

Supplementary Table S1. *KCNN4* promoted *in vivo* tumor formation ability by increasing stem cell potentials.

	Tumor weight (g)			Tumor volume (mm ³)			Median tumor incidence time (d)		
	ov-KCNN4	lv-ctrl	sh-KCNN4	ov-KCNN4	lv-ctrl	sh-KCNN4	ov-KCNN4	lv-ctrl	sh-KCNN4
2*10²	0.026±0.008	0.010±0.006	0.000±0.000	24.560±8.443	5.778±6.129	0.000±0.000	60±4	70±4	75±0
2*10³	0.021±0.082	0.059±0.014	0.004±0.001	180.170±59.800	50.830±15.490	4.857±1.574	53±1	55±1	71±2
2*10⁴	0.761±0.239	0.372±0.108	0.072±0.027	702.600±205.900	318.300±75.480	82.830±27.680	36±2	42±2	54±1
2*10⁵	2.413±0.573	7.389±0.214	0.515±0.089	2309.000±506.400	1329.000±202.500	491.800±90.210	25±3	32±1	43±1

Supplementary Table S2. *KCNN4* promoted *in vivo* tumor formation ability by enhancing CSC frequency.

Groups	No. of injected cells				CSC frequency	<i>P</i> -values
	2*10 ⁵	2*10 ⁴	2*10 ³	2*10 ²		
(A) ov-KCNN4	9/9	9/9	9/9	9/9	1/1	A vs. B: 0.029
(B) lv-ctrl	9/9	9/9	9/9	6/9	1/182	A vs. C: 2.31e-08
(C) sh-KCNN4	9/9	9/9	7/9	0/9	1/1629	B vs. C: 0.000256

Supplementary Table S3. Formulation of sphere culture medium.

supplementary	concentration	Manufacture (Catalog)
DMEM/F12 base medium	100ml	Thermo (A4192001)
Penicillin-Streptomycin	100IU/ml Penicillin and 100ug/ml Streptomycin	Corning® (30-002-CI)
L-glutamine	2mm/l	Corning® (25-005-CI)
Non-Essential Amino Acids Solution (100X)	1ml	Thermo (11140050)
B-27 supplement (50X), serum-free	2ml	Gibco (17504-044)
2-mercaptoethanol	75uM	Gibco (21985023)
N-2 supplementary liquid (100X)	1ml	Gibco (17502001)
EGF	20ng/ml	Sigma (#E9644)
Human Recombinant IGF-I, ACF	5U/L	Stem Cell (#78142)
Heparin solution	0.96IU/ml	Stem Cell (#07980)
15% glucose	4ml	Sigma(G7021)

Supplementary Table S4. sequence of primer, siRNA, and lentivirus

Gene	primers	sequence	
		Forward (5' to 3')	Reverse (3' to 5')
Stemness transcription factor	CD133	TGGATGCAGACCTTGACAACGT	ATACCTGCTACGACAGTCGTGGT
	CD90	GACCCGTGAGACAAAGAAGC	GCCCTCACACTTGACCAGTT
	Bmi1	TGGAGAAGGAATGGTCCACTTC	GTGAGGAAACTGTGGATGAGGA
	Oct4	CTTGCTGCAGAAAGTGGGTGGAGGAA	CTGCAGTGTGGGTTTCGGGCA
	Sox2	GCCGAGTGGAAACTTTTGTCG	GGCAGCGTGTACTTATCCTTCT
	Nanog	AATACCTCAGCCTCCAGCAGATG	TGCGTCACACCATTGCTATTCTTC
	β -actin	CCTGGCACCCAGCACAAAT	GGGCCGGACTCGTCATAC
KCNN4	KCNN4-1	TGCTCAACGCTTCCTACCGCAGCAT	CTCTCGGCCACGGACAGCACCCA
	KCNN4-2	TAACAAGGCAGAGAAGCACG	CCTTCCTGCGAGTATGTTTGTA
TCA	PDHK	TTGGCTGGATTTGGTTATGGT	CTTCAGGCGTGGTCTTGTAATG
	PDHA	AACCCACAGACCATCTCATCA	CCTTCCCTTTAGCACAAACCTC
	PDHB	TGGAGAAGAAGTTGCCCAGTATG	ACCAGCCATAGCTGCACCTA
Glycolysis	LDHA	GATTCAGCCCGATTCCGTTAC	GAGTCCAATAGCCCAGGATGTG
	GLUT1	TCACTGTGCTCCTGGTTCTGTTC	GCTCCTCGGGTGTCTTGTC
	HK2	GCCCGCCAGAAGACATTAGA	CCTTGCTCAGACCTCGCTCC
	PFK1	GGAGGAACACCTTTGTCGCC	GTCAAAGGCTGATGGCGTCC
	PKM	GCTTCTGACCCCATCCTCTACC	CGTTATCCAGCGTGATTTTGAG
Mitochondrial biosynthesis	TFAM	TAGGGCGGAGTGGCAGGTA	TTCTTCCCAAGACTTCATTTTCATTAT
	PGC1 α	AAAGGATGCGCTCTCGTTCA	CTTCAGCCTCTCGTGCTGAT
	NRF1	CAGGCGGTGGCATCGTT	GCGGTTTCCCCAGACAAGAC

siRNA-seq (Genephrama)	si-KCNN4-858(5' to 3')	GGAAGCUGGAGUUUAACAATT UUGUAAAACUCCAGCUUCCTT
	si-KCNN4-1083(5' to 3')	GGGAACAAGUGAACUCCAUTT AUGGAGUUCACUUGUUCCTT
	si-KCNN4-963(5' to 3')	CCUGGAUGUUCUACAAACATT UGUUUGUAGAACAUCAGGTT
	negative control (5' to 3')	UUCUCCGAACGUGUCACGUTT
		ACGUGACACGUUCGGAGCATT

lentivirus	ov-KCNN4(PCR primers of target gene)	AGGTCGACTCTAGAGATCCCGCCACCATGGGCGGGGATCTG GTG
	lv-ctrl	CTTCCATGGTGGCGACCGGCTTGGACTGCTGGCTGGGTTCTG
	sh-KCNN4-1	TTCTCCGAACGTGTCACGT
	sh-KCNN4-2	CAAGATGCACATGATCCTGTA
	sh-KCNN4-3	GCCTGGATGTTCTACAAACAT
	sh-ctrl	CGCTCTCAATCAAGTCCGCTT