Electronic Supporting Information

Coumarin-Appended Phosphorescent Cyclometalated Iridium(III) Complexes as Mitochondria-Targeted Theranostic Anticancer Agents

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Supporting Methods

Cell lines and culture conditions

HeLa, A549, A549R, HepG2 and LO2 cells were obtained from Experimental Animal Center of Sun Yat-Sen University (Guangzhou, China). The cells were maintained in DMEM (Dulbecco's modified Eagle's medium, Gibco BRL) or RPMI 1640 (Roswell Park Memorial Institute 1640, Gibco BRL) medium containing 10% FBS (fetal bovine serum, Gibco BRL), 100 μg/mL streptomycin (Gibco BRL), and 100 U/mL penicillin (Gibco BRL). The cells were cultured in a humidified incubator at 37 °C under 5% CO_2. A549R cells were cultured in a medium containing increasing concentrations of cisplatin to maintain the resistance. In each experiment, cells treated with vehicle DMSO (1%, v/v) were used as the reference group.

Cytotoxicity assay

The cells were seeded in 96-well tissue culture plates (Corning) at a density of 10, 000 cells per well. After incubation for 24 h, the cells were treated with varies concentrations of complexes **1**−**3** for 44 h. Then, 20 μL MTT (5 mg/mL) was added to each well. The cells were incubated for another 4 h. At the end of the incubation period, the medium was removed and the formazan product was dissolved in 150 μL DMSO. The cell viability was evaluated by measurement of the absorbance at 595 nm (Infinite F200, Tecan, Switzerland), and complexes **1**−**3** have no absorption at 595 nm. Each experiment was repeated at least three times to get the mean values. For the cytotoxicity assay in the presence of the inhibitors, HeLa cells were preincubated with 50 μM z-VAD-FMK or 10 mM NAC for 1 h before the complexes were added.

Determination of lipophilicity

The lipophilicity of the iridium(III) complexes, which was presented as log $P_{o/w}$ values, was determined according to a reported procedure.[1] Briefly, aqueous sodium chloride (0.9% w/v) and *n*-octanol were saturated for 1 week. Complexes **1**−**3** were dissolved in the aqueous phase. An equal volume of saturated *n*-octanol was added, and the solutions mixed for 24 h. The samples were then centrifuged (1500 g, 10 min). The Ir(III) content of the *n*-octanol and aqueous phases was determined by UV/Vis (280 nm). Log $P_{o/w}$ was calculated as the logarithmic ratio of Ir(III) concentration in *n*-octanol to that in aqueous phases.

ICP-MS measurement

HeLa cells were seeded in 10 cm tissue culture dishes and incubated for 24 h. The medium was removed and replaced with fresh medium containing the tested complexes **1**−**3** (10 μM). After 1 h incubation, the cells were washed with PBS, trypsinized and collected. The cells were counted, and digested with HNO_3 (65%, 0.2 mL) at room temperature for at least 24 h. The solution was then diluted to a final volume of 10 mL with Milli-Q water. The concentration of Ir(III) was measured using the XSERIES 2 ICP-MS.

Colocalization assay

HeLa and A549 cells were co-incubated with Ir(III) complexes (10 μM) and MTDR (150 nM) or LTDR (50 nM) at 37 °C for 30 min. Cells were washed three times with PBS and visualized by confocal microscopy immediately. The wavelength for the excitation of Ir(III) complexes is 405 nm. The excitation wavelength of MTDR and LTDR is 633 nm. Emission was collected at 600 ± 20 nm (**1**), 530 ± 20 nm (**2**), 630 ± 20 nm (**3**), 665 ± 20 nm (MTDR) and 668 ± 20 nm (LTDR).

Live cell imaging after treatment with metabolic or endocytic inhibitors

HeLa cells were seeded in 35 mm dishes for 24 h and preincubated with CCCP (30 μM) or chloroquine (50 μM) for 1 h. The medium was removed and the cells were then incubated with **1**, **2** or **3** (10 μM) for 30 min. The cells were washed three times with PBS and visualize by a confocal microscope immediately.

Analysis of MMP

HeLa cells were cultured in 60 mm dishes (Corning) and treated with complexes **1**−**3** for 6 h. The cells were then collected and resuspended at 1×10^6/mL in pre-warmed PBS containing 5 μg/mL JC-1, and incubated for 20 min at 37 °C. Subsequently, the cells were washed twice with PBS and immediately analyzed in a flow cytometer. Fluorescence was monitored by measuring both the monomer (527 nm emission; green) and the aggregate (590 nm emission; red) forms of JC-1 following excitation at 488 nm. Red and green MFI were analyzed using FlowJo 7.6 software (Tree Star, USA). 10, 000 events were acquired for each sample.

Real-time tracking of changes in mitochondrial morphology

HeLa cells were treated with **1**−**3** (10 μM) and incubated in a humidified incubator, which provided an atmosphere of 5% CO_2 and 95% air at a constant temperature of 37 °C and connected with the confocal microscope. Cell imaging was then carried out after 5 min by confocal microscopy and photographs were taken every 10 min. Excitation wavelength: 405 nm. Emission filters: 600 ± 20 nm (**1**), 530 ± 20 nm (**2**) and 630 ± 20 nm (**3**).

Measurement of intracellular ROS

Cells were treated with **1**−**3** at the indicated concentrations for 6 h and then incubated with 10 μM H_2DCFDA in serum-free DMEM for 15 min at 37 °C in the dark. After washed twice with serum-

free DMEM, the fluorescence intensity of cells was measured immediately by flow cytometry with excitation at 488 nm and emission at 530 nm. Green MFI were analyzed using FlowJo 7.6 software (Tree Star, USA).

Cell cycle analysis

HeLa cells were cultured in 60 mm dishes (Corning) and incubated with **1**−**3** for 24 h. The cells were then collected and fixed in 2 mL of 70% aqueous ethanol (v/v). After overnight storage at −20 °C, cells were centrifuged (15 min at 800 g) and washed twice with PBS, and then resuspended in 500 μL PBS containing PI (50 μg/mL) and DNase-free RNase (100 μg/mL). Data were collected by a flow cytometer and analyzed by ModFit LT 2.0 software. 10, 000 events were acquired for each sample.

Detection of apoptosis

1) Hoechst staining. HeLa cells were seeded into 35 mm dishes (Corning) and treated with **1**−**3** for 24 h.The cells were then washed once with PBS and fixed with 4% paraformaldehyde at room temperature for 10 min. After that, cells were labelled with Hoechst 33342 (5 μg/mL in PBS) for 5 min. The cells were analyzed immediately with a confocal microscope.

2) Annexin V/PI assay. The assay was performed according to the manufacturer's protocol. HeLa cells were cultured in 6-well plates and treated with different concentrations of **1**−**3** for 24 h. The cells were harvested and stained with 5 μL annexin V and 10 μL PI at room temperature for 10 min in the dark, and analyzed immediately by flow cytometry (λ_{ex} = 488 nm), and the absorbance at 488 nm of **1**−**3** can be ignored. Data were analyzed by FlowJo Software (Tree Star, USA).

3) Caspase-3/7 activity assay. Caspase-3/7 activity was measured using the Caspase-Glo® Assay kit (Promega, USA) according to the manufacturer's instructions. Briefly, cells were cultured in 48-

well plates and treated with different concentration of **1**−**3** for 6 h, and then 50 μL cell lysate was added to each well, followed by the addition of 50 μL Caspase-Glo® 3/7 reagent. The mixture was incubated at room temperature for 30 min and then the luminescence was measured using a TECAN Infinite M200 station.

Microarray analysis

1) RNA extraction and purification. HeLa cells (1×10^6) were treated with vehicle control (1% DMSO) or **3** (2 μM) for 24 h. All samples were run in triplicate. Total RNA was extracted using TRIZOL Reagent (Life technologies, USA) following the manufacturer's instructions and checked for a RNA integrity number (RIN) to inspect RNA integrity by an Agilent Bioanalyzer 2100 (Agilent technologies, USA). Qualified total RNA was further purified by RNeasy micro kit and RNase-Free DNase Set (QIAGEN, Germany).

2) RNA amplification and labeling. Total RNA was amplified, labeled and purified by Affymetrix WT PLUS Reagent Kit (Affymetrix, USA)/Ovation FFPE WTA System (NuGEN, USA) and FL-Ovation™ cDNA Biotin Module V2 (NuGEN, USA) according to the manufacturer's instructions to obtain biotin labeled cDNA.

3) Array hybridization. Array hybridization and washing was performed using GeneChip® Hybridization, Wash and Stain Kit (Affymetrix, USA) in a Hybridization Oven 645 (Affymetrix, USA) and a Fluidics Station 450 (Affymetrix, USA) following the manufacturer's instructions.

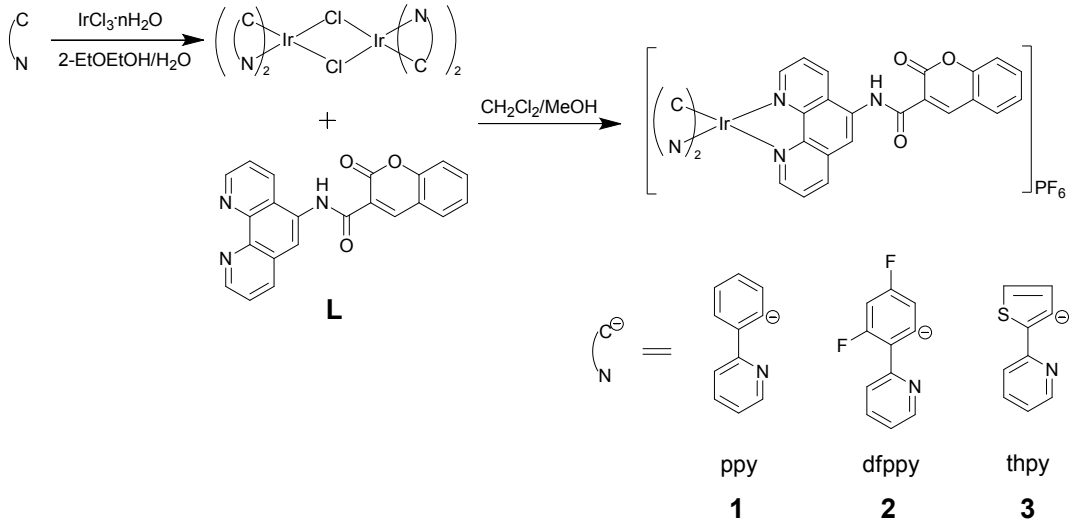
4) Data acquisition. Arrays were scanned by Affymetrix GeneChip® Scanner 3000 (Affymetrix, USA). Command Console Software (Affymetrix, USA) was used to control the scanner and summarize probe cell intensity data (CEL file generation) with default settings. Then the raw data were subjected to normalization, background correction and summarization using Expression

Console (Affymetrix, USA) software with the standard Robust Multi-array Average (RMA) algorithm. Differentially expressed genes were then identified through fold change. Gene Ontology (GO) analysis and Kyoto Encyclopedia of Genes and Genomes (KEGG) analysis using the online tool FunNet were applied to determine the roles of these differentially expressed mRNAs played in these GO terms or pathways. For Connectivity Map (http://www.broadinstitute.org/cmap), regulated genes with more than twofold change were selected and queried for analysis.

Statistical analysis

All biological experiments were performed at least twice with triplicates in each experiment. Representative results were depicted in this report and data were presented as means ± SD.

Supporting Figures



Scheme S1 Synthetic routes of complexes **1**−**3**.

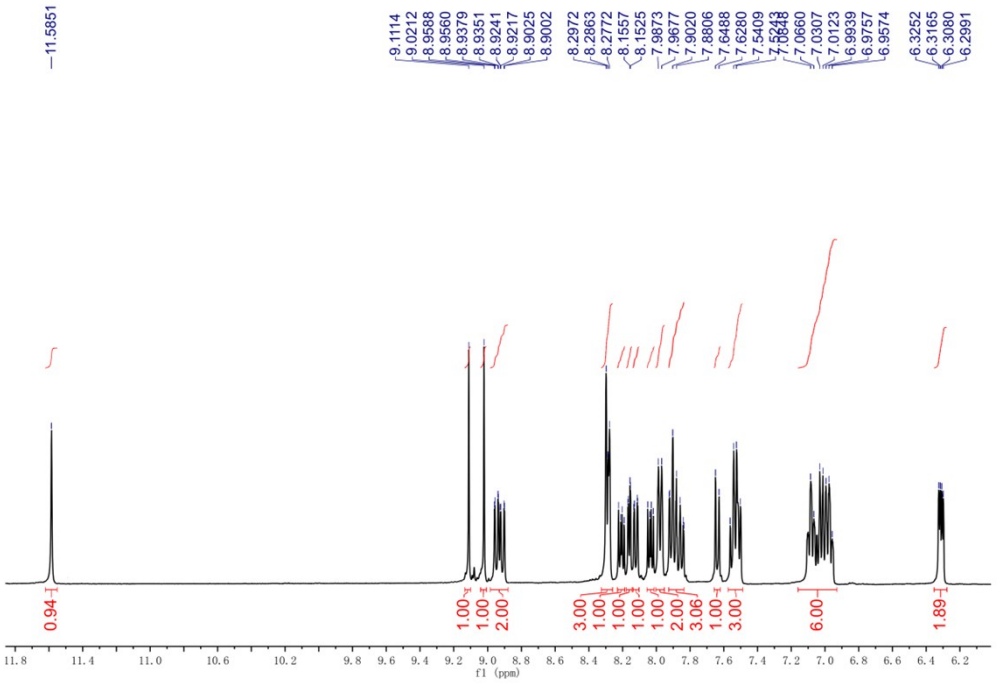


Fig. S1 ^{1}H NMR spectrum of **1**.

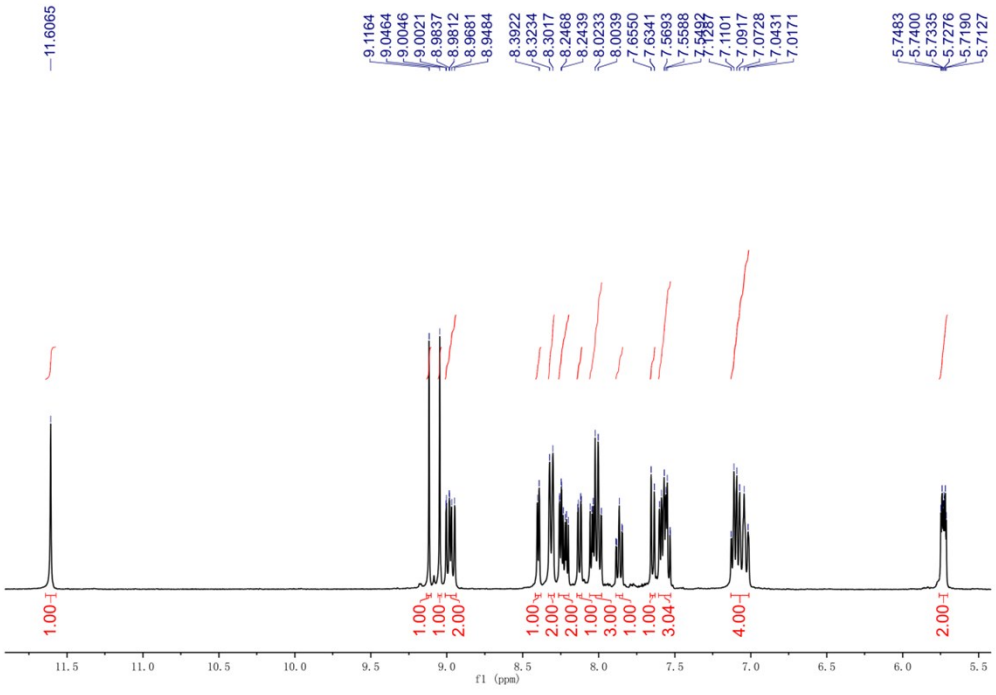


Fig. S2 ^{1}H NMR spectrum of **2**.

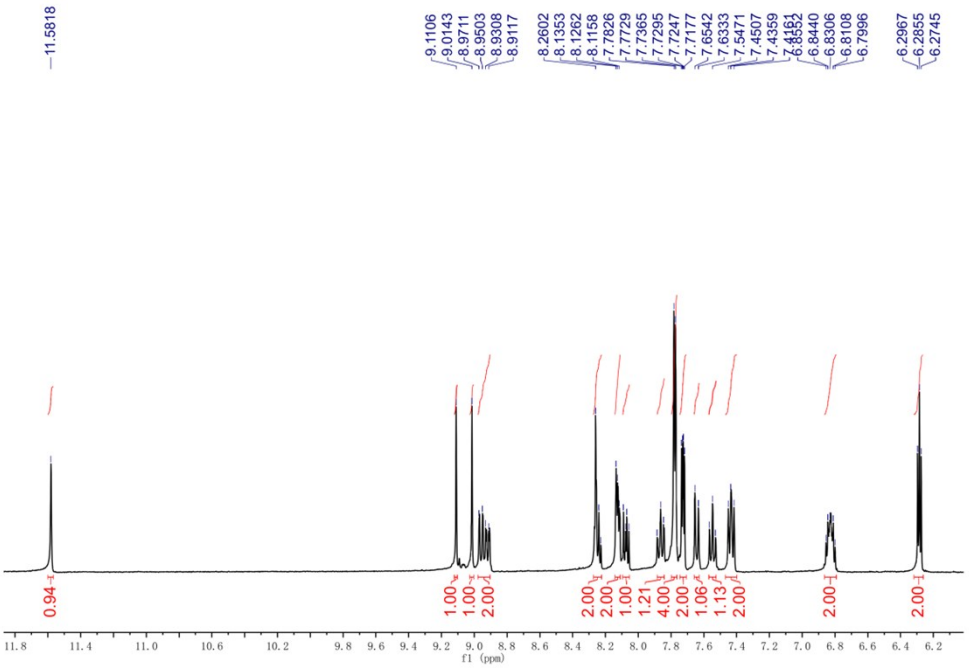


Fig. S3 ^{1}H NMR spectrum of **3**.

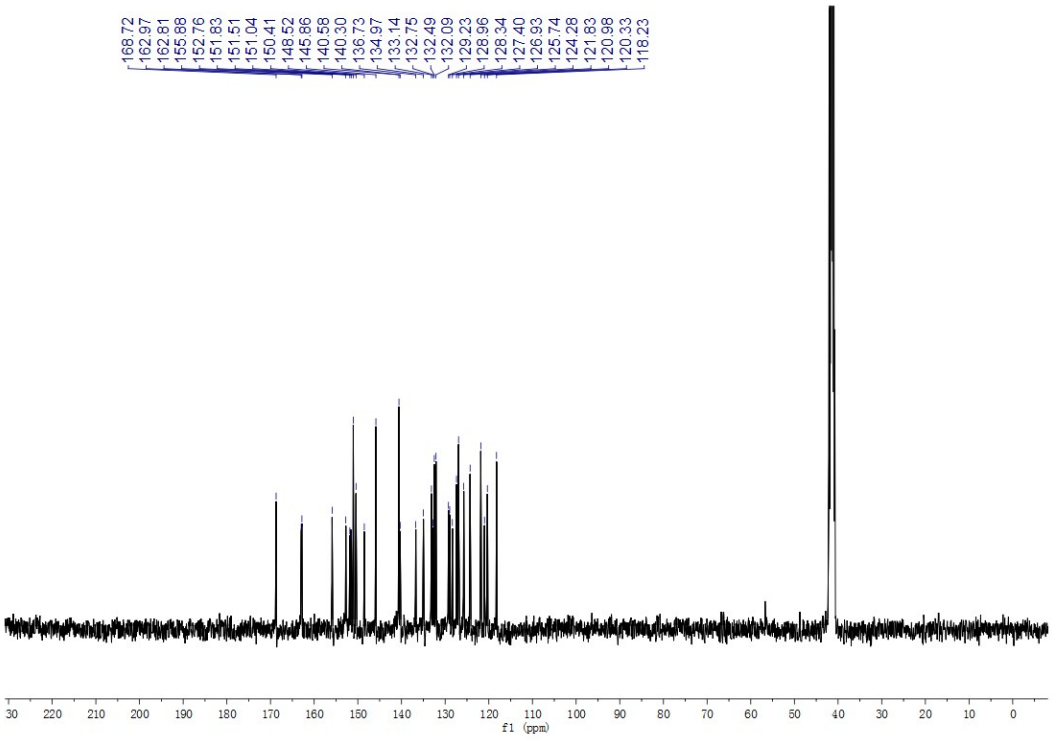


Fig. S4 ^{13}C NMR spectrum of **1**.

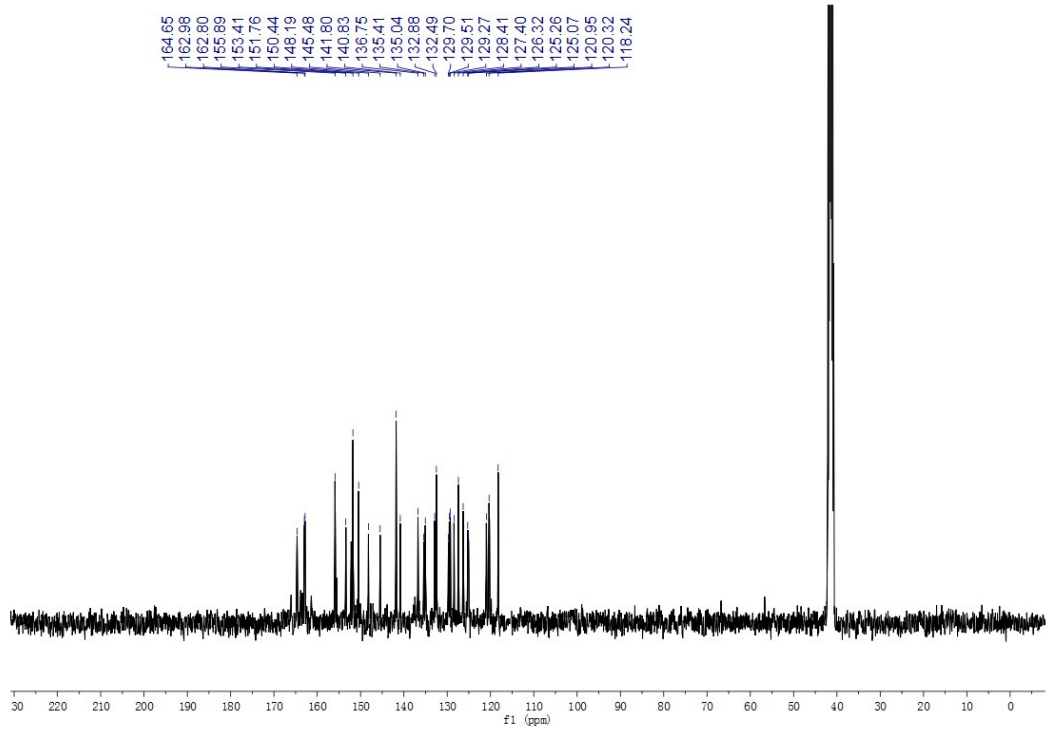


Fig. S5 ^{13}C NMR spectrum of **2**.

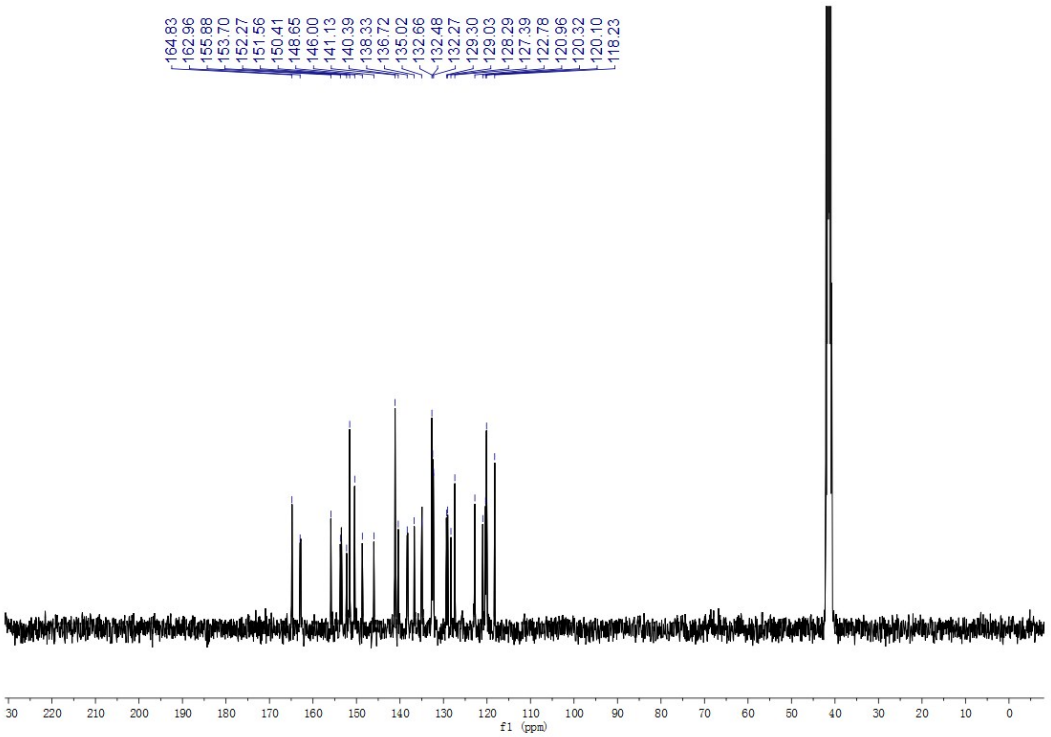


Fig. S6 ^{13}C NMR spectrum of **3**.

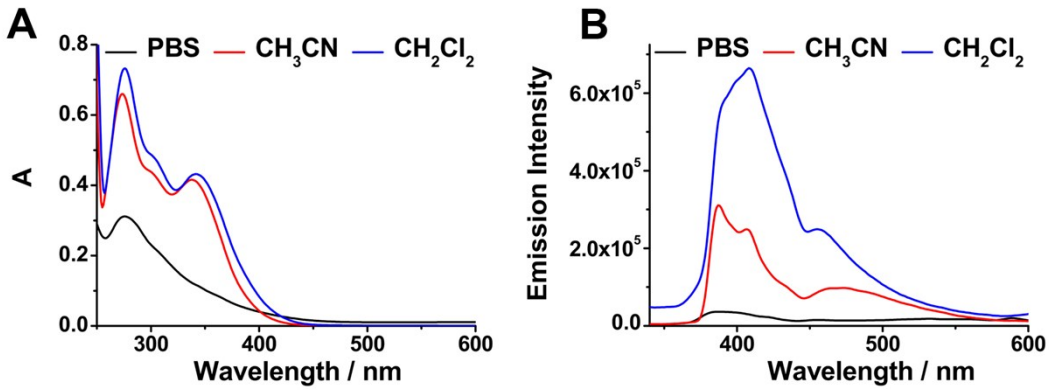


Fig. S7 (A) UV/Vis spectra of **L** (2×10^{-5} M) measured in degassed PBS, CH_3CN and CH_2Cl_2 at 298 K. (B) Emission spectra of **L** (2×10^{-5} M) measured in degassed PBS, CH_3CN and CH_2Cl_2 at 298 K (λ_{ex} = 275 nm).

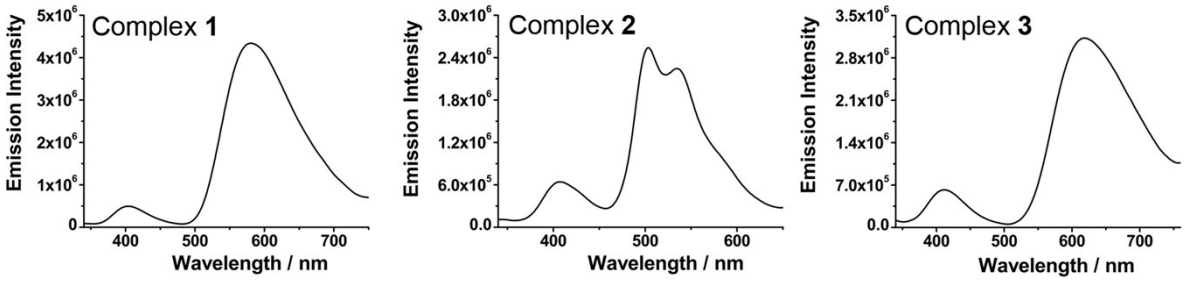


Fig. S8 Emission spectra of complexes **1**–**3** (2×10^{-5} M) measured in degassed CH_2Cl_2 (λ_{ex} = 300 nm).

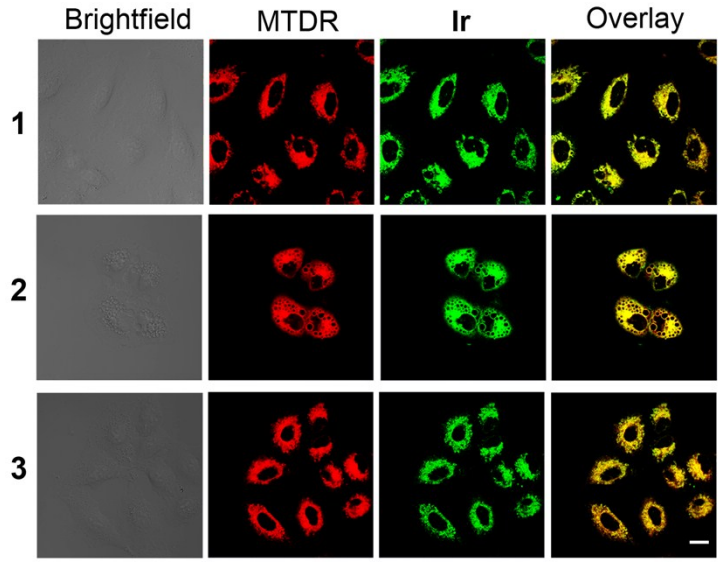


Fig. S9 Confocal microscopic images of A549 cells colabeled with **1**−**3** (10 μM, 30 min) and MTDR (150 nM, 30 min). **1**−**3** were excited at 405 nm and MTDR was excited at 633 nm. The phosphorescence/fluorescence was collected at 600 ± 20 nm, 530 ± 20 nm, 630 ± 20 nm and 665 ± 20 nm for **1**, **2**, **3** and MTDR, respectively. Scale bar: 20 μm.

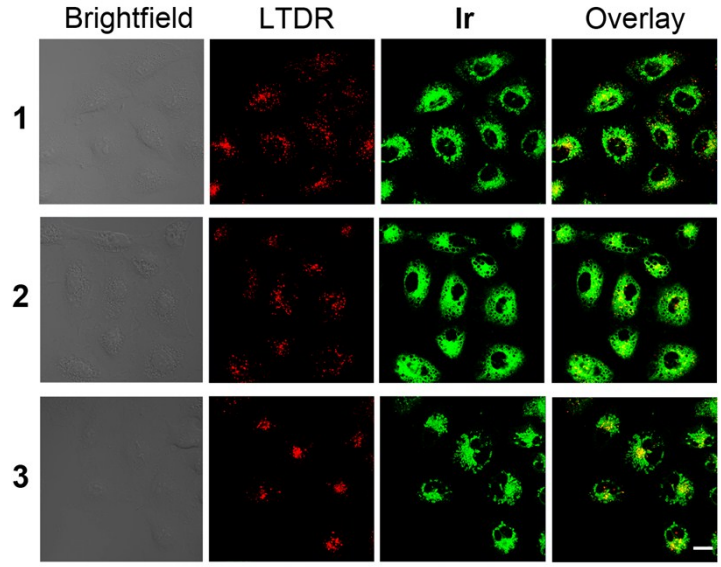


Fig. S10 Confocal microscopic images of A549 cells colabeled with **1**−**3** (10 μM, 30 min) and LTDR (50 nM, 30 min). **1**−**3** were excited at 405 nm and LTDR was excited at 633 nm. The phosphorescence/fluorescence was collected at 600 ± 20 nm, 530 ± 20 nm, 630 ± 20 nm and 668 ± 20 nm for **1**, **2**, **3** and LTDR, respectively. Scale bar: 20 μm.

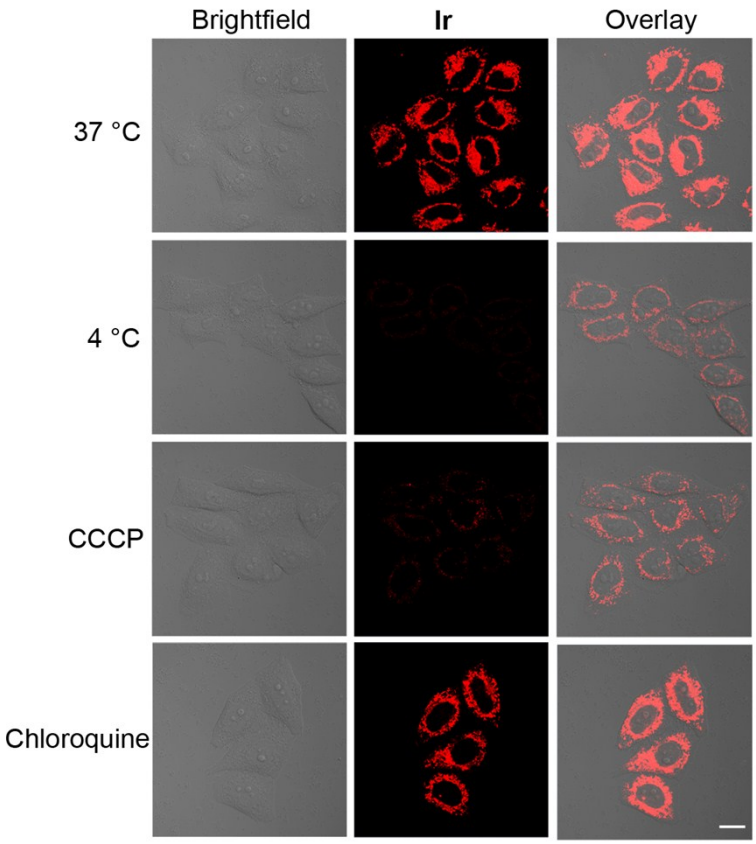


Fig. S11 Effect of incubation temperature (37 ºC and 4 ºC), metabolic inhibitor (CCCP, 30 μM) and chloroquine (50 μM) on cellular uptake of **1** (10 μM, 30 min) measured by confocal microscopy. Complex **1** was excited at 405 nm and emission was collected at 600 ± 20 nm. Scale bar: 20 μm.

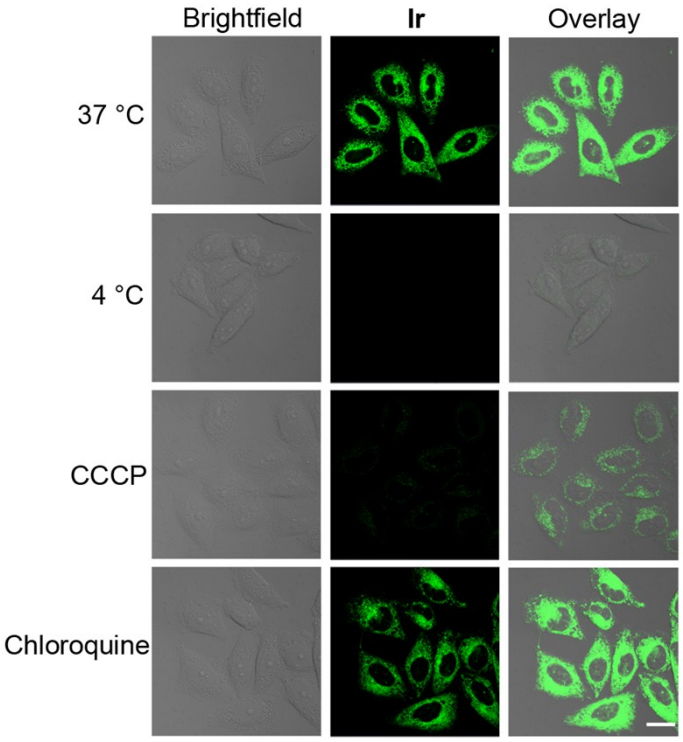


Fig. S12 Effect of incubation temperature (37 ºC and 4 ºC), metabolic inhibitor (CCCP, 30 μM) and chloroquine (50 μM) on cellular uptake of **2** (10 μM, 30 min) measured by confocal microscopy. Complex **2** was excited at 405 nm and emission was collected at 530 ± 20 nm. Scale bar: 20 μm.

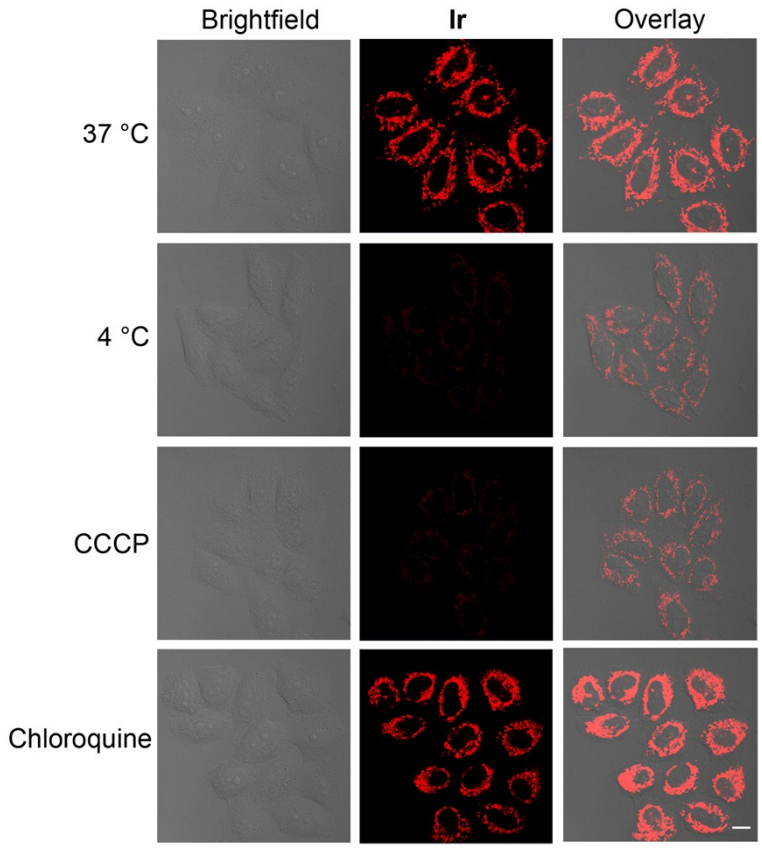


Fig. S13 Effect of incubation temperature (37 ºC and 4 ºC), metabolic inhibitor (CCCP, 30 μM) and chloroquine (50 μM) on cellular uptake of **3** (10 μM, 30 min) measured by confocal microscopy. Complex **3** was excited at 405 nm and emission was collected at 630 ± 20 nm. Scale bar: 20 μm.

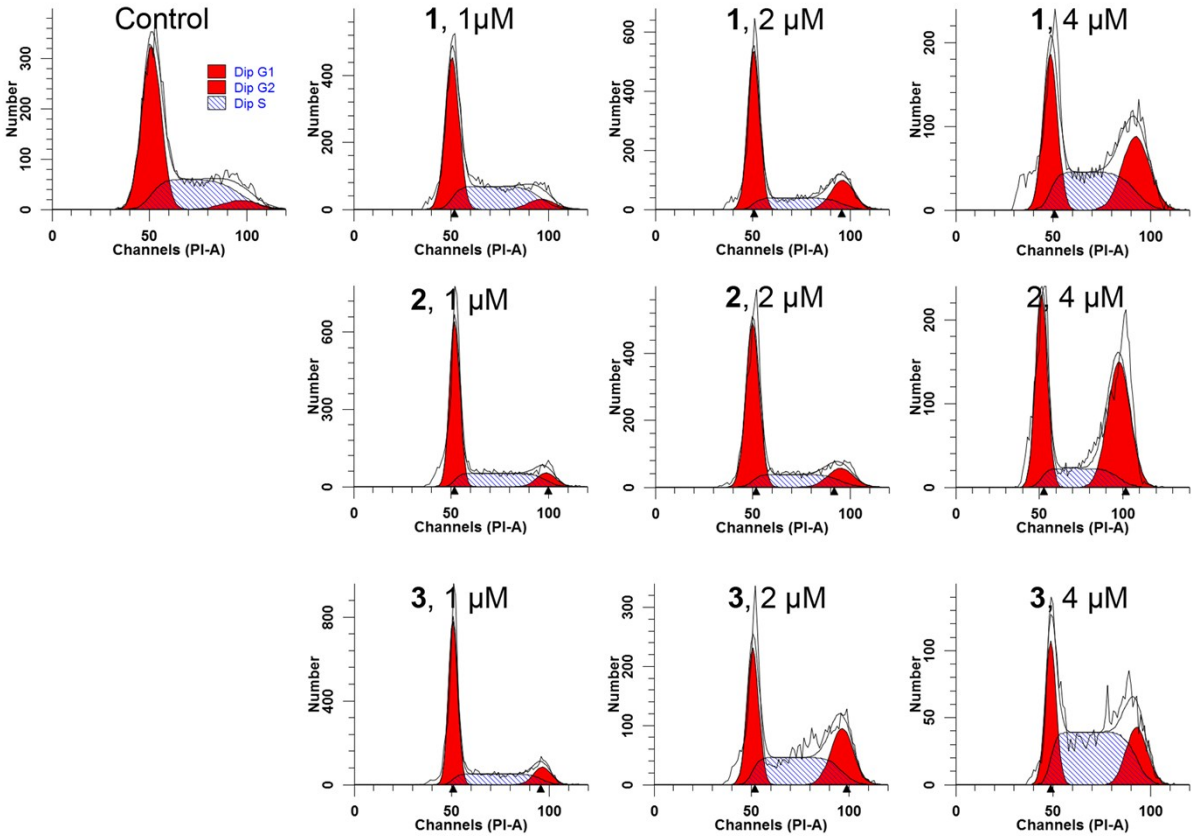


Fig. S14 Effect of **1**−**3** on the distribution of HeLa cells in cell cycle populations at different concentrations for 24 h treatment.

Table S1 Photophysical data of **1**−**3** in degassed medium[a]

Compound	Medium	$\lambda_{abs,\ max}$ (nm)	$\lambda_{em,\ max}$ (nm)	Φ_{em}[b]	τ_{av}[c] (ns)
	PBS	346	609	0.0020	125.50
1	CH_3CN	339	605	0.030	187.58
	CH_2Cl_2	341	588	0.090	206.66
	PBS	353	550	0.0021	492.89
2	CH_3CN	345	533	0.023	516.48
	CH_2Cl_2	350	509	0.052	870.60
	PBS	405	646	0.0012	119.99
3	CH_3CN	394	642	0.0094	104.82
	CH_2Cl_2	401	619	0.063	147.99

[a] Samples were 2×10^{-5} M in concentration. [b] Solutions of $[Ru(bpy)_3](PF_6)_2$ were used as the standard, PBS (Φ_{em} = 0.042),[2] CH_3CN (Φ_{em} = 0.062)[3] and CH_2Cl_2 (Φ_{em} = 0.059)[4]. [c] Decay curves of compounds were recorded by an Edinburgh FLS 920 Spectrometer. All curves were fitted into a two exponential formula $F(t) = A + B_1 \exp(-t/\tau_1) + B_2 \exp(-t/\tau_2) + B_3 \exp(-t/\tau_3)$; $\tau_{ay} = \frac{B_1\tau_1^2 + B_2\tau_2^2 + B_3\tau_3^2}{B_1\tau_1 + B_2\tau_2 + B_3\tau_3}$

Table S2 Effects of **1**−**3** on the distribution of HeLa cells in cell cycle populations after 24 h of treatment[a]

Compound	G0/G1	S	G2/M
Control	56.0 ± 4.3	38.2 ±2.4	5.8 ± 0.3
1, 1 μM	52.9 ± 3.8	40.3 ± 4.0	6.8 ± 0.5
1, 2 μM	56.6 ± 5.0	19.6 ± 1.2	23.8 ± 1.8
1, 4 μM	32.8 ± 2.1	37.8 ± 2.2	29.4 ± 1.9
2, 1 μM	58.0 ± 4.5	32.9 ± 2.6	9.1 ± 0.8
2, 2 μM	61.7 ± 5.8	24.8 ± 1.3	13.5 ± 1.1
2, 4 μM	36.6 ± 2.9	18.5 ± 1.2	44.9 ± 3.6
3, 1 μM	59.3 ± 5.8	28.8 ± 2.0	11.9 ± 1.0
3, 2 μM	40.7 ± 3.2	40.4 ± 3.9	18.9 ± 1.4
3, 4 μM	17.6 ± 1.8	56.3 ± 4.8	26.1 ± 2.2

[a] Data shown are mean values ± SD of three independent experiments for each treatment.

Table S3 List of differentially regulated genes induced by **3**

Up-regulated			
Probe Set ID	Fold change	Gene Symbol	Gene Description
TC19000356.hg.1	53.67	GDF15	growth differentiation factor 15
TC01003624.hg.1	27.90	FAM129A	family with sequence similarity 129, member A
TC10000062.hg.1	18.72	LOC100507127	uncharacterized LOC100507127
TC05000218.hg.1	16.13	ITGA2	integrin, alpha 2 (CD49B, alpha 2 subunit of VLA-2 receptor)
TC05000701.hg.1	13.92	EGR1	early growth response 1
TC04001570.hg.1	13.44	SLC7A11	solute carrier family 7 (anionic amino acid transporter light chain, xc- system), member 11
TC01002166.hg.1	11.86	ERRFI1	ERBB receptor feedback inhibitor 1
TC06001754.hg.1	10.27	GTPBP2	GTP binding protein 2
TC17000396.hg.1	9.52	SLFN5	schlafen family member 5
TC01001348.hg.1	8.62	IFI16	interferon, gamma-inducible protein 16
TC12001625.hg.1	7.91	DDIT3	DNA-damage-inducible transcript 3
TC15000300.hg.1	7.87	CHAC1	ChaC, cation transport regulator homolog 1 (E. coli)
TC02004994.hg.1	7.50	IL1RL1	interleukin 1 receptor-like 1
TC06001089.hg.1	7.02	ULBP1	UL16 binding protein 1
TC05001590.hg.1	6.88	ARRDC3	arrestin domain containing 3
TC10000801.hg.1	6.55	DUSP5	dual specificity phosphatase 5
TC0X000112.hg.1	6.44	SAT1	spermidine/spermine N1-acetyltransferase 1
TC01000745.hg.1	6.34	GADD45A	growth arrest and DNA-damage-inducible, alpha
TC6_qbl_hap6000133.hg.1	6.30	IER3	immediate early response 3
TC01000377.hg.1	6.19	SESN2	sestrin 2
TC10001641.hg.1	5.87	ITPRIP	inositol 1,4,5-trisphosphate receptor interacting protein
TC6_cox_hap2000143.hg.1	5.86	IER3	immediate early response 3
TC6_dbb_hap3000132.hg.1	5.86	IER3	immediate early response 3
TC6_mann_hap4000121.hg.1	5.86	IER3	immediate early response 3
TC6_ssto_hap7000123.hg.1	5.86	IER3	immediate early response 3
TC01001364.hg.1	5.66	PEA15	phosphoprotein enriched in astrocytes 15
TC02000705.hg.1	5.56	ZC3H6	zinc finger CCCH-type containing 6
TC18000413.hg.1	5.55	NPC1	Niemann-Pick disease, type C1
TC06001510.hg.1	5.55	IER3	immediate early response 3
TC19001593.hg.1	5.47	PLAUR	plasminogen activator, urokinase receptor
TC11001793.hg.1	5.43	SLC43A1	solute carrier family 43, member 1
TC13000193.hg.1	5.42	FNDC3A	fibronectin type III domain containing 3A
TC12000414.hg.1	5.38	NR4A1	nuclear receptor subfamily 4, group A, member 1
TC07001917.hg.1	5.37	JHDM1D	jumonji C domain containing histone demethylase 1 homolog D (S. cerevisiae)
TC19000711.hg.1	5.29	PPP1R15A	protein phosphatase 1, regulatory subunit 15A
TC12000793.hg.1	5.22	DRAM1	DNA-damage regulated autophagy modulator 1
TC03000015.hg.1	5.17	BHLHE40	basic helix-loop-helix family, member e40
TC18000213.hg.1	5.11	PMAIP1	phorbol-12-myristate-13-acetate-induced protein 1

TC16002034.hg.1	5.06	MT2A	metallothionein 2A
TC09000585.hg.1	4.94	C9orf91	chromosome 9 open reading frame 91
TC02000671.hg.1	4.80	SOWAHC	sosondowah ankyrin repeat domain family member C
TC03000636.hg.1	4.66	DIRC2	disrupted in renal carcinoma 2
TC12001751.hg.1	4.63	PHLDA1	pleckstrin homology-like domain, family A, member 1
TC09000962.hg.1	4.49	IFNE	interferon, epsilon
TC03003402.hg.1	4.36	TM4SF19	transmembrane 4 L six family member 19
TC03003333.hg.1	4.33	ETV5	ets variant 5
TC20000599.hg.1	4.20	GPCPD1	glycerophosphocholine phosphodiesterase GDE1 homolog (S. cerevisiae)
TC19001586.hg.1	4.18	LYPD3	LY6/PLAUR domain containing 3
TC02001948.hg.1	4.11	GFPT1	glutamine--fructose-6-phosphate transaminase 1
TC01001423.hg.1	4.09	DDR2	discoidin domain receptor tyrosine kinase 2
TC05000179.hg.1	4.04	OSMR	oncostatin M receptor
TC06000779.hg.1	3.99	NT5E	5'-nucleotidase, ecto (CD73)
TC11000957.hg.1	3.98	BIRC2	baculoviral IAP repeat containing 2
TC01001777.hg.1	3.83	ATF3	activating transcription factor 3
TC07001630.hg.1	3.80	ASNS	asparagine synthetase (glutamine-hydrolyzing)
TC03001720.hg.1	3.75	HEG1	HEG homolog 1 (zebrafish)
TC16000095.hg.1	3.75	TNFRSF12A	tumor necrosis factor receptor superfamily, member 12A
TC02004970.hg.1	3.74	MXD1	MAX dimerization protein 1
TC10000434.hg.1	3.68	SGPL1	sphingosine-1-phosphate lyase 1
TC02001071.hg.1	3.64	OSBPL6	oxysterol binding protein-like 6
TC03000917.hg.1	3.62	SKIL	SKI-like oncogene
TC18000149.hg.1	3.60	MOCOS	molybdenum cofactor sulfurase
TC19001754.hg.1	3.54	C19orf48	chromosome 19 open reading frame 48
TC02000374.hg.1	3.53	SLC1A4	solute carrier family 1 (glutamate/neutral amino acid transporter), member 4
TC08000520.hg.1	3.53	CHMP4C	charged multivesicular body protein 4C
TC17000794.hg.1	3.52	PITPNC1	phosphatidylinositol transfer protein, cytoplasmic 1
TC02000281.hg.1	3.52	EPAS1	endothelial PAS domain protein 1
TC16000473.hg.1	3.47	MT1F	metallothionein 1F
TC12000159.hg.1	3.46	GABARAPL1	GABA(A) receptor-associated protein like 1
TC03001699.hg.1	3.45	IQCB1	IQ motif containing B1
TC16000989.hg.1	3.40	NUPR1	nuclear protein, transcriptional regulator, 1
TC01002478.hg.1	3.39	RNF19B	ring finger protein 19B
TC19001656.hg.1	3.39	SLC1A5	solute carrier family 1 (neutral amino acid transporter), member 5
TC12001910.hg.1	3.38	ALDH1L2	aldehyde dehydrogenase 1 family, member L2
TC06002024.hg.1	3.37	TUBE1	tubulin, epsilon 1
TC16000823.hg.1	3.31	CREBBP	CREB binding protein
TC18001001.hg.1	3.30	SERPINB8	serpin peptidase inhibitor, clade B (ovalbumin), member 8
TC01003663.hg.1	3.30	ZBTB41	zinc finger and BTB domain containing 41
TC01003566.hg.1	3.22	ABL2	v-abl Abelson murine leukemia viral oncogene homolog 2
TC02002823.hg.1	3.20	SERPINE2	serpin peptidase inhibitor, clade E (nexin, plasminogen activator inhibitor type 1), member 2

TC11001027.hg.1	3.19	NNMT	nicotinamide N-methyltransferase
TC05000389.hg.1	3.18	JMY	junction mediating and regulatory protein, p53 cofactor
TC19002665.hg.1	3.18	ZNF134	zinc finger protein 134
TC01000841.hg.1	3.17	LRRC8D	leucine rich repeat containing 8 family, member D
TC09001325.hg.1	3.17	NFIL3	nuclear factor, interleukin 3 regulated
TC07001868.hg.1	3.17	LOC646329	uncharacterized LOC646329
TC07000112.hg.1	3.15	AHR	aryl hydrocarbon receptor
TC17001560.hg.1	3.15	ETV4	ets variant 4
TC18000100.hg.1	3.14	RIOK3	RIO kinase 3 (yeast)
TC02004916.hg.1	3.10	C2orf18	chromosome 2 open reading frame 18
TC11002165.hg.1	3.10	PICALM	phosphatidylinositol binding clathrin assembly protein
TC06000062.hg.1	3.03	BMP6	bone morphogenetic protein 6
TC12003284.hg.1	3.02	RHOF	ras homolog family member F (in filopodia)
TC16000693.hg.1	3.02	ZNF778	zinc finger protein 778
TC19000055.hg.1	3.02	GADD45B	growth arrest and DNA-damage-inducible, beta
TC0X002330.hg.1	3.00	PRAF2	PRA1 domain family, member 2
TC14001509.hg.1	2.99	WARS	tryptophanyl-tRNA synthetase
TC11001124.hg.1	2.93	GRAMD1B	GRAM domain containing 1B
TC08001216.hg.1	2.91	TCEA1	transcription elongation factor A (SII), 1
TC01001624.hg.1	2.90	RGS2	regulator of G-protein signaling 2, 24kDa
TC11001289.hg.1	2.90	CARS	cysteinyl-tRNA synthetase
TC19000174.hg.1	2.90	ICAM1	intercellular adhesion molecule 1
TC07000307.hg.1	2.90	UPP1	uridine phosphorylase 1
TC14002296.hg.1	2.89	CTAGE5	CTAGE family, member 5
TC19000228.hg.1	2.89	JUNB	jun B proto-oncogene
TC21000284.hg.1	2.89	HSPA13	heat shock protein 70kDa family, member 13
TC05001137.hg.1	2.88	MED10	mediator complex subunit 10
TC01001358.hg.1	2.87	LOC100505633	uncharacterized LOC100505633
TC13000523.hg.1	2.85	SLC7A1	solute carrier family 7 (cationic amino acid transporter, y+ system), member 1
TC0X000528.hg.1	2.85	MID2	midline 2
TC03000212.hg.1	2.85	ZNF621	zinc finger protein 621
TC17001796.hg.1	2.83	ERN1	endoplasmic reticulum to nucleus signaling 1
TC11000956.hg.1	2.83	BIRC3	baculoviral IAP repeat containing 3
TC0X001056.hg.1	2.82	SSX2B	synovial sarcoma, X breakpoint 2B
TC19000544.hg.1	2.82	ZFP36	zinc finger protein 36, C3H type, homolog (mouse)
TC10001329.hg.1	2.82	JMJD1C	jumonji domain containing 1C
TC06000508.hg.1	2.82	UHRF1BP1	UHRF1 binding protein 1
TC07000328.hg.1	2.81	EGFR	epidermal growth factor receptor
TC03003341.hg.1	2.80	ACAD11	acyl-CoA dehydrogenase family, member 11
TC20000009.hg.1	2.80	TRIB3	tribbles homolog 3 (Drosophila)
TC0X000346.hg.1	2.80	FAAH2	fatty acid amide hydrolase 2
TC01003328.hg.1	2.80	ARHGEF2	Rho/Rac guanine nucleotide exchange factor (GEF) 2
TC0X000306.hg.1	2.79	SSX2B	synovial sarcoma, X breakpoint 2B
TC22000796.hg.1	2.79	JOSD1	Josephin domain containing 1

TC17000764.hg.1	2.78	TANC2	tetratricopeptide repeat, ankyrin repeat and coiled-coil containing 2
TC01001414.hg.1	2.77	ATF6	activating transcription factor 6
TC12000564.hg.1	2.77	SRGAP1	SLIT-ROBO Rho GTPase activating protein 1
TC03000207.hg.1	2.77	EIF1B	eukaryotic translation initiation factor 1B
TC16000471.hg.1	2.77	MT1CP	metallothionein 1C, pseudogene
TC01000639.hg.1	2.77	ZFYVE9	zinc finger, FYVE domain containing 9
TC22000430.hg.1	2.74	KLHDC7B	kelch domain containing 7B
TC16000476.hg.1	2.73	MT1X	metallothionein 1X
TC11001948.hg.1	2.71	FOSL1	FOS-like antigen 1
TC12000340.hg.1	2.71	SLC48A1	solute carrier family 48 (heme transporter), member 1
TC03000127.hg.1	2.69	NR1D2	nuclear receptor subfamily 1, group D, member 2
TC12001282.hg.1	2.69	EPS8	epidermal growth factor receptor pathway substrate 8
TC19001377.hg.1	2.69	LOC148189	uncharacterized LOC148189
TC22000223.hg.1	2.68	RNF185	ring finger protein 185
TC06001057.hg.1	2.67	STX11	syntaxin 11
TC19000256.hg.1	2.67	CD97	CD97 molecule
TC07001823.hg.1	2.67	WASL	Wiskott-Aldrich syndrome-like
TC04000319.hg.1	2.67	SRD5A3	steroid 5 alpha-reductase 3
TC06001546.hg.1	2.66	HSPA1L	heat shock 70kDa protein 1-like
TC03000978.hg.1	2.66	B3GNT5	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 5
TC12000726.hg.1	2.66	SOCS2	suppressor of cytokine signaling 2
TC09000400.hg.1	2.66	CTSL1	cathepsin L1
TC0X000216.hg.1	2.65	ZNF673	zinc finger family member 673
TC04001092.hg.1	2.65	SEL1L3	sel-1 suppressor of lin-12-like 3 (C. elegans)
TC19000237.hg.1	2.65	IER2	immediate early response 2
TC09000572.hg.1	2.64	SLC31A1	solute carrier family 31 (copper transporters), member 1
TC10001097.hg.1	2.64	DNAJC1	DnaJ (Hsp40) homolog, subfamily C, member 1
TC01003903.hg.1	2.63	CDC42BPA	CDC42 binding protein kinase alpha (DMPK-like)
TC19001151.hg.1	2.62	ZNF562	zinc finger protein 562
TC16001234.hg.1	2.62	AARS	alanyl-tRNA synthetase
TC01002979.hg.1	2.62	LRIF1	ligand dependent nuclear receptor interacting factor 1
TC18000132.hg.1	2.62	RNF125	ring finger protein 125, E3 ubiquitin protein ligase
TC22000627.hg.1	2.62	XBP1	X-box binding protein 1
TC04000437.hg.1	2.61	ANXA3	annexin A3
TC17000868.hg.1	2.61	FAM100B	family with sequence similarity 100, member B
TC08001369.hg.1	2.61	SLC10A5	solute carrier family 10 (sodium/bile acid cotransporter family), member 5
TC16000501.hg.1	2.61	CCDC113	coiled-coil domain containing 113
TC09001283.hg.1	2.60	C9orf64	chromosome 9 open reading frame 64
TC01001840.hg.1	2.60	LOC100287934	uncharacterized LOC100287934
TC18000021.hg.1	2.60	MGC11082	hypothetical LOC84777
TC12000189.hg.1	2.60	EMP1	epithelial membrane protein 1
TC11000742.hg.1	2.60	FAM86C1	family with sequence similarity 86, member C1
TC03001071.hg.1	2.59	HES1	hairy and enhancer of split 1, (Drosophila)

TC10000122.hg.1	2.59	PTER	phosphotriesterase related
TC01002163.hg.1	2.58	TNFRSF9	tumor necrosis factor receptor superfamily, member 9
TC16000079.hg.1	2.57	LOC652276	potassium channel tetramerisation domain containing 5 pseudogene
TC16000916.hg.1	2.56	SMG1	smg-1 homolog, phosphatidylinositol 3-kinase-related kinase (C. elegans)
TC17001064.hg.1	2.56	KIAA0753	KIAA0753
TC04000239.hg.1	2.56	N4BP2	NEDD4 binding protein 2
TC02002818.hg.1	2.55	SCG2	secretogranin II
TC01001452.hg.1	2.55	POGK	pogo transposable element with KRAB domain
TC15002782.hg.1	2.55	AP3S2	adaptor-related protein complex 3, sigma 2 subunit
TC16000480.hg.1	2.55	HERPUD1	homocysteine-inducible, endoplasmic reticulum stress-inducible, ubiquitin-like domain member 1
TC0X000787.hg.1	2.55	F8A2	coagulation factor VIII-associated 2
TC03000632.hg.1	2.54	DTX3L	deltex 3-like (Drosophila)
TC01001895.hg.1	2.54	RNF187	ring finger protein 187
TC12001216.hg.1	2.54	OLR1	oxidized low density lipoprotein (lectin-like) receptor 1
TC15002767.hg.1	2.53	NGRN	neugrin, neurite outgrowth associated
TC05001610.hg.1	2.52	ELL2	elongation factor, RNA polymerase II, 2
TC19000576.hg.1	2.52	AXL	AXL receptor tyrosine kinase
TC06000120.hg.1	2.52	RNF144B	ring finger protein 144B
TC03000378.hg.1	2.52	PXK	PX domain containing serine/threonine kinase
TC12000936.hg.1	2.52	PRKAB1	protein kinase, AMP-activated, beta 1 non-catalytic subunit
TC06002297.hg.1	2.51	PDE10A	phosphodiesterase 10A
TC12001456.hg.1	2.51	CCNT1	cyclin T1
TC14000439.hg.1	2.50	PSEN1	presenilin 1
TC08000997.hg.1	2.49	LONRF1	LON peptidase N-terminal domain and ring finger 1
TC15002777.hg.1	2.49	PARP6	poly (ADP-ribose) polymerase family, member 6
TC12001928.hg.1	2.49	PRDM4	PR domain containing 4
TC15001110.hg.1	2.49	TJP1	tight junction protein 1 (zona occludens 1)
TC10000882.hg.1	2.48	LOC100130887	uncharacterized LOC100130887
TC02000703.hg.1	2.48	TMEM87B	transmembrane protein 87B
TC12001598.hg.1	2.47	RNF41	ring finger protein 41
TC12001796.hg.1	2.47	DUSP6	dual specificity phosphatase 6
TC10000177.hg.1	2.46	GPR158	G protein-coupled receptor 158
TC10000445.hg.1	2.46	CHST3	carbohydrate (chondroitin 6) sulfotransferase 3
TC20000051.hg.1	2.46	PRNP	prion protein
TC12002074.hg.1	2.46	ZCCHC8	zinc finger, CCHC domain containing 8
TC08001099.hg.1	2.46	DUSP4	dual specificity phosphatase 4
TC05001854.hg.1	2.45	HBEGF	heparin-binding EGF-like growth factor
TC10000449.hg.1	2.45	DDIT4	DNA-damage-inducible transcript 4
TC02002289.hg.1	2.45	AMMECR1L	AMME chromosomal region gene 1-like
TC01001588.hg.1	2.45	TSEN15	tRNA splicing endonuclease 15 homolog (S. cerevisiae)
TC20000837.hg.1	2.45	LOC388796	uncharacterized LOC388796
TC15001263.hg.1	2.44	TMEM87A	transmembrane protein 87A

TC01003198.hg.1	2.43	OTUD7B	OTU domain containing 7B
TC22000262.hg.1	2.42	APOL6	apolipoprotein L, 6
TC12001135.hg.1	2.42	TNFRSF1A	tumor necrosis factor receptor superfamily, member 1A
TC09000593.hg.1	2.42	PAPPA	pregnancy-associated plasma protein A, pappalysin 1
TC10000753.hg.1	2.42	NFKB2	nuclear factor of kappa light polypeptide gene enhancer in B-cells 2 (p49/p100)
TC01003218.hg.1	2.41	CDC42SE1	CDC42 small effector 1
TC14000130.hg.1	2.41	ABHD4	abhydrolase domain containing 4
TC01001014.hg.1	2.41	SLC22A15	solute carrier family 22, member 15
TC07000520.hg.1	2.40	DMTF1	cyclin D binding myb-like transcription factor 1
TC10000979.hg.1	2.39	KLF6	Kruppel-like factor 6
TC12001068.hg.1	2.39	ZNF84	zinc finger protein 84
TC10000636.hg.1	2.39	IFIT2	interferon-induced protein with tetratricopeptide repeats 2
TC21001061.hg.1	2.38	DOPEY2	dopey family member 2
TC02000197.hg.1	2.38	YPEL5	yippee-like 5 (Drosophila)
TC08000943.hg.1	2.38	MFHAS1	malignant fibrous histiocytoma amplified sequence 1
TC12001176.hg.1	2.38	FAM86FP	family with sequence similarity 86, member F, pseudogene
TC07000198.hg.1	2.38	GARS	glycyl-tRNA synthetase
TC20000391.hg.1	2.38	SLC9A8	solute carrier family 9, subfamily A (NHE8, cation proton antiporter 8), member 8
TC12001170.hg.1	2.38	SLC2A3	solute carrier family 2 (facilitated glucose transporter), member 3
TC09000358.hg.1	2.37	PSAT1	phosphoserine aminotransferase 1
TC03000088.hg.1	2.36	C3orf19	chromosome 3 open reading frame 19
TC0X000781.hg.1	2.36	F8A2	coagulation factor VIII-associated 2
TC22000259.hg.1	2.36	HMOX1	heme oxygenase (decycling) 1
TC09000389.hg.1	2.36	LOC389765	kinesin family member 27 pseudogene
TC06001313.hg.1	2.35	MBOAT1	membrane bound O-acyltransferase domain containing 1
TC19000624.hg.1	2.35	PVR	poliovirus receptor
TC16001350.hg.1	2.35	ANKRD11	ankyrin repeat domain 11
TC06000868.hg.1	2.34	FOXO3	forkhead box O3
TC15001277.hg.1	2.34	ZSCAN29	zinc finger and SCAN domain containing 29
TC15000417.hg.1	2.33	MAPK6	mitogen-activated protein kinase 6
TC17001912.hg.1	2.32	LOC100131096	uncharacterized LOC100131096
TC02001950.hg.1	2.31	AAK1	AP2 associated kinase 1
TC01003205.hg.1	2.31	MCL1	myeloid cell leukemia sequence 1 (BCL2-related)
TC06001132.hg.1	2.31	TULP4	tubby like protein 4
TC06002071.hg.1	2.31	SERINC1	serine incorporator 1
TC01000723.hg.1	2.31	ROR1	receptor tyrosine kinase-like orphan receptor 1
TC09001374.hg.1	2.30	SLC35D2	solute carrier family 35, member D2
TC03001956.hg.1	2.30	KPNA4	karyopherin alpha 4 (importin alpha 3)
TC16001145.hg.1	2.30	ZNF319	zinc finger protein 319
TC01002258.hg.1	2.29	EPHA2	EPH receptor A2
TC10000219.hg.1	2.29	ZEB1	zinc finger E-box binding homeobox 1
TC19001301.hg.1	2.29	NR2C2AP	nuclear receptor 2C2-associated protein

TC11002136.hg.1	2.29	GAB2	GRB2-associated binding protein 2
TC17000103.hg.1	2.29	CD68	CD68 molecule
TC05001944.hg.1	2.29	ZNF300	zinc finger protein 300
TC21000436.hg.1	2.28	HLCS	holocarboxylase synthetase (biotin-(proprionyl-CoA-carboxylase (ATP-hydrolysing)) ligase)
TC01003240.hg.1	2.28	S100A11	S100 calcium binding protein A11
TC6_mcf_hap5000211.hg.1	2.27	LY6G5B	lymphocyte antigen 6 complex, locus G5B
TC05001524.hg.1	2.27	MTX3	metaxin 3
TC03000803.hg.1	2.27	HPS3	Hermansky-Pudlak syndrome 3
TC10001626.hg.1	2.26	NT5C2	5'-nucleotidase, cytosolic II
TC21000169.hg.1	2.26	ETS2	v-ets erythroblastosis virus E26 oncogene homolog 2 (avian)
TC19000439.hg.1	2.26	KCTD15	potassium channel tetramerisation domain containing 15
TC17001465.hg.1	2.26	TNS4	tensin 4
TC17000707.hg.1	2.26	DYNLL2	dynein, light chain, LC8-type 2
TC16000469.hg.1	2.26	MT1JP	metallothionein 1J, pseudogene
TC03001563.hg.1	2.26	FAM86DP	family with sequence similarity 86, member D, pseudogene
TC05001589.hg.1	2.26	LOC100505994	uncharacterized LOC100505994
TC01002708.hg.1	2.26	JUN	jun proto-oncogene
TC09000320.hg.1	2.25	FAM189A2	family with sequence similarity 189, member A2
TC11002351.hg.1	2.25	IFT46	intraflagellar transport 46 homolog (Chlamydomonas)
TC12000078.hg.1	2.25	LTBR	lymphotoxin beta receptor (TNFR superfamily, member 3)
TC01003124.hg.1	2.25	PRKAB2	protein kinase, AMP-activated, beta 2 non-catalytic subunit
TC13000584.hg.1	2.24	PROSER1	proline and serine rich 1
TC01003112.hg.1	2.24	POLR3C	polymerase (RNA) III (DNA directed) polypeptide C (62kD)
TC0X001257.hg.1	2.24	MORC4	MORC family CW-type zinc finger 4
TC06002238.hg.1	2.23	SYNE1	spectrin repeat containing, nuclear envelope 1
TC0X000991.hg.1	2.23	ZNF674	zinc finger protein 674
TC15000431.hg.1	2.23	FLJ27352	uncharacterized LOC145788
TC05002153.hg.1	2.23	ZFP62	zinc finger protein 62 homolog (mouse)
TC05001822.hg.1	2.22	FAM13B	family with sequence similarity 13, member B
TC01000757.hg.1	2.21	CTH	cystathionase (cystathionine gamma-lyase)
TC17000619.hg.1	2.21	NFE2L1	nuclear factor (erythroid-derived 2)-like 1
TC11002393.hg.1	2.21	CLMP	CXADR-like membrane protein
TC10002945.hg.1	2.21	ENTPD7	ectonucleoside triphosphate diphosphohydrolase 7
TC08000324.hg.1	2.20	AP3M2	adaptor-related protein complex 3, mu 2 subunit
TC16000638.hg.1	2.19	GAN	gigaxonin
TC17000631.hg.1	2.19	CALCOCO2	calcium binding and coiled-coil domain 2
TC6_cox_hap2000242.hg.1	2.19	LY6G5B	lymphocyte antigen 6 complex, locus G5B
TC17001925.hg.1	2.19	CANT1	calcium activated nucleotidase 1
TC01001043.hg.1	2.18	PHGDH	phosphoglycerate dehydrogenase
TC03001169.hg.1	2.18	TIMP4	TIMP metallopeptidase inhibitor 4
TC04001660.hg.1	2.18	PLRG1	pleiotropic regulator 1
TC19001588.hg.1	2.18	ETHE1	ethylmalonic encephalopathy 1

TC6_dbb_hap3000220.hg.1	2.18	LY6G5B	lymphocyte antigen 6 complex, locus G5B
TC6_mann_hap4000194.hg.1	2.18	LY6G5B	lymphocyte antigen 6 complex, locus G5B
TC09000647.hg.1	2.18	RABEPK	Rab9 effector protein with kelch motifs
TC22000881.hg.1	2.18	LOC100271722	uncharacterized LOC100271722
TC03000056.hg.1	2.18	IRAK2	interleukin-1 receptor-associated kinase 2
TC15001736.hg.1	2.18	EFTUD1	elongation factor Tu GTP binding domain containing 1
TC01004071.hg.1	2.17	ZNF496	zinc finger protein 496
TC09000143.hg.1	2.17	ANKRD18B	ankyrin repeat domain 18B
TC06000532.hg.1	2.17	CDKN1A	cyclin-dependent kinase inhibitor 1A (p21, Cip1)
TC17000371.hg.1	2.17	LRRC37B	leucine rich repeat containing 37B
TC6_qbl_hap6000223.hg.1	2.17	LY6G5B	lymphocyte antigen 6 complex, locus G5B
TC6_ssto_hap7000197.hg.1	2.17	LY6G5B	lymphocyte antigen 6 complex, locus G5B
TC17000210.hg.1	2.17	SMCR8	Smith-Magenis syndrome chromosome region, candidate 8
TC20000878.hg.1	2.17	SDC4	syndecan 4
TC19002701.hg.1	2.17	FBXO17	F-box protein 17
TC19001730.hg.1	2.17	VRK3	vaccinia related kinase 3
TC07001417.hg.1	2.16	LOC650226	ankyrin repeat domain 26 pseudogene
TC01002882.hg.1	2.15	GCLM	glutamate-cysteine ligase, modifier subunit
TC03000039.hg.1	2.15	MTMR14	myotubularin related protein 14
TC15000802.hg.1	2.15	LOC648809	elongation factor Tu GTP-binding domain-containing protein 1 pseudogene
TC07003306.hg.1	2.15	OR2A7	olfactory receptor, family 2, subfamily A, member 7
TC16001135.hg.1	2.15	MT1G	metallothionein 1G
TC06002181.hg.1	2.14	HIVEP2	human immunodeficiency virus type I enhancer binding protein 2
TC01002845.hg.1	2.14	GBP3	guanylate binding protein 3
TC19000621.hg.1	2.14	ZNF227	zinc finger protein 227
TC07001618.hg.1	2.14	PDK4	pyruvate dehydrogenase kinase, isozyme 4
TC17001808.hg.1	2.13	GNA13	guanine nucleotide binding protein (G protein), alpha 13
TC10000909.hg.1	2.13	ZRANB1	zinc finger, RAN-binding domain containing 1
TC16001132.hg.1	2.13	AMFR	autocrine motility factor receptor, E3 ubiquitin protein ligase
TC14001149.hg.1	2.13	CNIH	cornichon homolog (Drosophila)
TC6_ssto_hap7000120.hg.1	2.13	PPP1R18	protein phosphatase 1, regulatory subunit 18
TC05001366.hg.1	2.13	IL6ST	interleukin 6 signal transducer (gp130, oncostatin M receptor)
TC07000068.hg.1	2.12	C7orf26	chromosome 7 open reading frame 26
TC04000440.hg.1	2.12	BMP2K	BMP2 inducible kinase
TC12003210.hg.1	2.12	ETV6	ets variant 6
TC13000571.hg.1	2.12	FAM48A	family with sequence similarity 48, member A
TC09000999.hg.1	2.12	DDX58	DEAD (Asp-Glu-Ala-Asp) box polypeptide 58
TC0X000732.hg.1	2.12	PASD1	PAS domain containing 1
TC0X002343.hg.1	2.12	IDS	iduronate 2-sulfatase
TC04000221.hg.1	2.11	KLF3	Kruppel-like factor 3 (basic)
TC16000293.hg.1	2.11	IL4R	interleukin 4 receptor

TC11002246.hg.1	2.11	CASP4	caspase 4, apoptosis-related cysteine peptidase
TC16000842.hg.1	2.11	FAM86A	family with sequence similarity 86, member A
TC18000524.hg.1	2.11	CCDC68	coiled-coil domain containing 68
TC08001210.hg.1	2.11	RB1CC1	RB1-inducible coiled-coil 1
TC01003985.hg.1	2.11	IRF2BP2	interferon regulatory factor 2 binding protein 2
TC08000281.hg.1	2.10	EIF4EBP1	eukaryotic translation initiation factor 4E binding protein 1
TC06001232.hg.1	2.10	PXDC1	PX domain containing 1
TC10000596.hg.1	2.09	FAM190B	family with sequence similarity 190, member B
TC22001458.hg.1	2.09	SPECC1L	sperm antigen with calponin homology and coiled-coil domains 1-like
TC11002002.hg.1	2.09	CHKA	choline kinase alpha
TC02001359.hg.1	2.09	RHBDD1	rhomboid domain containing 1
TC01006386.hg.1	2.09	PYCR2	pyrroline-5-carboxylate reductase family, member 2
TC19000191.hg.1	2.09	LDLR	low density lipoprotein receptor
TC06000306.hg.1	2.09	HCG15	HLA complex group 15
TC06000549.hg.1	2.09	ZFAND3	zinc finger, AN1-type domain 3
TC06001962.hg.1	2.09	FAXC	failed axon connections homolog (Drosophila)
TC10000440.hg.1	2.09	SLC29A3	solute carrier family 29 (nucleoside transporters), member 3
TC13000394.hg.1	2.09	CARKD	carbohydrate kinase domain containing
TC12000531.hg.1	2.08	MARS	methionyl-tRNA synthetase
TC05000818.hg.1	2.08	GRPEL2	GrpE-like 2, mitochondrial (E. coli)
TC11000793.hg.1	2.08	RNF169	ring finger protein 169
TC04000485.hg.1	2.08	HERC5	HECT and RLD domain containing E3 ubiquitin protein ligase 5
TC13000763.hg.1	2.07	SPRY2	sprouty homolog 2 (Drosophila)
TC18000189.hg.1	2.07	RAB27B	RAB27B, member RAS oncogene family
TC01004093.hg.1	2.07	LOC646627	phospholipase inhibitor
TC01001289.hg.1	2.07	SLC50A1	solute carrier family 50 (sugar transporter), member 1
TC07000254.hg.1	2.07	CDK13	cyclin-dependent kinase 13
TC15002769.hg.1	2.06	CHD2	chromodomain helicase DNA binding protein 2
TC05003443.hg.1	2.06	LOC100132287	uncharacterized LOC100132287
TC05000303.hg.1	2.06	MARVELD2	MARVEL domain containing 2
TC13000552.hg.1	2.06	CG030	uncharacterized CG030
TC05002075.hg.1	2.06	STC2	stanniocalcin 2
TC16001218.hg.1	2.06	CHTF8	CTF8, chromosome transmission fidelity factor 8 homolog (S. cerevisiae)
TC20000621.hg.1	2.06	JAG1	jagged 1
TC07001279.hg.1	2.06	HERPUD2	HERPUD family member 2
TC02000454.hg.1	2.06	MTHFD2	methylenetetrahydrofolate dehydrogenase (NADP+ dependent) 2, methenyltetrahydrofolate cyclohydrolase
TC08000995.hg.1	2.06	FAM86B2	family with sequence similarity 86, member B2
TC05001689.hg.1	2.05	FEM1C	fem-1 homolog c (C. elegans)
TC03001464.hg.1	2.05	SFMBT1	Scm-like with four mbt domains 1
TC17001772.hg.1	2.05	MED13	mediator complex subunit 13
TC15000827.hg.1	2.05	AKAP13	A kinase (PRKA) anchor protein 13
TCUn_gl000223000005.hg.1	2.05	ZNF26	zinc finger protein 26

TC15000628.hg.1	2.05	FEM1B	fem-1 homolog b (C. elegans)
TC16000472.hg.1	2.04	MT1B	metallothionein 1B
TC07000495.hg.1	2.04	PTPN12	protein tyrosine phosphatase, non-receptor type 12
TC04000258.hg.1	2.04	DCAF4L1	DDB1 and CUL4 associated factor 4-like 1
TC04000611.hg.1	2.04	USP53	ubiquitin specific peptidase 53
TC14002302.hg.1	2.04	ZNF410	zinc finger protein 410
TC01000462.hg.1	2.04	EIF2C4	eukaryotic translation initiation factor 2C, 4
TC06000960.hg.1	2.04	HEY2	hairy/enhancer-of-split related with YRPW motif 2
TC11001939.hg.1	2.04	RELA	v-rel reticuloendotheliosis viral oncogene homolog A (avian)
TC11000399.hg.1	2.03	ATG13	autophagy related 13
TC05000083.hg.1	2.03	TRIO	triple functional domain (PTPRF interacting)
TC22000282.hg.1	2.03	CDC42EP1	CDC42 effector protein (Rho GTPase binding) 1
TC12001129.hg.1	2.03	ANO2	anoctamin 2
TC08000988.hg.1	2.03	FAM86B1	family with sequence similarity 86, member B1
TC02002212.hg.1	2.03	ZC3H8	zinc finger CCCH-type containing 8
TC05000958.hg.1	2.03	CREBRF	CREB3 regulatory factor
TC09001070.hg.1	2.02	RNF38	ring finger protein 38
TC16000959.hg.1	2.02	USP31	ubiquitin specific peptidase 31
TC17001615.hg.1	2.02	WNT3	wingless-type MMTV integration site family, member 3
TC08001765.hg.1	2.02	ZNF252P	zinc finger protein 252, pseudogene
TC12000266.hg.1	2.02	PPFIBP1	PTPRF interacting protein, binding protein 1 (liprin beta 1)
TC0X000278.hg.1	2.02	CLCN5	chloride channel, voltage-sensitive 5
TC06001029.hg.1	2.01	KIAA1244	KIAA1244
TC18000998.hg.1	2.01	SMAD4	SMAD family member 4
TC12001807.hg.1	2.01	BTG1	B-cell translocation gene 1, anti-proliferative
TC01000549.hg.1	2.01	KDM4A	lysine (K)-specific demethylase 4A
TC03001565.hg.1	2.01	ZNF717	zinc finger protein 717
TC12001501.hg.1	2.01	CSRNP2	cysteine-serine-rich nuclear protein 2
TC12001067.hg.1	2.01	ZNF26	zinc finger protein 26
TCUn_gl000223000004.hg.1	2.00	ZNF84	zinc finger protein 84
TC02000368.hg.1	2.00	AFTPH	aftiphilin

Down-regulated

Probe Set ID	Fold change	Gene Symbol	Gene Description
TC16000479.hg.1	28.46	SLC12A3	solute carrier family 12 (sodium/chloride transporters), member 3
TC07000810.hg.1	16.76	CPA4	carboxypeptidase A4
TC12001566.hg.1	11.20	CBX5	chromobox homolog 5
TC02001399.hg.1	11.12	ALPPL2	alkaline phosphatase, placental-like 2
TC16001085.hg.1	10.94	MYLK3	myosin light chain kinase 3
TC11000149.hg.1	10.20	OLFML1	olfactomedin-like 1
TC02001398.hg.1	9.61	ALPP	alkaline phosphatase, placental
TC06004137.hg.1	8.60	ARHGAP18	Rho GTPase activating protein 18
TC17000807.hg.1	7.64	MAP2K6	mitogen-activated protein kinase kinase 6
TC12002066.hg.1	7.60	HPD	4-hydroxyphenylpyruvate dioxygenase

TC18000324.hg.1	7.49	PIEZO2	piezo-type mechanosensitive ion channel component 2
TC02002874.hg.1	7.31	ECEL1	endothelin converting enzyme-like 1
TC02001139.hg.1	6.74	SLC39A10	solute carrier family 39 (zinc transporter), member 10
TC0X001396.hg.1	6.63	FAM122B	family with sequence similarity 122B
TC12000142.hg.1	6.47	LOC100499405	uncharacterized LOC100499405
TC19001041.hg.1	6.44	AES	amino-terminal enhancer of split
TC06001343.hg.1	6.42	HIST1H2AB	histone cluster 1, H2ab
TC12001155.hg.1	5.68	LPCAT3	lysophosphatidylcholine acyltransferase 3
TC09000036.hg.1	5.67	INSL4	insulin-like 4 (placenta)
TC01002679.hg.1	5.59	HSPB11	heat shock protein family B (small), member 11
TC12000399.hg.1	5.33	METTL7A	methyltransferase like 7A
TC10000302.hg.1	5.28	PPYR1	pancreatic polypeptide receptor 1
TC17002883.hg.1	4.92	SLC25A10	solute carrier family 25 (mitochondrial carrier; dicarboxylate transporter), member 10
TC03001400.hg.1	4.91	QARS	glutaminyl-tRNA synthetase
TC12000846.hg.1	4.70	ACACB	acetyl-CoA carboxylase beta
TC16000555.hg.1	4.43	PRMT7	protein arginine methyltransferase 7
TC07000276.hg.1	4.42	OGDH	oxoglutarate (alpha-ketoglutarate) dehydrogenase (lipoamide)
TC15001683.hg.1	4.41	NRG4	neuregulin 4
TC0X001370.hg.1	4.35	MBNL3	muscleblind-like splicing regulator 3
TC05001614.hg.1	4.34	PCSK1	proprotein convertase subtilisin/kexin type 1
TC01003266.hg.1	4.33	S100A4	S100 calcium binding protein A4
TC11002237.hg.1	4.32	MMP12	matrix metallopeptidase 12 (macrophage elastase)
TC04001370.hg.1	4.31	ABCG2	ATP-binding cassette, sub-family G (WHITE), member 2
TC11000876.hg.1	4.25	PRSS23	protease, serine, 23
TC05001947.hg.1	4.14	ANXA6	annexin A6
TC19001018.hg.1	4.14	BTBD2	BTB (POZ) domain containing 2
TC16000872.hg.1	4.13	ZC3H7A	zinc finger CCCH-type containing 7A
TC09000323.hg.1	4.12	MAMDC2	MAM domain containing 2
TC05000697.hg.1	4.12	KIF20A	kinesin family member 20A
TC07000463.hg.1	4.09	GATSL1	GATS protein-like 1
TC06000178.hg.1	4.04	HIST1H2BI	histone cluster 1, H2bi
TC01000892.hg.1	3.99	PALMD	palmdelphin
TC01001748.hg.1	3.97	CAMK1G	calcium/calmodulin-dependent protein kinase IG
TC01000895.hg.1	3.93	AGL	amylo-alpha-1, 6-glucosidase, 4-alpha-glucanotransferase
TC08000602.hg.1	3.89	POP1	processing of precursor 1, ribonuclease P/MRP subunit (S. cerevisiae)
TC19001101.hg.1	3.88	CD70	CD70 molecule
TC03001456.hg.1	3.83	NT5DC2	5'-nucleotidase domain containing 2
TC20000816.hg.1	3.81	NDRG3	NDRG family member 3
TC11000773.hg.1	3.80	P2RY6	pyrimidinergic receptor P2Y, G-protein coupled, 6
TC01001900.hg.1	3.80	RAB4A	RAB4A, member RAS oncogene family
TC20000416.hg.1	3.75	TSHZ2	teashirt zinc finger homeobox 2
TC04001820.hg.1	3.75	SORBS2	sorbin and SH3 domain containing 2
TC19001045.hg.1	3.73	MFSD12	major facilitator superfamily domain containing 12

TC09000330.hg.1	3.71	GDA	guanine deaminase
TC10000089.hg.1	3.70	DHTKD1	dehydrogenase E1 and transketolase domain containing 1
TC0X001518.hg.1	3.70	IDH3G	isocitrate dehydrogenase 3 (NAD+) gamma
TC02002765.hg.1	3.67	TNS1	tensin 1
TC03002034.hg.1	3.66	ZMAT3	zinc finger, matrin-type 3
TC07003339.hg.1	3.66	CAV1	caveolin 1, caveolae protein, 22kDa
TC05000004.hg.1	3.66	SDHA	succinate dehydrogenase complex, subunit A, flavoprotein (Fp)
TC02001246.hg.1	3.63	CPS1	carbamoyl-phosphate synthase 1, mitochondrial
TC03003359.hg.1	3.62	GXYLT2	glucoside xylosyltransferase 2
TC05001742.hg.1	3.62	ALDH7A1	aldehyde dehydrogenase 7 family, member A1
TC06001879.hg.1	3.62	COL12A1	collagen, type XII, alpha 1
TC07002083.hg.1	3.59	NCAPG2	non-SMC condensin II complex, subunit G2
TC17000535.hg.1	3.53	VPS25	vacuolar protein sorting 25 homolog (S. cerevisiae)
TC14002318.hg.1	3.52	HEATR5A	HEAT repeat containing 5A
TC16000063.hg.1	3.46	TRAF7	TNF receptor-associated factor 7, E3 ubiquitin protein ligase
TC08001086.hg.1	3.45	PBK	PDZ binding kinase
TC17000777.hg.1	3.44	MILR1	mast cell immunoglobulin-like receptor 1
TC03001978.hg.1	3.44	GOLIM4	golgi integral membrane protein 4
TC17000970.hg.1	3.44	ABR	active BCR-related
TC11001509.hg.1	3.43	LGR4	leucine-rich repeat containing G protein-coupled receptor 4
TC19001922.hg.1	3.42	CHMP2A	charged multivesicular body protein 2A
TC07001904.hg.1	3.37	SVOPL	SVOP-like
TC02002733.hg.1	3.34	LANCL1	LanC lantibiotic synthetase component C-like 1 (bacterial)
TC14001364.hg.1	3.33	DIO2	deiodinase, iodothyronine, type II
TC0X000681.hg.1	3.32	HNRNPA3P3	heterogeneous nuclear ribonucleoprotein A3 pseudogene 3
TC03000419.hg.1	3.31	MITF	microphthalmia-associated transcription factor
TC14001538.hg.1	3.29	CKB	creatine kinase, brain
TC20000531.hg.1	3.29	PRPF6	PRP6 pre-mRNA processing factor 6 homolog (S. cerevisiae)
TC19000720.hg.1	3.28	RUVBL2	RuvB-like 2 (E. coli)
TC04000833.hg.1	3.27	TLL1	tolloid-like 1
TC04001344.hg.1	3.22	PLAC8	placenta-specific 8
TC19000340.hg.1	3.21	GLT25D1	glycosyltransferase 25 domain containing 1
TC01000261.hg.1	3.19	CDA	cytidine deaminase
TC01000872.hg.1	3.18	ABCD3	ATP-binding cassette, sub-family D (ALD), member 3
TC12001605.hg.1	3.17	TIMELESS	timeless homolog (Drosophila)
TC07003360.hg.1	3.14	GATSL2	GATS protein-like 2
TC17000958.hg.1	3.11	TBCD	tubulin folding cofactor D
TC06001341.hg.1	3.11	HIST1H4B	histone cluster 1, H4b
TC20000335.hg.1	3.11	WISP2	WNT1 inducible signaling pathway protein 2
TC17000999.hg.1	3.10	KIAA0664	KIAA0664
TC0X000572.hg.1	3.08	WDR44	WD repeat domain 44
TC07000437.hg.1	3.08	GTF2IP1	general transcription factor IIi, pseudogene 1

TC17001520.hg.1	3.08	ACLY	ATP citrate lyase
TC19001275.hg.1	3.07	BST2	bone marrow stromal cell antigen 2
TC06000658.hg.1	3.07	TMEM14A	transmembrane protein 14A
TC6_ssto_hap7000143.hg.1	3.07	VARS	valyl-tRNA synthetase
TC02001750.hg.1	3.05	CYP1B1	cytochrome P450, family 1, subfamily B, polypeptide 1
TC03000297.hg.1	3.05	APEH	N-acylaminoacyl-peptide hydrolase
TC17000098.hg.1	3.04	POLR2A	polymerase (RNA) II (DNA directed) polypeptide A, 220kDa
TC03001583.hg.1	3.04	VGLL3	vestigial like 3 (Drosophila)
TC10001702.hg.1	3.04	PRDX3	peroxiredoxin 3
TC13000715.hg.1	3.02	HNRNPA3P5	heterogeneous nuclear ribonucleoprotein A3 pseudogene 5
TC01001607.hg.1	3.02	PLA2G4A	phospholipase A2, group IVA (cytosolic, calcium-dependent)
TC16001343.hg.1	3.01	PIEZO1	piezo-type mechanosensitive ion channel component 1
TC20000810.hg.1	3.00	LOC647979	uncharacterized LOC647979
TC19002646.hg.1	3.00	PRMT1	protein arginine methyltransferase 1
TC0X000118.hg.1	2.99	PDK3	pyruvate dehydrogenase kinase, isozyme 3
TC07002027.hg.1	2.99	CDK5	cyclin-dependent kinase 5
TC11000677.hg.1	2.98	C11orf86	chromosome 11 open reading frame 86
TC17000954.hg.1	2.98	FOXK2	forkhead box K2
TC0X000495.hg.1	2.95	WBP5	WW domain binding protein 5
TC12000521.hg.1	2.94	LRP1	low density lipoprotein receptor-related protein 1
TC02000057.hg.1	2.94	RRM2	ribonucleotide reductase M2
TC17001311.hg.1	2.94	FLOT2	flotillin 2
TC07000562.hg.1	2.92	PEG10	paternally expressed 10
TC19000012.hg.1	2.90	FSTL3	follistatin-like 3 (secreted glycoprotein)
TC03002154.hg.1	2.90	SDHAP1	succinate dehydrogenase complex, subunit A, flavoprotein pseudogene 1
TC0X001303.hg.1	2.89	KLHL13	kelch-like 13 (Drosophila)
TC06000265.hg.1	2.88	HIST1H2BM	histone cluster 1, H2bm
TC02000259.hg.1	2.87	PKDCC	protein kinase domain containing, cytoplasmic homolog (mouse)
TC0Y000182.hg.1	2.86	CD24	CD24 molecule
TC0X002307.hg.1	2.86	L1CAM	L1 cell adhesion molecule
TC0X002316.hg.1	2.84	HNRNPH2	heterogeneous nuclear ribonucleoprotein H2 (H')
TC11000482.hg.1	2.84	FAM111B	family with sequence similarity 111, member B
TC06000762.hg.1	2.84	BCKDHB	branched chain keto acid dehydrogenase E1, beta polypeptide
TC06001354.hg.1	2.81	HIST1H3G	histone cluster 1, H3g
TC10000350.hg.1	2.81	DKK1	dickkopf 1 homolog (Xenopus laevis)
TC06001345.hg.1	2.81	HIST1H1C	histone cluster 1, H1c
TC06001342.hg.1	2.80	HIST1H3B	histone cluster 1, H3b
TC19000747.hg.1	2.79	AP2A1	adaptor-related protein complex 2, alpha 1 subunit
TC11002092.hg.1	2.78	ARRB1	arrestin, beta 1
TC0X001237.hg.1	2.77	TCEAL8	transcription elongation factor A (SII)-like 8
TC17001745.hg.1	2.77	SKA2	spindle and kinetochore associated complex subunit 2
TC01003392.hg.1	2.77	TAGLN2	transgelin 2

TC19000117.hg.1	2.76	TNFSF9	tumor necrosis factor (ligand) superfamily, member 9
TC02001062.hg.1	2.75	HNRNPA3	heterogeneous nuclear ribonucleoprotein A3
TC03000295.hg.1	2.75	DAG1	dystroglycan 1 (dystrophin-associated glycoprotein 1)
TC19001659.hg.1	2.75	TMEM160	transmembrane protein 160
TC08000353.hg.1	2.74	C8orf22	chromosome 8 open reading frame 22
TC07001363.hg.1	2.73	TNS3	tensin 3
TC0X001182.hg.1	2.73	BRWD3	bromodomain and WD repeat domain containing 3
TC02002826.hg.1	2.73	CUL3	cullin 3
TC01000776.hg.1	2.72	ACADM	acyl-CoA dehydrogenase, C-4 to C-12 straight chain
TC10000406.hg.1	2.72	TET1	tet methylcytosine dioxygenase 1
TC07001084.hg.1	2.72	INTS1	integrator complex subunit 1
TC16000554.hg.1	2.71	SLC7A6	solute carrier family 7 (amino acid transporter light chain, y+L system), member 6
TC11001251.hg.1	2.70	POLR2L	polymerase (RNA) II (DNA directed) polypeptide L, 7.6kDa
TC0X000092.hg.1	2.69	PDHA1	pyruvate dehydrogenase (lipoamide) alpha 1
TC14001023.hg.1	2.69	SPTSSA	serine palmitoyltransferase, small subunit A
TC03001087.hg.1	2.68	SDHAP2	succinate dehydrogenase complex, subunit A, flavoprotein pseudogene 2
TC16000656.hg.1	2.68	WFDC1	WAP four-disulfide core domain 1
TC14002292.hg.1	2.66	PABPN1	poly(A) binding protein, nuclear 1
TC10001238.hg.1	2.66	LOC728643	heterogeneous nuclear ribonucleoprotein A1 pseudogene
TC16000822.hg.1	2.65	TRAP1	TNF receptor-associated protein 1
TC07000517.hg.1	2.65	HNRNPA1P8	heterogeneous nuclear ribonucleoprotein A1 pseudogene 8
TC16000731.hg.1	2.64	C16orf13	chromosome 16 open reading frame 13
TC19001003.hg.1	2.64	GAMT	guanidinoacetate N-methyltransferase
TC18000480.hg.1	2.64	ATP5A1	ATP synthase, H+ transporting, mitochondrial F1 complex, alpha subunit 1, cardiac muscle
TC17001973.hg.1	2.63	FASN	fatty acid synthase
TC03001693.hg.1	2.63	RABL3	RAB, member of RAS oncogene family-like 3
TC11000691.hg.1	2.63	RPS6KB2	ribosomal protein S6 kinase, 70kDa, polypeptide 2
TC22000385.hg.1	2.62	ATXN10	ataxin 10
TC6_cox_hap2000171.hg.1	2.62	VARS	valyl-tRNA synthetase
TC06001543.hg.1	2.62	VARS	valyl-tRNA synthetase
TC15000350.hg.1	2.62	SORD	sorbitol dehydrogenase
TC10000377.hg.1	2.61	ARID5B	AT rich interactive domain 5B (MRF1-like)
TC17000120.hg.1	2.61	CHD3	chromodomain helicase DNA binding protein 3
TC01000659.hg.1	2.60	LRRC42	leucine rich repeat containing 42
TC05000809.hg.1	2.60	SPINK13	serine peptidase inhibitor, Kazal type 13 (putative)
TC12000725.hg.1	2.60	MRPL42	mitochondrial ribosomal protein L42
TC01002578.hg.1	2.58	SLC2A1	solute carrier family 2 (facilitated glucose transporter), member 1
TC6_dbb_hap3000160.hg.1	2.57	VARS	valyl-tRNA synthetase
TC0X000382.hg.1	2.57	MED12	mediator complex subunit 12
TC03001188.hg.1	2.57	NUP210	nucleoporin 210kDa
TC19000010.hg.1	2.57	HCN2	hyperpolarization activated cyclic nucleotide-gated potassium channel 2

TC6_apd_hap1000085.hg.1	2.56	VARS	valyl-tRNA synthetase
TC6_mcf_hap5000148.hg.1	2.56	VARS	valyl-tRNA synthetase
TC14001560.hg.1	2.56	AKT1	v-akt murine thymoma viral oncogene homolog 1
TC01002864.hg.1	2.56	TGFBR3	transforming growth factor, beta receptor III
TC17001118.hg.1	2.55	MYH10	myosin, heavy chain 10, non-muscle
TC0X001184.hg.1	2.54	HMGN5	high mobility group nucleosome binding domain 5
TC20000316.hg.1	2.54	SRSF6	serine/arginine-rich splicing factor 6
TC06000171.hg.1	2.54	HIST1H2BF	histone cluster 1, H2bf
TC0X000628.hg.1	2.53	MST4	serine/threonine protein kinase MST4
TC01003194.hg.1	2.53	HIST2H2AB	histone cluster 2, H2ab
TC01000931.hg.1	2.53	FAM102B	family with sequence similarity 102, member B
TC01001732.hg.1	2.53	C4BPB	complement component 4 binding protein, beta
TC02000141.hg.1	2.53	EFR3B	EFR3 homolog B (S. cerevisiae)
TC05000453.hg.1	2.53	ANKRD32	ankyrin repeat domain 32
TC17000085.hg.1	2.52	ACADVL	acyl-CoA dehydrogenase, very long chain
TC01003200.hg.1	2.52	ANP32E	acidic (leucine-rich) nuclear phosphoprotein 32 family, member E
TC14000914.hg.1	2.51	LOC283624	uncharacterized LOC283624
TC20000876.hg.1	2.51	SLPI	secretory leukocyte peptidase inhibitor
TC15000580.hg.1	2.51	LACTB	lactamase, beta
TC03000053.hg.1	2.51	BRK1	BRICK1, SCAR/WAVE actin-nucleating complex subunit
TC03001019.hg.1	2.51	DNAJB11	DnaJ (Hsp40) homolog, subfamily B, member 11
TC12001330.hg.1	2.50	ASUN	asunder, spermatogenesis regulator homolog (Drosphila)
TC01002328.hg.1	2.50	HSPG2	heparan sulfate proteoglycan 2
TC19001076.hg.1	2.49	PTPRS	protein tyrosine phosphatase, receptor type, S
TC02000310.hg.1	2.48	CHAC2	ChaC, cation transport regulator homolog 2 (E. coli)
TC07001617.hg.1	2.48	PON2	paraoxonase 2
TC21000222.hg.1	2.47	PFKL	phosphofructokinase, liver
TC19000067.hg.1	2.47	NCLN	nicalin
TC17000633.hg.1	2.47	ATP5G1	ATP synthase, H+ transporting, mitochondrial Fo complex, subunit C1 (subunit 9)
TC17001579.hg.1	2.47	SLC25A39	solute carrier family 25, member 39
TC16001083.hg.1	2.47	SHCBP1	SHC SH2-domain binding protein 1
TC19001029.hg.1	2.47	TIMM13	translocase of inner mitochondrial membrane 13 homolog (yeast)
TC11000133.hg.1	2.47	ILK	integrin-linked kinase
TC16000217.hg.1	2.46	IQCK	IQ motif containing K
TC15002807.hg.1	2.46	KIAA0101	KIAA0101
TC17000147.hg.1	2.46	GLP2R	glucagon-like peptide 2 receptor
TC18000104.hg.1	2.46	TTC39C	tetratricopeptide repeat domain 39C
TC0X001353.hg.1	2.46	SMARCA1	SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily a, member 1
TC01001463.hg.1	2.46	DCAF6	DDB1 and CUL4 associated factor 6
TC06001426.hg.1	2.44	HIST1H1B	histone cluster 1, H1b
TC11002427.hg.1	2.44	CDON	Cdon homolog (mouse)
TC06001896.hg.1	2.44	HMGN3	high mobility group nucleosomal binding domain

			3
TC15000455.hg.1	2.43	FAM81A	family with sequence similarity 81, member A
TC09000624.hg.1	2.43	SKA2L	spindle and kinetochore associated complex subunit 2-like
TC15000864.hg.1	2.43	IQGAP1	IQ motif containing GTPase activating protein 1
TC10000946.hg.1	2.42	INPP5A	inositol polyphosphate-5-phosphatase, 40kDa
TC01004027.hg.1	2.42	CHML	choroideremia-like (Rab escort protein 2)
TC02001401.hg.1	2.42	PRSS56	protease, serine, 56
TC11001102.hg.1	2.41	ARHGEF12	Rho guanine nucleotide exchange factor (GEF) 12
TC03000012.hg.1	2.41	SETMAR	SET domain and mariner transposase fusion gene
TC19001233.hg.1	2.40	LPHN1	latrophilin 1
TC03001482.hg.1	2.40	WNT5A	wingless-type MMTV integration site family, member 5A
TC11001976.hg.1	2.40	PC	pyruvate carboxylase
TC06001349.hg.1	2.39	HIST1H3D	histone cluster 1, H3d
TC09001012.hg.1	2.39	AQP3	aquaporin 3 (Gill blood group)
TC12000495.hg.1	2.39	DGKA	diacylglycerol kinase, alpha 80kDa
TC0X000423.hg.1	2.38	COX7B	cytochrome c oxidase subunit VIIb
TC01002340.hg.1	2.37	HNRNPR	heterogeneous nuclear ribonucleoprotein R
TC14001101.hg.1	2.36	RPL36AL	ribosomal protein L36a-like
TC05001788.hg.1	2.36	CDKN2AIPNL	CDKN2A interacting protein N-terminal like
TC07000235.hg.1	2.36	ANLN	anillin, actin binding protein
TC10001136.hg.1	2.35	MPP7	membrane protein, palmitoylated 7 (MAGUK p55 subfamily member 7)
TC10000813.hg.1	2.35	ACSL5	acyl-CoA synthetase long-chain family member 5
TC06001425.hg.1	2.35	HIST1H2AK	histone cluster 1, H2ak
TC08001264.hg.1	2.35	ASPH	aspartate beta-hydroxylase
TC22000198.hg.1	2.35	NEFH	neurofilament, heavy polypeptide
TC11000592.hg.1	2.35	PLCB3	phospholipase C, beta 3 (phosphatidylinositol-specific)
TC19001721.hg.1	2.34	RRAS	related RAS viral (r-ras) oncogene homolog
TC12002016.hg.1	2.34	WSB2	WD repeat and SOCS box containing 2
TC19001618.hg.1	2.34	ERCC2	excision repair cross-complementing rodent repair deficiency, complementation group 2
TC03000077.hg.1	2.34	FBLN2	fibulin 2
TC17001905.hg.1	2.33	MXRA7	matrix-remodelling associated 7
TC07000458.hg.1	2.33	GTF2I	general transcription factor IIi
TC17001561.hg.1	2.33	MEOX1	mesenchyme homeobox 1
TC14000346.hg.1	2.33	PSMA3	proteasome (prosome, macropain) subunit, alpha type, 3
TC10000797.hg.1	2.33	ADD3	adducin 3 (gamma)
TC22001426.hg.1	2.32	APOBEC3C	apolipoprotein B mRNA editing enzyme, catalytic polypeptide-like 3C
TC02002516.hg.1	2.32	HMGB1P4	high mobility group box 1 pseudogene 4
TC17001914.hg.1	2.32	TK1	thymidine kinase 1, soluble
TC0X000783.hg.1	2.32	BRCC3	BRCA1/BRCA2-containing complex, subunit 3
TC05000096.hg.1	2.31	BASP1	brain abundant, membrane attached signal protein 1
TC03001866.hg.1	2.31	PLOD2	procollagen-lysine, 2-oxoglutarate 5-dioxygenase 2
TC11000657.hg.1	2.31	RAB1B	RAB1B, member RAS oncogene family

TC11002269.hg.1	2.31	EXPH5	exophilin 5
TC10000715.hg.1	2.31	ABCC2	ATP-binding cassette, sub-family C (CFTR/MRP), member 2
TC06002301.hg.1	2.30	SDIM1	stress responsive DNAJB4 interacting membrane protein 1
TC03000583.hg.1	2.30	ATP6V1A	ATPase, H+ transporting, lysosomal 70kDa, V1 subunit A
TC09001009.hg.1	2.30	BAG1	BCL2-associated athanogene
TC06000173.hg.1	2.29	HIST1H2AE	histone cluster 1, H2ae
TC19000180.hg.1	2.29	SLC44A2	solute carrier family 44, member 2
TC03000120.hg.1	2.29	HMGB1P5	high mobility group box 1 pseudogene 5
TC04001797.hg.1	2.29	RWDD4	RWD domain containing 4
TC11002473.hg.1	2.28	NCAPD3	non-SMC condensin II complex, subunit D3
TC06001844.hg.1	2.28	LGSN	lengsin, lens protein with glutamine synthetase domain
TC05000144.hg.1	2.28	NPR3	natriuretic peptide receptor C/guanylate cyclase C (atrionatriuretic peptide receptor C)
TC02004919.hg.1	2.28	HOXD10	homeobox D10
TC02002033.hg.1	2.27	SUCLG1	succinate-CoA ligase, alpha subunit
TC10001790.hg.1	2.27	ECHS1	enoyl CoA hydratase, short chain, 1, mitochondrial
TC09002905.hg.1	2.27	NIPSNAP3A	nipsnap homolog 3A (C. elegans)
TC06004064.hg.1	2.27	HIST1H3H	histone cluster 1, H3h
TC12001792.hg.1	2.27	KITLG	KIT ligand
TC19000057.hg.1	2.27	THOP1	thimet oligopeptidase 1
TC02001742.hg.1	2.27	PRKD3	protein kinase D3
TC06001386.hg.1	2.26	HIST1H2BJ	histone cluster 1, H2bj
TC19001874.hg.1	2.26	ISOC2	isochorismatase domain containing 2
TC02000168.hg.1	2.26	CAD	carbamoyl-phosphate synthetase 2, aspartate transcarbamylase, and dihydroorotase
TC06002106.hg.1	2.26	EPB41L2	erythrocyte membrane protein band 4.1-like 2
TC13000876.hg.1	2.26	CARS2	cysteinyl-tRNA synthetase 2, mitochondrial (putative)
TC06004063.hg.1	2.25	HIST1H2AI	histone cluster 1, H2ai
TC12000926.hg.1	2.25	PEBP1	phosphatidylethanolamine binding protein 1
TC03001570.hg.1	2.25	ROBO1	roundabout, axon guidance receptor, homolog 1 (Drosophila)
TC12000804.hg.1	2.25	TDG	thymine-DNA glycosylase
TC13000344.hg.1	2.24	FARP1	FERM, RhoGEF (ARHGEF) and pleckstrin domain protein 1 (chondrocyte-derived)
TC17001937.hg.1	2.24	NPTX1	neuronal pentraxin I
TC20000082.hg.1	2.24	SNAP25	synaptosomal-associated protein, 25kDa
TC14000388.hg.1	2.24	MTHFD1	methylenetetrahydrofolate dehydrogenase (NADP+ dependent) 1, methenyltetrahydrofolate cyclohydrolase, formyltetrahydrofolate synthetase
TC19000496.hg.1	2.23	CAPNS1	calpain, small subunit 1
TC11000464.hg.1	2.23	RTN4RL2	reticulon 4 receptor-like 2
TC06000909.hg.1	2.23	MARCKS	myristoylated alanine-rich protein kinase C substrate
TC19000681.hg.1	2.22	EHD2	EH-domain containing 2
TC05000622.hg.1	2.22	LYRM7	Lyrm7 homolog (mouse)
TC22000202.hg.1	2.22	UQCR10	ubiquinol-cytochrome c reductase, complex III subunit X
TC14000418.hg.1	2.22	SRSF5	serine/arginine-rich splicing factor 5

TC12003254.hg.1	2.21	TMEM19	transmembrane protein 19
TC19001298.hg.1	2.21	TMEM161A	transmembrane protein 161A
TC03000631.hg.1	2.21	FAM162A	family with sequence similarity 162, member A
TC14000810.hg.1	2.20	TDRD9	tudor domain containing 9
TC17000772.hg.1	2.20	PSMC5	proteasome (prosome, macropain) 26S subunit, ATPase, 5
TC09000968.hg.1	2.20	ELAVL2	ELAV (embryonic lethal, abnormal vision, Drosophila)-like 2 (Hu antigen B)
TC01006285.hg.1	2.20	GSTM4	glutathione S-transferase mu 4
TC11000856.hg.1	2.20	PCF11	PCF11, cleavage and polyadenylation factor subunit, homolog (S. cerevisiae)
TC01002412.hg.1	2.19	IFI6	interferon, alpha-inducible protein 6
TC06000176.hg.1	2.19	HIST1H2BH	histone cluster 1, H2bh
TC11000036.hg.1	2.19	AP2A2	adaptor-related protein complex 2, alpha 2 subunit
TC02002378.hg.1	2.19	CXCR4	chemokine (C-X-C motif) receptor 4
TC01000977.hg.1	2.18	ATP5F1	ATP synthase, H+ transporting, mitochondrial Fo complex, subunit B1
TC06001027.hg.1	2.18	TNFAIP3	tumor necrosis factor, alpha-induced protein 3
TC01000733.hg.1	2.18	PDE4B	phosphodiesterase 4B, cAMP-specific
TC03000518.hg.1	2.18	TRMT10C	tRNA methyltransferase 10 homolog C (S. cerevisiae)
TC17001098.hg.1	2.18	TRAPPC1	trafficking protein particle complex 1
TC13000192.hg.1	2.18	PSME2P2	proteasome activator subunit 2 pseudogene 2
TC21000511.hg.1	2.18	MYL6P1	myosin, light chain 6 pseudogene 1
TC08000538.hg.1	2.18	WWP1	WW domain containing E3 ubiquitin protein ligase 1
TC02000041.hg.1	2.18	ID2	inhibitor of DNA binding 2, dominant negative helix-loop-helix protein
TC01000492.hg.1	2.17	NDUFS5	NADH dehydrogenase (ubiquinone) Fe-S protein 5, 15kDa (NADH-coenzyme Q reductase)
TC06001430.hg.1	2.17	HIST1H2AM	histone cluster 1, H2am
TC13000662.hg.1	2.17	EBPL	emopamil binding protein-like
TC19001703.hg.1	2.16	GYS1	glycogen synthase 1 (muscle)
TC09000500.hg.1	2.16	TGFBR1	transforming growth factor, beta receptor 1
TC11001873.hg.1	2.16	GANAB	glucosidase, alpha; neutral AB
TC07003350.hg.1	2.16	KDELR2	KDEL (Lys-Asp-Glu-Leu) endoplasmic reticulum protein retention receptor 2
TC0X001491.hg.1	2.15	GABRE	gamma-aminobutyric acid (GABA) A receptor, epsilon
TC19000907.hg.1	2.15	EPN1	epsin 1
TC06000153.hg.1	2.15	LRRC16A	leucine rich repeat containing 16A
TC11001173.hg.1	2.15	DCPS	decapping enzyme, scavenger
TC06001353.hg.1	2.15	HIST1H3F	histone cluster 1, H3f
TC06001421.hg.1	2.15	HIST1H2BL	histone cluster 1, H2bl
TC12003245.hg.1	2.15	MYL6	myosin, light chain 6, alkali, smooth muscle and non-muscle
TC17002886.hg.1	2.14	C17orf61	chromosome 17 open reading frame 61
TC02000751.hg.1	2.14	DBI	diazepam binding inhibitor (GABA receptor modulator, acyl-CoA binding protein)
TC08000814.hg.1	2.14	LY6E	lymphocyte antigen 6 complex, locus E
TC07001344.hg.1	2.14	TMED4	transmembrane emp24 protein transport domain containing 4
TC09001547.hg.1	2.14	STOM	stomatin
TC12003295.hg.1	2.14	HOXC4	homeobox C4

TC03000417.hg.1	2.14	ARL6IP5	ADP-ribosylation-like factor 6 interacting protein 5
TC08000415.hg.1	2.13	KRT8	keratin 8
TC14001455.hg.1	2.13	C14orf142	chromosome 14 open reading frame 142
TC01002788.hg.1	2.13	CRYZ	crystallin, zeta (quinone reductase)
TC20000109.hg.1	2.13	DSTN	destrin (actin depolymerizing factor)
TC17001147.hg.1	2.13	ELAC2	elaC homolog 2 (E. coli)
TC02000856.hg.1	2.13	POTEKP	POTE ankyrin domain family, member K, pseudogene
TC12000138.hg.1	2.13	KLRG1	killer cell lectin-like receptor subfamily G, member 1
TC19001774.hg.1	2.13	ETFB	electron-transfer-flavoprotein, beta polypeptide
TC02002695.hg.1	2.13	GCSHP3	glycine cleavage system protein H (aminomethyl carrier) pseudogene 3
TC11000979.hg.1	2.13	ACAT1	acetyl-CoA acetyltransferase 1
TC02001729.hg.1	2.12	FAM98A	family with sequence similarity 98, member A
TC10001726.hg.1	2.12	OAT	ornithine aminotransferase
TC01002775.hg.1	2.12	ZRANB2	zinc finger, RAN-binding domain containing 2
TC19000665.hg.1	2.12	CALM3	calmodulin 3 (phosphorylase kinase, delta)
TC17000315.hg.1	2.11	NLK	nemo-like kinase
TC19001253.hg.1	2.11	AKAP8	A kinase (PRKA) anchor protein 8
TC09000812.hg.1	2.11	PMPCA	peptidase (mitochondrial processing) alpha
TC6_qbl_hap6000161.hg.1	2.11	VARS	valyl-tRNA synthetase
TC01001814.hg.1	2.11	IARS2	isoleucyl-tRNA synthetase 2, mitochondrial
TC17001301.hg.1	2.11	ALDOC	aldolase C, fructose-bisphosphate
TC05001307.hg.1	2.11	OXCT1	3-oxoacid CoA transferase 1
TC07000111.hg.1	2.11	TSPAN13	tetraspanin 13
TC19000532.hg.1	2.11	ACTN4	actinin, alpha 4
TC12002087.hg.1	2.11	SBNO1	strawberry notch homolog 1 (Drosophila)
TC01001435.hg.1	2.10	PBX1	pre-B-cell leukemia homeobox 1
TC20000821.hg.1	2.10	SAMHD1	SAM domain and HD domain 1
TC22000142.hg.1	2.10	GSTT2	glutathione S-transferase theta 2
TC09000731.hg.1	2.10	NCS1	neuronal calcium sensor 1
TC11002074.hg.1	2.10	UCP2	uncoupling protein 2 (mitochondrial, proton carrier)
TC22000301.hg.1	2.10	KDELR3	KDEL (Lys-Asp-Glu-Leu) endoplasmic reticulum protein retention receptor 3
TC13000524.hg.1	2.10	UBL3	ubiquitin-like 3
TC17000698.hg.1	2.10	NOG	noggin
TC11000404.hg.1	2.10	DDB2	damage-specific DNA binding protein 2, 48kDa
TC17000402.hg.1	2.09	TAF15	TAF15 RNA polymerase II, TATA box binding protein (TBP)-associated factor, 68kDa
TC12000884.hg.1	2.09	OAS1	2'-5'-oligoadenylate synthetase 1, 40/46kDa
TC02002574.hg.1	2.09	FKBP7	FK506 binding protein 7
TC16000851.hg.1	2.09	CARHSP1	calcium regulated heat stable protein 1, 24kDa
TC06001881.hg.1	2.08	TMEM30A	transmembrane protein 30A
TC05001112.hg.1	2.08	SDHAP3	succinate dehydrogenase complex, subunit A, flavoprotein pseudogene 3
TC04000853.hg.1	2.08	GALNT7	UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 7 (GalNAc-T7)
TC11000696.hg.1	2.08	NDUFV1	NADH dehydrogenase (ubiquinone) flavoprotein 1, 51kDa

TC15000881.hg.1	2.08	SLCO3A1	solute carrier organic anion transporter family, member 3A1
TC14001508.hg.1	2.08	SLC25A29	solute carrier family 25 (mitochondrial carnitine/acylcarnitine carrier), member 29
TC17001056.hg.1	2.08	C1QBP	complement component 1, q subcomponent binding protein
TC16000427.hg.1	2.08	PHKB	phosphorylase kinase, beta
TC12000490.hg.1	2.08	GDF11	growth differentiation factor 11
TC0X001486.hg.1	2.07	CD99L2	CD99 molecule-like 2
TC22000580.hg.1	2.07	GSTT2	glutathione S-transferase theta 2
TC02001354.hg.1	2.07	MRPL44	mitochondrial ribosomal protein L44
TC17001890.hg.1	2.07	ACOX1	acyl-CoA oxidase 1, palmitoyl
TC11000707.hg.1	2.07	LRP5	low density lipoprotein receptor-related protein 5
TC07000011.hg.1	2.07	HEATR2	HEAT repeat containing 2
TC16000062.hg.1	2.07	RAB26	RAB26, member RAS oncogene family
TC19001210.hg.1	2.07	PRDX2	peroxiredoxin 2
TC01002314.hg.1	2.06	CAMK2N1	calcium/calmodulin-dependent protein kinase II inhibitor 1
TC15000868.hg.1	2.06	BLM	Bloom syndrome, RecQ helicase-like
TC02000582.hg.1	2.06	NCAPH	non-SMC condensin I complex, subunit H
TC06000223.hg.1	2.06	HIST1H2AG	histone cluster 1, H2ag
TC01002803.hg.1	2.06	FUBP1	far upstream element (FUSE) binding protein 1
TC02002043.hg.1	2.06	GGCX	gamma-glutamyl carboxylase
TC22000337.hg.1	2.06	ACO2	aconitase 2, mitochondrial
TC10000138.hg.1	2.05	CACNB2	calcium channel, voltage-dependent, beta 2 subunit
TC17000060.hg.1	2.05	KIF1C	kinesin family member 1C
TC17001970.hg.1	2.05	DCXR	dicarbonyl/L-xylulose reductase
TC01001819.hg.1	2.05	2-Mar	mitochondrial amidoxime reducing component 2
TC04001376.hg.1	2.05	PIGY	phosphatidylinositol glycan anchor biosynthesis, class Y
TC06000225.hg.1	2.05	HIST1H2AH	histone cluster 1, H2ah
TC05000509.hg.1	2.05	FER	fer (fps/fes related) tyrosine kinase
TC02001100.hg.1	2.05	ITGAV	integrin, alpha V
TC01003226.hg.1	2.05	SELENBP1	selenium binding protein 1
TC05000202.hg.1	2.04	NNT	nicotinamide nucleotide transhydrogenase
TC13000119.hg.1	2.04	RFC3	replication factor C (activator 1) 3, 38kDa
TC13000468.hg.1	2.04	SKA3	spindle and kinetochore associated complex subunit 3
TC05000161.hg.1	2.04	SKP2	S-phase kinase-associated protein 2, E3 ubiquitin protein ligase
TC09001058.hg.1	2.04	TPM2	tropomyosin 2 (beta)
TC03001067.hg.1	2.04	OPA1	optic atrophy 1 (autosomal dominant)
TC22000285.hg.1	2.04	LGALS1	lectin, galactoside-binding, soluble, 1
TC05000498.hg.1	2.03	PPIP5K2	diphosphoinositol pentakisphosphate kinase 2
TC09001591.hg.1	2.03	MAPKAP1	mitogen-activated protein kinase associated protein 1
TC17001820.hg.1	2.03	SLC16A6	solute carrier family 16, member 6 (monocarboxylic acid transporter 7)
TC0X000425.hg.1	2.03	PGK1	phosphoglycerate kinase 1
TC07000110.hg.1	2.03	BZW2	basic leucine zipper and W2 domains 2
TC13000599.hg.1	2.03	KBTBD6	kelch repeat and BTB (POZ) domain containing 6

TC02001866.hg.1	2.03	PNPT1	polyribonucleotide nucleotidyltransferase 1
TC10000896.hg.1	2.03	ACADSB	acyl-CoA dehydrogenase, short/branched chain
TC01003835.hg.1	2.03	BPNT1	3'(2'), 5'-bisphosphate nucleotidase 1
TC06001052.hg.1	2.03	PEX3	peroxisomal biogenesis factor 3
TC11002059.hg.1	2.02	PDE2A	phosphodiesterase 2A, cGMP-stimulated
TC09001420.hg.1	2.02	MRPL50	mitochondrial ribosomal protein L50
TC01000151.hg.1	2.02	PLOD1	procollagen-lysine, 2-oxoglutarate 5-dioxygenase 1
TC01003751.hg.1	2.02	NUCKS1	nuclear casein kinase and cyclin-dependent kinase substrate 1
TC05001385.hg.1	2.02	PLK2	polo-like kinase 2
TC15001245.hg.1	2.02	RHOV	ras homolog family member V
TC09000526.hg.1	2.02	SMC2	structural maintenance of chromosomes 2
TC0X001538.hg.1	2.02	G6PD	glucose-6-phosphate dehydrogenase
TC19000442.hg.1	2.02	GPI	glucose-6-phosphate isomerase
TC17002885.hg.1	2.02	P2RX5	purinergic receptor P2X, ligand-gated ion channel, 5
TC14000554.hg.1	2.02	CALM1	calmodulin 1 (phosphorylase kinase, delta)
TC01004025.hg.1	2.01	FH	fumarate hydratase
TC14000433.hg.1	2.01	SIPA1L1	signal-induced proliferation-associated 1 like 1
TC09001001.hg.1	2.01	NDUFB6	NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 6, 17kDa
TC17000600.hg.1	2.01	NSF	N-ethylmaleimide-sensitive factor
TC17000834.hg.1	2.01	SLC9A3R1	solute carrier family 9, subfamily A (NHE3, cation proton antiporter 3), member 3 regulator 1
TC19000069.hg.1	2.00	NFIC	nuclear factor I/C (CCAAT-binding transcription factor)
TC0X000730.hg.1	2.00	VMA21	VMA21 vacuolar H+-ATPase homolog (S. cerevisiae)
TC06001350.hg.1	2.00	HIST1H2BG	histone cluster 1, H2bg
TC11000622.hg.1	2.00	POLA2	polymerase (DNA directed), alpha 2, accessory subunit

Supporting References

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2. J. Van Houten and R. J. Watts, *J. Am. Chem. Soc.*, 1976, **98**, 4853-4858.
3. D. S. Tyson and F. N. Castellano, *J. Phys. Chem. A*, 1999, **103**, 10955-10960.
4. D. Pucci, A. Bellusci, A. Crispini, M. Ghedini, N. Godbert, E. I. Szerb and A. M. Talarico, *J. Mater. Chem.*, 2009, **19**, 7643-7649.