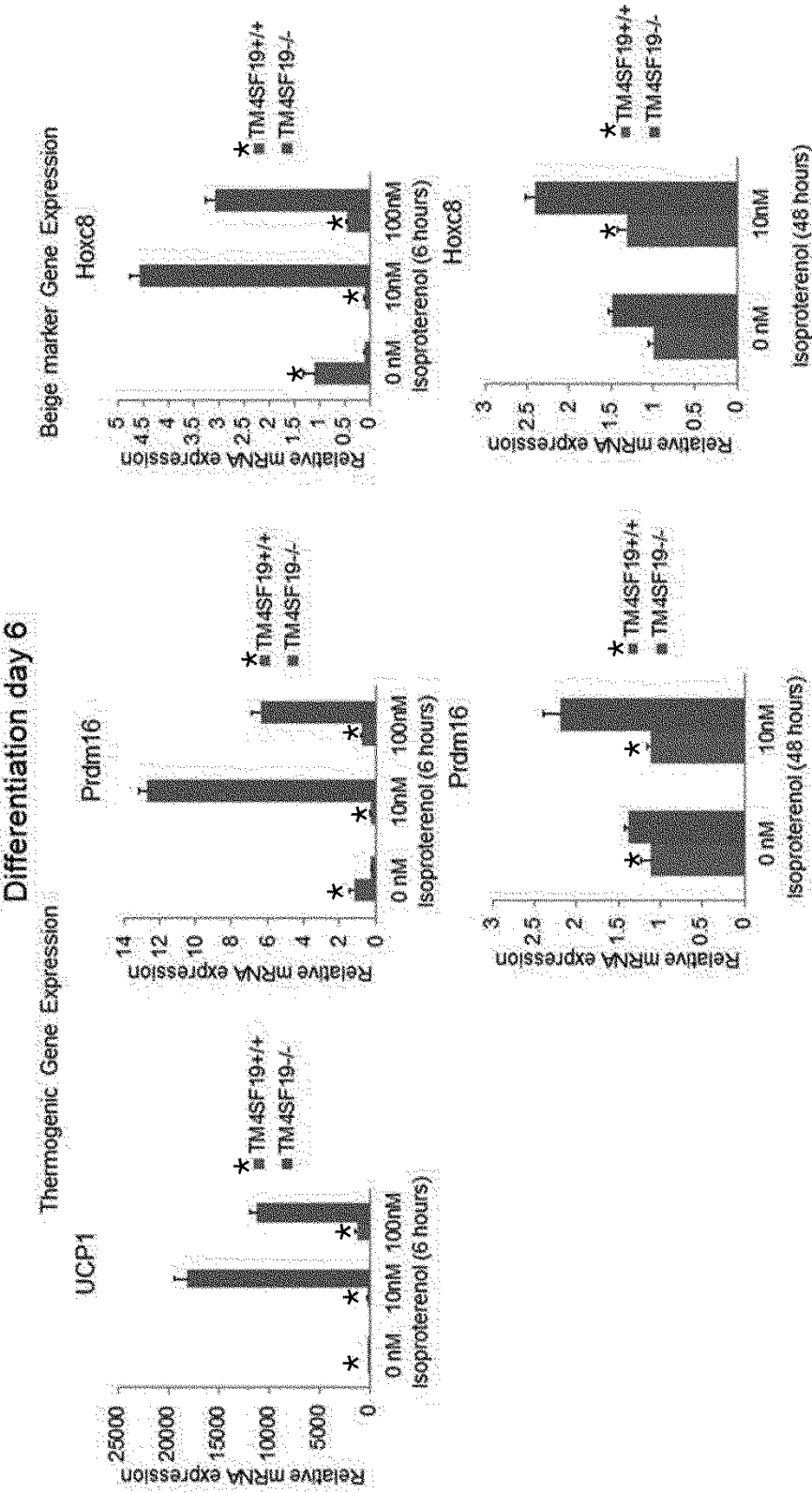
【FIG. 25A】



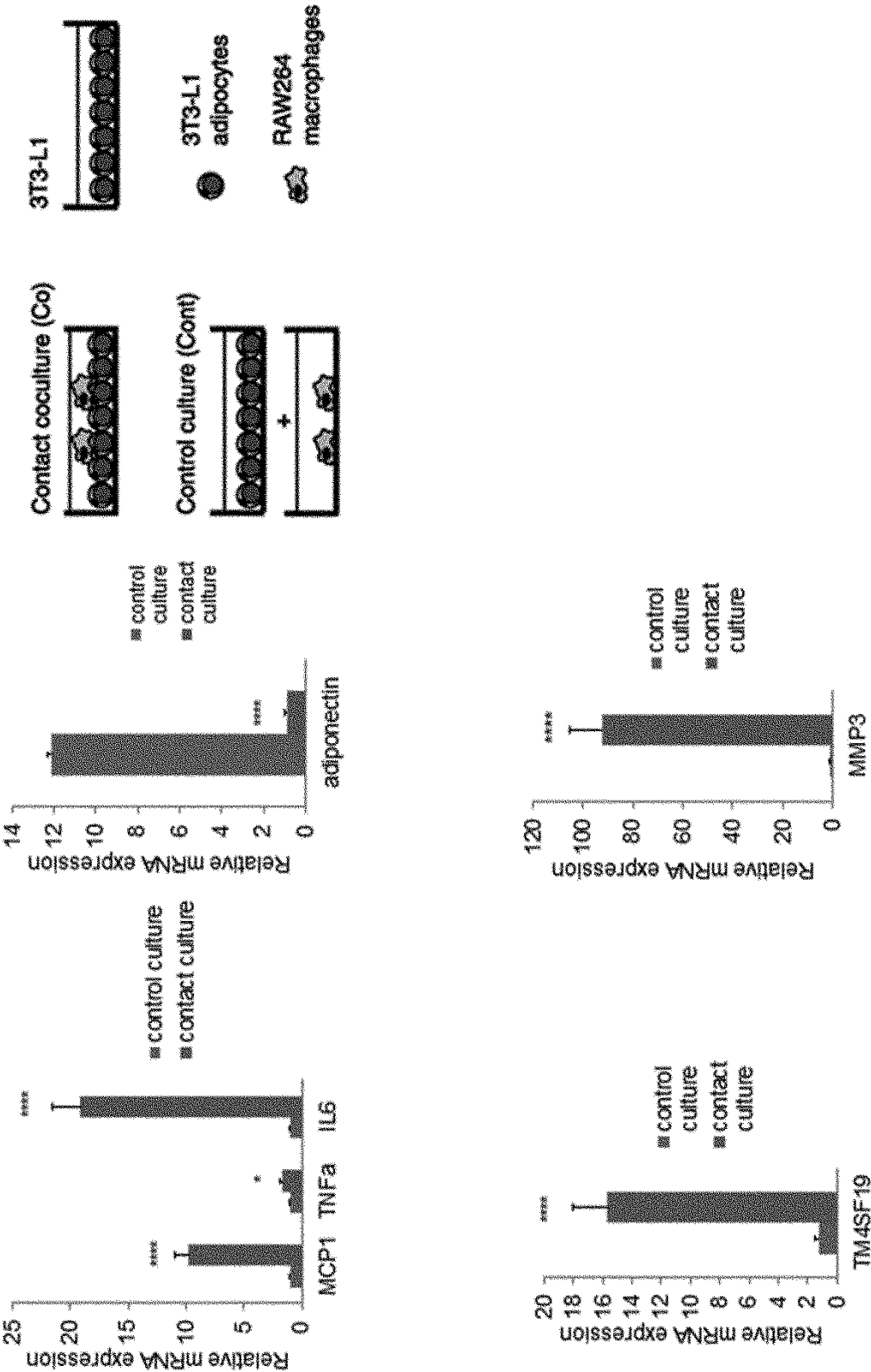
【FIG. 25b】



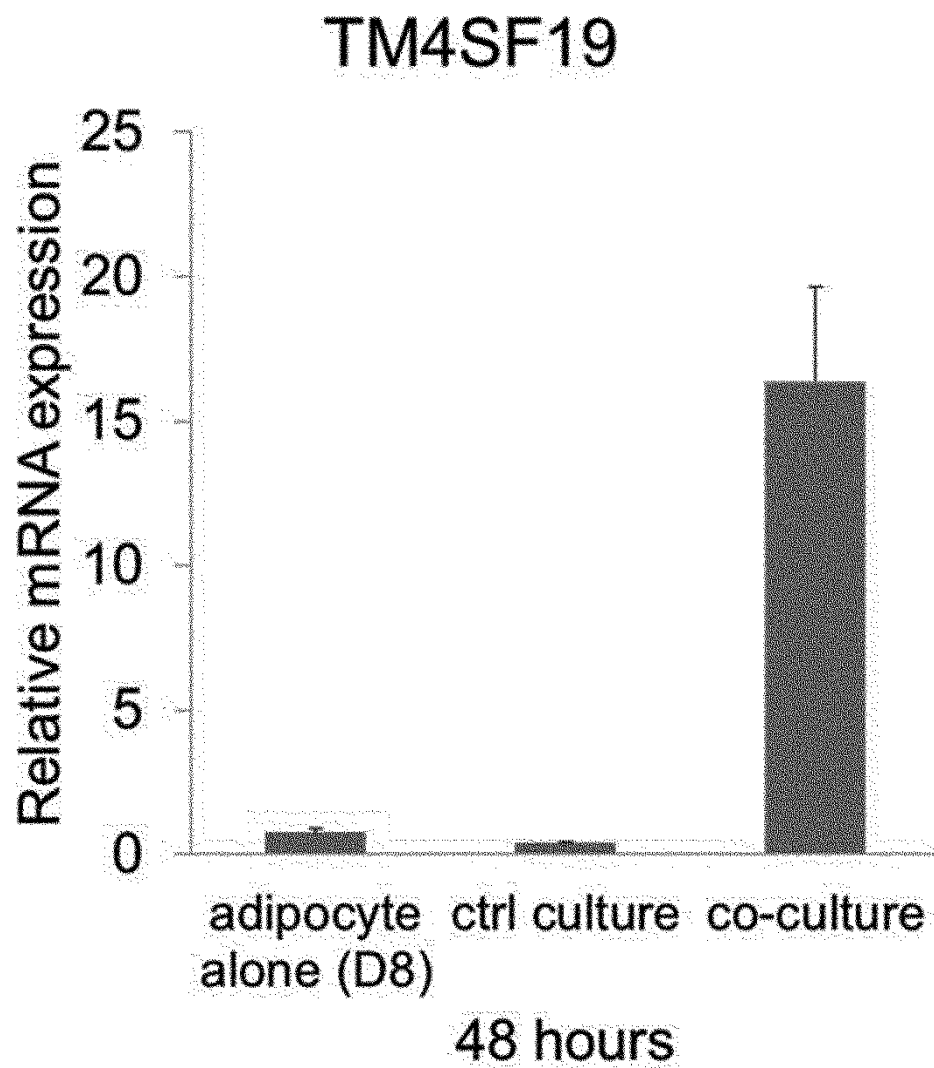
【FIG. 26】



【FIG. 27】

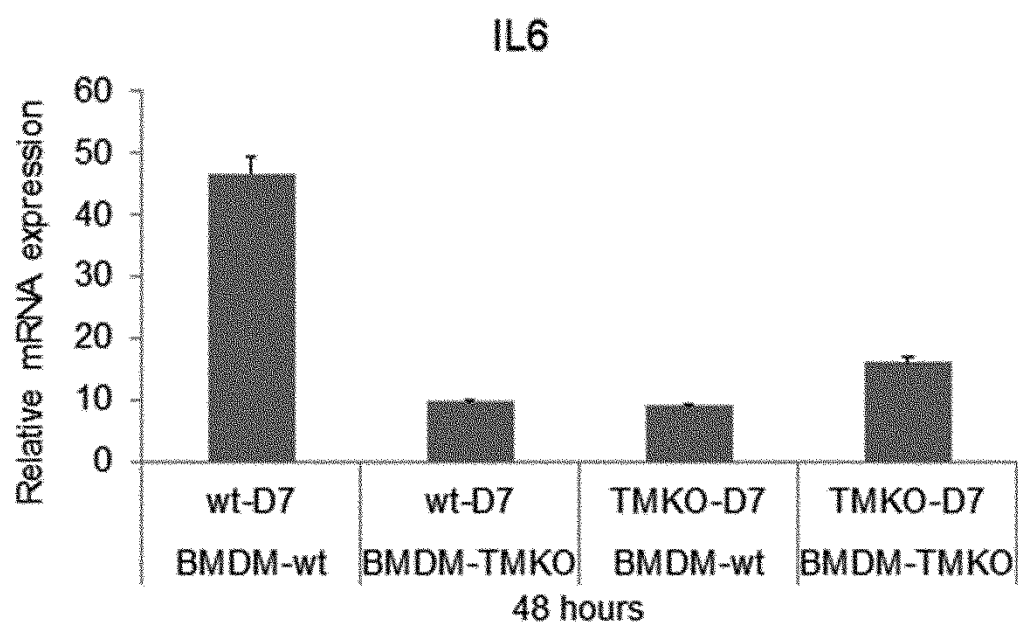
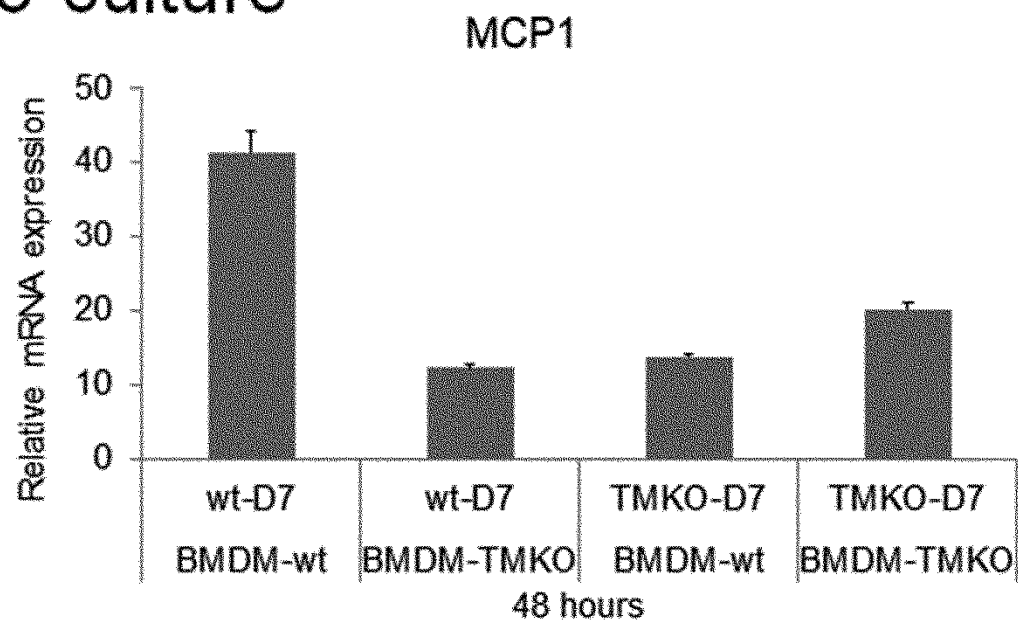


【FIG. 28】

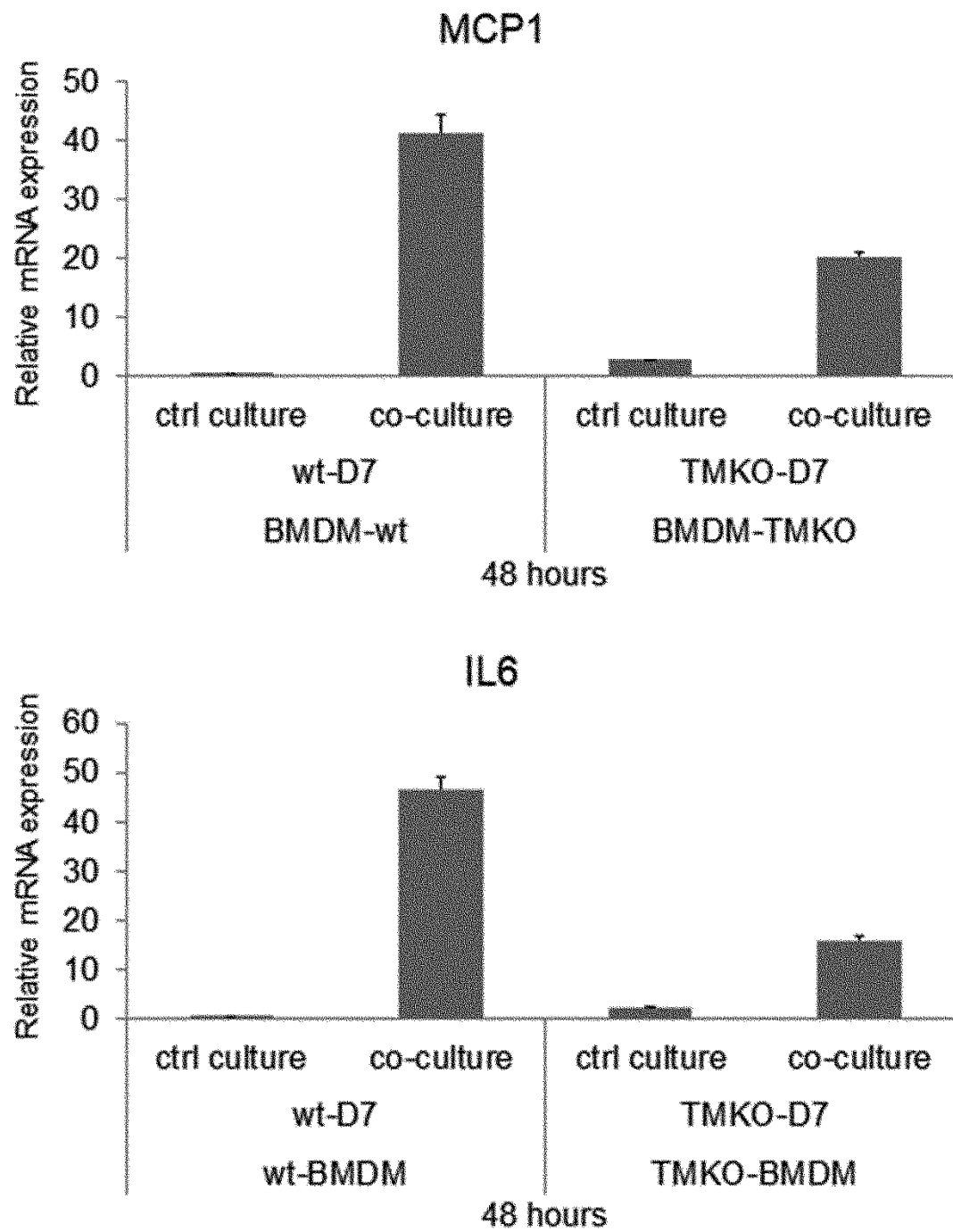


【FIG. 29】

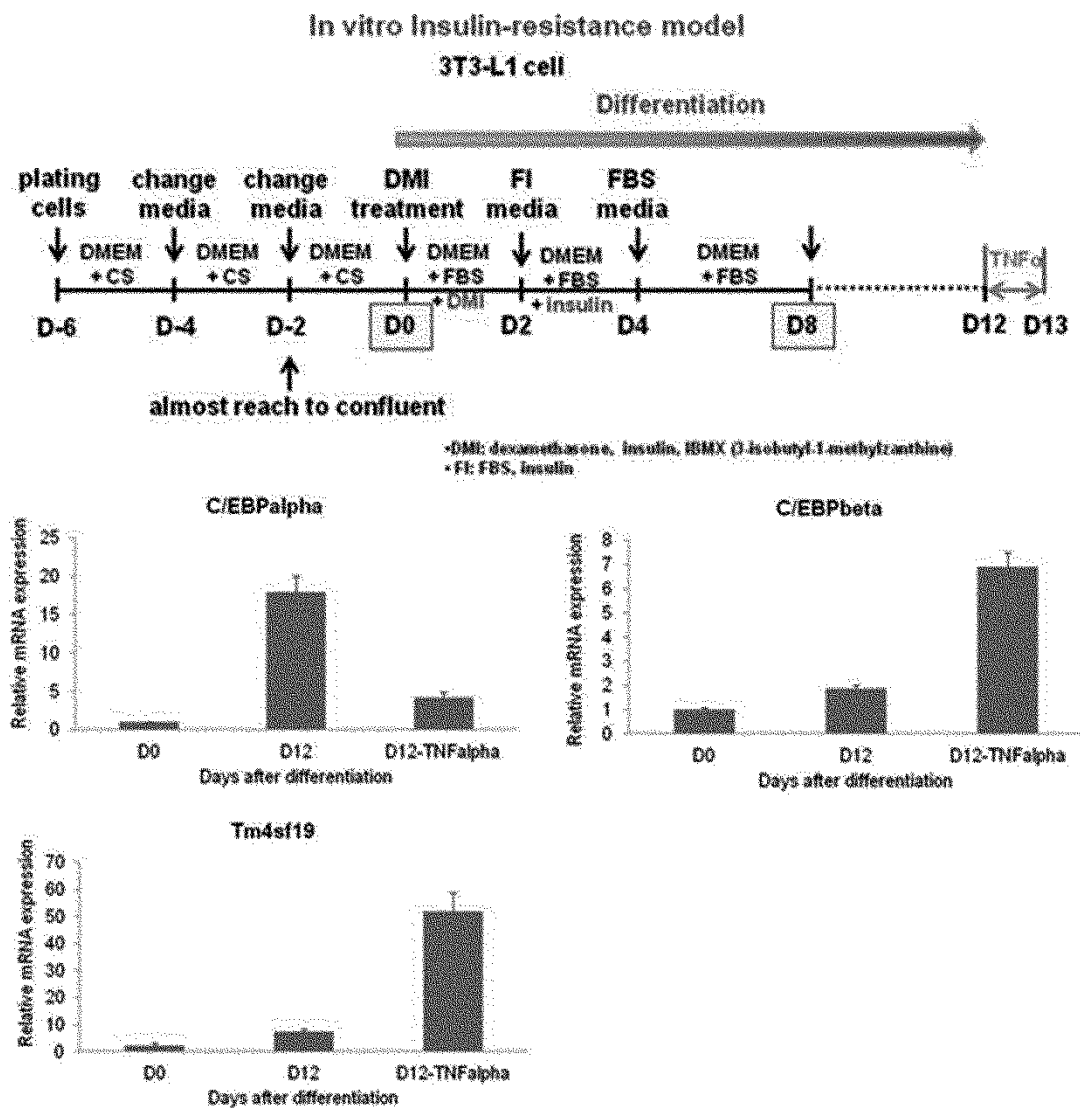
co-culture



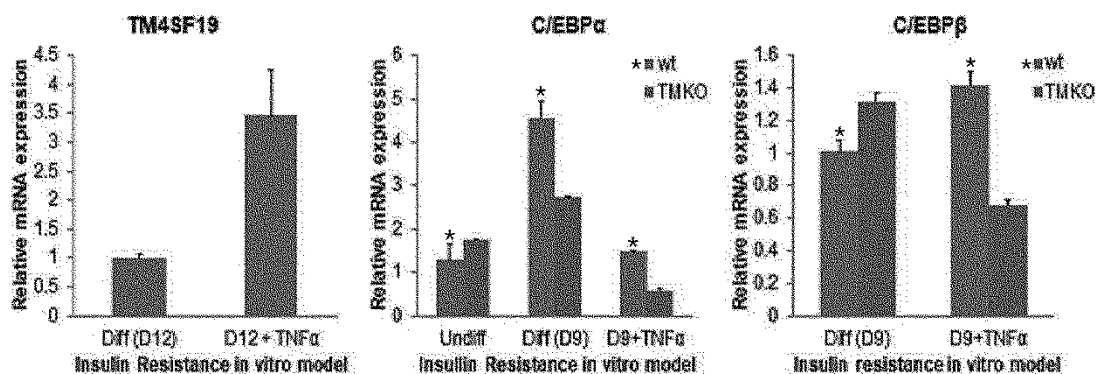
【FIG. 30】



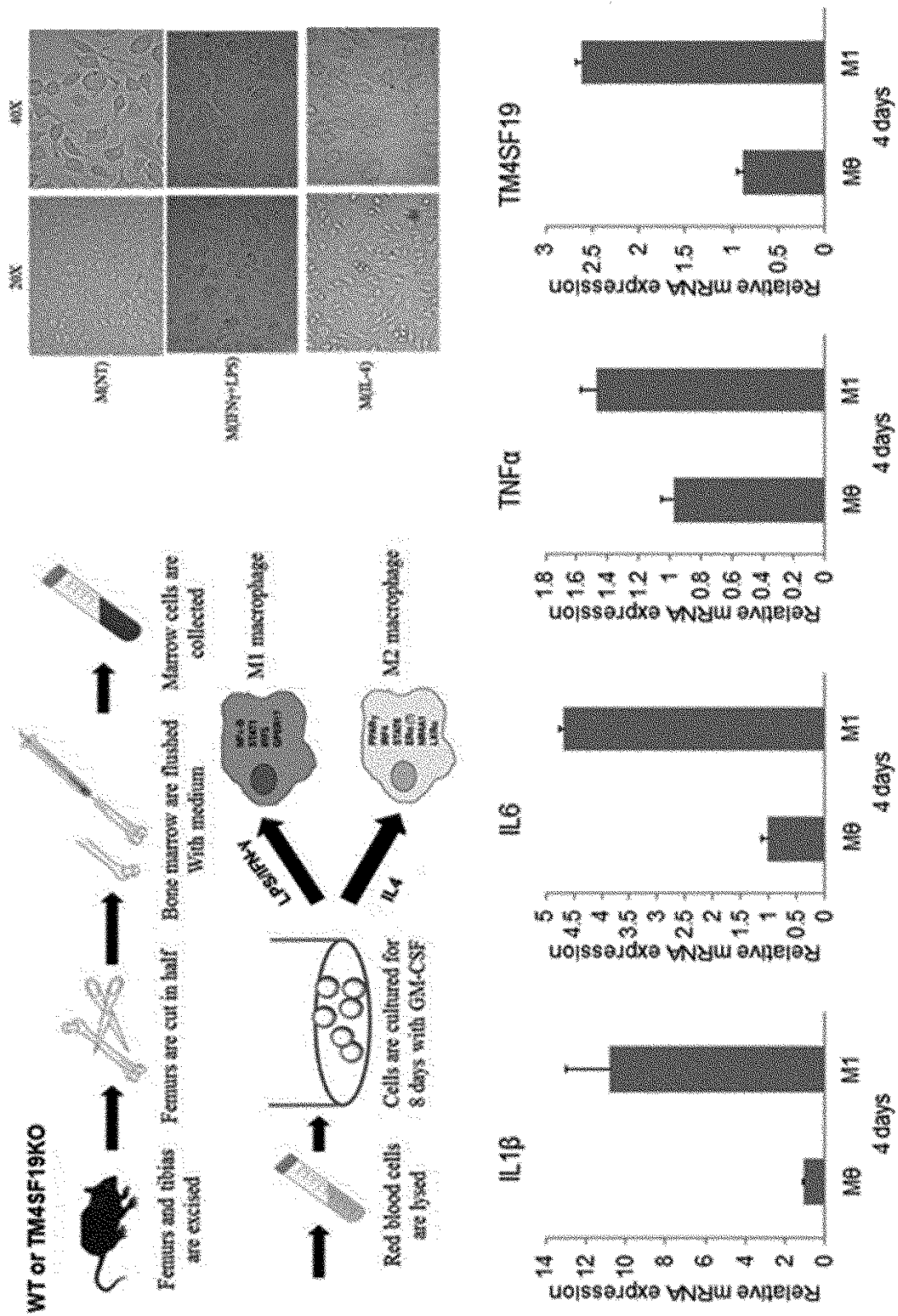
【FIG. 31】



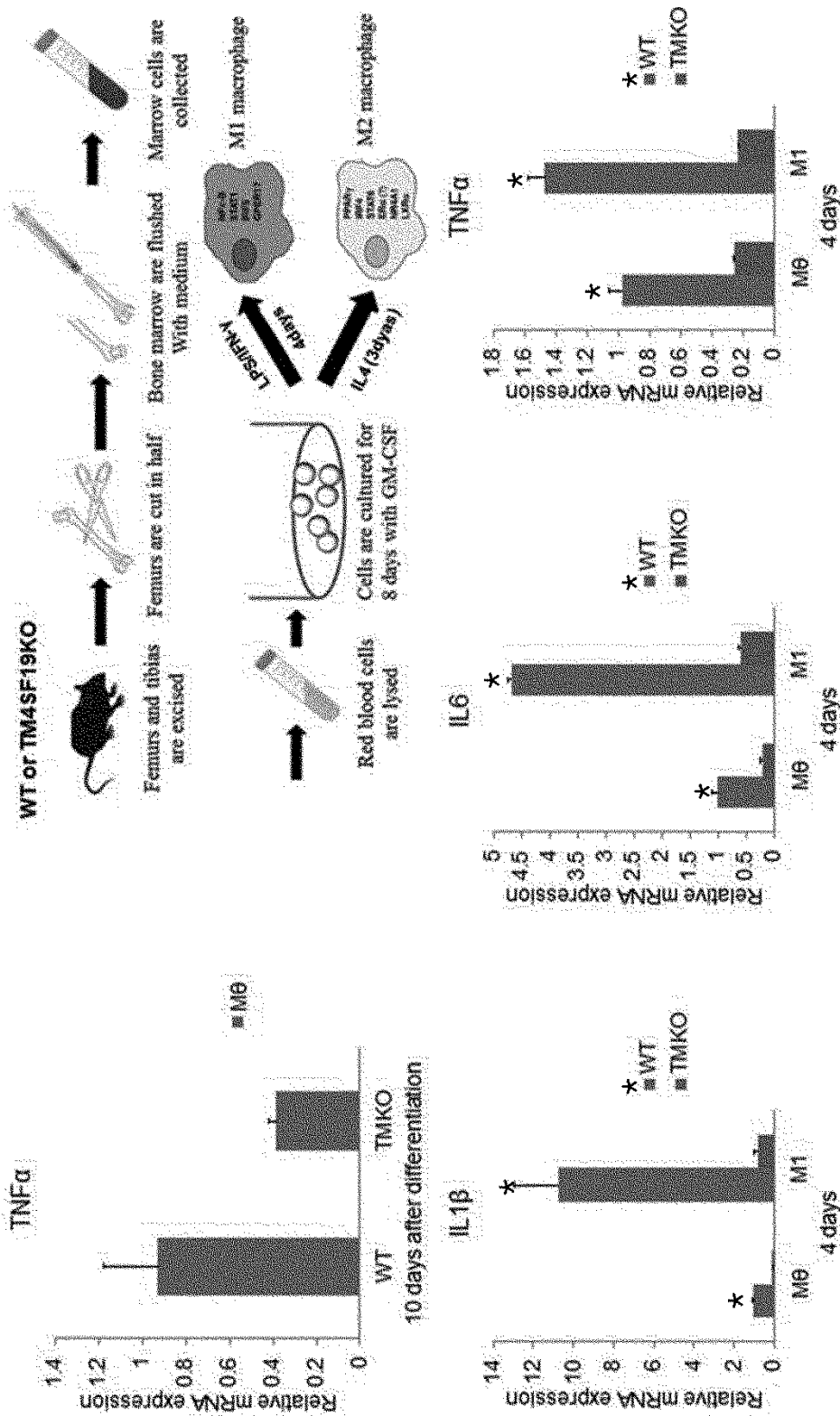
【FIG. 32】



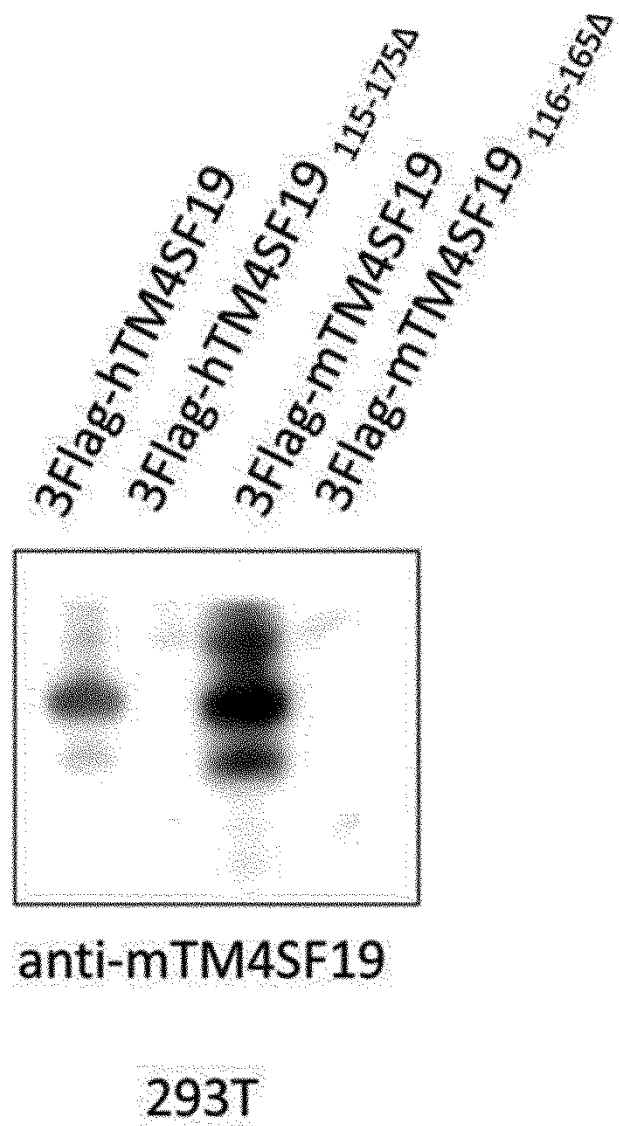
【FIG. 33】



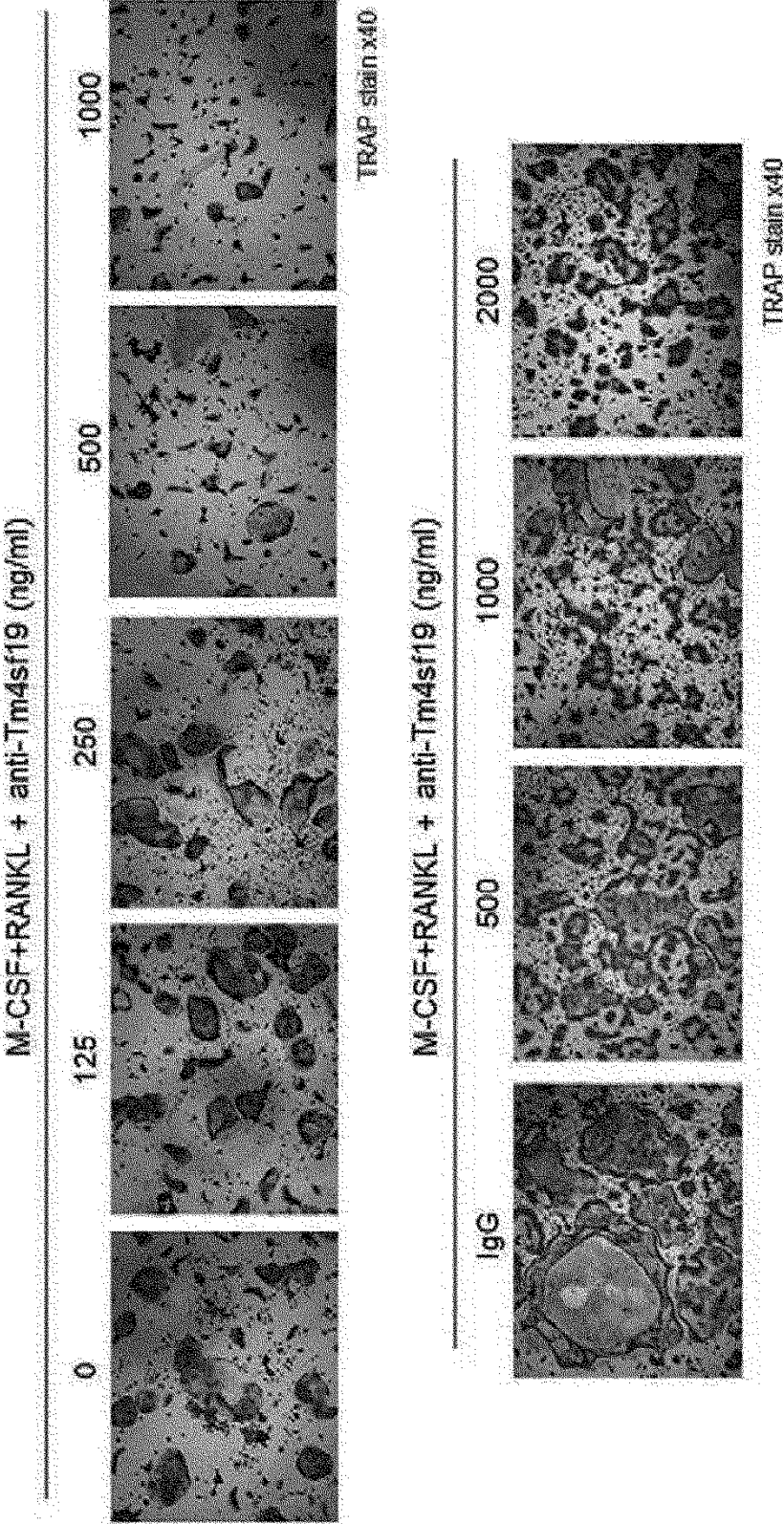
【FIG. 34】



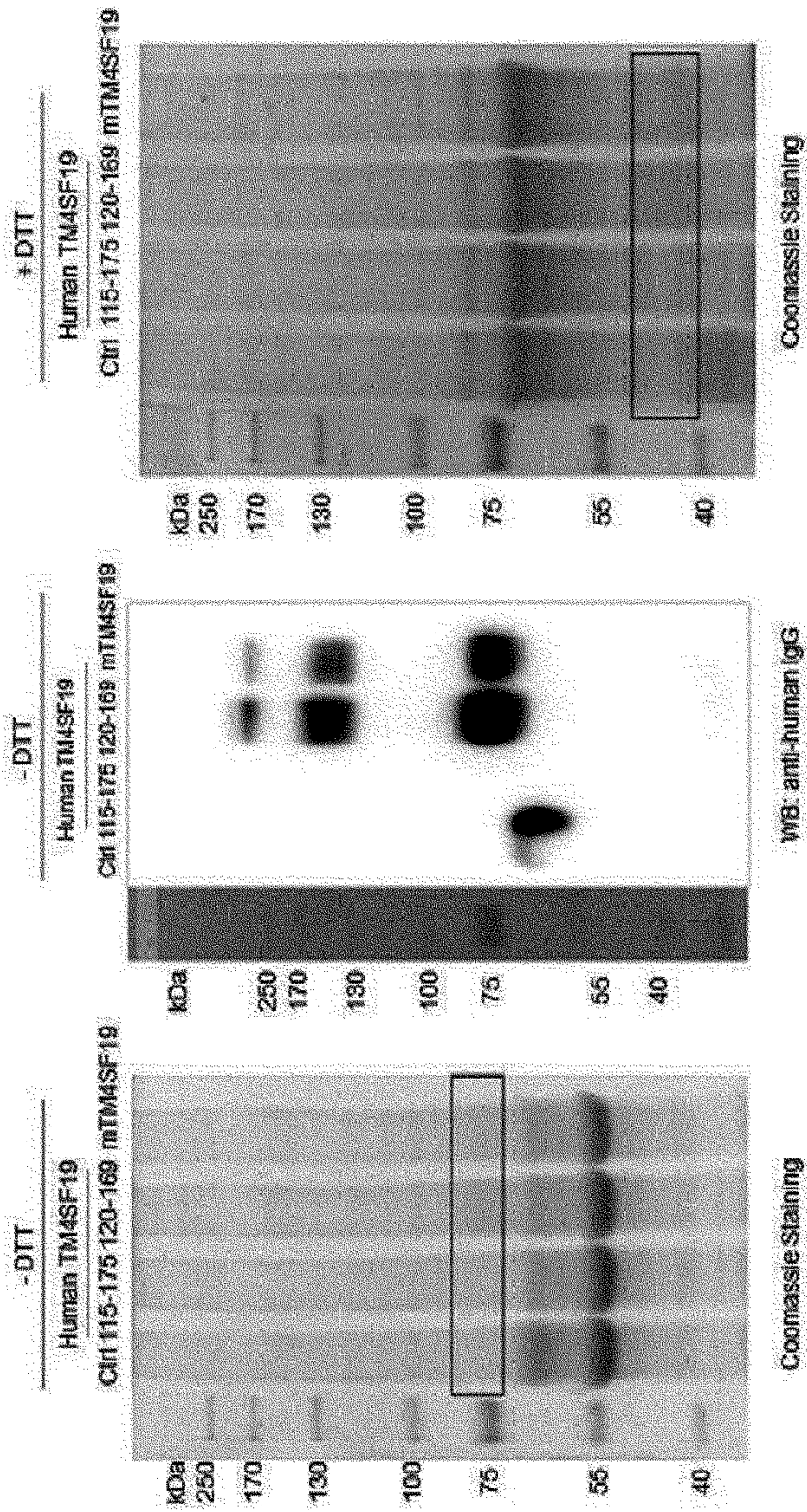
【FIG. 35】



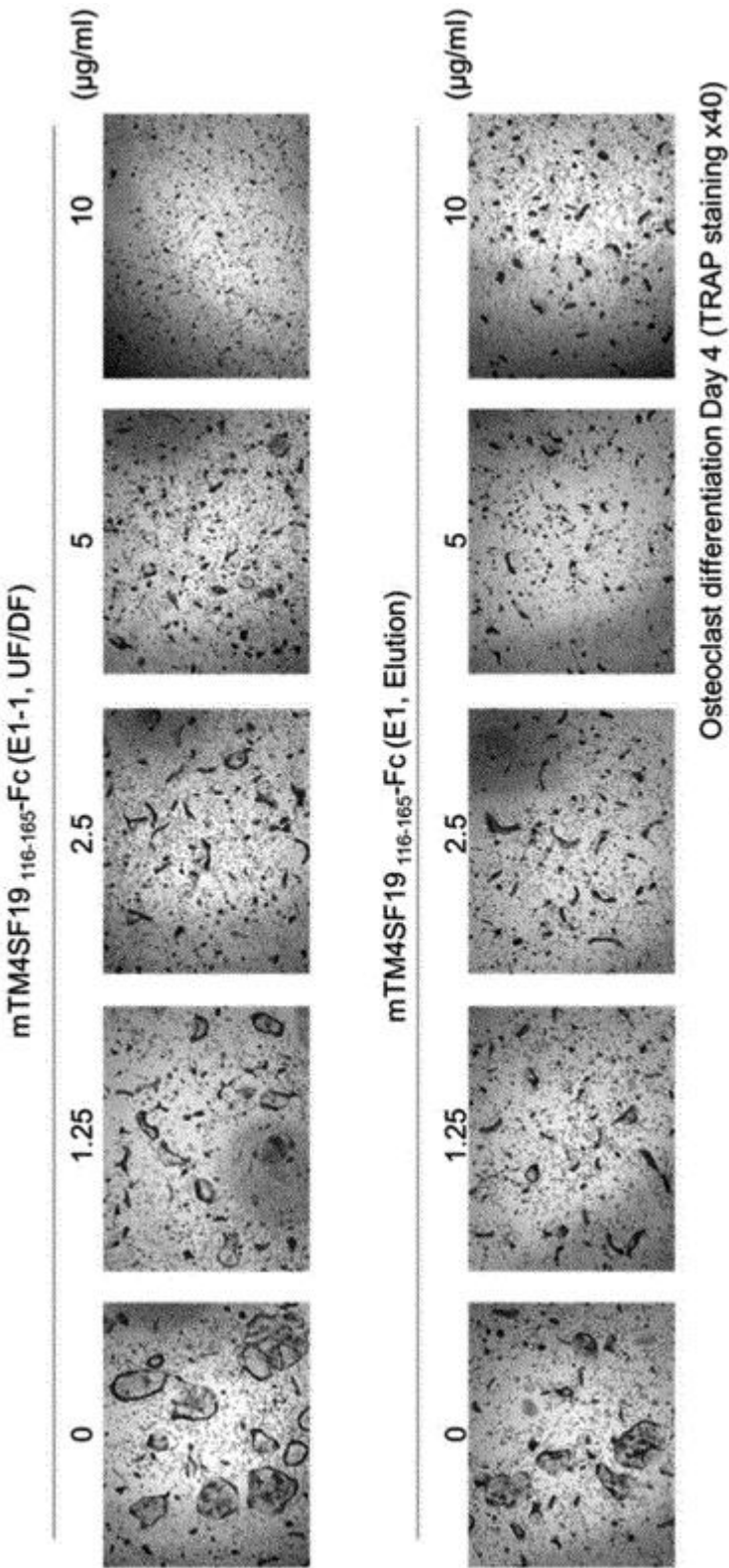
【FIG. 36】



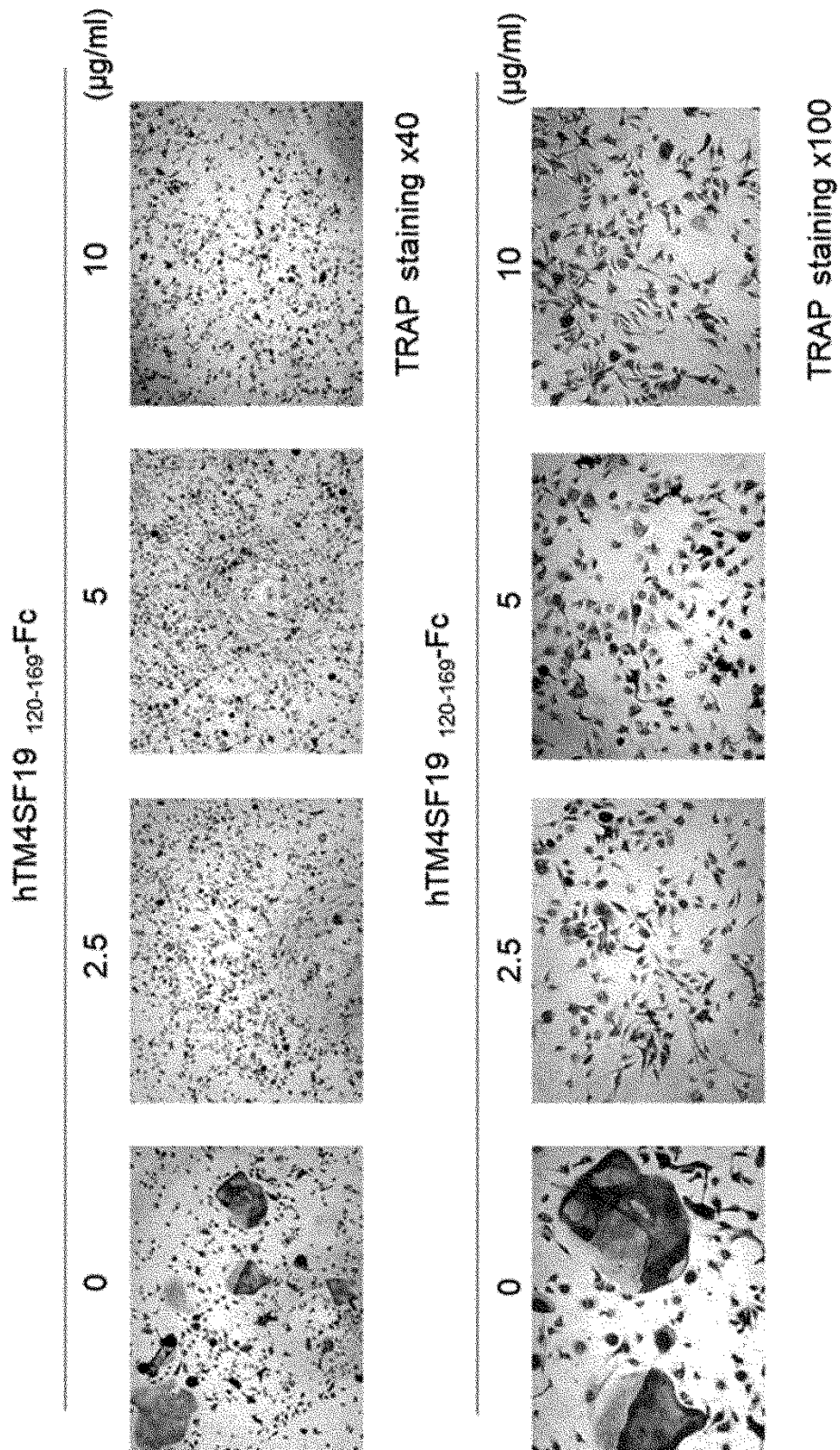
【FIG. 37】



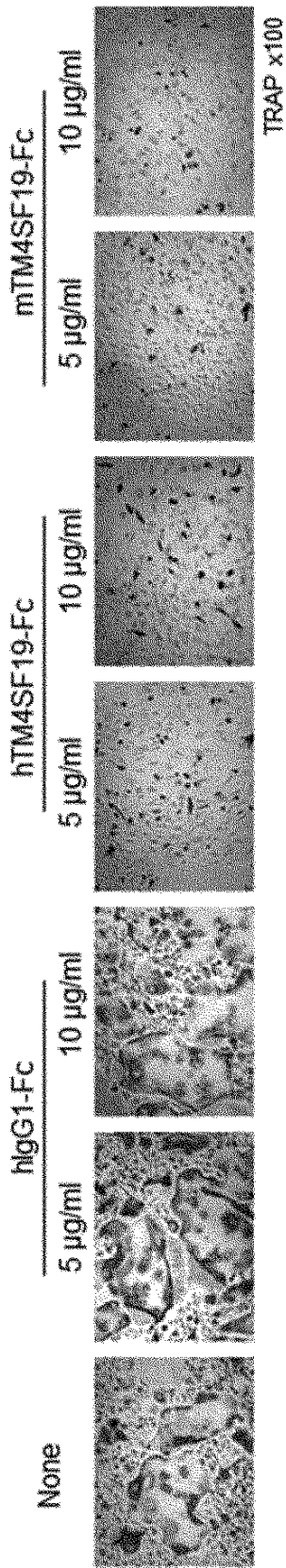
【FIG. 38A】



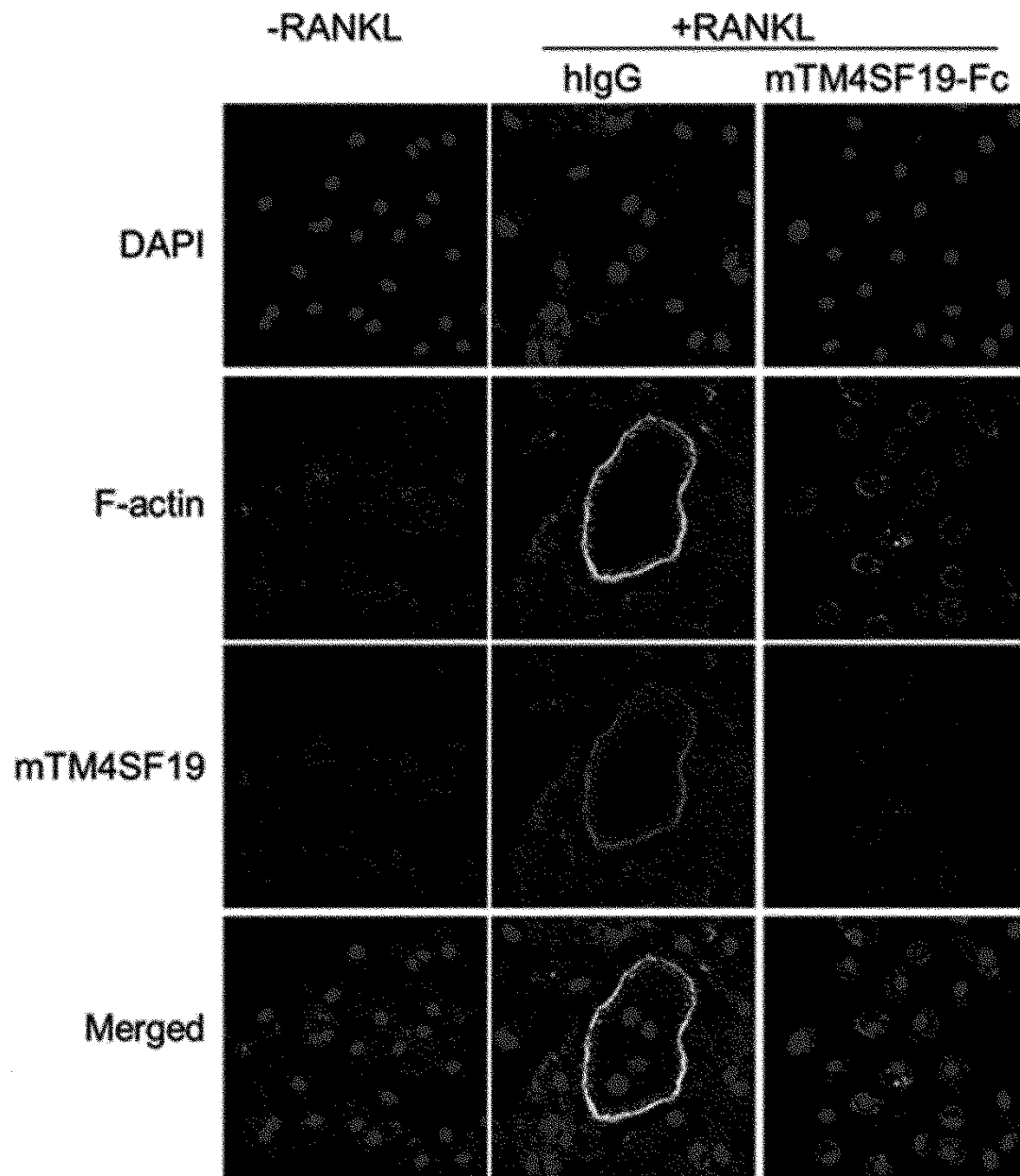
【FIG. 38B】



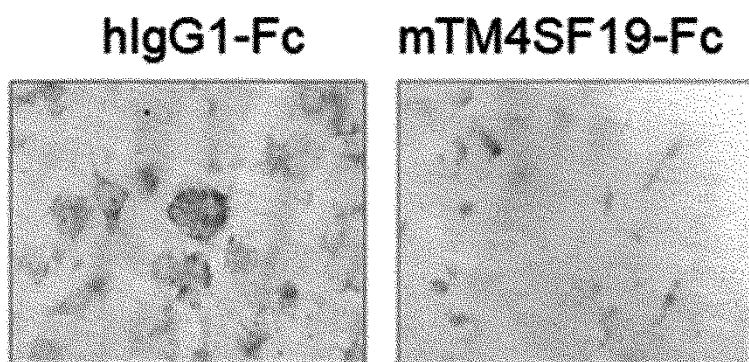
【FIG. 38C】



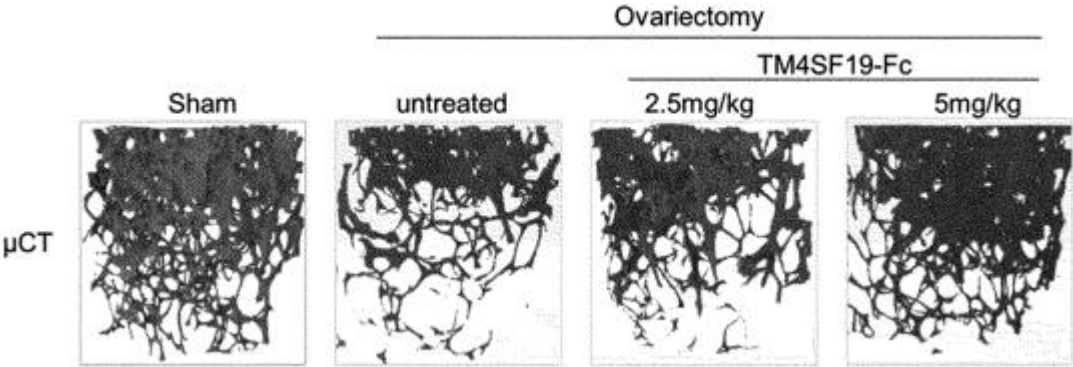
【FIG. 38D】



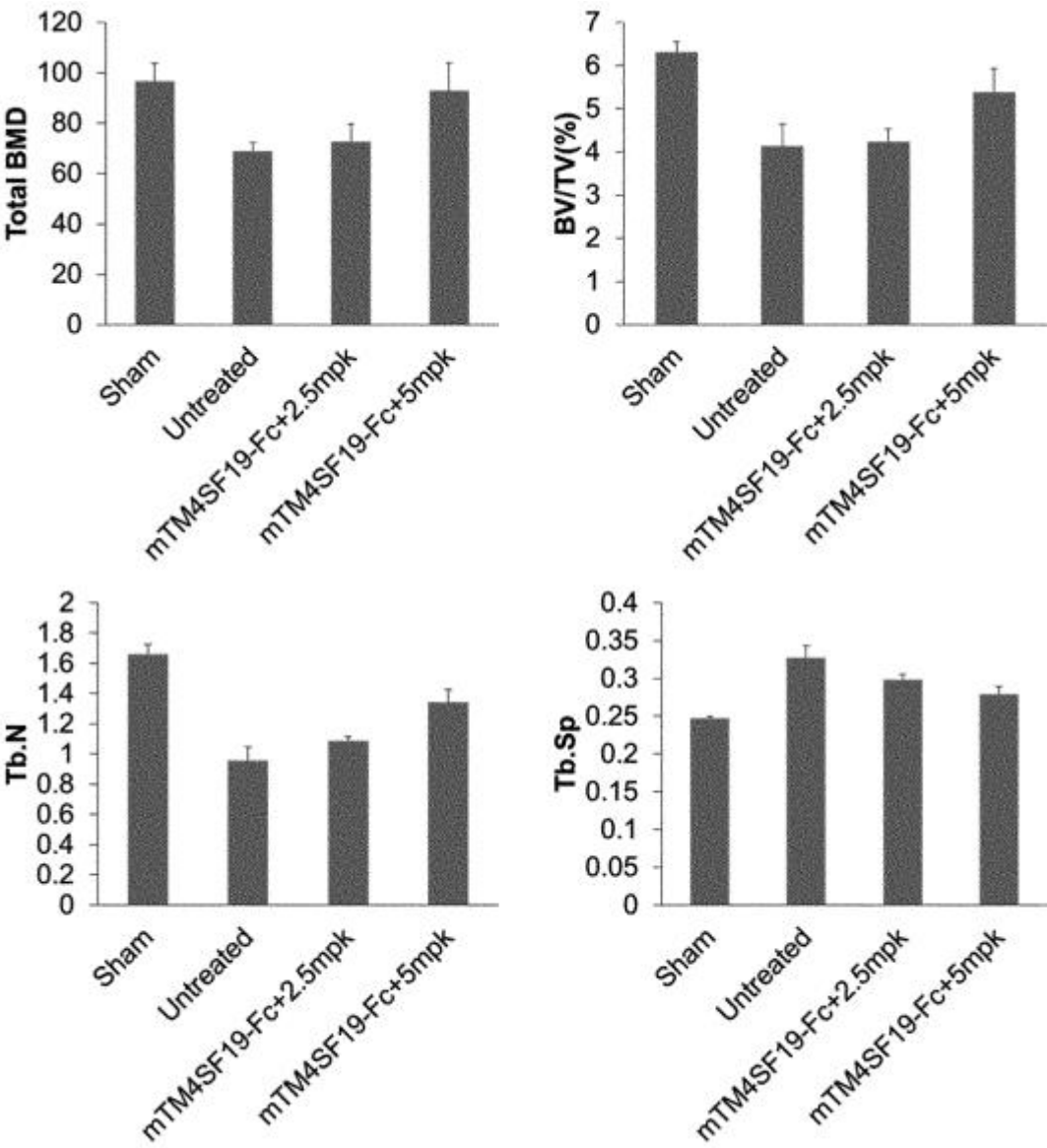
【FIG. 38E】



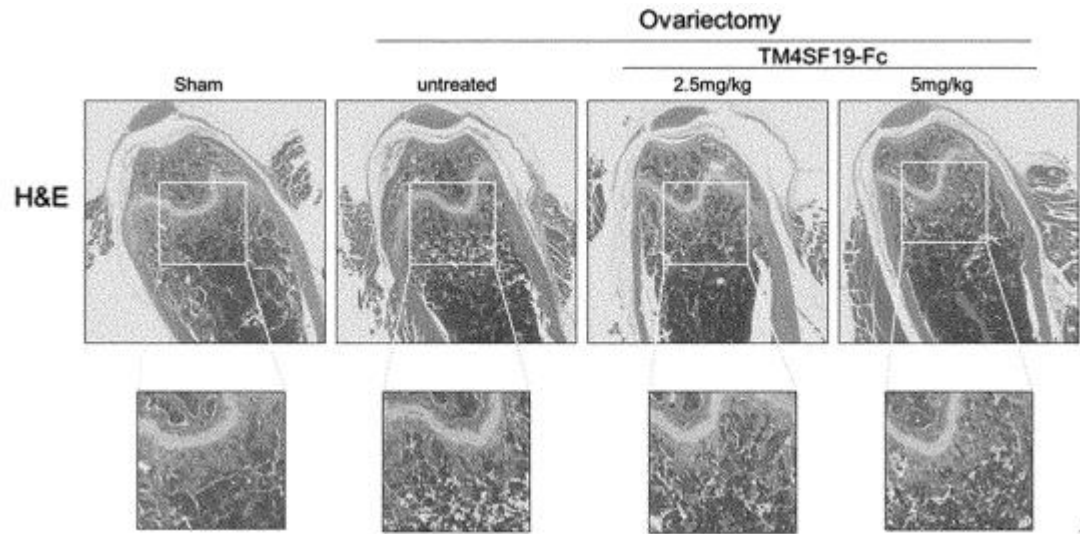
【FIG. 39A】



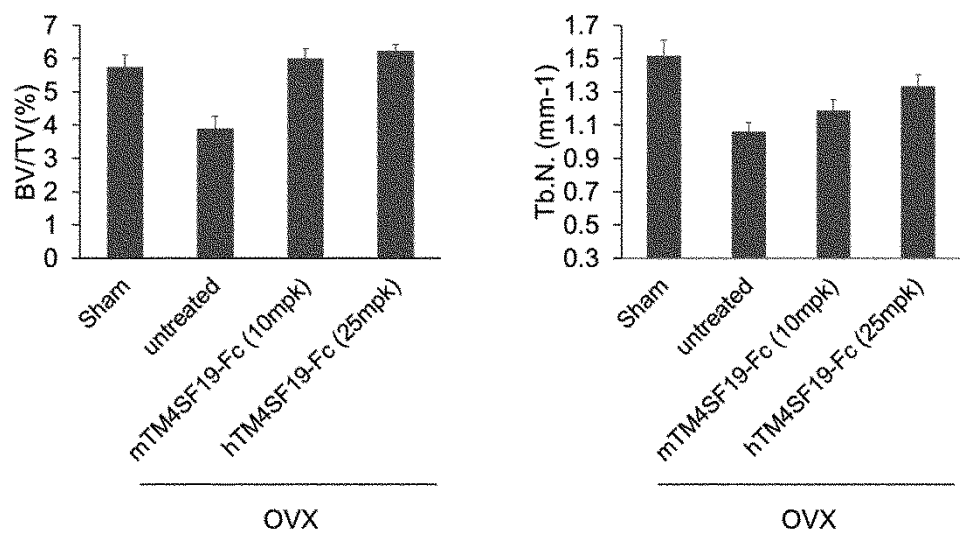
【FIG. 39B】



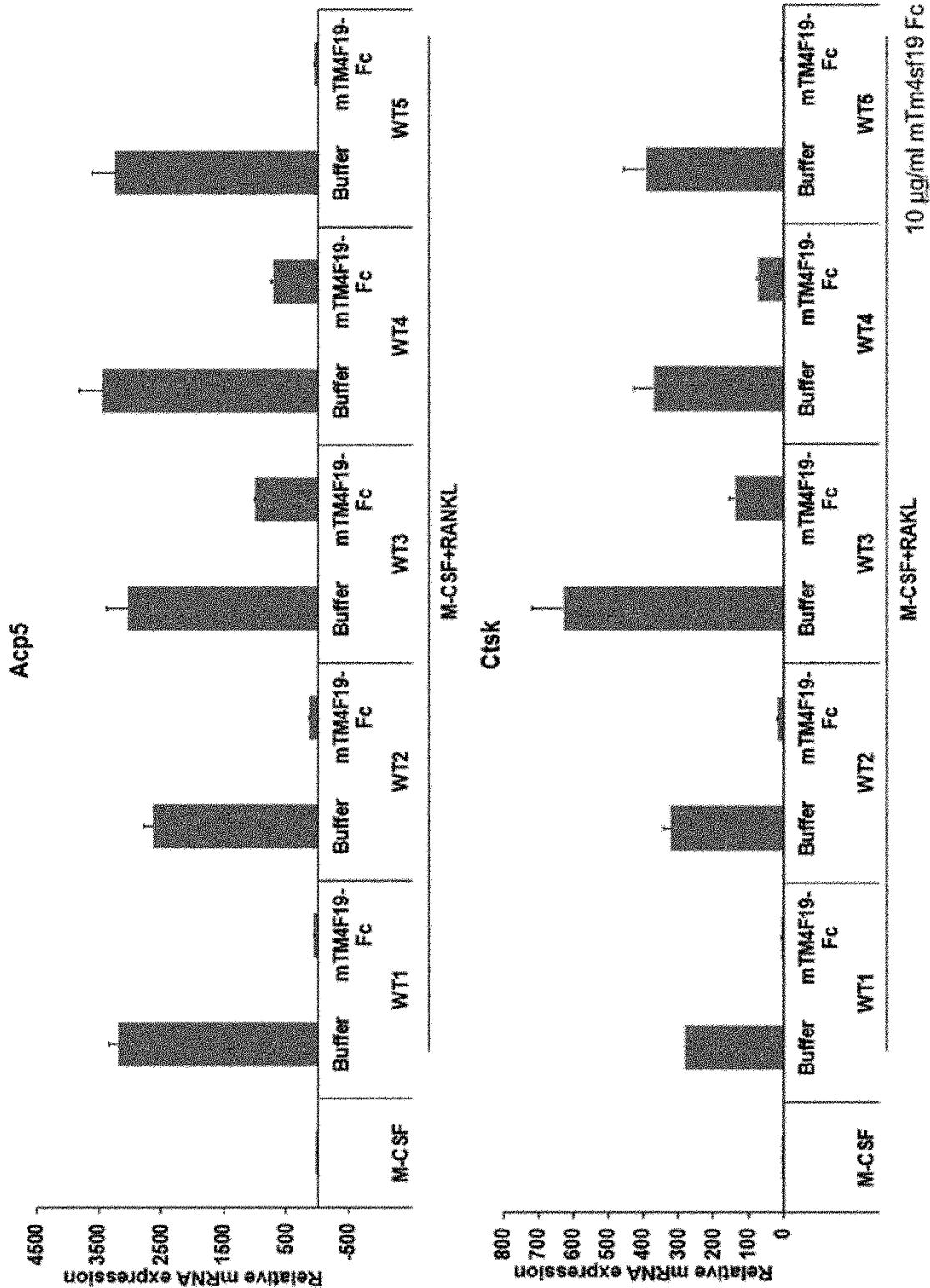
【FIG. 39C】



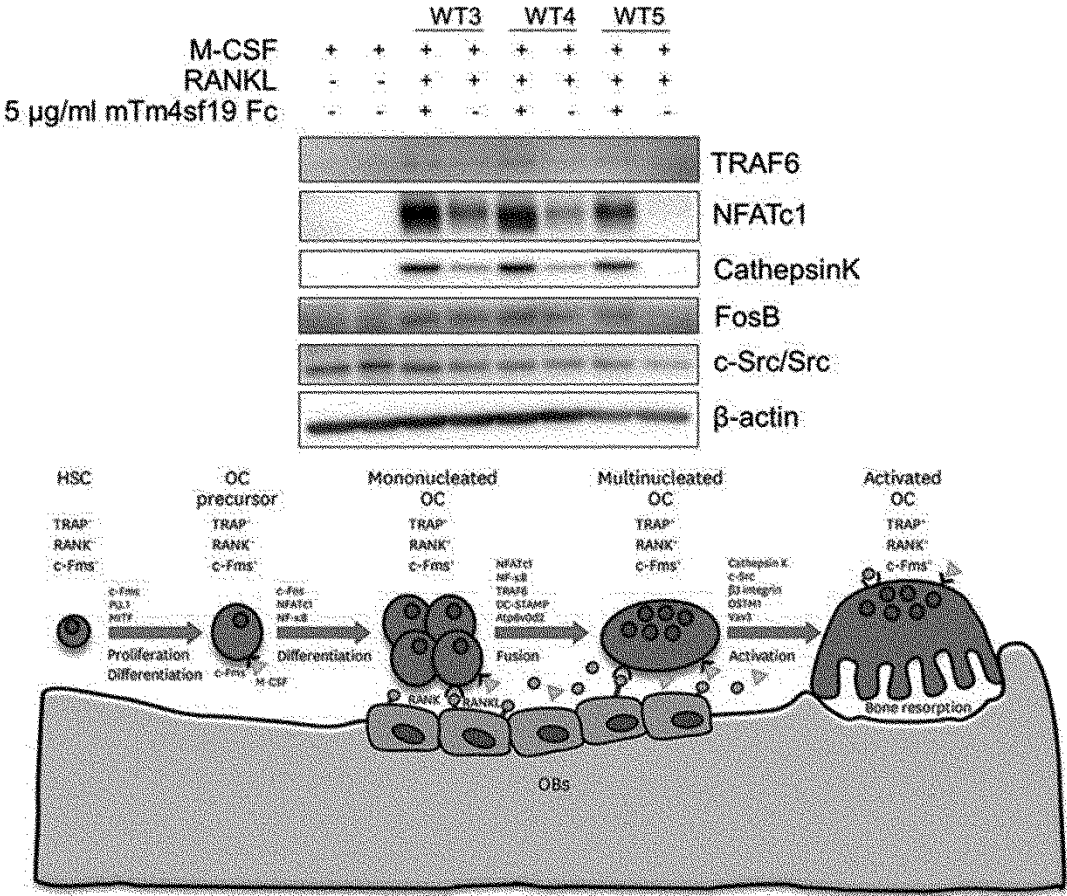
【FIG. 39D】



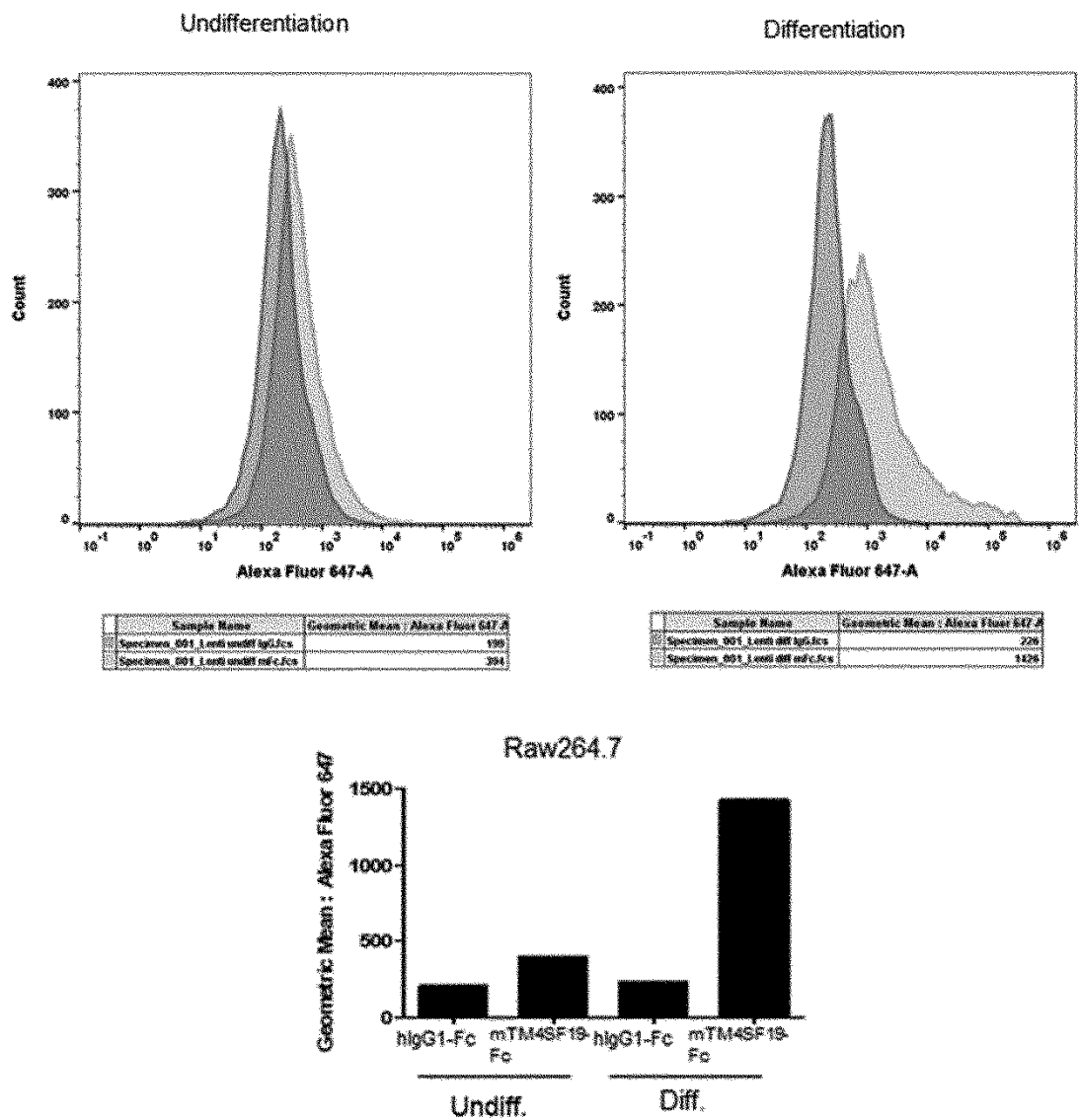
【FIG. 40A】



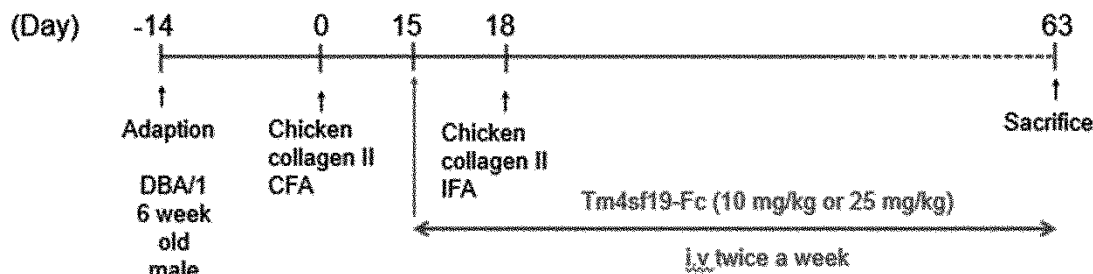
【FIG. 40B】



【FIG. 41】

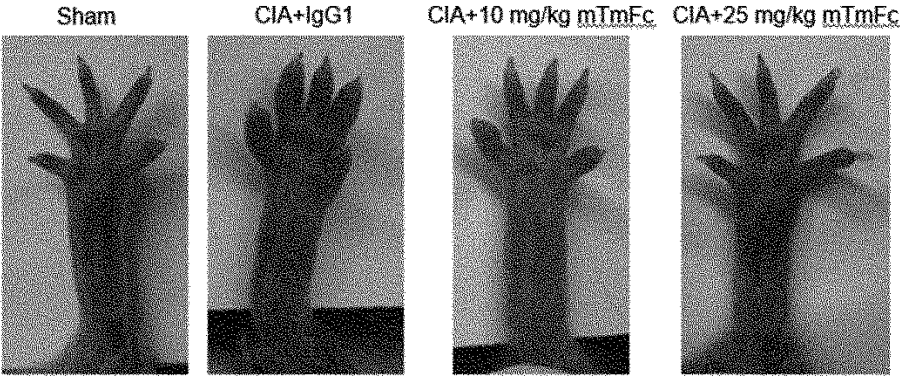


【FIG. 42A】

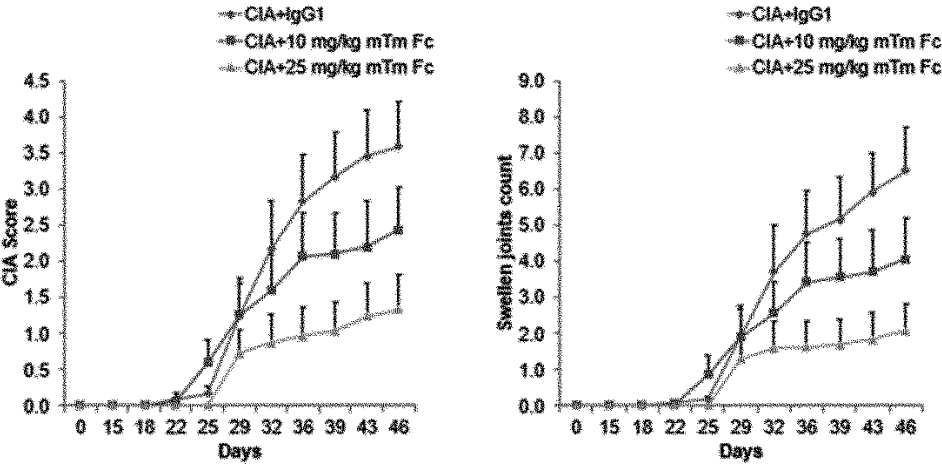


【FIG. 42B】

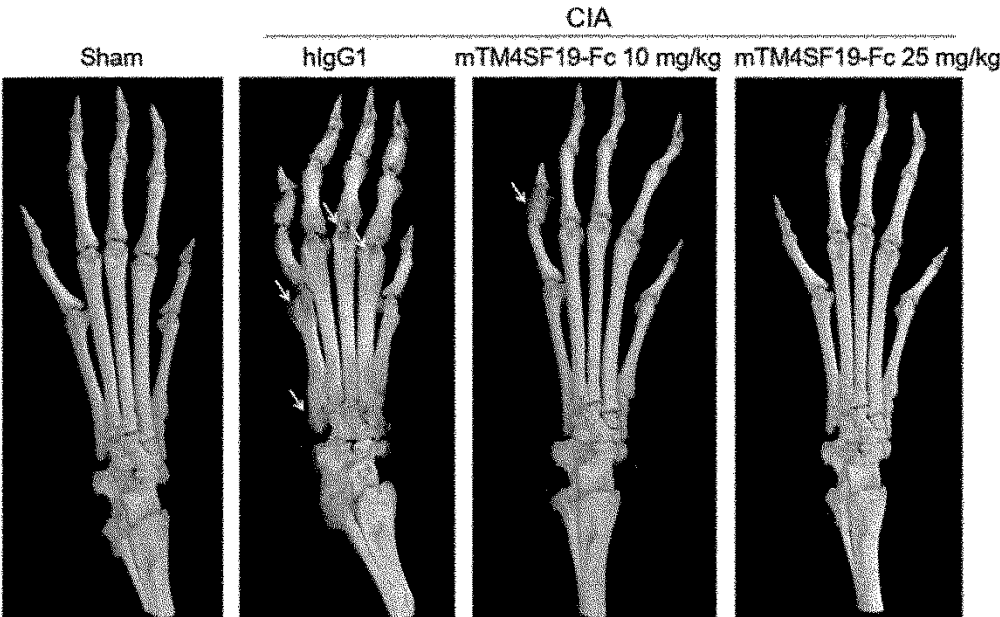
Day 42



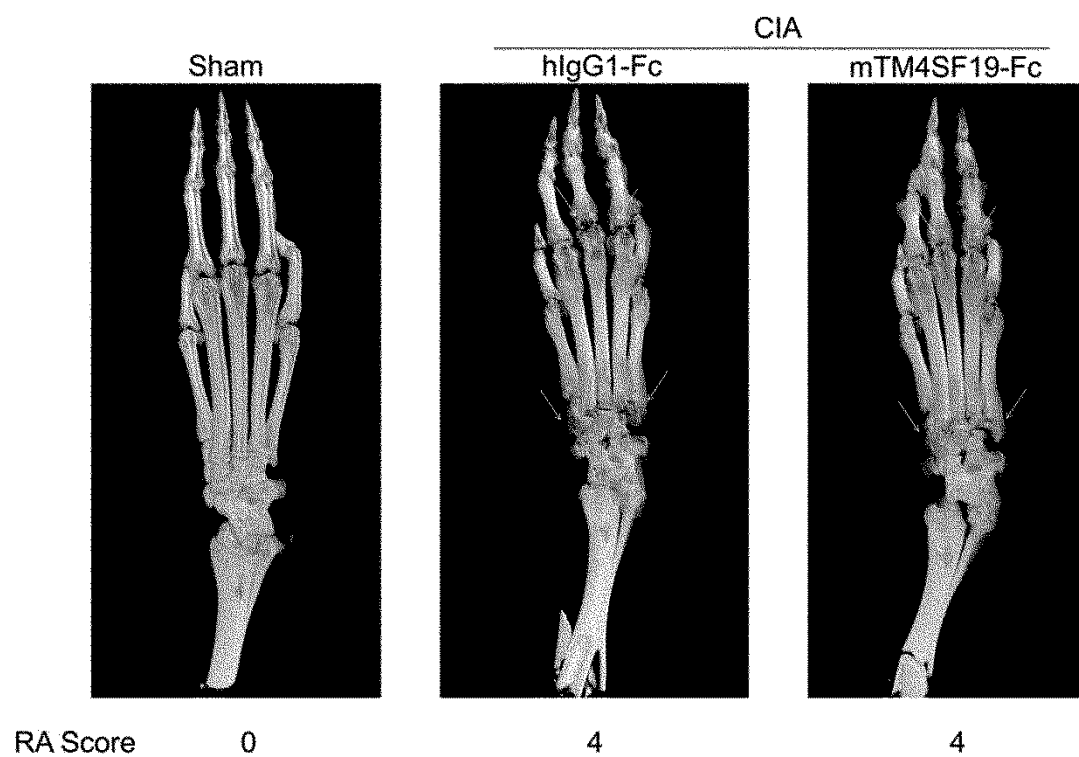
【FIG. 42C】



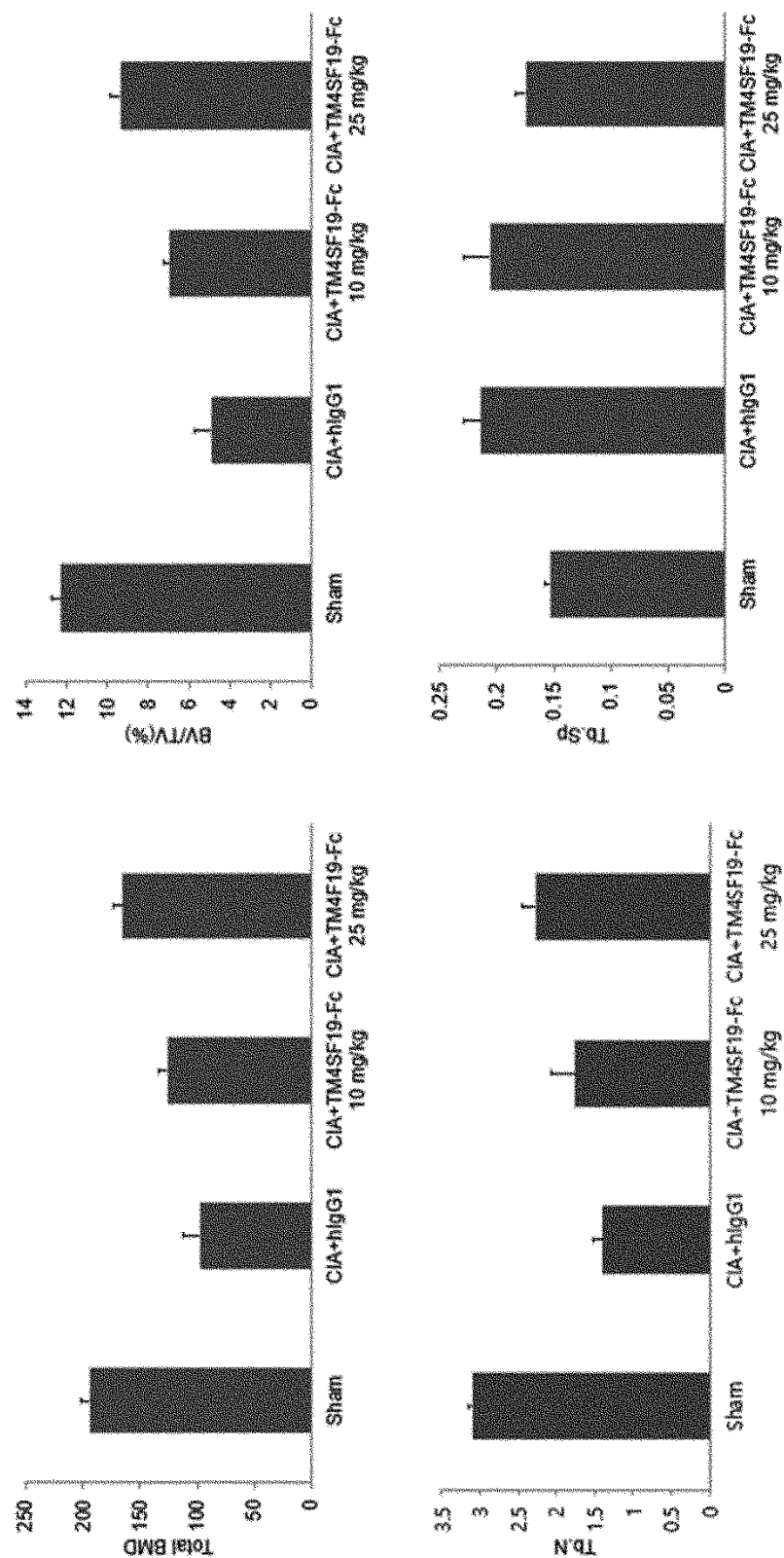
【FIG. 42D】



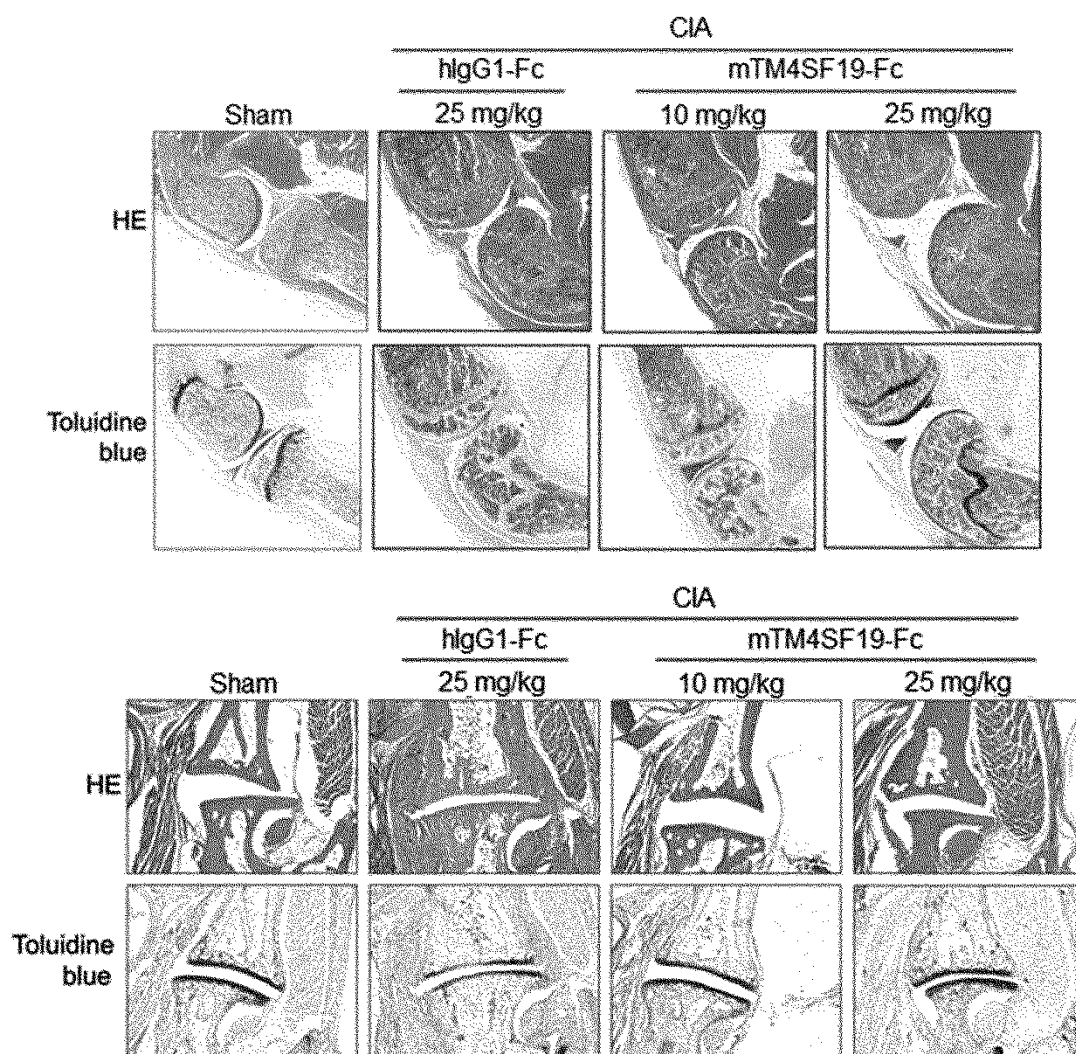
【FIG. 42E】



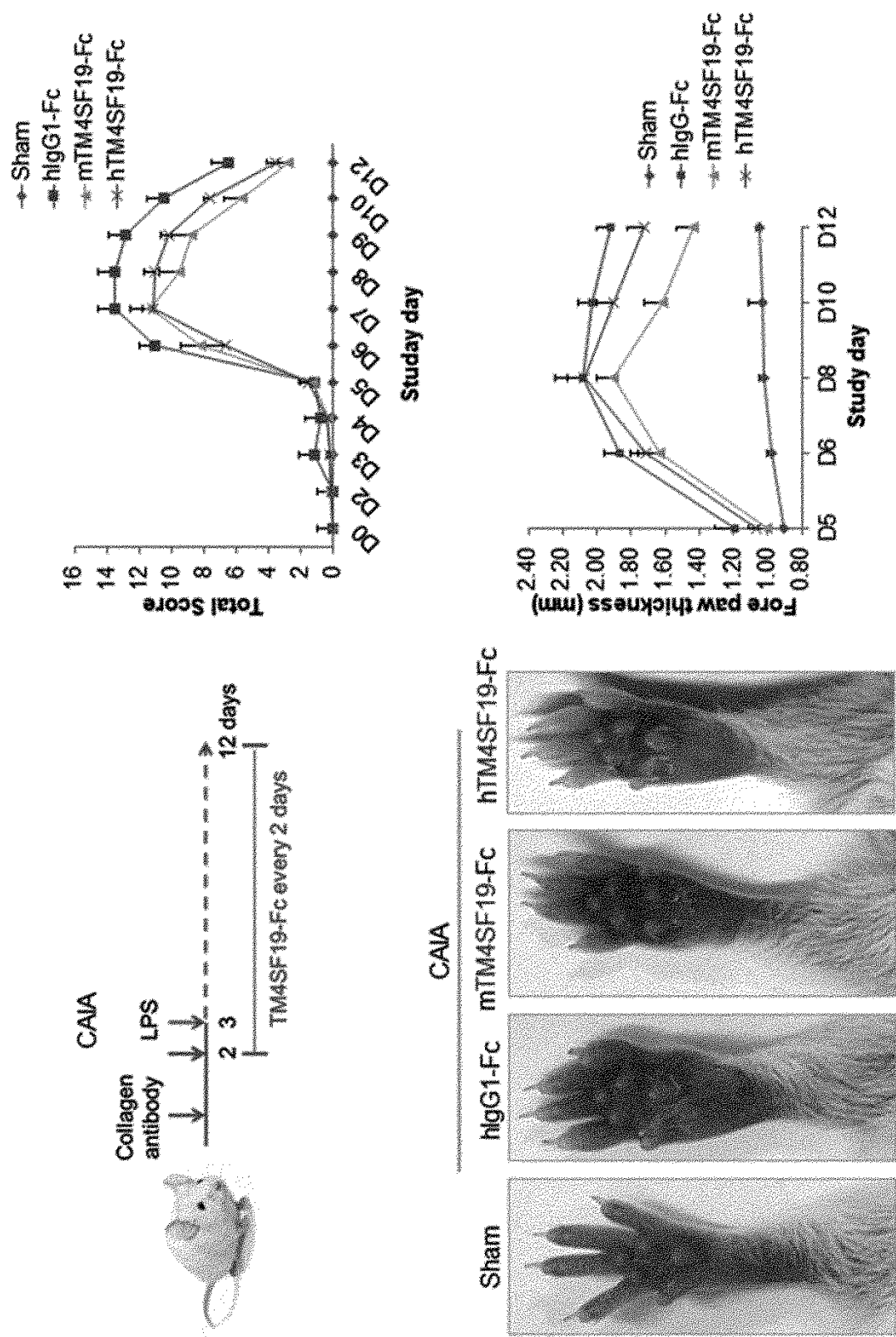
【FIG. 42F】



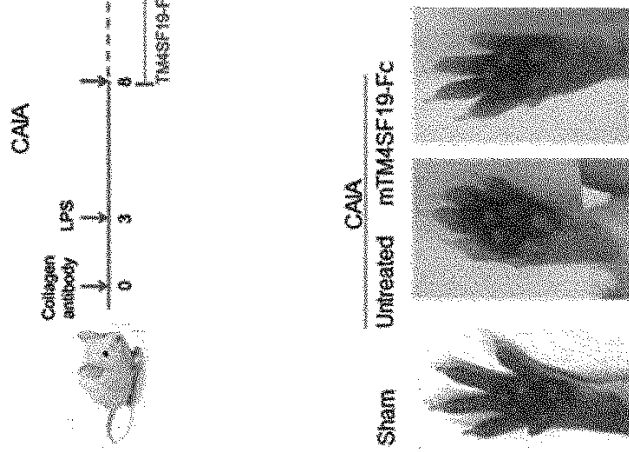
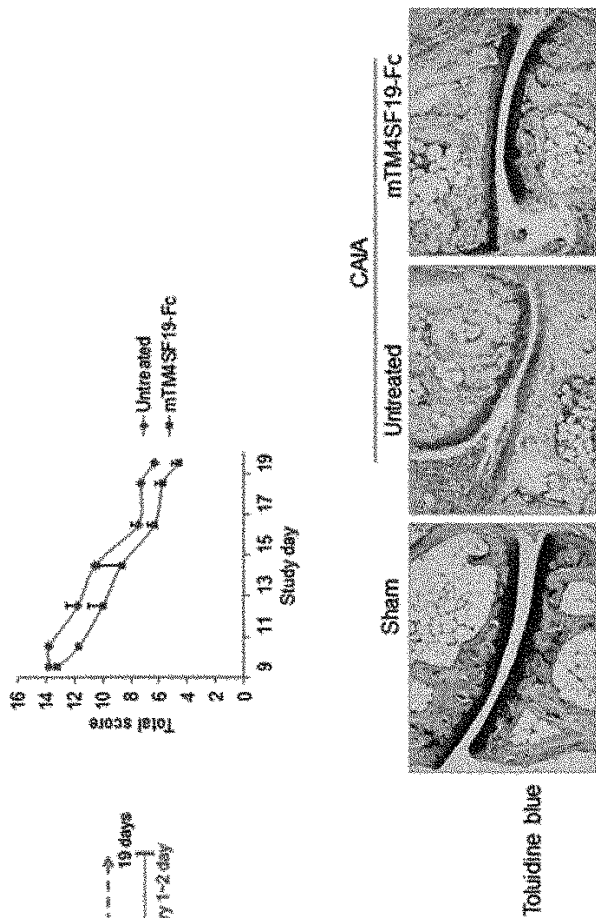
【FIG. 42g】



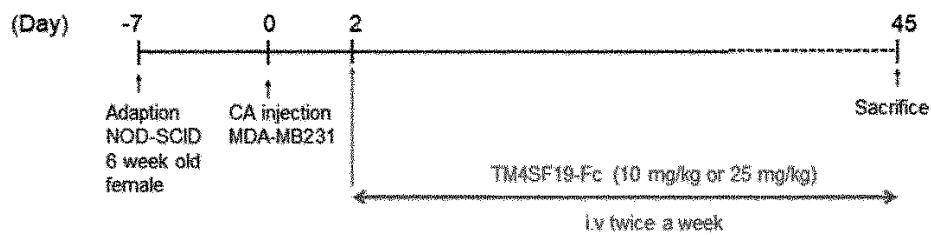
【FIG. 42H】



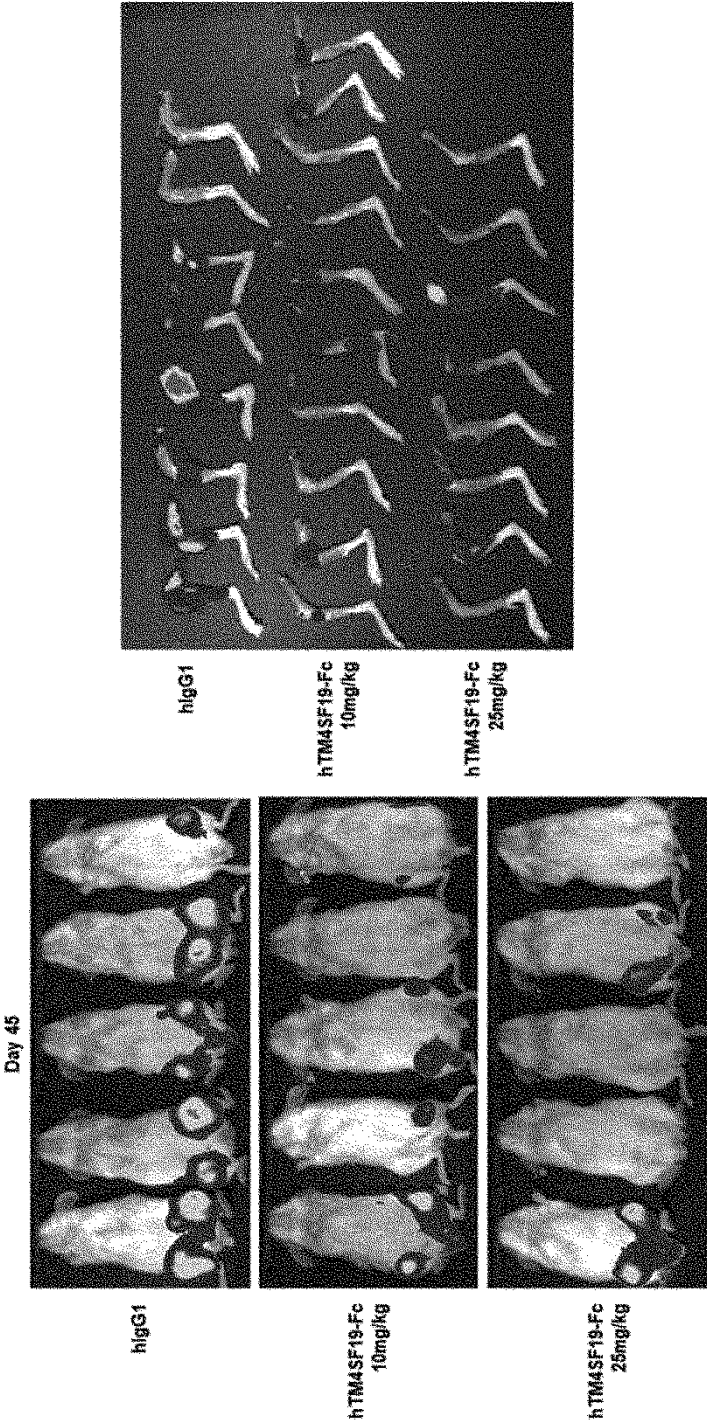
【FIG. 42I】



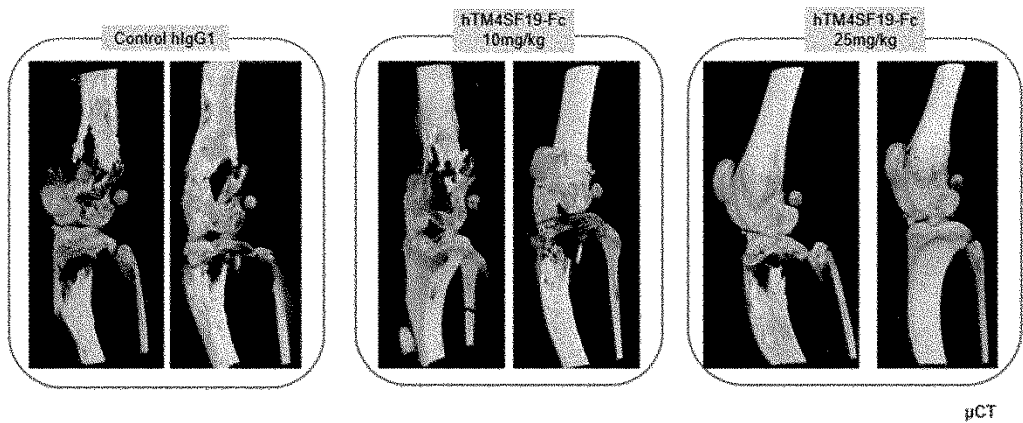
【FIG. 43A】



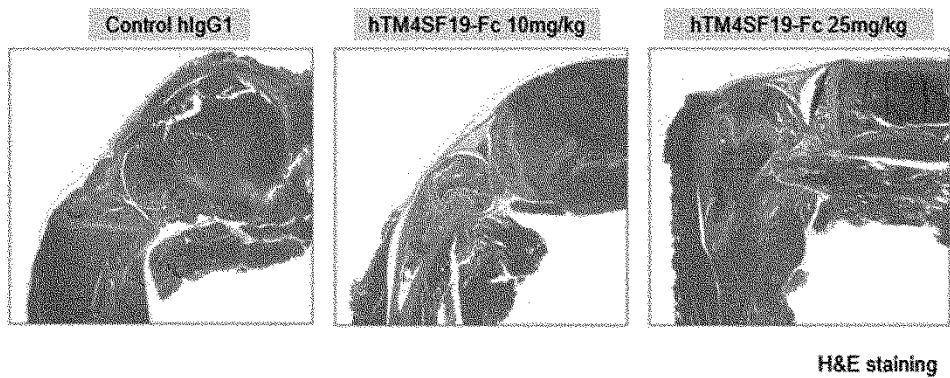
【FIG. 43B】



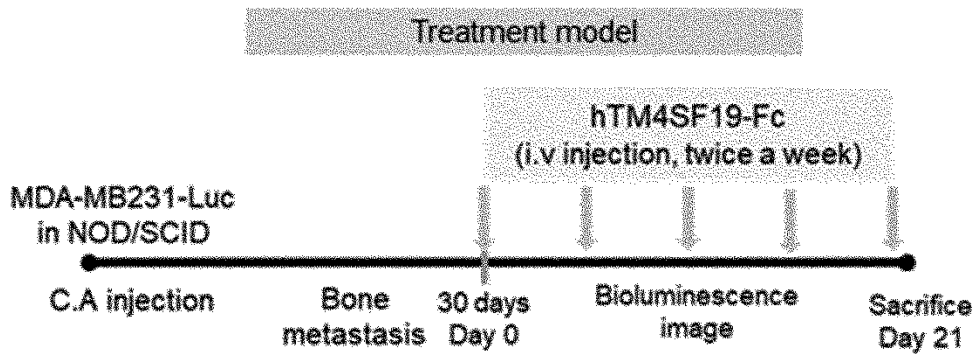
【FIG. 43C】



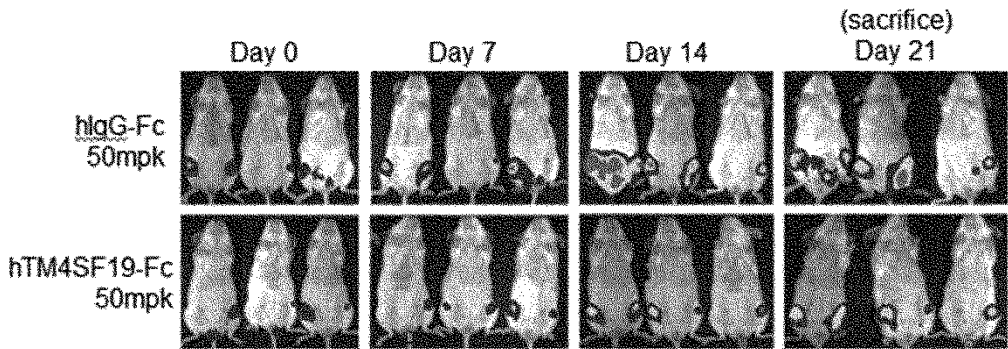
【FIG. 43D】



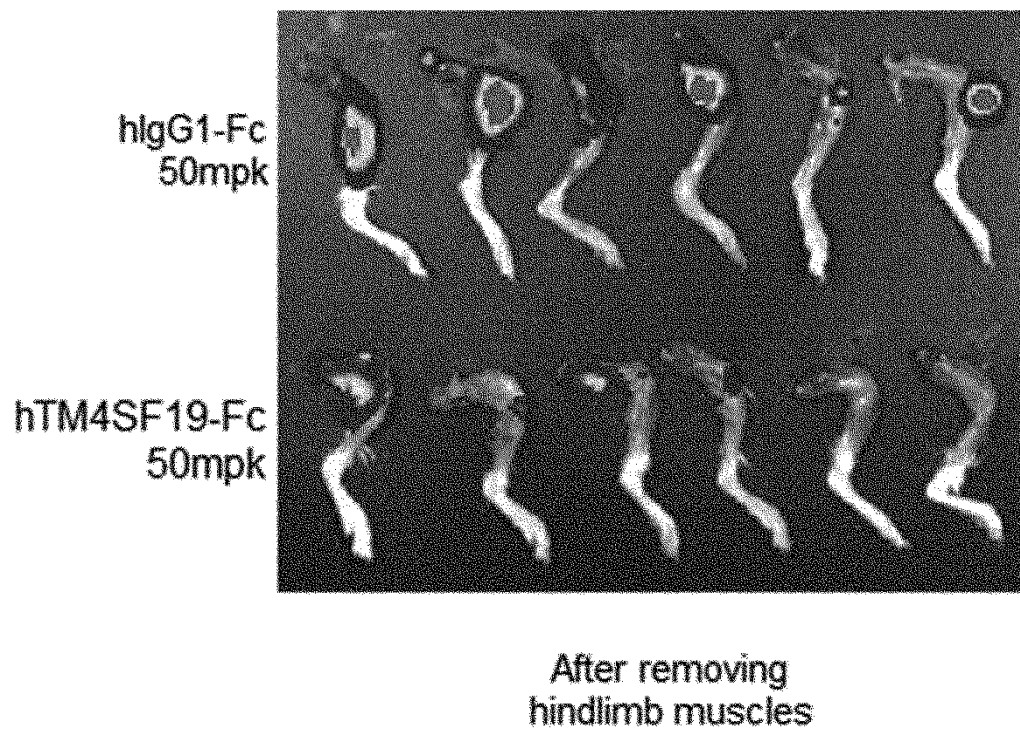
【FIG. 44A】



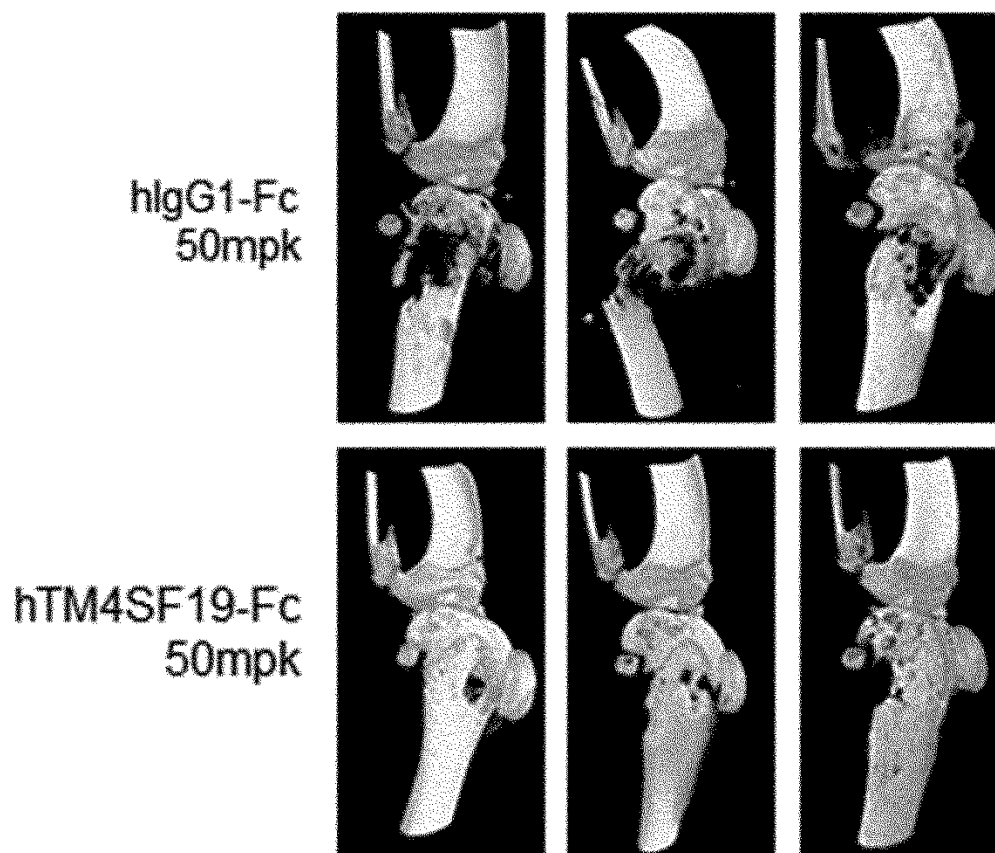
【FIG. 44B】



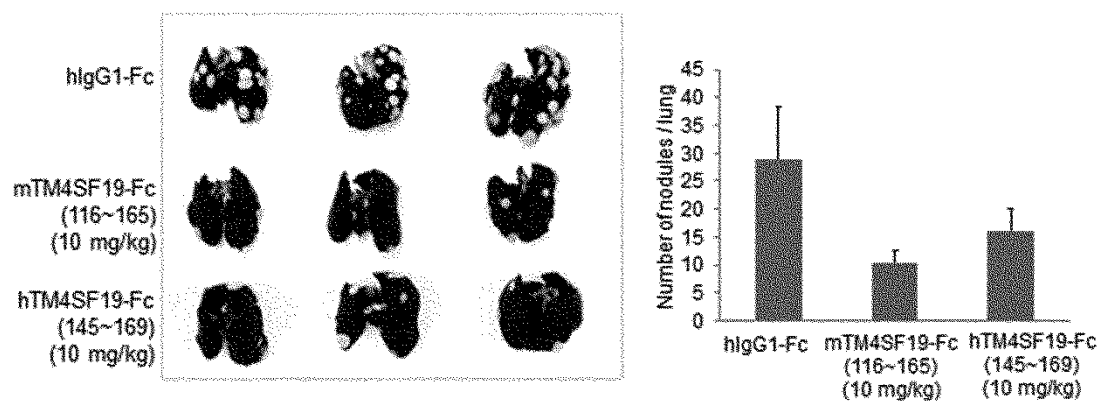
【FIG. 44C】



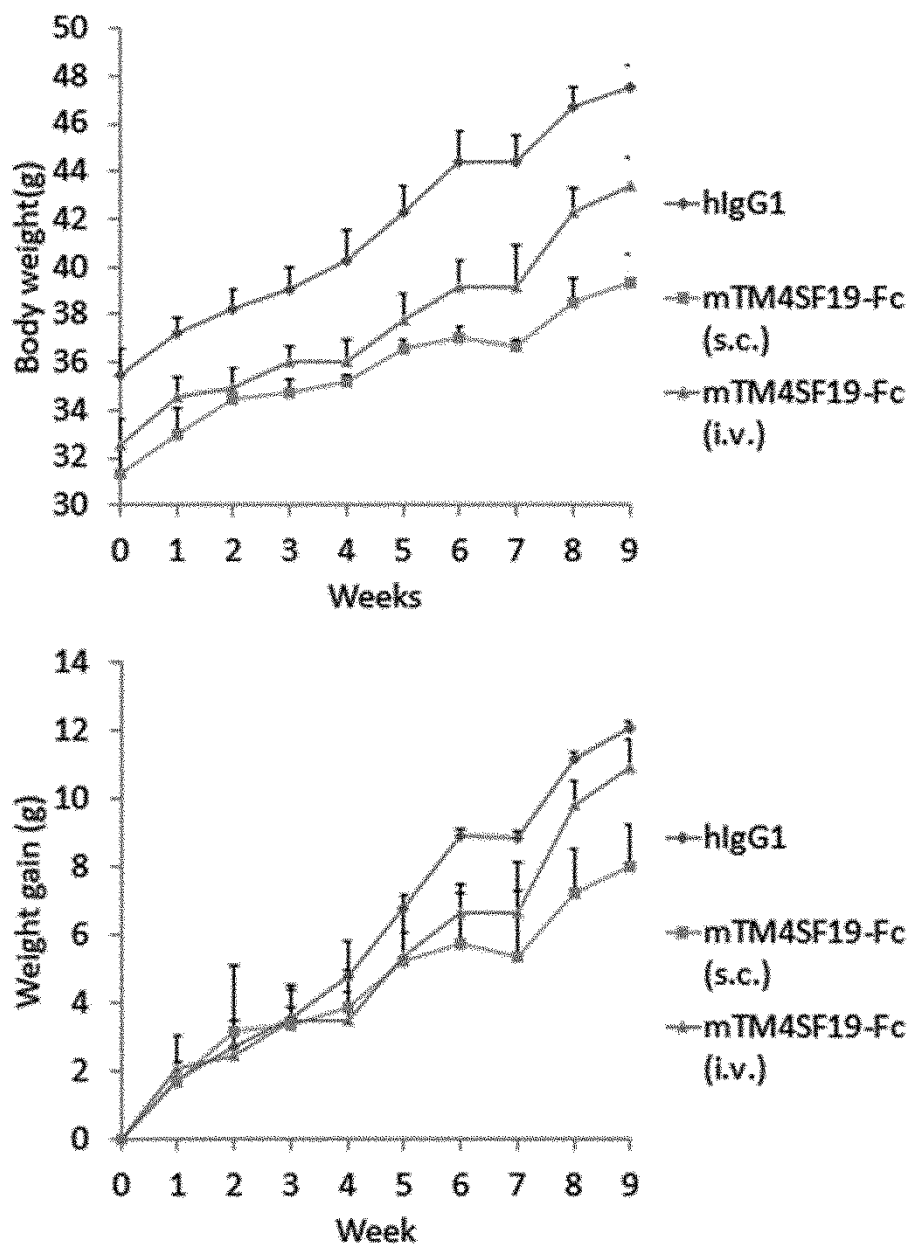
【FIG. 44D】



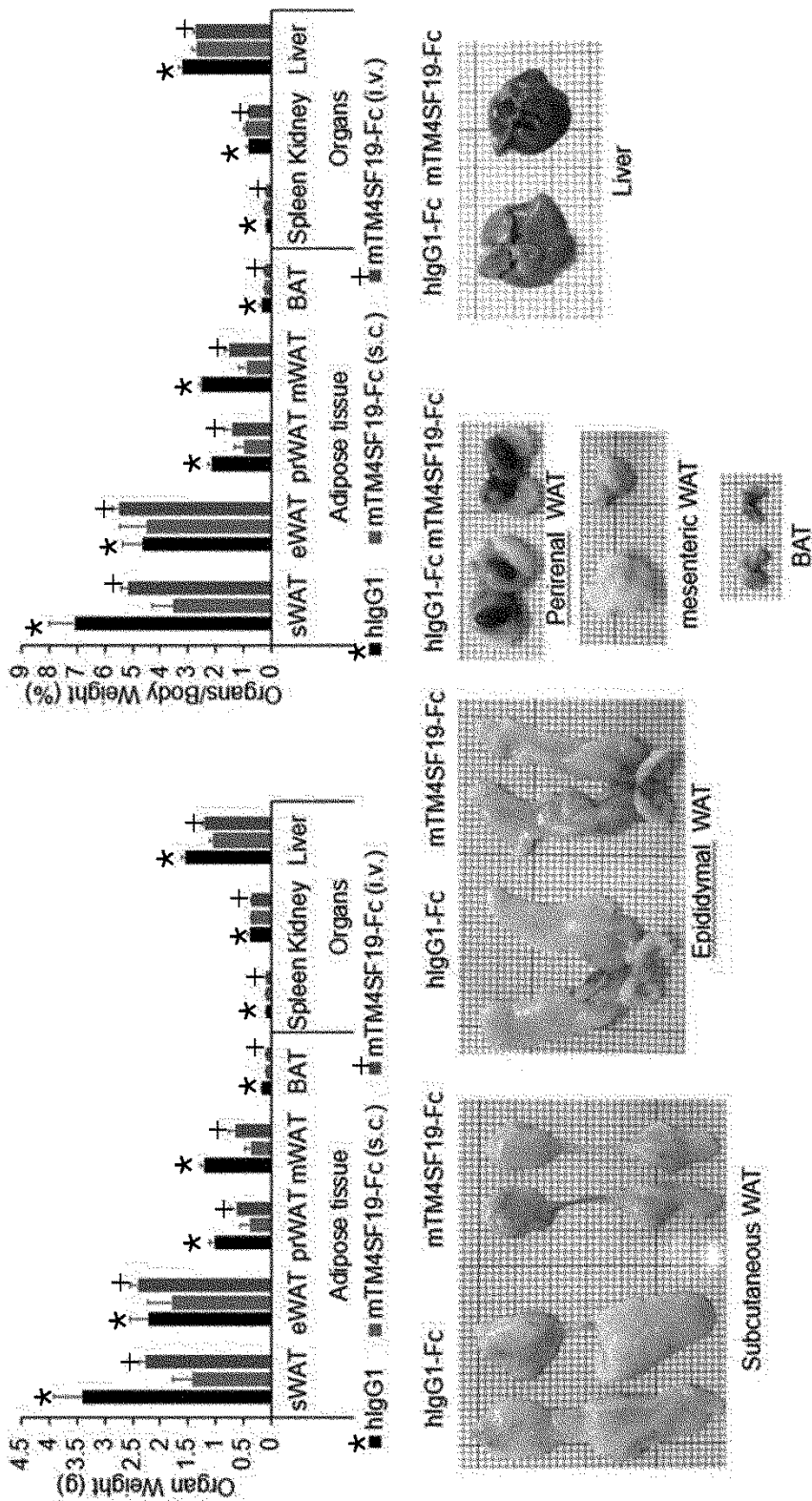
【FIG. 45】



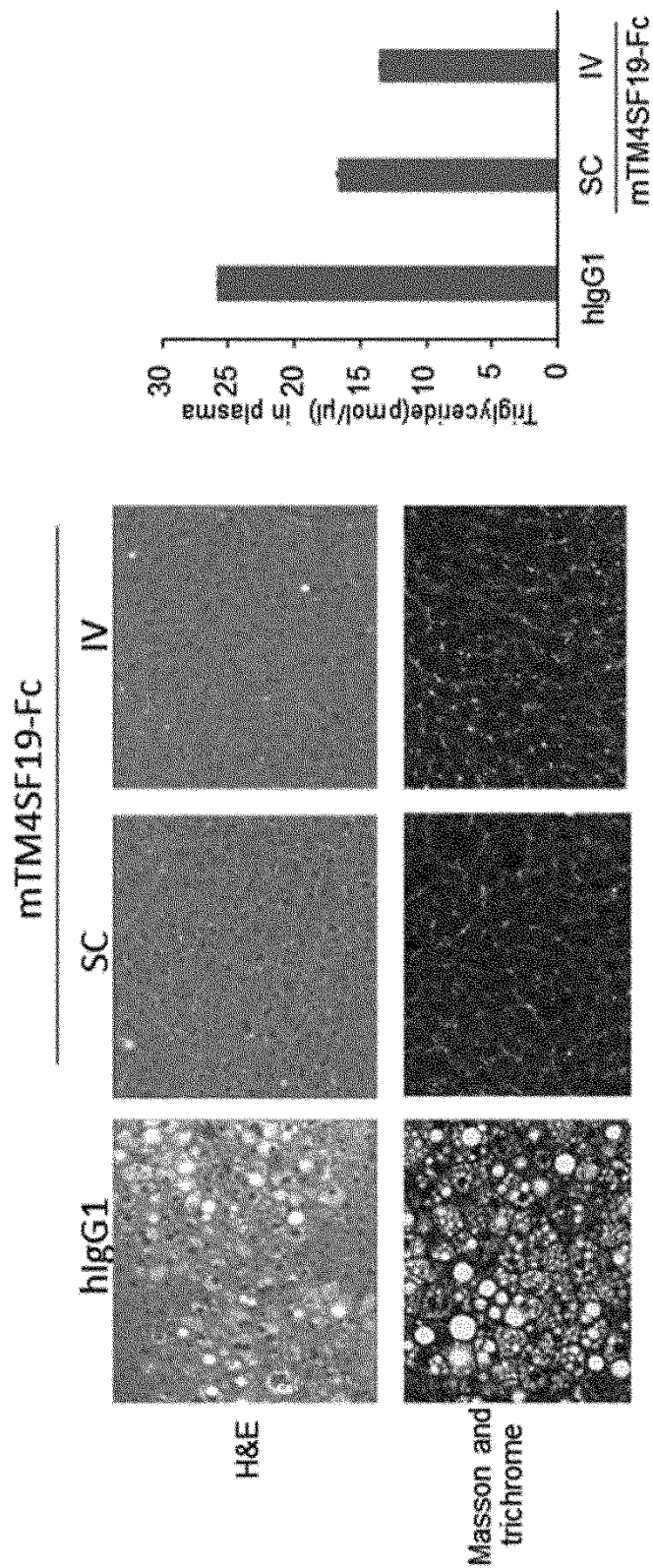
【FIG. 46A】



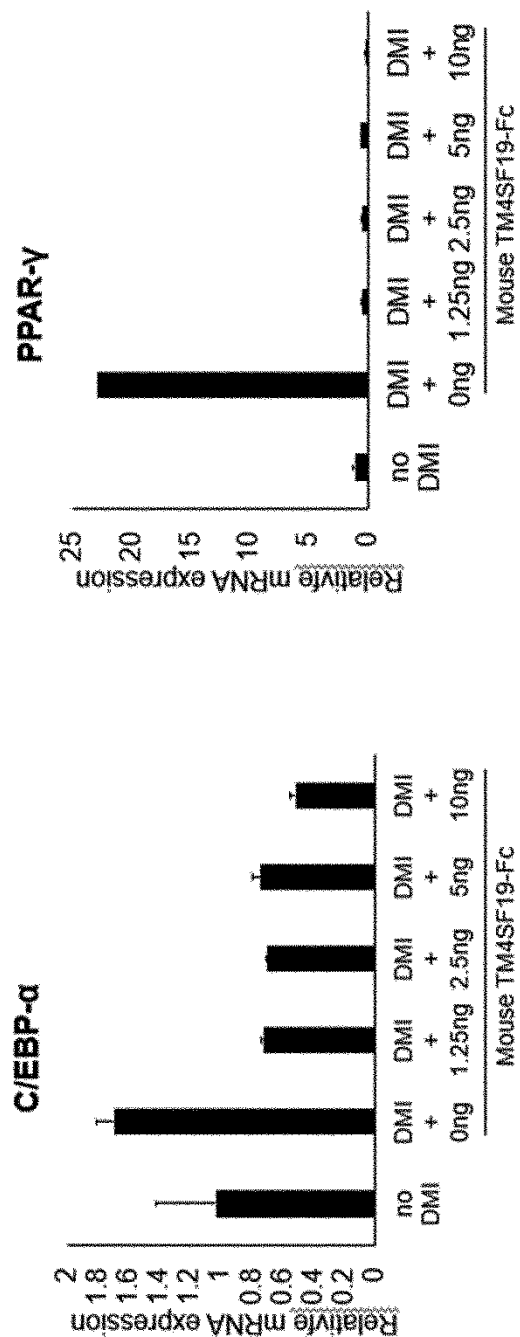
【FIG. 46B】



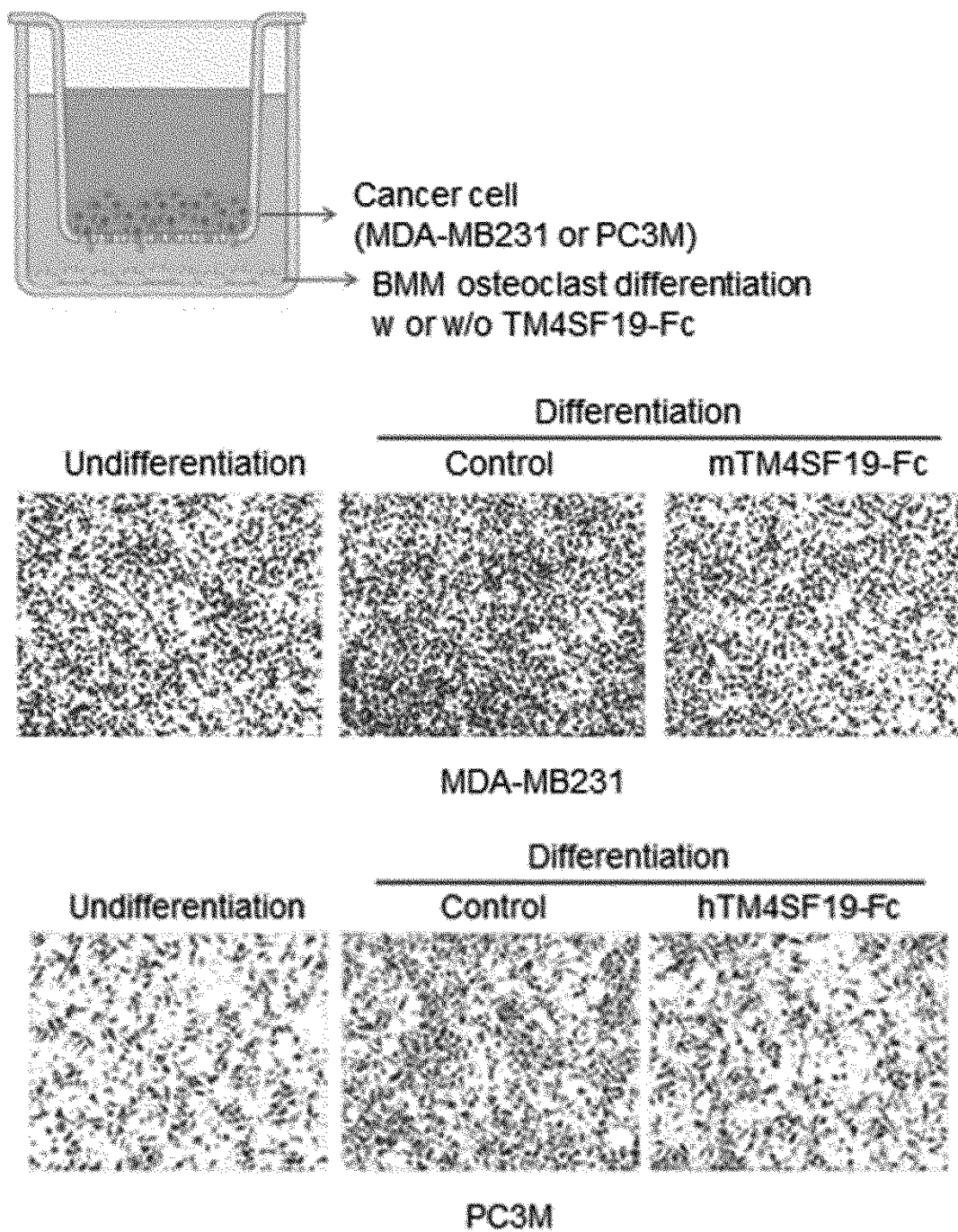
【FIG. 47】



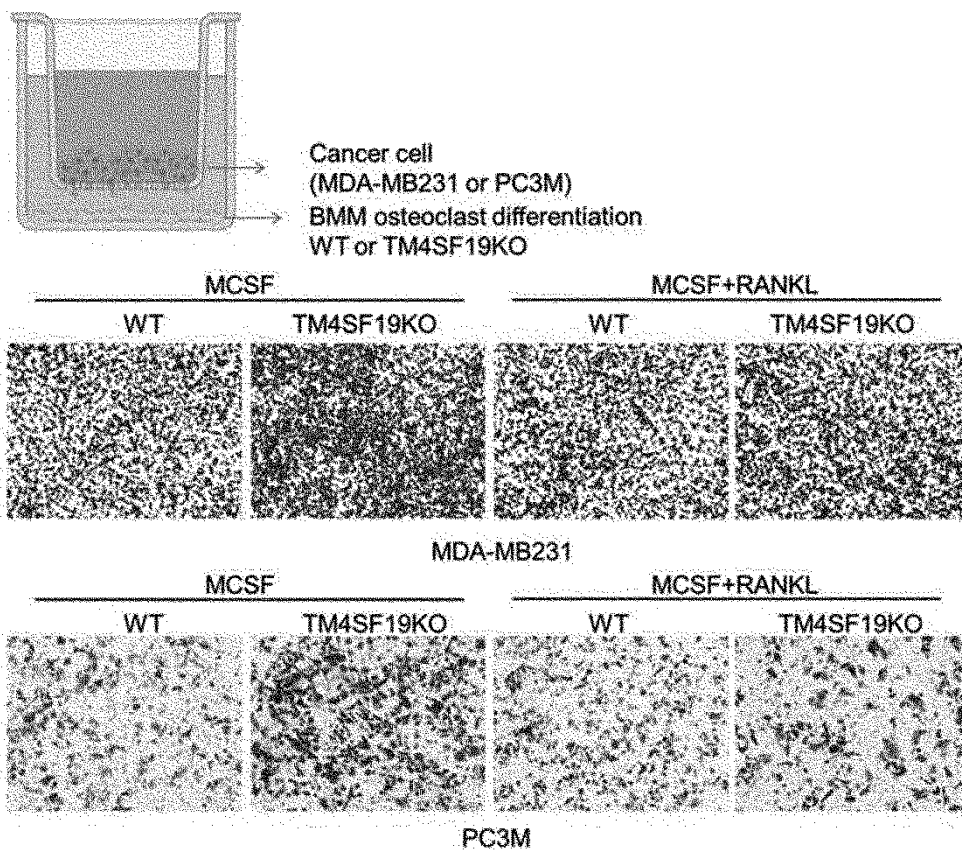
DMI + mouse TM4SF19-Fc



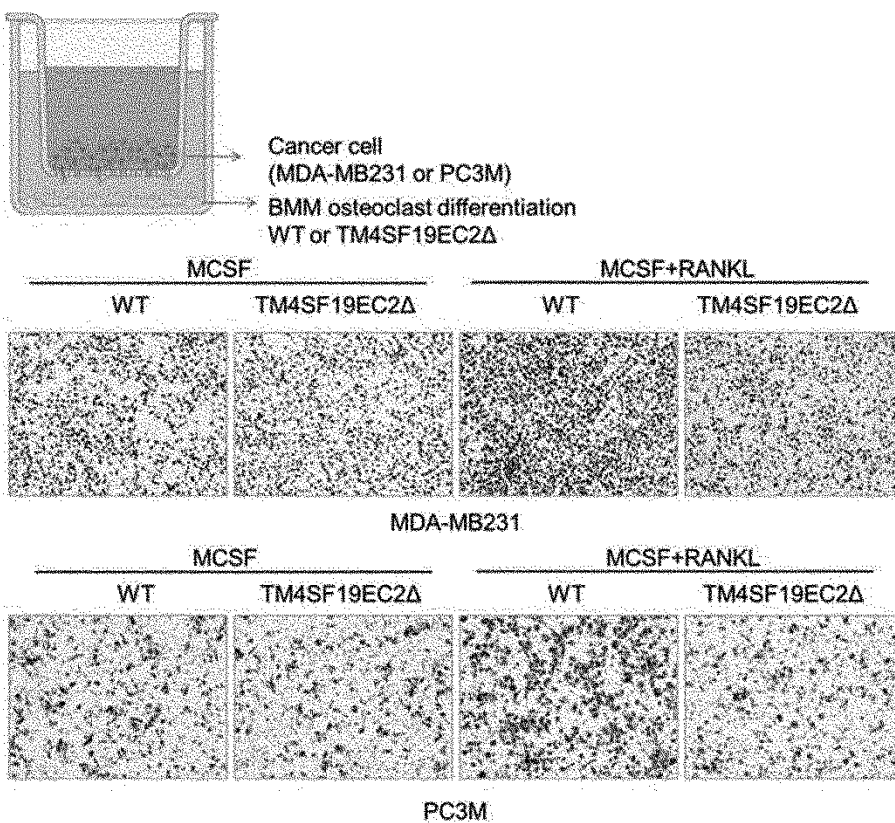
【FIG. 49】



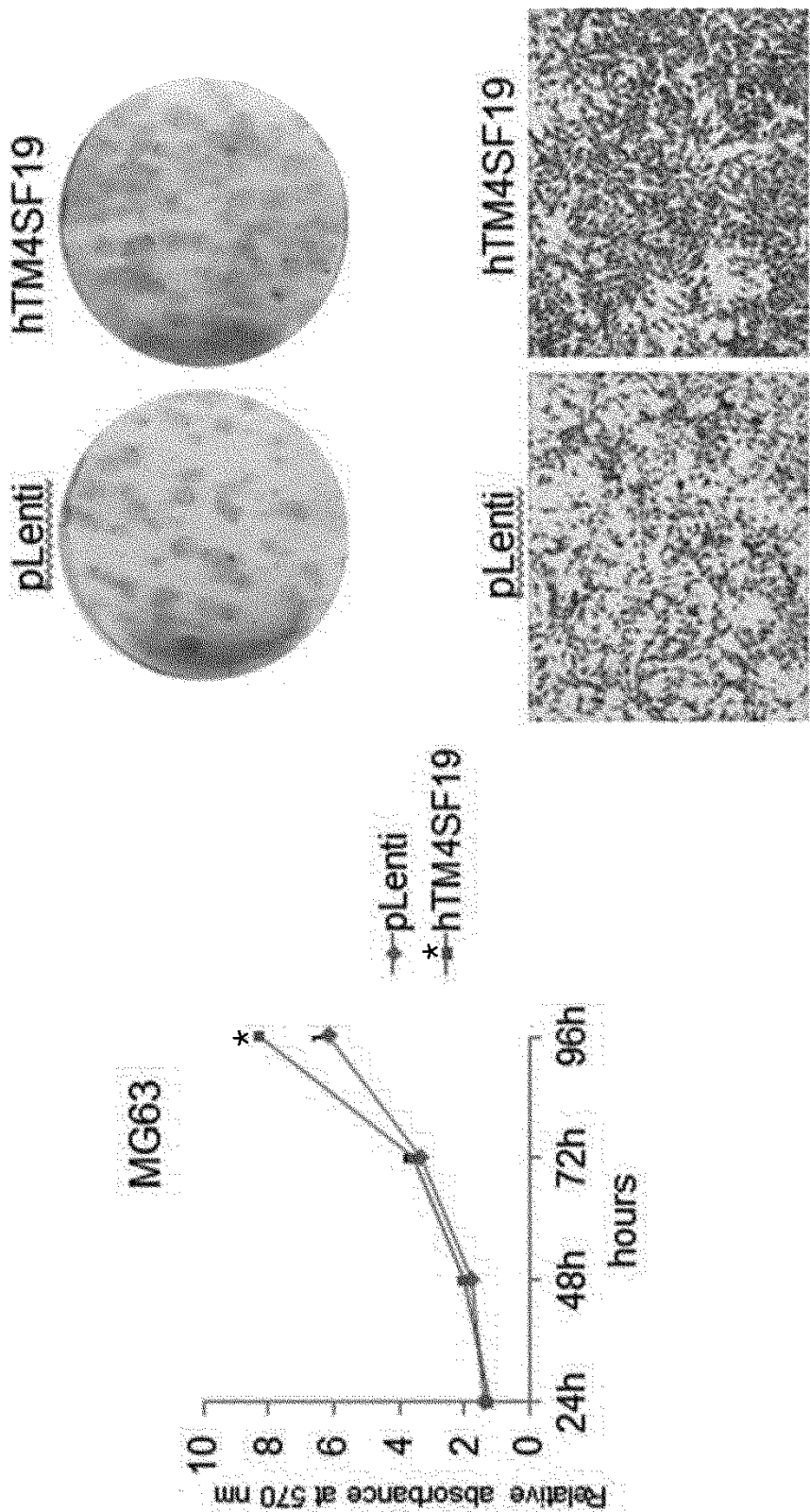
【FIG. 50A】



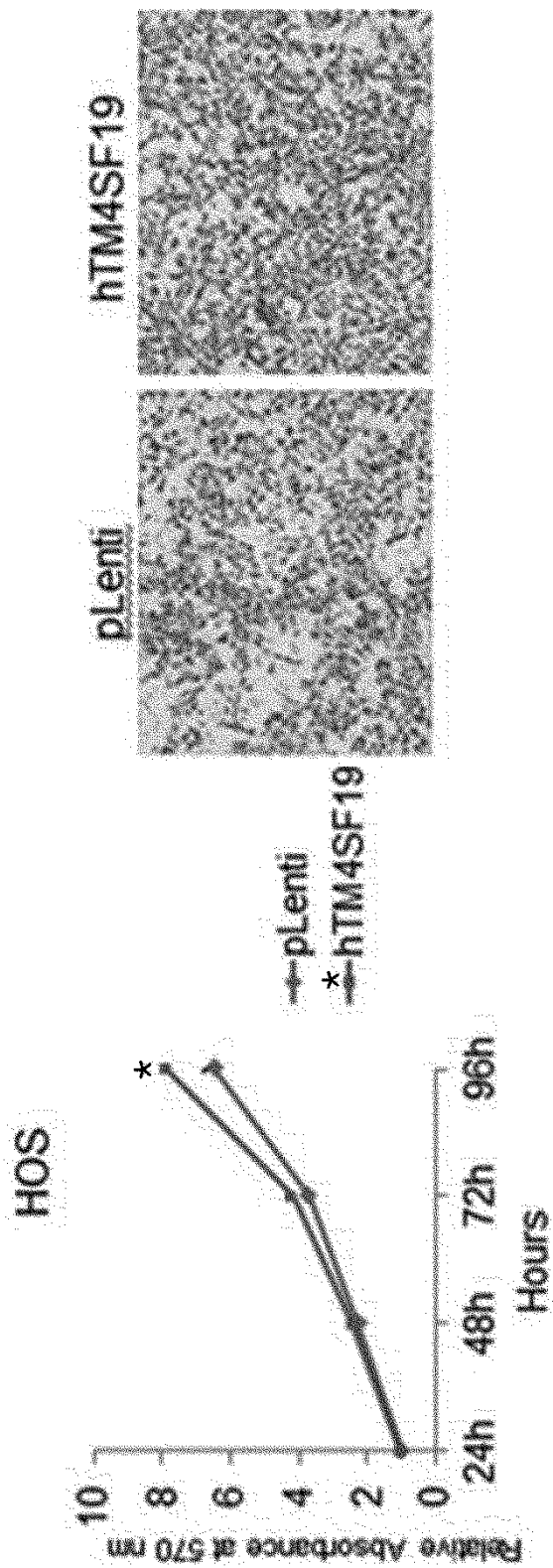
【FIG. 50B】



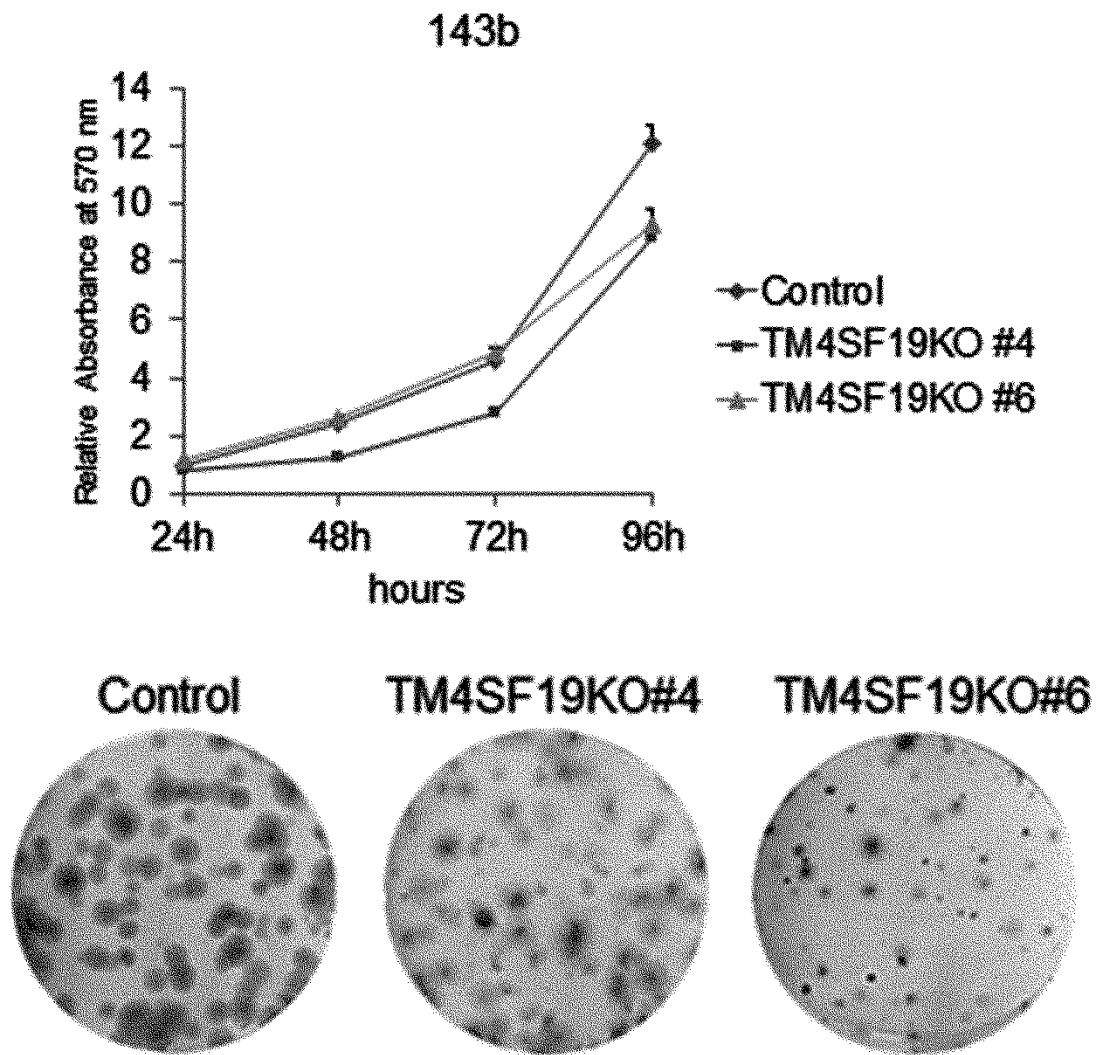
【FIG. 51】



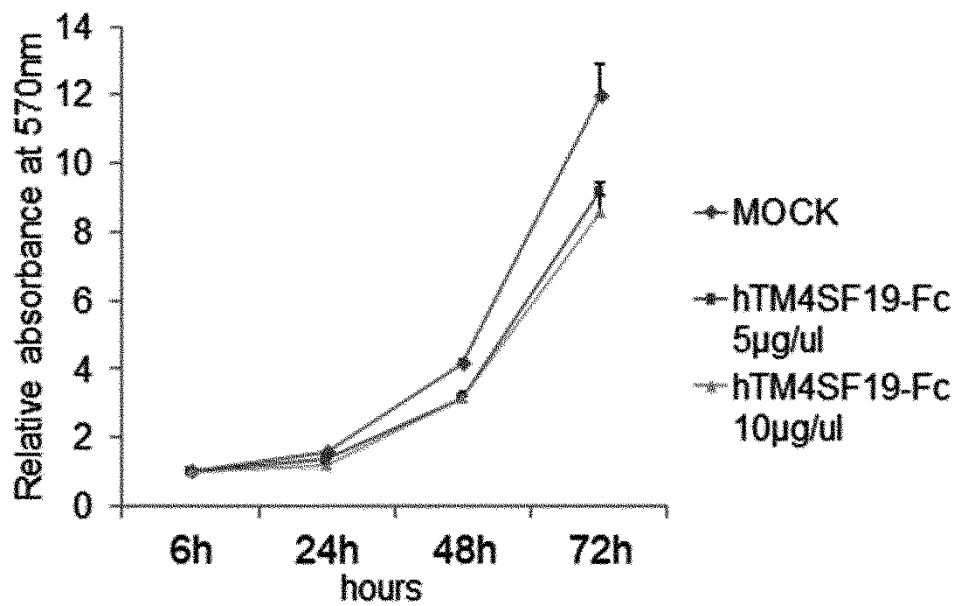
【FIG. 52】



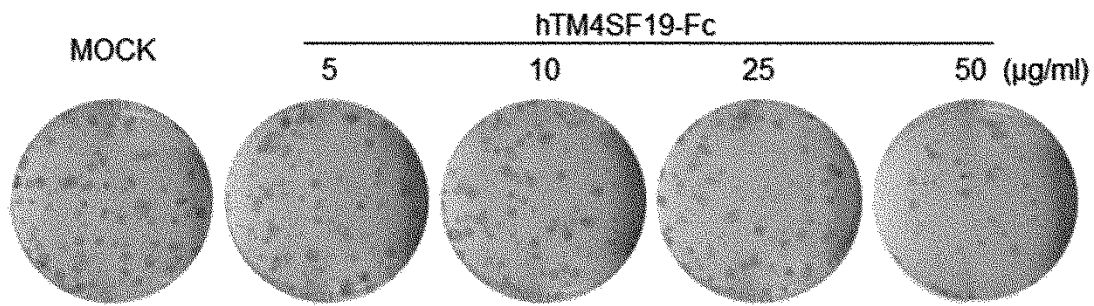
【FIG. 53】



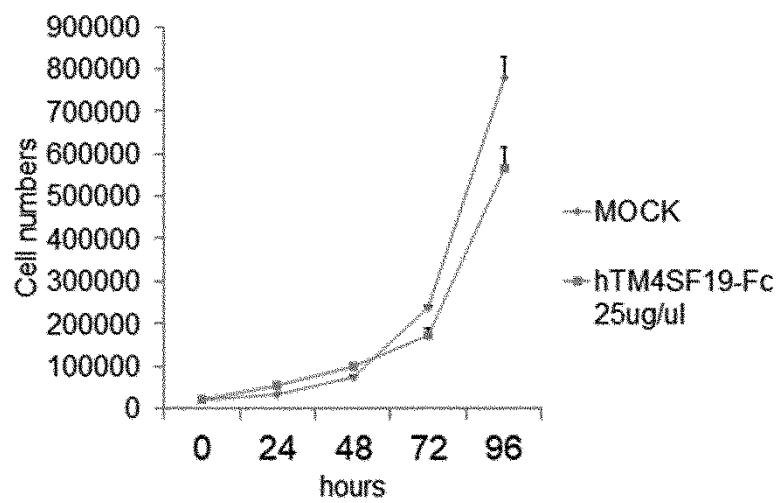
【FIG. 54A】



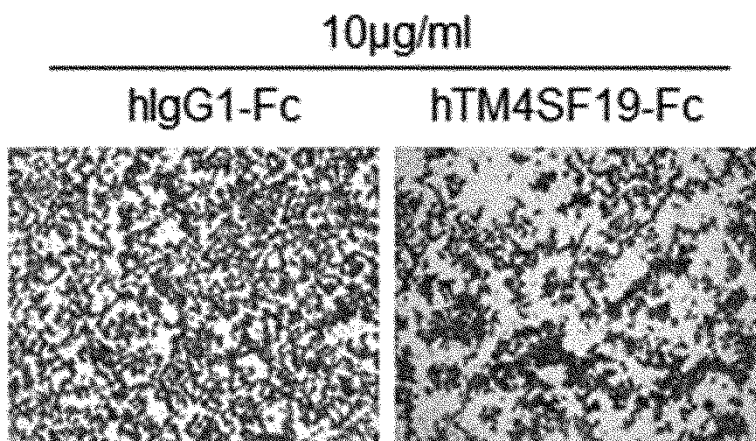
【FIG. 54B】



【FIG. 54C】

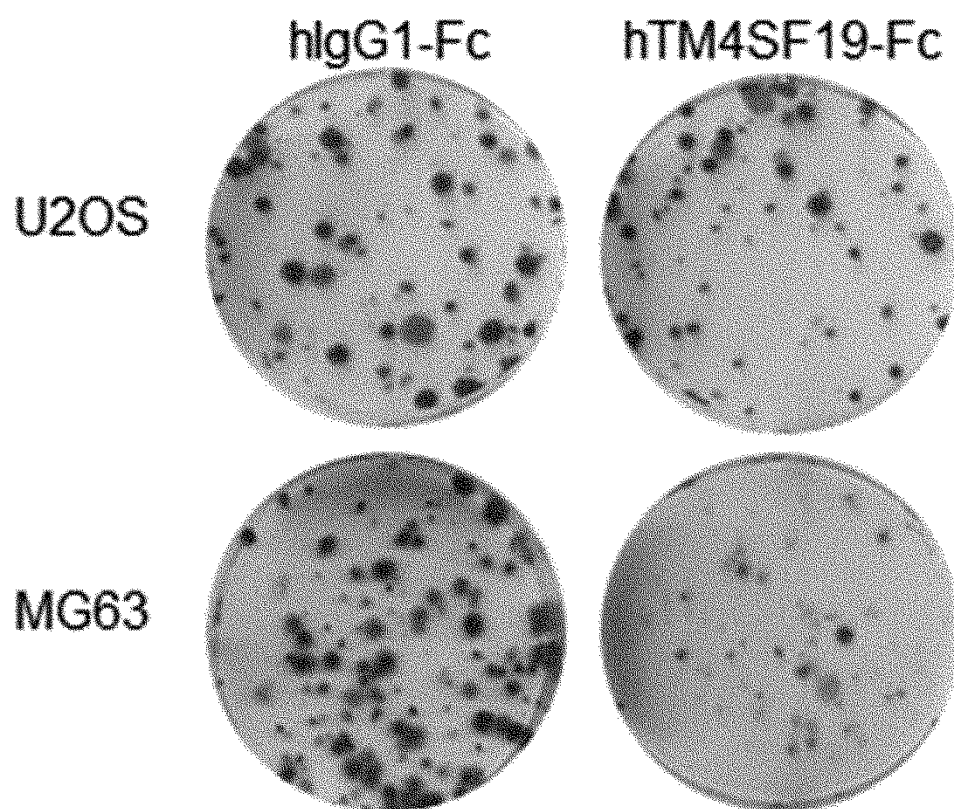


【FIG. 54D】

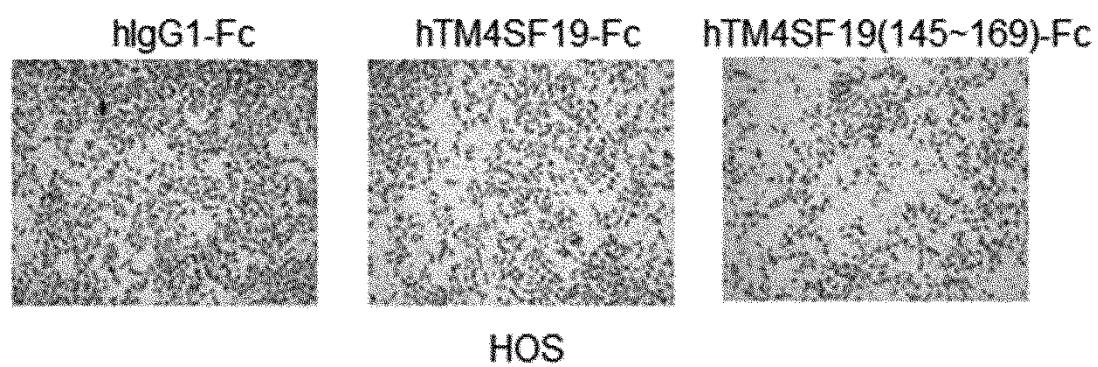


143b

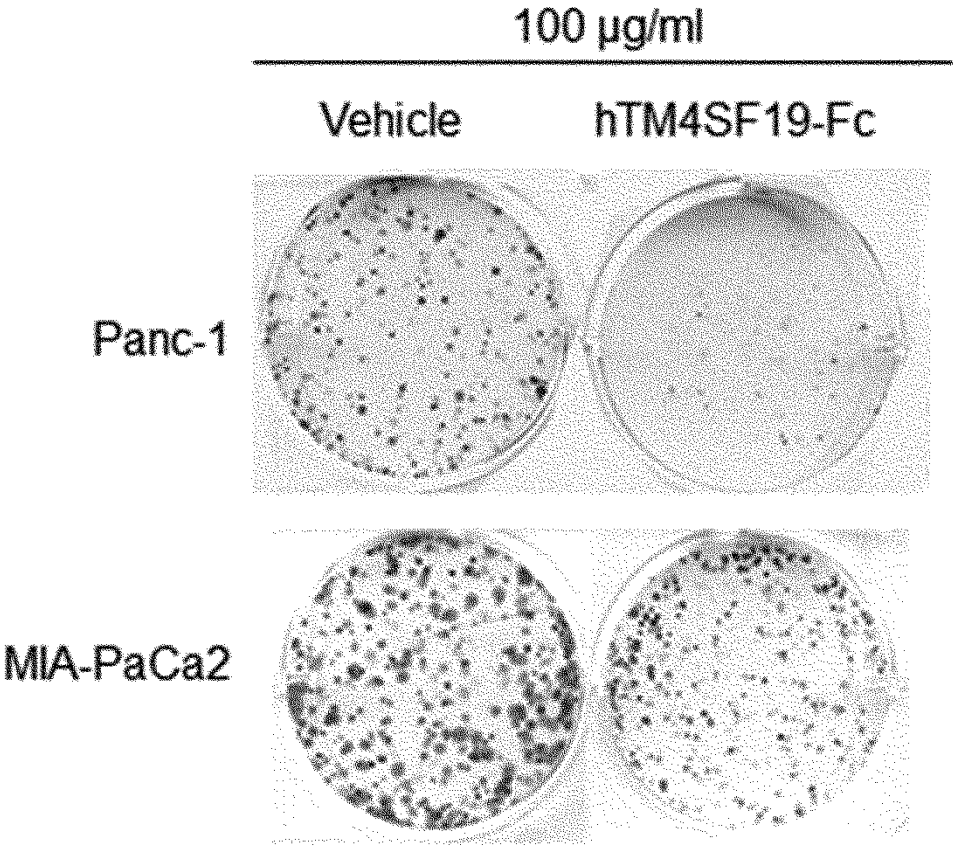
【FIG. 55】



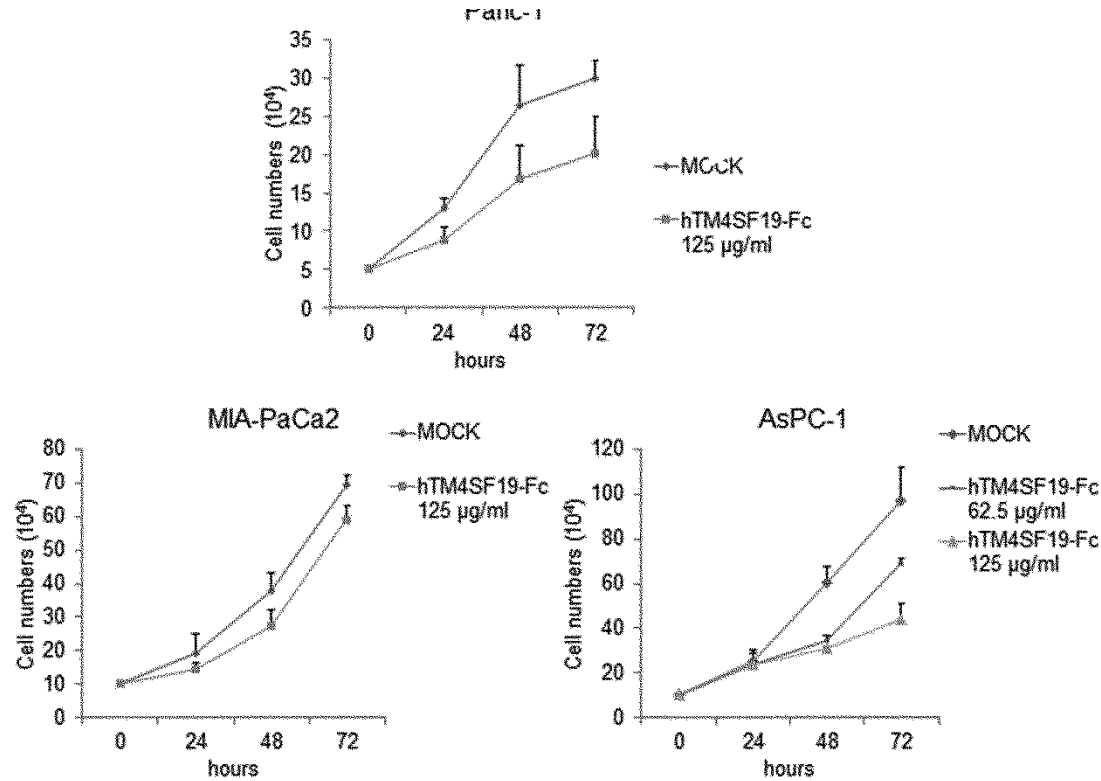
【FIG. 56】



【FIG. 57A】



【FIG. 57B】



【FIG. 58A】

Mouse TM4SF19₁₁₆₋₁₆₅-Fc : SEQ ID NO: 10

Target Sequence: SEQ ID NO: 8

Enzyme Site

hlgG1-Fc : SEQ ID NO: 9

Mouse 116-165 amino acid seq

KDGPFCMFDVSSFNQTQAWKFGYPFKDLHNRNYLYDRSLWTSVCLEPSKATSEPKSCDKHTCPPCP
PAPELLGGPSVFLFPPKPKDITLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNST
YRVVSVLTVTLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVK
GFYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNYHTQ
KSLSLSPGK

Nucleotides encoding Mouse TM4SF19₁₁₆₋₁₆₅-Fc : SEQ ID NO: 11

AAAGATGGTCCCTTTTGCATGTTTGATGTCTCATCCTTCAATCAGACACAAGCTTGGAAATTCGG
CTATCCCTTTAAAGATCTACACAACAGGAATTATCTGTATGACCGTTCACTTTGGACCTCCGTTT
GCCTGGAGCCCTCTAAGGCTACTAGTGAGCCCAAATCTTGTGACAAAACACACATGCCACCGT
GCCCAGCACCTGAACCTCTGGGGGGACCGTCAGTCTTCCTCTTCCCCCAAAACCAAGGACACCC
TCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAGACCTGAGG
TCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAG
CAGTACAACAGCACGTACCGTGTGGTCAGCGTCCTCACCCTCCTGCACCAGGACTGGCTGAATGGC
AAGGAGTACAAGTGCAAGGTCTCCAACAAAGCCCTCCAGCCCCATCGAGAAAACCATCTCCAAA
GCCAAAGGGCAGCCCCGAGAACCACAGGTGTACACCCTGCCCCCATCCCGGGATGAGCTGACCAA
GAACCAGGTGAGCCTGACCTGCCTGGTCAAAGGCTTCTATCCAGCGACATCGCCGTGGAGTGGGA
GAGCAATGGGCAGCCGGAGAACAACACTACAAGACCACGCCTCCCGTGCTGGACTCCGACGGCTCCT
TCTTCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCT
CCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAAT
GA

【FIG. 58B】

Human TM4SF19₁₂₀₋₁₆₉-Fc : SEQ ID NO: 13

Target Sequence : SEQ ID NO: 12

Enzyme Site

hlgG1-Fc : SEQ ID NO: 9

KDGPFCMFDVSSFNQTAWKYGYPFKDLHSRNYLYDRSLWNSVCLEPSAATSEPKSCDKTHTCPPC
PAPELLGGPSVFLFPPPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNST
YRVVSVLTVHLQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVK
GFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMIHEALHNHYTQ
KSLSLSPGK

Nucleotides encoding Human TM4SF19₁₂₀₋₁₆₉-Fc : SEQ ID NO: 14

AAAGATGGTCCTTTTGCATGTTTGATGTTTCATCCTCAATCAGACACAAGCTTGGAAATATGG
TTACCCATTCAAAGACCTGCATAGTAGGAATTATCTGTATGACCGTTCGCTCTGGAACCTCCGTCT
GCCTGGAGCCCTCTGCAGCTACTAGTGAGCCCAAATCTTGTGACAAAACACACATGCCACCGT
GCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCTCTTCCCCCAAACCAAGGACACCC
TCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGACGTGAGCCACGAAGACCCCTGAGG
TCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAG
CAGTACAACAGCACGTACCGTGTGGTCAGCGTCCTCACCCTCCTGCACCAGGACTGGCTGAATGGC
AAGGAGTACAAGTGCAAGGTCTCCAACAAAGCCCTCCAGCCCCATCGAGAAAACCATCTCCAAA
GCCAAAGGGCAGCCCCGAGAACCACAGGTGTACACCCTGCCCCCATCCCGGGATGAGCTGACCAA
GAACCAGGTACAGCTGACCTGCCCTGGTCAAAGGCTTCTATCCAGCGACATCGCCGTGGAGTGGGA
GAGCAATGGGCAGCCGGAGAACAACCTACAAGACCACGCCCTCCCGTGCTGGACTCCGACGGCTCCT
TCTTCTCTACAGCAAGCTCACCCTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCT
CCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAAT
GA

【FIG. 58C】

Human TM4SF19₁₄₅₋₁₆₉-Fc : SEQ ID NO: 16

Target Sequence : SEQ ID NO: 15

Enzyme Site

hlgG1-Fc: SEQ ID NO: 9

KDLHSRNYLYDRSLWNSVCLPSAATS EPKSCDKHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPE
VTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSN
KALPAPIEKTIKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTP
VLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

Nucleotides encoding Human Human TM4SF19₁₄₅₋₁₆₉-Fc : SEQ ID NO: 17

AAAGACCTGCATAGTAGGAATTATCTGTATGACCGTTCGCTCTGGAACCTCGTCTGCCTGGAGC
CCTCTGCAGCTACTAGTGAGCCCAAATCTTGTGACAAAACCTCACACATGCCACCGTGCCAGCAC
CTGAACTCCTGGGGGGACCGTCAGTCTTCTCTTCCCCCAAACCCAAGGACACCTCATGATCTC
CCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAGACCTGAGGTCAAGTTCA
ACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAGTACAAC
AGCACGTACCGTGTGGTCAGCGTCTCACCCTGCTGACCAAGGACTGGCTGAATGGCAAGGAGTAC
AAGTGCAAGGTCTCCAACAAAGCCCTCCAGCCCCCATCGAGAAAACCATCTCCAAGCCAAAGGG
CAGCCCCGAGAACCACAGGTGTACACCTGCCCCCATCCCGGGATGAGCTGACCAAGAACCAGGT
CAGCCTGACCTGCTGGTCAAAGGCTTCTATCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGG
GCAGCCGGAGAACAACCTACAAGACCACGCCTCCCGTGCTGGACTCCGACGGCTCCTTCTTCTCTAC
AGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGCTTCTCATGCTCCGTGATGCAT
GAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA

【FIG. 58D】

Human TM4SF19₁₃₁₋₁₆₉-Fc : SEQ ID NO: 19

Target Sequence : SEQ ID NO: 18

Enzyme Site

hlgG1-Fc : SEQ ID NO: 9

SFNQTQAWKYGYPFKDLHSRNYLYDRSLWNSVCLEPSAATSEPKSCDKHTCPPCPAPPELLGGPSVFL
FPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQ
DWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWE
SNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSQVMHEALHNHYTQKSLSLSPGK

Nucleotides encoding Human TM4SF19₁₃₁₋₁₆₉-Fc SEQ ID NO: 20

TCCTTCAATCAGACACAAGCTTGGAAATATGGTTACCCATTCAAAGACCTGCATAGTAGGAATT
ATCTGTATGACCGTTTCGCTCTGGAACCTCCGTCTGCCTGGAGCCCTCTGCAGCTACTAGTGAGCCC
AAATCTTGTGACAAAACCTACACATGCCACCGTGCCAGCACCTGAACCTCTGGGGGGACCGTCA
GTCTTCTCTTCCCCCAAAACCAAGGACACCTCATGATCTCCCGACCCCTGAGGTCACATGCC
TGGTGGTGGACGTGAGCCACGAAGACCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAG
GTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAGTACAACAGCACGTACCGTGTGGTCAGCGT
CCTCACCGTCTCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAGTGCAAGGTCTCCAACAAAGC
CCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACCACAGGTGT
ACACCCTGCCCCCATCCCGGATGAGCTGACCAAGAACCAGGTACAGCTGACCTGCCTGGTCAAAG
GCTTCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACACTACAAG
ACCACGCCTCCCGTGTGACTCCGACGGCTCCTTCTTCTCTACAGCAAGCTCACCGTGGACAAGA
GCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACA
CGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA

Human TM4SF19 extracellular loop 2, 115~175, 60 aa: SEQ ID NO: 21

SGVALKDGPFCMFDVSSFNQTQAWKYGYPFKDLHSRNYLYDRSLWNSVCLEPSAAVWHVS