Supplemental Table 1. Primers used for quantitative and semi-quantitative RT-PCR.

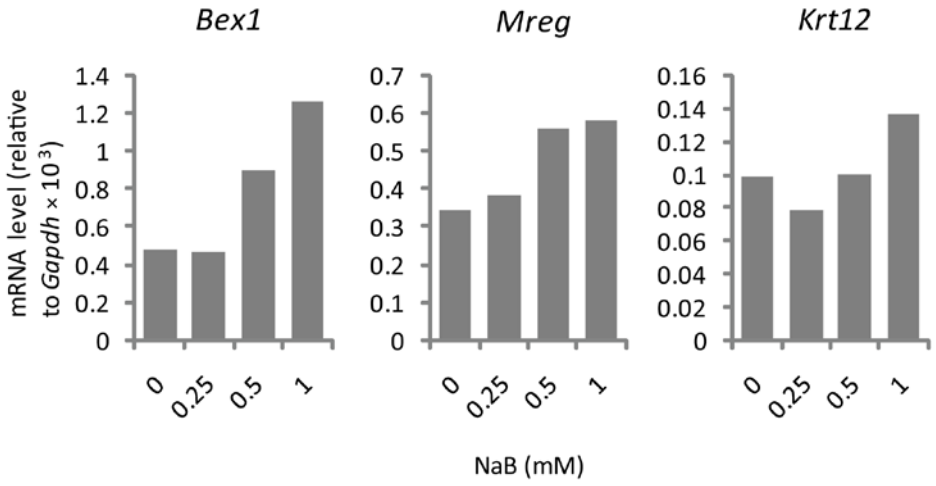
Primer	Sequence
Oct4 F	CCAGAAGGGCAAAAGATCAA
Oct4 R	GCTCCTGATCAACAGCATCA
Sox2 F	ACCAGCTCGCAGACCTACAT
Sox2 R	CCCTCCCAATTCCCTTGTAT
Nanog F	AAGTACCTCAGCCTCCAGCA
Nanog R	GAAGTTATGGAGCGGAGCAG
Fbxl15 F	ACATTGCCTCCCGACACTAC
Fbxl15 R	GAAGGCAGGCAGATCTCAAG
Utf1 F	CGTCGCTACAAGTTCCTCAA
Utf1 R	CAGAGTGTCGGTGCTCGTAA
Gapdh F	CATGGCCTTCCGTGTTCCTA
Gapdh R	GCCTGCTTCACCACCTTCTT
Mreg F	GCGGCAGATCCGCAGGGAAG
Mreg R	CTCCCAGCTGGCGGGGAAGA
Krt12 F	GGCTCGCTGGCTGAAACCGA
Krt12 R	CTCCAGGCGAGCCTTGACGC
Bex1 F	TTCGGCAGCCCATCGCTCAC
Bex1 R	CGGGTCAGTGCTAACCGCCC

Supplemental Table 2. Probes of ES cell-enriched genes that are 2-fold up-regulated by butyrate in 4F reprogramming, 3F reprogramming and both.

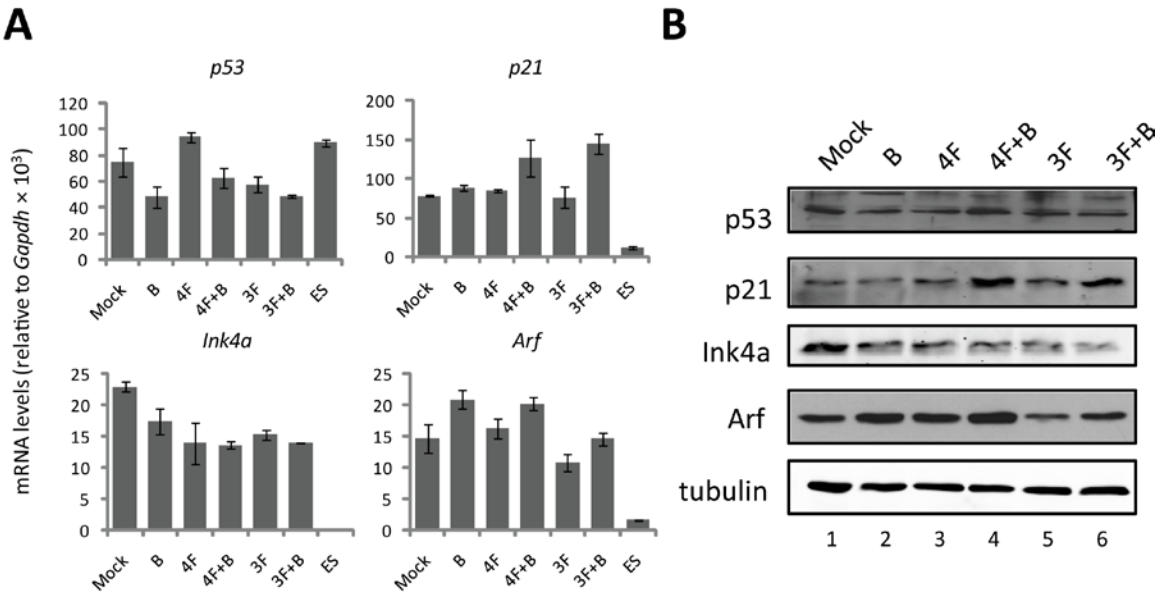
Probe ID	Gene Symbol	Gene Name
Up-regulated only in 4F reprogramming		
1432466_a_at	Apoe	apolipoprotein E
1418687_at	Arc	activity regulated cytoskeletal-associated protein
1448595_a_at	Bex1	brain expressed gene 1
1449887_at	Chmp4c	chromatin modifying protein 4C
1418709_at	Cox7a1	cytochrome c oxidase, subunit VIIa 1
1434170_at	Dcaf12l1	DDB1 and CUL4 associated factor 12-like 1
1416579_a_at	Epcam	epithelial cell adhesion molecule
1417883_at	Gstt2	glutathione S-transferase, theta 2
1449074_at	Kcnk4	potassium channel, subfamily K, member 4
1419230_at	Krt12	keratin 12
1457314_at	L1td1	LINE-1 type transposase domain containing 1
1416236_a_at	Mpzl2	myelin protein zero-like 2
1448265_x_at	Mpzl2	myelin protein zero-like 2
1437250_at	Mreg	melanoregulin
1429013_at	Mtap7d2	MAP7 domain containing 2
1438820_at	Rnf17	ring finger protein 17
1416627_at	Spint1	serine protease inhibitor, Kunitz type 1
1448562_at	Upp1	uridine phosphorylase 1
1431786_s_at	1190003J15Rik	RIKEN cDNA 1190003J15 gene
1417797_a_at	1810019J16Rik	RIKEN cDNA 1810019J16 gene
1455918_at		
Up-regulated only in 3F reprogramming		
1434073_at	Gprasp2	G protein-coupled receptor associated sorting protein 2
1426617_a_at	Ttyh1	tweety homolog 1 (Drosophila)
Up-regulated in both 4F and 3F reprogramming		
1428209_at	Bex4	brain expressed gene 4
1452004_at	Calca	calcitonin/calcitonin-related polypeptide, alpha
1442273_at	Ccdc158	coiled-coil domain containing 158
1417590_at	Cyp27a1	cytochrome P450, family 27, subfamily a, polypeptide 1
1460454_at	Glod5	glyoxalase domain containing 5
1430238_at	Got1l1	glutamic-oxaloacetic transaminase 1-like 1
1434670_at	Kif5a	kinesin family member 5A
1426255_at	Nefl	neurofilament, light polypeptide
1416965_at	Pcsk1n	proprotein convertase subtilisin/kexin type 1 inhibitor
1434292_at	Snhg11	small nucleolar RNA host gene 11 (non-protein coding)
1417426_at	Srgn	serglycin
1421606_a_at	Sult4a1	sulfotransferase family 4A, member 1
1419289_a_at	Syngr1	synaptogyrin 1

1418743_a_at	Tesc	tescalcin
1418744_s_at	Tesc	tescalcin
1424351_at	Wfdc2	WAP four-disulfide core domain 2

Supplemental Fig. 1. Expression of butyrate up-regulated genes in response to different concentrations of butyrate. Total RNA samples harvested 2 days after mock or butyrate treatment (0.25 mM, 0.5 mM and 1 mM) were subjected to RT-qPCR using primers specific for *Bex1*, *Mreg* and *Krt12*.



Supplemental Fig. 2. Butyrate treatment does not significantly suppress the *p53-p21* pathway or *Ink4a/Arf* level. *A.* RT-qPCR analysis of the various samples with or without the treatment of butyrate indicates that butyrate treatment does not significantly suppress the *p53-p21* pathway or *Ink4a/Arf* level in promoting the reprogramming. *B.* Western blot analysis confirmed the RT-qPCR analysis presented in panel A, supporting the conclusion that butyrate treatment does not significantly suppress the *p53-p21* pathway or *Ink4a/Arf*, excluding its involvement in mediating the butyrate effect.



Supplemental Methods

Western blotting- Cell populations were collected at day 2 post-infection and lysed with RIPA buffer (150 mM NaCl, 50 mM Tris, pH7.5, 1% NP40, 0.05% Na-deoxycholate, 1 mM Na_3VO_4 and 1 mM NaF) for 1 h at 4°C. Soluble faction, as total protein extract, was isolated by centrifugation and then subjected to electrophoresis. Western blotting was performed with antibodies against p53 (Santa Cruz, sc6243), p21 (Santa Cruz, sc52870), Ink4a (Santa Cruz, sc1207), Arf (Santa Cruz, sc32748) and α-tubulin (Sigma, T6199).