Supplementary Data

SATB2 and *NGR1*: potential upstream regulatory factors in uterine leiomyomas

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Supplementary Table 1　Canonical pathways for the aberrantly expressed genes in uterine leiomyomas and the altered genes in the SATB2 and NRG1 lines

#	Uterine leiomyomas (151)	SATB2 line (92)	NRG1 line (58)
1	Hepatic Fibrosis / Hepatic Stellate Cell Activation	Axonal Guidance Signaling	Human Embryonic Stem Cell Pluripotency
2	Macropinocytosis Signaling	Hepatic Fibrosis / Hepatic Stellate Cell Activation	Role of Osteoblasts, Osteoclasts and Chondrocytes in Rheumatoid Arthritis
3	Atherosclerosis Signaling	Role of Osteoblasts, Osteoclasts and Chondrocytes in Rheumatoid Arthritis	Hepatic Fibrosis / Hepatic Stellate Cell Activation
4	RAR Activation	Osteoarthritis Pathway	G-Protein Coupled Receptor Signaling
5	Complement System	Leukocyte Extravasation Signaling	Regulation of the Epithelial-Mesenchymal Transition Pathway
6	Clathrin-mediated Endocytosis Signaling	Role of Macrophages, Fibroblasts and Endothelial Cells in Rheumatoid Arthritis	Adipogenesis pathway
7	IL-12 Signaling and Production in Macrophages	Pancreatic Adenocarcinoma Signaling	Factors Promoting Cardiogenesis in Vertebrates
8	Leukocyte Extravasation Signaling	Human Embryonic Stem Cell Pluripotency	Role of Macrophages, Fibroblasts and Endothelial Cells in Rheumatoid Arthritis
9	Protein Kinase A Signaling	Granulocyte Adhesion and Diapedesis	Th1 and Th2 Activation Pathway
10	Endothelin-1 Signaling	Molecular Mechanisms of Cancer	Gαi Signaling
11	Axonal Guidance Signaling	Atherosclerosis Signaling	Wnt/β-catenin Signaling
12	HGF Signaling	Virus Entry via Endocytic Pathways	Mouse Embryonic Stem Cell Pluripotency

13	Colorectal Cancer Metastasis Signaling	Factors Promoting Cardiogenesis in Vertebrates	Retinoic acid Mediated Apoptosis Signaling
14	Tec Kinase Signaling	Reelin Signaling in Neurons	TGF-β Signaling
15	IL-8 Signaling	Complement System	Osteoarthritis Pathway
16	HER-2 Signaling in Breast Cancer	Glioma Signaling	Axonal Guidance Signaling
17	Role of Tissue Factor in Cancer	Signaling by Rho Family GTPases	HGF Signaling
18	Granulocyte Adhesion and Diapedesis	PTEN Signaling	Amyotrophic Lateral Sclerosis Signaling
19	Role of Macrophages, Fibroblasts and Endothelial Cells in Rheumatoid Arthritis	Aryl Hydrocarbon Receptor Signaling	Pancreatic Adenocarcinoma Signaling
20	Renin-Angiotensin Signaling	Colorectal Cancer Metastasis Signaling	Ovarian Cancer Signaling
21	UVA-Induced MAPK Signaling	Wnt/β-catenin Signaling	Th2 Pathway
22	CXCR4 Signaling	PAK Signaling	CD40 Signaling
23	Inhibition of Matrix Metalloproteases	Macropinocytosis Signaling	RANK Signaling in Osteoclasts
24	GNRH Signaling	Endothelin-1 Signaling	NF-κB Signaling
25	Agranulocyte Adhesion and Diapedesis	NF-κB Activation by Viruses	Triacylglycerol Biosynthesis
26	Prolactin Signaling	Regulation of the Epithelial-Mesenchymal Transition Pathway	UVA-Induced MAPK Signaling
27	NRF2-mediated Oxidative Stress Response	Glioblastoma Multiforme Signaling	HMGB1 Signaling
28	Bladder Cancer Signaling	Phospholipase C Signaling	Leukocyte Extravasation Signaling
29	EIF2 Signaling	Agranulocyte Adhesion and Diapedesis	Th1 Pathway
30	Intrinsic Prothrombin Activation Pathway	Gαq Signaling	p53 Signaling

31	Acute Phase Response Signaling	Neuropathic Pain Signaling In Dorsal Horn Neurons	NRF2-mediated Oxidative Stress Response
32	Aryl Hydrocarbon Receptor Signaling	Ovarian Cancer Signaling	Small Cell Lung Cancer Signaling
33	Death Receptor Signaling	HIF1α Signaling	RAR Activation
34	HMGB1 Signaling	Caveolar-mediated Endocytosis Signaling	cAMP-mediated signaling
35	HIF1α Signaling	Phagosome Formation	Xenobiotic Metabolism Signaling
36	Agrin Interactions at Neuromuscular Junction	Role of Tissue Factor in Cancer	Molecular Mechanisms of Cancer
37	Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses	FAK Signaling	Superoxide Radicals Degradation
38	Molecular Mechanisms of Cancer	VDR/RXR Activation	FGF Signaling
39	LPS/IL-1 Mediated Inhibition of RXR Function	Gα12/13 Signaling	Acute Myeloid Leukemia Signaling
40	ErbB Signaling	Mouse Embryonic Stem Cell Pluripotency	Chondroitin Sulfate Biosynthesis
41	Growth Hormone Signaling	HMGB1 Signaling	MSP-RON Signaling Pathway
42	PPARα/RXRα Activation	Adipogenesis pathway	γ-glutamyl Cycle
43	Chemokine Signaling	Protein Kinase A Signaling	Dermatan Sulfate Biosynthesis
44	Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	NRF2-mediated Oxidative Stress Response	Cardiac Hypertrophy Signaling
45	Glucocorticoid Receptor Signaling	Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses	Hematopoiesis from Multipotent Stem Cells
46	P2Y Purigenic Receptor Signaling Pathway	LPS/IL-1 Mediated Inhibition of RXR Function	STAT3 Pathway
47	Reelin Signaling in Neurons	Growth Hormone Signaling	Sphingosine-1-phosphate Signaling

48	GPCR-Mediated Nutrient Sensing in Enteroendocrine Cells	Paxillin Signaling	BMP signaling pathway
49	Cancer Drug Resistance By Drug Efflux	Bladder Cancer Signaling	CD27 Signaling in Lymphocytes
50	NF-κB Signaling	Inflammasome pathway	Serotonin Receptor Signaling
51	Phagosome Formation	Xenobiotic Metabolism Signaling	Gα12/13 Signaling
52	Cardiac Hypertrophy Signaling	ILK Signaling	Unfolded protein response
53	Coagulation System	Role of NFAT in Cardiac Hypertrophy	LPS/IL-1 Mediated Inhibition of RXR Function
54	Putrescine Degradation III	IL-8 Signaling	Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses
55	Tryptophan Degradation X (Mammalian, via Tryptamine)	Clathrin-mediated Endocytosis Signaling	Chondroitin Sulfate Biosynthesis (Late Stages)
56	MIF Regulation of Innate Immunity	Myo-inositol Biosynthesis	Gαq Signaling
57	Fatty Acid α-oxidation	Tec Kinase Signaling	Prostanoid Biosynthesis
58	p53 Signaling	HGF Signaling	Coagulation System
59	Role of NFAT in Cardiac Hypertrophy	Neuregulin Signaling	
60	G Beta Gamma Signaling	Role of NANOG in Mammalian Embryonic Stem Cell Pluripotency	
61	G-Protein Coupled Receptor Signaling	RhoGDI Signaling	
62	LXR/RXR Activation	Superoxide Radicals Degradation	
63	LPS-stimulated MAPK Signaling	Agrin Interactions at Neuromuscular Junction	
64	Sphingosine-1-phosphate Signaling	PDGF Signaling	

65	Regulation of the Epithelial-Mesenchymal Transition Pathway	Glioma Invasiveness Signaling
66	CCR5 Signaling in Macrophages	NF-κB Signaling
67	Hepatic Cholestasis	eNOS Signaling
68	STAT3 Pathway	Nitric Oxide Signaling in the Cardiovascular System
69	Role of NFAT in Regulation of the Immune Response	Basal Cell Carcinoma Signaling
70	Dendritic Cell Maturation	MSP-RON Signaling Pathway
71	Xenobiotic Metabolism Signaling	Sphingosine-1-phosphate Signaling
72	Extrinsic Prothrombin Activation Pathway	PI3K/AKT Signaling
73	Thrombin Signaling	Integrin Signaling
74	Inhibition of Angiogenesis by TSP1	Cyclins and Cell Cycle Regulation
75	Human Embryonic Stem Cell Pluripotency	CD40 Signaling
76	14-3-3-mediated Signaling	UVA-Induced MAPK Signaling
77	Corticotropin Releasing Hormone Signaling	IGF-1 Signaling
78	UVB-Induced MAPK Signaling	Glucocorticoid Receptor Signaling
79	IGF-1 Signaling	Estrogen-Dependent Breast Cancer Signaling
80	Osteoarthritis Pathway	VEGF Signaling
81	Sertoli Cell-Sertoli Cell Junction Signaling	Regulation of Cellular Mechanics by Calpain Protease
82	IL-1 Signaling	Triacylglycerol Biosynthesis
83	Synaptic Long Term Depression	Prostanoid Biosynthesis

84	Glutathione Redox Reactions I	Coagulation System
85	UVC-Induced MAPK Signaling	Ethanol Degradation IV
86	Thrombopoietin Signaling	TGF-β Signaling
87	α-Adrenergic Signaling	Germ Cell-Sertoli Cell Junction Signaling
88	Erythropoietin Signaling	Breast Cancer Regulation by Stathmin1
89	Paxillin Signaling	Ephrin Receptor Signaling
90	IL-6 Signaling	Parkinson's Signaling
91	FcγRIIB Signaling in B Lymphocytes	HER-2 Signaling in Breast Cancer
92	Noradrenaline and Adrenaline Degradation	Wnt/Ca+ pathway
93	Renal Cell Carcinoma Signaling	
94	Germ Cell-Sertoli Cell Junction Signaling	
95	cAMP-mediated signaling	
96	Aldosterone Signaling in Epithelial Cells	
97	MSP-RON Signaling Pathway	
98	TGF-β Signaling	
99	Relaxin Signaling	
100	Oncostatin M Signaling	
101	ErbB4 Signaling	
102	eNOS Signaling	
103	Type II Diabetes Mellitus Signaling	
104	p38 MAPK Signaling	
105	G Protein Signaling Mediated by Tubby	
106	Tight Junction Signaling	

107	Pyridoxal 5'-phosphate Salvage Pathway
108	Apoptosis Signaling
109	Glioma Signaling
110	iNOS Signaling
111	Ethanol Degradation IV
112	Cholecystokinin/Gastrin-mediated Signaling
113	p70S6K Signaling
114	Dopamine Degradation
115	MIF-mediated Glucocorticoid Regulation
116	Role of JAK family kinases in IL-6-type Cytokine Signaling
117	Virus Entry via Endocytic Pathways
118	Melatonin Signaling
119	Role of Osteoblasts, Osteoclasts and Chondrocytes in Rheumatoid Arthritis
120	VEGF Family Ligand-Receptor Interactions
121	Wnt/β-catenin Signaling
122	VEGF Signaling
123	mTOR Signaling
124	Prostanoid Biosynthesis
125	PCP pathway
126	Retinoic acid Mediated Apoptosis Signaling
127	Fc Epsilon RI Signaling
128	Nitric Oxide Signaling in the Cardiovascular System
129	PPAR Signaling
130	ERK5 Signaling

131	GPCR-Mediated Integration of Enteroendocrine Signaling Exemplified by an L Cell
132	Neurotrophin/TRK Signaling
133	PDGF Signaling
134	CREB Signaling in Neurons
135	Salvage Pathways of Pyrimidine Ribonucleotides
136	Regulation of IL-2 Expression in Activated and Anergic T Lymphocytes
137	B Cell Receptor Signaling
138	Ovarian Cancer Signaling
139	JAK/Stat Signaling
140	Glioblastoma Multiforme Signaling
141	Gap Junction Signaling
142	Glioma Invasiveness Signaling
143	Sumoylation Pathway
144	Adipogenesis pathway
145	PI3K Signaling in B Lymphocytes
146	PAK Signaling
147	Neuropathic Pain Signaling In Dorsal Horn Neurons
148	Caveolar-mediated Endocytosis Signaling
149	Nicotine Degradation II
150	Chronic Myeloid Leukemia Signaling
151	Pancreatic Adenocarcinoma Signaling

Canonical pathways were analyzed with Ingenuity Pathway Analysis (IPA) software.

Pathways with p-values below 0.05 were selected.

The numbers of pathways are shown in parentheses.

Supplementary Table 2 PCR primers used in this study

#	Gene name	Usage	Amplified region (UCSC hg19)	PCR primers	Product size (bp)	# of CpGs	Restriction enzyme Fragment size (bp)
1	*SATB2*	COBRA	chr2: 200,330,754-200,331,048	F: TTAGAAAAGTGGTGGGTTTTTTTTAGTT R: TACACCCACAACTCAAATTCTACTATCC	295	9	*Hpy*CH4IV 148 / 147
2	*NRG1*	COBRA	chr8: 32,503,979-32,504,264	F: TGTTGTTGAAAAGTTTATTTTTTTAGGGAG R: ACATCAATTAAACCTAATCCCCATAACC	286	3	*Taq* I 132 / 154
3	*SATB2*	RT-PCR real-time RT-PCR	chr2: 200,193,607-200,213,649	F: GATAAACCAACAGATTGCCGTTAG R: CTTACGCAGAATCTCAGACAACAAT	253	-	-
4	*NRG1*	RT-PCR real-time RT-PCR	chr8: 32,453,412-32,463,168	F: GTGTGAAACCAGTTCTGAATACTCC R: CACTGTCATTTCCTAATTTGCTGAT	200	-	-
5	*ESR1*	real-time RT-PCR	chr6: 152,163,839-152,201,854	F: TGTGCAATGACTATGCTTCA R: GCTCTTCCTCCTGTTTTTA	149	-	-
6	*PGR*	real-time RT-PCR	chr11: 100,909,902-100,912,802	F: GTTTGAGGAGATGAGGTCAAGC R: TGTGCAGCAATAACTTCAGACA	228	-	-
7	*GAPDH*	RT-PCR	chr12: 6,646,484-6,647,017	F: GTGGATAGAACACTGACTCTTGC R: GAGCCTAAGGAGACATGACTACT	341	-	-
8	*GAPDH*	real-time RT-PCR	chr12: 6,644,006-6,645,736	F: AGGTGAAGGTCGGAGTCA R: GGTCATTGATGGCAACAA	99	-	-
9	*SATB2*	CDS amplification	chr2: 200,136,890-200,320,790	F: CTCGAGTGGGAACTTTGTCTCCGAGT R: GTCGACAAATCCTTGGACCGATGTATTG	2276	-	-
10	*NRG1*	CDS amplification	chr8: 32,406,148-32,621,948	F: CTCGAGACGTAGAGCGCTCCGTCTC R: CCCGGGCAGGTGAATCTATGTGTTTATTTAGG	1988	-	-