

α -Phellandrene Alters Expression of Genes Associated with DNA Damage, Cell Cycle, and Apoptosis in Murine Leukemia WEHI-3 Cells

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Abstract. α -phellandrene (α -PA) is a cyclic monoterpene, present in natural plants such as *Schinus molle* L. α -PA promotes immune responses in mice *in vivo*. However, there is no available information on whether α -PA affects gene expression in leukemia cells. The present study determined effects of α -PA on expression levels of genes associated with DNA damage, cell cycle and apoptotic cell death in mouse leukemia WEHI-3 cells. WEHI-3 cells were treated with 10 μ M α -PA for 24 h, cells were harvested and total RNA was extracted, and gene expression was analyzed by cDNA microarray. Results indicated that α -PA up-regulated 10 genes 4-fold, 13 by over 3-fold and 175 by over 2-fold; 21 genes were down-regulated by over 4-fold, 26 genes by over 3-fold and expression of 204 genes was altered by at least 2-fold compared with the untreated control cells. DNA damage-associated genes such as DNA damage-inducer transcript 4 and DNA fragmentation factor were up-regulated by 4-fold and over 2-fold, respectively; cell-cycle check point genes such as cyclin G2 and cyclin-dependent kinases inhibitor 2D and IA (p21) were up-regulated by over 3-fold and over 2-fold, respectively; apoptosis-associated genes such as BCL2/adenovirus E1B interacting protein 3, XIAP-associated factor 1, BCL2 modifying factor, caspase-8 and FADD-like apoptosis regulator were over 2-fold up-

regulated. Furthermore, DNA damage-associated gene TATA box binding protein was over 4-fold down-regulated, and D19Erttd652c (DNA segment) over 2-fold down-regulated; cell cycle-associated gene cyclin E2 was over 2-fold down-regulated; apoptosis associated gene growth arrest-specific 5 was over 9-fold down-regulated, Gm5426 (ATP synthase) was over 3-fold down-regulated, and death box polypeptide 33 was over 2-fold down-regulated. Based on these observations, α -PA altered gene expression in WEHI-3 cells *in vitro*.

Leukemia, a myeloproliferative disease (abnormal growth of phenotypically immature leukocytes), is the second most common type of cancer in children (1). The incidence of leukemia in humans is increasing worldwide. Leukemia can be divided into acute myeloid leukemia (AML) and chronic myeloid leukemia (CML). In AML, Paired box 5 (PAX5) expression selectively clusters with t(8;21) and it likely explains a peculiar biological feature of this subset of myeloid leukemias (2). In CML, NM23-H1 gene expression may inhibit K562 cell proliferation and migration and suggests that NM23-H1 may be a cancer-suppressor gene and play a significant role in inhibiting the survival of CML cells (3). Currently, treatment for leukemia is unsatisfactory. Therapies with increased efficacy and decreased toxicity are, therefore, required. There is increasing interest in identifying compounds from natural products.

α -Phellandrene (5-isopropyl-2-methyl-1,3-cyclohexadiene; α -PA) is a cyclic monoterpene and is a component in essential oil of natural plants such as *Schinus molle* L., *Schinus terebinthifolius* Raddi (4), and *Zingiber officinale* Roscoe (5). Recently, we were the first to show that α -PA stimulated immune responses by increasing macrophage phagocytosis and inducing natural killer cell cytotoxic effects in normal Balb/c mice *in vivo* (6). The detection of leukemia-associated gene expression (up- or down-regulation) is

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essential for diagnosis and therapy. Thus, in the present study, we investigated the effects of α -PA on gene expression of WEHI-3 cells *in vitro* and found that α -PA altered expression of cell cycle-, DNA damage- and apoptosis-associated genes.

Materials and Methods

Chemicals and reagents. α -PA, propidium iodide (PI) and dimethyl sulfoxide (DMSO) were purchased from Sigma Chemical Co. (St. Louis, MO, USA). RPMI-1640 medium, glutamine, fetal bovine serum (FBS) and penicillin-streptomycin, trypsin-EDTA were purchased from Invitrogen (Carlsbad, CA, USA).

Cell culture. The mouse myelomonocytic WEHI-3 cell line was purchased from the Food Industry Research and Development Institute (Hsinchu, Taiwan). Cells were grown in RPMI-1640 medium supplemented with 10% (v/v) fetal bovine serum (FBS), 100 Units/ml penicillin, 100 μ g/ml streptomycin and 2 mM L-glutamine (Sigma-Aldrich, St. Louis, MO, USA). The cells were maintained in a humidified incubator with 5% CO₂ at 37°C, and the culture medium was changed every two days (7).

cDNA microarray assay in WEHI-3 cells treated with α -PA. WEHI-3 cells were plated at a density of 5×10⁵ cells/ml in 24-well plates containing RPMI-1640 medium with 10% (v/v) FBS and 2 mM L-glutamine, 100 Units/ml penicillin and 100 μ g/ml streptomycin for 24 h. After this procedure, cells were treated with 10 μ M α -PA or vehicle for 48 h and then harvested and centrifuged at 1500 × g for 5 min then washed twice with PBS. Total RNA was isolated using a Qiagen RNeasy Mini Kit (Qiagen, Valencia, CA, USA) and used for cDNA synthesis and labeling, microarray hybridization. In turn, this was followed by fluorescent-labeled cDNA hybridization (Affymetrix GeneChip Human Gene 1.0 ST array; Affymetrix, Santa Clara, CA, USA) on the chip as described previously (8). Fluorescence of the samples was quantitated by Asia BioInnovations Corporation (Taipei, Taiwan) and the data were analyzed using Expression Console software (Affymetrix) with default RNA parameters. For gene expression changes, a 1.8-fold difference in hybridization intensity/average differences was considered significantly different compared with the control group (8-11).

Statistical analysis. All assays were carried out in triplicate, and the results are presented as the means±SD. Genes regulated by α -PA by at least a 2-fold change were recorded. Data are representative of three separate assays.

Results

cDNA microarray analysis for α -PA-induced changes in expression of genes associated with DNA damage, cell cycle, and apoptosis in mouse myelomonocytic WEHI-3 cells. WEHI-3 cells were treated with or without 10 μ M α -PA for 48 h, then were harvested and total RNA from each treatment was isolated and then cDNA microarray analysis was performed. The results from microarray analysis are shown in Tables I and II, which indicate that 10 genes were 4-fold up-regulated, 13 were over 3-fold up-regulated and 175 were over 2-fold up-regulated; moreover, Table II indicates 21

genes over 4-fold down-regulated, 26 genes over 3-fold down-regulated and expression of 204 genes was altered by at least 2-fold compared to the untreated control cells.

Our results showed that genes associated with DNA damage such as DNA damage inducer transcript-4 was up-regulated 4-fold and DNA fragmentation factor was up-regulated over 2-fold. Genes associated with the cell cycle (cell check point genes), such as cyclin G2, were up-regulated over 3-fold, and cyclin-dependent kinase inhibitor 2D and IA (p21) were up-regulated over 2-fold. Apoptosis-associated genes such as BCL2/adenovirus E1B interacting protein 3, associated factor 3, BCL2-modifying factor, caspase-8 and like apoptosis regulator were up-regulated over 2-fold (Table I). Data in Table II shows that DNA damage-associated genes such as TATA box binding proteins were down-regulated over 4-fold and DNA segment down-regulated over 2-fold. Cell cycle-associated genes such as cyclin F2 were down-regulated over 2-fold, apoptosis-associated genes such as growth arrest-specific 5 were over 9-fold down-regulated, ATP synthase were over 3-fold down-regulated, Death box polypeptide 33 was over 2-fold down-regulated (Table II).

The top alterations in gene expression scored by the number of pathway networks from GeneGo analysis program (Taichung, Taiwan) from α -PA treated WEHI-3 cells for 48 h can be seen in Figures 1-3. Experimental data are mapped on the processes and shown as red (up regulation) and blue (down regulation) circles of different intensity. These genes may also be involved in DNA damage, cell cycle arrest and apoptosis-associated responses in α -PA-treated WEHI-3 cells.

Discussion

α -PA is present in plants such as *Schinus molle* L., *Schinus terebinthifolius* Raddi. (4) and *Zingiber officinale* Roscoe (5). It has been used as a spice and perfume but its biological function is scarcely reported. We found that α -PA can induce apoptosis of murine leukemia WEHI-3 cells (data not shown). We previously showed that α -PA induced immune responses in normal mice (6), however, its exact effects on cells are still unclear. Thus, in the present study, we are the first to show that α -PA affects gene expression in WEHI-3 cells.

Numerous studies have shown that cancer development, progression, and response to therapeutic agents are associated with stromal cells, matrix proteins, and secreted molecules that participate in the tumor microenvironment (12-14). Furthermore, a better understanding of the tumor microenvironment may assist in the development of cell culture and media. Under suitable *in vivo* conditions, then we may suggest that tumor microenvironment could provide a more accurate prediction of patient response to the therapy agents. Agents affect cells in culture media, including DNA damage, cell-cycle arrest and induction of apoptosis. In our earlier studies, we observed the

Table I. *Up-regulation of gene expression in α -phellandrene-treated WEHI-3 cells.*

Probeset ID	Fold change	Gene symbol	Gene description	mRNA accession no.	mRNA description
10399710	4.92	<i>Rsad2</i>	Radical S-adenosyl methionine domain containing 2	NM_021384	<i>Mus musculus</i> radical S-adenosyl methionine domain containing 2 (<i>Rsad2</i>), mRNA.
10435501	4.90	<i>Sfta1</i>	Stefin A1	NM_001082543	<i>Mus musculus</i> stefin A1 (<i>Sfta1</i>), mRNA.
10399691	4.88	<i>Id2</i>	Inhibitor of DNA binding 2	NM_010496	<i>Mus musculus</i> inhibitor of DNA binding 2 (<i>Id2</i>), mRNA.
10514466	4.78	<i>Jun</i>	Jun oncogene	NM_010591	<i>Mus musculus</i> Jun oncogene (<i>Jun</i>), mRNA.
10551526	4.75	<i>Il28b</i>	Interleukin 28B	NM_177396	<i>Mus musculus</i> interleukin 28B (<i>Il28b</i>), mRNA.
10541307	4.73	<i>Usp18</i>	Ubiquitin specific peptidase 18	NM_011909	<i>Mus musculus</i> ubiquitin specific peptidase 18 (<i>Usp18</i>), mRNA.
10569102	4.63	<i>Irf7</i>	Interferon regulatory factor 7	NM_016850	<i>Mus musculus</i> interferon regulatory factor 7 (<i>Irf7</i>), mRNA.
10547807	4.39	<i>Eno2</i>	Enolase 2, gamma neuronal	NM_013509	<i>Mus musculus</i> enolase 2, gamma neuronal (<i>Eno2</i>), mRNA.
10505028	4.33	<i>Slc44a1</i>	Solute carrier family 44, member 1	ENSMUST0000107651	Solute carrier family 44, member 1 gene: ENSMUSG00000028412
10437224	4.08	<i>Mx2</i>	Myxovirus (influenza virus) resistance 2	NM_003508	<i>Mus musculus</i> myxovirus (influenza virus) resistance 2 (<i>Mx2</i>), noN-coding RNA.
10397346	3.82	<i>Fos</i>	FBJ osteosarcoma oncogene	NM_010234	<i>Mus musculus</i> FBJ osteosarcoma oncogene (<i>Fos</i>), mRNA.
10379615	3.63	<i>Slfn5</i>	Schlafen 5	NM_183201	<i>Mus musculus</i> schlafen 5 (<i>Slfn5</i>), mRNA.
10369290	3.58	<i>Ddit4</i>	DNA-damage-inducible transcript 4	NM_029083	<i>Mus musculus</i> DNA-damage-inducible transcript 4 (<i>Ddit4</i>), mRNA.
10523297	3.55	<i>Ccng2</i>	Cyclin G2	NM_007635	<i>Mus musculus</i> cyclin G2 (<i>Ccng2</i>), mRNA.
10536794	3.37	<i>2310016C08Rik</i>	RIKEN cdna 2310016C08 gene	NM_023516	<i>Mus musculus</i> RIKEN cDNA 2310016C08 gene (<i>2310016C08Rik</i>), mRNA.
10391207	3.23	<i>Dhx58</i>	DEXH (Asp-Glu-X-His) box polypeptide 58	NM_030150	<i>Mus musculus</i> DEXH (Asp-Glu-X-His) box polypeptide 58 (<i>Dhx58</i>), mRNA.
10597279	3.19	<i>Ccr12</i>	Chemokine (C-C motif) receptor-like 2	NM_017466	<i>Mus musculus</i> chemokine (C-C motif) receptor-like 2 (<i>Ccr12</i>), mRNA.
10552824	3.17	<i>Rras</i>	Harvey rat sarcoma oncogene, subgroup R	NM_009101	<i>Mus musculus</i> Harvey rat sarcoma oncogene, subgroup R (<i>Rras</i>), mRNA.
10531415	3.13	<i>Cxcl10</i>	Chemokine (C-X-C motif) ligand 10	NM_021274	<i>Mus musculus</i> chemokine (C-X-C motif) ligand 10 (<i>Cxcl10</i>), mRNA.
10395039	3.08	<i>Cmpk2</i>	Cytidine monophosphate (UMP-CMP) kinase 2, mitochondrial	NM_020557	<i>Mus musculus</i> cytidine monophosphate (UMP-CMP) kinase 2, mitochondrial (<i>Cmpk2</i>), mRNA.
10357875	3.06	<i>Btg2</i>	B cell translocation gene 2, anti-proliferative	NM_007570	<i>Mus musculus</i> B cell translocation gene 2, anti-proliferative (<i>Btg2</i>), mRNA.
10545001	3.05	<i>Ppm1k</i>	Protein phosphatase 1K (PP2C domain containing)	NM_175523	<i>Mus musculus</i> protein phosphatase 1K (PP2C domain containing) (<i>Ppm1k</i>), nuclear gene.
10439249	3.03	<i>Parp14</i>	Poly (ADP-ribose) polymerase family, member 14	NM_001039530	<i>Mus musculus</i> poly (ADP-ribose) polymerase family, member 14 (<i>Parp14</i>), mRNA.
10420155	2.95	<i>Dhrs1</i>	Dehydrogenase/reductase (SDR family) member 1	NM_026819	<i>Mus musculus</i> dehydrogenase/reductase (SDR family) member 1 (<i>Dhrs1</i>), mRNA.
10390519	2.88	<i>Plxdc1</i>	Plexin domain containing 1	NM_001163608	<i>Mus musculus</i> plexin domain containing 1 (<i>Plxdc1</i>), transcript variant 1, mRNA.
10533213	2.86	<i>Oas3</i>	2'-5' oligoadenylate synthetase 3	NM_145226	<i>Mus musculus</i> 2'-5' oligoadenylate synthetase 3 (<i>Oas3</i>), mRNA.
10536898	2.85	<i>Irf5</i>	Interferon regulatory factor 5	NM_012057	<i>Mus musculus</i> interferon regulatory factor 5 (<i>Irf5</i>), mRNA.
10407072	2.83	<i>Elov17</i>	ELOVL family member 7, elongation of long chain fatty acids (yeast)	NM_029001	<i>Mus musculus</i> ELOVL family member 7, elongation of long chain fatty acids (yeast) (<i>Elov17</i>), mRNA.
10389207	2.82	<i>Ccl5</i>	Chemokine (C-C motif) ligand 5	NM_013653	<i>Mus musculus</i> chemokine (C-C motif) ligand 5 (<i>Ccl5</i>), mRNA.
10545130	2.79	<i>Gadd45a</i>	Growth arrest and DNA-damage-inducible 45 alpha	NM_007836	<i>Mus musculus</i> growth arrest and DNA-damage-inducible 45 alpha (<i>Gadd45a</i>), mRNA.
10511803	2.79	<i>2610029I01Rik</i>	RIKEN cdna 2610029I01 gene	NM_029840	<i>Mus musculus</i> RIKEN cDNA 2610029I01 gene (<i>2610029I01Rik</i>), mRNA.
10491825	2.71	<i>3110057O12Rik</i>	RIKEN cdna3110057o12 gene	BC145212	<i>Mus musculus</i> RIKEN cDNA 3110057O12 gene, mRNA (cDNA clone MGC:178771 IMAGE:9053763).
10533720	2.70	<i>Niacr1</i>	Niacin receptor 1	NM_030701	<i>Mus musculus</i> niacin receptor 1 (<i>Niacr1</i>), mRNA.

Table I. *Continued*

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Probeset ID	Fold change	Gene symbol	Gene description	mRNA accession no.	mRNA description
10443463	2.70	<i>Cdkn1a</i>	Cyclin-dependent kinase inhibitor 1A (P21)	NM_007669	<i>Mus musculus</i> cyclin-dependent kinase inhibitor 1A (P21) (<i>Cdkn1a</i>), transcript variant 1, mRNA.
10404051	2.69	<i>Hist1h4d</i>	Histone cluster 1, h4d	NM_175654	<i>Mus musculus</i> histone cluster 1, H4d (<i>Hist1h4d</i>), mRNA.
10508392	2.67	<i>Rnf19b</i>	Ring finger protein 19B	NM_029219	<i>Mus musculus</i> ring finger protein 19B (<i>Rnf19b</i>), mRNA.
10358713	2.67	<i>1700025G04Rik</i>	RIKEN cdna 1700025G04 gene	NM_197990	<i>Mus musculus</i> RIKEN cDNA 1700025G04 gene (1700025G04Rik), mRNA.
10369993	2.67	<i>Gstt3</i>	Glutathione S-transferase, theta 3	NM_133994	<i>Mus musculus</i> glutathione S-transferase, theta 3 (<i>Gstt3</i>), mRNA.
10414576	2.67	<i>Gm5622</i>	Predicted gene 5622	NM_001013816	<i>Mus musculus</i> predicted gene 5622 (<i>Gm5622</i>), mRNA.
10434806	2.66	<i>Lpp</i>	LIM domain containing preferred translocation partner in lipoma	NM_178665	<i>Mus musculus</i> LIM domain containing preferred translocation partner in lipoma (<i>Lpp</i>), mRNA.
10358982	2.66	<i>Mr1</i>	Major histocompatibility complex, class I-related	NM_008209	<i>Mus musculus</i> major histocompatibility complex, class I-related (<i>Mr1</i>), mRNA.
10545921	2.65	<i>Mxd1</i>	MAX dimerization protein 1	NM_010751	<i>Mus musculus</i> MAX dimerization protein 1 (<i>Mxd1</i>), mRNA.
10483401	2.65	<i>Spc25</i>	SPC25, NDC80 kinetochore complex component, homolog (<i>S. cerevisiae</i>)	NM_025565	<i>Mus musculus</i> SPC25, NDC80 kinetochore complex component, homolog (<i>S. cerevisiae</i>) (<i>Spc25</i>), mRNA.
10512030	2.65	<i>3110043O21Rik</i>	RIKEN cdna 3110043O21 gene	BC076612	<i>Mus musculus</i> RIKEN cDNA 3110043O21 gene, mRNA (cDNA clone MGC: 100148 IMAGE:30638238).
10406198	2.63	<i>Ftl2</i>	Ferritin light chain 2	NM_008049	<i>Mus musculus</i> ferritin light chain 2 (<i>Ftl2</i>), mRNA.
10556528	2.63	<i>Pde3b</i>	Phosphodiesterase 3B, cgmp-inhibited	NM_011055	<i>Mus musculus</i> phosphodiesterase 3B, cGMP-inhibited (<i>Pde3b</i>), mRNA.
10400304	2.62	<i>Egln3</i>	EGL nine homolog 3 (<i>C. Elegans</i>)	NM_028133	<i>Mus musculus</i> EGL nine homolog 3 (<i>C. elegans</i>) (<i>Egln3</i>), mRNA.
10447591	2.61	<i>Ftl1</i>	Ferritin light chain 1	NM_010240	<i>Mus musculus</i> ferritin light chain 1 (<i>Ftl1</i>), mRNA.
10551815	2.61	<i>Zfp260</i>	Zinc finger protein 260	NM_011981	<i>Mus musculus</i> zinc finger protein 260 (<i>Zfp260</i>), mRNA.
10455954	2.60	<i>Gm4951</i>	Predicted gene 4951	NM_001033767	<i>Mus musculus</i> predicted gene 4951 (<i>Gm4951</i>), mRNA.
10563295	2.60	<i>Ftl1</i>	Ferritin light chain 1	NM_010240	<i>Mus musculus</i> ferritin light chain 1 (<i>Ftl1</i>), mRNA.
10414269	2.59	<i>Bnip3</i>	BCL2/adenovirus E1B interacting protein 3	NM_009760	<i>Mus musculus</i> BCL2/adenovirus E1B interacting protein 3 (<i>Bnip3</i>), nuclear gene encoding.
10508069	2.58	<i>Ftl2</i>	Ferritin light chain 2	NM_008049	<i>Mus musculus</i> ferritin light chain 2 (<i>Ftl2</i>), mRNA.
10432540	2.57	<i>Lima1</i>	LIM domain and actin binding 1	NM_001113545	<i>Mus musculus</i> LIM domain and actin binding 1 (<i>Lima1</i>), transcript variant a, mRNA.
10533256	2.56	<i>Oas1a</i>	2'-5' oligoadenylate synthetase 1A	NM_145211	<i>Mus musculus</i> 2'-5' oligoadenylate synthetase 1A (<i>Oas1a</i>), mRNA.
10365344	2.55	<i>Tcp1112</i>	T-complex 11 (mouse) like 2	NM_146008	<i>Mus musculus</i> t-complex 11 (mouse) like 2 (<i>Tcp1112</i>), mRNA.
10400405	2.55	<i>Nfkbia</i>	Nuclear factor of kappa light polypeptide gene enhancer in B cells inhibitor, alpha	NM_010907	<i>Mus musculus</i> nuclear factor of kappa light polypeptide gene enhancer in B cells inhibitor, alpha (<i>Nfkbia</i>), mRNA.
10409278	2.55	<i>Nfil3</i>	Nuclear factor, interleukin 3, regulated	NM_017373	<i>Mus musculus</i> nuclear factor, interleukin 3, regulated (<i>Nfil3</i>), mRNA.
10461402	2.54	<i>Fth1</i>	Ferritin heavy chain 1	NM_010239	<i>Mus musculus</i> ferritin heavy chain 1 (<i>Fth1</i>), mRNA.
10448202	2.52	<i>Tpm4</i>	Tropomyosin 4	NM_001001491	<i>Mus musculus</i> tropomyosin 4 (<i>Tpm4</i>), mRNA.
10427454	2.48	<i>Card6</i>	Caspase recruitment domain family, member 6	NM_001163138	<i>Mus musculus</i> caspase recruitment domain family, member 6 (<i>Card6</i>), mRNA.
10512067	2.48	<i>Ddx58</i>	DEAD (Asp-Glu-Ala-Asp) box polypeptide 58	NM_172689	<i>Mus musculus</i> DEAD (Asp-Glu-Ala-Asp) box polypeptide 58 (<i>Ddx58</i>), mRNA.
10453797	2.48	<i>Greb11</i>	Growth regulation by estrogen in breast cancer-like	NM_001083628	<i>Mus musculus</i> growth regulation by estrogen in breast cancer-like (<i>Greb11</i>), mRNA.
10517421	2.47	<i>Pnrc2</i>	Proline-rich nuclear receptor coactivator 2	NM_026383	<i>Mus musculus</i> proline-rich nuclear receptor coactivator 2 (<i>Pnrc2</i>), mRNA.
10434778	2.46	<i>Rtp4</i>	Receptor transporter protein 4	NM_023386	<i>Mus musculus</i> receptor transporter protein 4 (<i>Rtp4</i>), mRNA.
10571984	2.45	<i>Ddx60</i>	DEAD (Asp-Glu-Ala-Asp) box polypeptide 60	NM_001081215	<i>Mus musculus</i> DEAD (Asp-Glu-Ala-Asp) box polypeptide 60 (<i>Ddx60</i>), mRNA.
10376021	2.44	<i>Sept8</i>	Septin 8	NM_033144	<i>Mus musculus</i> septin 8 (<i>Sept8</i>), mRNA.
10396831	2.44	<i>Arg2</i>	Arginase type II	NM_009705	<i>Mus musculus</i> arginase type II (<i>Arg2</i>), mRNA.

Table I. *Continued*

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Probeset ID	Fold change	Gene symbol	Gene description	mRNA accession no.	mRNA description
10437590	2.43	<i>Carhsp1</i>	Calcium regulated heat stable protein 1	NM_025821	<i>Mus musculus</i> calcium regulated heat stable protein 1 (Carhsp1), mRNA.
10425207	2.43	<i>H1f0</i>	H1 histone family, member O	NM_008197	<i>Mus musculus</i> H1 histone family, member O (H1f0), mRNA
10549473	2.41	<i>Caprin2</i>	Caprin family member 2	NM_181541	<i>Mus musculus</i> caprin family member 2(Caprin2), mRNA
10554693	2.41	<i>Stard5</i>	Star-related lipid transfer (START) domain containing 5	NM_023377	<i>Mus musculus</i> caprin family member 2 Star-related lipid transfer (START) domain containing 5 (Stard5), mRNA
10416423	2.41	<i>5031414D18Rik</i>	RIKEN cDNA 5031414D18 gene	NM_198642	<i>Mus musculus</i> RIKEN cDNA 5031414D18 gene (5031414D18Rik), mRNA
10382890	2.40	<i>Sec14l1</i>	SEC14-like 1 (<i>S. Cerevisiae</i>)	NM_001166506	<i>Mus musculus</i> SEC14-like 1 (<i>S. cerevisiae</i>) (Sec14l1), transcript variant, mRNA
10355668	2.40	<i>Mir375</i>	Microna 375	NR_029876	<i>Mus musculus</i> microRNA 375 (Mir375), microRNA
10521913	2.39	<i>Rbpj</i>	Recombination signal binding protein for immunoglobulin kappa J region	NM_009035	<i>Mus musculus</i> recombination signal binding protein for immunoglobulin kappa J region (Rbpj), mRNA
10566926	2.39	<i>Rnf141</i>	Ring finger protein 141	NM_025999	<i>Mus musculus</i> ring finger protein 141 (Rnf141), mRNA
10494114	2.38	<i>Selenbp1</i>	Selenium binding protein 1	NM_009150	<i>Mus musculus</i> selenium binding protein 1 (Selenbp1), mRNA
10379228	2.38	<i>Nos2</i>	Nitric oxide synthase 2, inducible	NM_010927	<i>Mus musculus</i> nitric oxide synthase 2, inducible (Nos2), mRNA
10476301	2.36	<i>Smox</i>	Spermine oxidase	NM_001177833	<i>Mus musculus</i> spermine oxidase (Smox), transcript variant 1, mRNA
10569823	2.36	<i>C330021F23Rik</i>	RIKEN cDNA C330021F23 gene	NM_001024728	<i>Mus musculus</i> RIKEN cDNA C330021F23 gene (C330021F23Rik), mRNA
10591517	2.35	<i>Cdkn2d</i>	Cyclin-dependent kinase inhibitor 2D (p19, inhibits CDK4)	NM_009878	<i>Mus musculus</i> cyclin-dependent kinase inhibitor 2D (p19, inhibits CDK4) (Cdkn2d), mRNA
10358357	2.35	<i>Gm4845</i>	Predicted gene 4845	ENSMUST0000081144	hypothetical protein geneENSMUSG00000063042
10496569	2.35	<i>Gbp6</i>	Guanylate binding protein 6	NM_145545	<i>Mus musculus</i> guanylate binding protein 6 (Gbp6), mRNA
10404053	2.34	<i>Hist1h2bc</i>	Histone cluster 1, h2bc	NM_023422	<i>Mus musculus</i> histone cluster 1, H2bc (Hist1h2bc), mRNA
10607865	2.31	<i>Tmsb4x</i>	Thymosin beta 4, X chromosome	NM_021278	<i>Mus musculus</i> thymosin beta 4, X chromosome (Tmsb4x),mRNA
10371332	2.31	<i>Aldh1l2</i>	Aldehyde dehydrogenase 1 fami;y, member L2	NM_153543	<i>Mus musculus</i> Aldehyde dehydrogenase 1 fami;y, member L2 (Aldh1l2), mRNA
10515051	2.30	<i>Osbp19</i>	Oxysterol binding protein-like 9	NM_133885	<i>Mus musculus</i> Oxysterol binding protein-like 9 (Osbp19), transcript variant a, mRNA
10428336	2.30	<i>Ft12 // Ft12 // Ft12 //</i>	Ferritin light chain 2 // Ferritin light chain 2 // Ferritin light chain 2 //	NM_008049	<i>Mus musculus</i> Ferritin light chain 2 (Ft12), mRNA
10361091	2.30	<i>Atf3</i>	Activating transcription factor 3	NM_007498	<i>Mus musculus</i> activating transcription factor 3 (Atf3), mRNA
10378068	2.29	<i>Xaf1</i>	XIAP associated factor 1	NM_001037719	<i>Mus musculus</i> XIAP associated factor 1 (Xaf1), mRNA
10579872	2.29	<i>Tpd52</i>	Tumor protein D52	NM_009412	<i>Mus musculus</i> tumor protein D52 (Tpd52), transcript variant 5, mRNA
10566144	2.29	<i>Trim21</i>	Tripartite motif containing 21	NM_009277	<i>Mus musculus</i> tripartite motif containing 21 (Trim21), transcript variant 1, mRNA
10566358	2.28	<i>Trim30</i>	Tripartite motif containing 30	NM_009099	<i>Mus musculus</i> tripartite motif containing 30 (Trim30), mRNA
10501811	2.28	<i>Slc44a3</i>	Solute carrier family 44, member 3	NM_145394	<i>Mus musculus</i> Solute carrier family 44, member 3 (Slc44a3) mRNA
10379636	2.27	<i>Slfn4</i>	Schlafen 4	NM_011410	<i>Mus musculus</i> schlafen 4 (Slfn4), mRNA
10389627	2.27	<i>Rad51c</i>	RAD51 homolog C (<i>S. cerevisiae</i>)	NM_053269	<i>Mus musculus</i> RAD51 homolog C (<i>S. cerevisiae</i>) (Rad51c), mRNA
10507675	2.27	<i>Hivep3</i>	Human immunodeficiency virus type I enhancer binding protein 3	AY454346	<i>Mus musculus</i> clone 5'RACE 1 ZAS3 (Krc) mRNA, 5'UTR
10483110	2.26	<i>Ifih1</i>	Interferon induced with helicase C domain 1	NM_027835	<i>Mus musculus</i> interferon induced with helicase C domain 1 (Ifih1), transcript variant 1, mRNA
10552276	2.26	<i>Ube2h</i>	Ubiquitin-conjugating enzyme E2H	NM_009459	<i>Mus musculus</i> Ubiquitin-conjugating enzyme E2H (Ube2h), transcript variant 1, mRNA

Table I. *Continued*

Table I. Continued

Probeset ID	Fold change	Gene symbol	Gene description	mRNA accession no.	mRNA description
10384968	2.26	<i>Bod1</i>	Biorientation of chromosomes in cell division 1	NM_001024919	<i>Mus musculus</i> biorientation of chromosomes in cell division 1 (Bod1), mRNA
10346191	2.25	<i>Stat1</i>	Signal transducer and activator of transcription 1,	NM_009283	<i>Mus musculus</i> signal transducer and activator of transcription 1 (Stat1), mRNA
10604633	2.24	<i>Cxx1a</i>	CAAX box 1 homologo A (human)	NM_024170	<i>Mus musculus</i> CAAX box 1 homologo A (human) (Cxx1a), mRNA
10568785	2.24	<i>Bnip3</i>	BCL2/adenovirus E1B interacting protein 3	NM_009760	<i>Mus musculus</i> BCL2/adenovirus E1B interacting protein 3 (Bnip3), nuclear gene encoding mitochondrial protein
10577586	2.24	<i>Ap3m2</i>	Adaptor-related protein complex 3, mu 2 subunit	NM_001122820	<i>Mus musculus</i> adaptor-related protein complex 3, mu 2 subunit (Ap3m2), transcript variant 1, mRNA
10525158	2.24	<i>Oas1b</i>	2'-5' oligoadenylate synthetase 1B	NR_003507	<i>Mus musculus</i> 2'-5' oligoadenylate synthetase 1B (Oas1b), noN-coding RNA
10419578	2.24	<i>Ndr2</i>	N-myc downstream regulated gene 2	NM_013864	<i>Mus musculus</i> N-myc downstream regulated gene 2 (Ndr2), transcript variant 1, mRNA
10373542	2.22	<i>Dgka</i>	Diacylglycerol kinase, alpha	NM_016811	<i>Mus musculus</i> diacylglycerol kinase, alpha (Dgka), mRNA
10404038	2.22	<i>Hist1h3d</i>	Histone cluster 1, h3d	NM_178204	<i>Mus musculus</i> histone cluster 1, H3d (Hist1h3d), mRNA
10602166	2.22	<i>Nxt2</i>	Nuclear transport factor 2-like export factor 2	NM_172782	<i>Mus musculus</i> nuclear transport factor 2-like export factor 2 (Nxt2), transcript variant 1, mRNA
10560015	2.21	<i>Rnf141</i>	Ring finger protein 141	NM_025999	<i>Mus musculus</i> ring finger protein 141 (Rnf141), mRNA
10466606	2.21	<i>Anxa1</i>	Annexin A1	NM_010730	<i>Mus musculus</i> annexin A1 (Anxa1), mRNA
10551009	2.21	<i>Tmsb10</i>	Thymosin beta 10	NM_025284	<i>Mus musculus</i> thymosin beta 10 (Tmsb10), mRNA
10482434	2.21	<i>Gtdc1</i>	Glycosyltransferase-like domain containing 1	NM_172662	<i>Mus musculus</i> glycosyltransferase-like domain containing 1 (Gtdc1), mRNA
10347933	2.19	<i>Sp140</i>	SP140 nuclear body protein	NM_001013817	<i>Mus musculus</i> SP140 nuclear body protein (Sp140), mRNA
10543686	2.18	<i>Ube2h</i>	Ubiquitin-conjugating enzyme E2H	NM_009459	<i>Mus musculus</i> ubiquitin-conjugating enzyme E2H (Ube2h), transcript variant 1, mRNA
10414802	2.18	<i>Gm10893</i>	Predicted gene 10893	ENSMUST0000103606	Similar to T-cell receptor alpha chain gene:ENSMUSG00000076796
10443027	2.18	<i>A93000</i>	RIKEN cdna	NM_029870	<i>Mus musculus</i> RIKEN cDNA
10462390	2.18	<i>IN09Rik</i>	A930001N09 gene		A930001N09 gene (A930001N09Rik), mRNA
10494085	2.18	<i>Cd274</i>	CD274 antigen	NM_021893	<i>Mus musculus</i> CD274 antigen (Cd274), mRNA
10449284	2.17	<i>Selenbp2</i>	Selenium binding protein 2	NM_019414	<i>Mus musculus</i> selenium binding protein 2 (Selenbp2), mRNA
10486112	2.17	<i>Dusp1</i>	Dual specificity phosphatase 1	NM_013642	<i>Mus musculus</i> dual specificity phosphatase 1 (Dusp1), mRNA
10486112	2.17	<i>Bmf</i>	Bcl2 modifying factor	NM_0138313	<i>Mus musculus</i> Bcl2 modifying factor (Bmf), mRNA
10561673	2.17	<i>Spred3</i>	Sprouty-related, EVH1 domain containing 3	NM_182927	<i>Mus musculus</i> sprouty-related, EVH1 domain containing 3 (Spred3), mRNA
10388254	2.17	<i>Aspa</i>	Aspartoacylase	NM_023113	<i>Mus musculus</i> aspartoacylase (Aspa), mRNA
10376326	2.17	<i>Irgm2</i>	Immunity-related gtpase family M member 2	NM_019440	<i>Mus musculus</i> immunity-related GTPase family M member 2 (Irgm2), mRNA
10346365	2.16	<i>Sgol2</i>	Shugoshin-like 2 (S. Pombe)	NM_199007	<i>Mus musculus</i> shugoshiN-like 2 (S. pombe) (Sgol2), transcript variant 1, mRNA
10603567	2.16	<i>Dynlt3</i>	Dynein, light chain, Tctex-type 3	NM_025975	<i>Mus musculus</i> dynein, light chain, Tctex-type 3 (Dynlt3), mRNA
10544148	2.16	<i>Jhdm1d</i>	Jumonji C domain containing histone demethylase 1 homolog D (<i>S. Cerevisiae</i>)	NM_001033430	<i>Mus musculus</i> jumonji C domain containing histone demethylase 1 homolog D (<i>S. cerevisiae</i>) (Jhdm1d), mRNA
10398459	2.16	<i>Ppp2r5c</i>	Protein phosphatase 2, regulatory subunit B (B56), gamma isoform	NM_001135001	<i>Mus musculus</i> protein phosphatase 2, regulatory subunit B (B56), gamma isoform (Ppp2r5c), mRNA
10434302	2.16	<i>Klhl24</i>	Kelch-like 24 (<i>Drosophila</i>)	NM_029436	<i>Mus musculus</i> kelch-like 24 (<i>Drosophila</i>) (Klhl24), mRNA
10403943	2.15	<i>Hist1h2bm</i>	Histone cluster 1, h2bm	NM_178200	<i>Mus musculus</i> histone cluster 1, H2bm (Hist1h2bm), mRNA
10545479	2.15	<i>Tmsb10</i>	Thymosin beta 10	NM_025284	<i>Mus musculus</i> thymosin beta 10 (Tmsb10), mRNA
10382300	2.15	<i>Map2k6</i>	Mitogen-activated protein kinase kinase 6	NM_011943	<i>Mus musculus</i> mitogen-activated protein kinase kinase 6 (Map2k6), mRNA
10358717	2.15	<i>1700025</i> <i>G04Rik</i>	RIKEN cdna 1700025G04 gene	NM_197990	<i>Mus musculus</i> RIKEN cDNA 1700025G04 gene (1700025G04Rik), mRNA

Table I. Continued

Table I. *Continued*

Probeset ID	Fold change	Gene symbol	Gene description	mRNA accession no.	mRNA description
10607467	2.13	<i>Sat1</i>	Spermidine/spermine N1-acetyl transferase 1	NM_009121	<i>Mus musculus</i> spermidine/spermine N1-acetyl transferase 1 (Sat1), mRNA
10424781	2.13	<i>Grina</i>	Glutamate receptor, ionotropic, N-methyl D-aspartate-associated protein 1 (glutamate binding)	NM_023168	<i>Mus musculus</i> glutamate receptor, ionotropic, N-methyl D-aspartate-associated protein 1 (glutamate binding) (Grina), mRNA
10551355	2.13	<i>Sertad3</i>	SERTA domain containing 3	NM_133210	<i>Mus musculus</i> SERTA domain containing 3 (Sertad3), mRNA
10380137	2.12	<i>Bzrap1</i>	Benzodiazepine receptor associated protein 1	NM_172449	<i>Mus musculus</i> benzodiazepine receptor associated protein 1 (Bzrap1), mRNA
105582862	2.12	<i>Arhgef12</i>	Rho guanine nucleotide exchange factor (GEF) 12	NM_027144	<i>Mus musculus</i> Rho guanine nucleotide exchange factor (GEF) 12 (Arhgef12), mRNA
10482868	2.11	<i>Wdsub1</i>	WD repeat, SAM and U-box domain containing 1	NM_028118	<i>Mus musculus</i> WD repeat, SAM and U-box domain containing 1 (Wdsub1), transcript variant 1, mRNA.
10530215	2.11	<i>1110003 E01Rik</i>	RIKEN cdna 1110003E01 gene	BC009097	<i>Mus musculus</i> RIKEN cDNA 1110003E01 gene, mRNA (cDNA clone MGC:7185 IMAGE:3481841), complete cds.
10507347	2.11	<i>Tesk2</i>	Testis-specific kinase 2	Nm_146151	<i>Mus musculus</i> testis-specific kinase 2 (Tesk2), mRNA.
10366043	2.10	<i>Dusp6</i>	Dual specificity phosphatase 6	Nm_026268	<i>Mus musculus</i> dual specificity phosphatase 6 (Dusp6), mRNA
10563797	2.10	<i>Dbx1</i>	Developing brain homeobox 1	Nm_001005232	<i>Mus musculus</i> developing brain homeobox 1 (Dbx1), mRNA
10505996	2.10	<i>Fggy</i>	FGGY carbohydrate kinase domain containing	NM_001113412	<i>Mus musculus</i> FGGY carbohydrate kinase domain containing (Fggy), transcript variant 1, mRNA
10552945	2.10	<i>Gys1</i>	Glycogen synthase 1, muscle	Nm_030678	<i>Mus musculus</i> glycogen synthase 1, muscle (Gys1), mRNA
10462623	2.09	<i>Ifit1</i>	Interferon-induced protein with tetratricopeptide repeats 1	Nm_008331	<i>Mus musculus</i> interferon-induced protein with tetratricopeptide repeats 1 (Ifit1), mRNA
10472598	2.09	<i>Klhl23</i>	Kelch-like 23	Nm_177784	<i>Mus musculus</i> kelch-like 23 (Drosophila) (Klhl23), mRNA
10404059	2.08	<i>Hist1h1c</i>	Histone cluster 1, h1c	NM_015786	<i>Mus musculus</i> histone cluster 1, H1c (Hist1h1c), mRNA.
10467493	2.08	<i>Tctn3</i>	Tectonic family member 3	Nm_026260	<i>Mus musculus</i> tectonic family member 3 (Tctn3), mRNA
10561842	2.08	<i>Capns1</i>	Calpain, small subunit 1	Nm_009795	<i>Mus musculus</i> calpain, small subunit 1 (Capns1), mRNA
10346562	2.08	<i>Cflar</i>	CASP8 and FADD-like apoptosis regulator	NM_207653	<i>Mus musculus</i> CASP8 and FADD-like apoptosis regulator (Cflar), transcript variant 1, mRNA.
10386636	2.07	<i>Usp22</i>	Ubiquitin specific peptidase 22	Nm_001004143	<i>Mus musculus</i> ubiquitin specific peptidase 22 (Usp22), mRNA.
10569707	2.07	<i>Myadm</i>	Myeloid-associated differentiation marker	Nm_001093765	<i>Mus musculus</i> myeloid-associated differentiation marker (Myadm), transcript variant 2, mRNA
10977689	2.07	<i>Gabarap</i>	Gamma-aminobutyric acid receptor associated protein	Nm_019749	<i>Mus musculus</i> gamma-aminobutyric acid receptor associated protein (Gabarap), mRNA
10347948	2.07	<i>Sp100</i>	Nuclear antigensp100	NM_013673	<i>Mus musculus</i> nuclear antigen Sp100 (Sp100), mRNA
10392449	2.07	<i>Wipi1</i>	WD repeat domain, phosphoinositide interacting 1	NM_145940	<i>Mus musculus</i> WD repeat domain, phosphoinositide interacting 1 (Wipi1), mRNA
10598839	2.07	<i>Rp2h</i>	Retinitis pigmentosa 2 homolog (human)	Nm_133669	<i>Mus musculus</i> retinitis pigmentosa 2 homolog (human) (Rp2h), mRNA
10490150	2.06	<i>Zbp1</i>	Z-DNA binding protein 1	NM_021394	<i>Mus musculus</i> Z-DNA binding protein 1 (Zbp1), transcript variant 1, mRNA
10395259	2.06	<i>Nampt</i>	Nicotinamide phosphoribosyltransferase	Nm_021524	<i>Mus musculus</i> nicotinamide phosphoribosyltransferase (Nampt), mRNA.
10396652	2.06	<i>Hspa2</i>	Heat shock protein 2	Nm_001002012	<i>Mus musculus</i> heat shock protein 2 (Hspa2), transcript variant 2, mRNA
10409330	2.06	<i>48334 39L19Rik</i>	RIKEN cdna 4833439L19 gene	NM_133797	<i>Mus musculus</i> RIKEN cDNA 4833439L19 gene (4833439L19Rik), transcript variant 1, mRNA
10450519	2.06	<i>Tcf19</i>	Transcription factor 19	Nm_001163763	<i>Mus musculus</i> transcription factor 19 (Tcf19), transcript variant 1, mRNA
10421214	2.05	<i>Rhobtb2</i>	Rho-related BTB domain containing 2	NM_153514	<i>Mus musculus</i> Rho-related BTB domain containing 2 (Rhobtb2), mRNA
10440469	2.05	<i>Gm6032</i>	Predicted gene 6032	Xr_031351	PREDICTED: <i>Mus musculus</i> similar to Scr3 (LOC547311), misc RNA
10454782	2.05	<i>Egr1</i>	Early growth response 1	Nm_007913	<i>Mus musculus</i> early growth response 1 (Egr1), mRNA
10604637	2.05	<i>Cxx1a</i>	CAAX box homolog 1A	NM_024170	<i>Mus musculus</i> CAAX box 1 homolog A (human) (Cxx1a), mRNA.
10379153	2.05	<i>Aldoc</i>	Aldolase C, fructose-bisphosphate	NM_009657	<i>Mus musculus</i> aldolase C, fructose-bisphosphate (Aldoc), mRNA

Table I. *Continued*

Table I. Continued

Probeset ID	Fold change	Gene symbol	Gene description	mRNA accession no.	mRNA description
10594800	2.05	<i>Fam63b</i>	Family with sequence similarity 63, member B	NM_172772	<i>Mus musculus</i> family with sequence similarity 63, member B (Fam63b), mRNA
10604520	2.04	<i>Fam122b</i>	Family with sequence similarity 122, member B	NM_001166365	<i>Mus musculus</i> family with sequence similarity 122, member B (Fam122b), transcript variant 1, mRNA
10367224	2.04	<i>Stat2</i>	Signal transducer and activator of transcription 2	Nm_019963	<i>Mus musculus</i> signal transducer and activator of transcription 2 (Stat2), mRNA
10380751	2.04	<i>Mrpl45</i>	Mitochondrial ribosomal protein L45	NM_025927	<i>Mus musculus</i> mitochondrial ribosomal protein L45 (Mrpl45), mRNA, nuclear gene encoding mRNA.
10557591	2.03	<i>Itgal</i>	Integrin, alpha L	NM_008400	<i>Mus musculus</i> integrin alpha L (Itgal), mRNA
10453451	2.03	<i>Calm2</i>	Calmodulin 2	Nm_007589	<i>Mus musculus</i> calmodulin 2 (Calm2), mRNA
10380566	2.03	<i>Phospho1</i>	Phosphatase, orphan 1	NM_153104	<i>Mus musculus</i> phosphatase, orphan 1 (Phospho1), mRNA
10513381	2.03	<i>Rod1</i>	ROD1 regulator of differentiation 1 (S. Pombe)	NM_144904	<i>Mus musculus</i> ROD1 regulator of differentiation 1 (S. pombe) (Rod1), transcript variant 1
10498053	2.02	<i>4930583H14Rik</i>	RIKEN cdna 4930583H14 gene	NR_028121	<i>Mus musculus</i> RIKEN cDNA 4930583H14 gene (4930583H14Rik), transcript variant 1 as transfection-ready DNA
10477649	2.02	<i>Acsc2</i>	Acyl-coa synthetase short-chain family member 2	NM_019811	<i>Mus musculus</i> acyl-CoA synthetase short-chain family member 2 (Acsc2), mRNA
10492335	2.02	<i>Rap2b</i>	RAP2B, member of RAS oncogene family	NM_028712	<i>Mus musculus</i> RAP2B, member of RAS oncogene family (Rap2b), mRNA
10595924	2.02	<i>Pik3cb</i>	Phosphatidylinositol 3-kinase, catalytic, beta polypeptide	Nm_029094	<i>Mus musculus</i> phosphatidylinositol 3-kinase, catalytic, beta polypeptide (Pik3cb), mRNA
10388154	2.02	<i>Med31</i>	Mediator of RNA polymerase II transcription subunit 31	NM_026068	<i>Mus musculus</i> mediator of RNA polymerase II transcription, subunit 31 homolog (yeast) organism
10569877	2.02	<i>1810033B17Rik</i>	RIKEN cdna 1810033B17 gene	NM_026985	<i>Mus musculus</i> RIKEN cDNA 1810033B17 gene (1810033B17Rik), mRNA
10407946	2.02	<i>Stard3n1</i>	STARD3 N-terminal like	NM_024270	<i>Mus musculus</i> STARD3 N-terminal like (Stard3n1), mRNA
10489107	2.02	<i>Samhd1</i>	SAM domain and HD domain 1	NM_018851	<i>Mus musculus</i> SAM domain and HD domain, 1 (Samhd1), transcript variant 1, mRNA
10519504	2.01	<i>Sri</i>	Sorcin	Nm_025618	<i>Mus musculus</i> sorcin (Sri), transcript variant 2, mRNA
10388377	2.01	<i>Srr</i>	Serine racemase	Nm_013761	<i>Mus musculus</i> serine racemase (Srr), transcript variant 1, mRNA
10552440	2.01	<i>Zfp719</i>	Zinc finger protein 719	Nm_172482	<i>Mus musculus</i> zinc finger protein 719 (Zfp719), mRNA
10490203	2.01	<i>Gnas</i>	GNAS (guanine nucleotide binding protein, alpha stimulating) complex locus	NM_010309	<i>Mus musculus</i> GNAS (guanine nucleotide binding protein, alpha stimulating) complex locus (Gnas), transcript variant 1, mRNA
10585992	2.01	<i>Myo9a</i>	Myosin IXA	NM_173018	<i>Mus musculus</i> myosin IXa (Myo9a), mRNA
10491962	2.01	<i>Foxo1</i>	Forkhead box O1	NM_019739	<i>Mus musculus</i> forkhead box O1 (Foxo1), mRNA
10494407	2.01	<i>Hist2h2bb</i>	Histone cluster 2, h2bb	NM_175666	<i>Mus musculus</i> histone cluster 2, H2bb (Hist2h2bb), mRNA
10504672	2.01	<i>Tdrd7</i>	Tudor domain containing 7	Nm_146142	<i>Mus musculus</i> tudor domain containing 7 (Tdrd7), mRNA
10506638	2.01	<i>Cdcp2</i>	CUB domain containing protein 2	NM_172873	<i>Mus musculus</i> CUB domain containing protein 2 (Cdcp2), mRNA
10518484	2.01	<i>Fbxo44</i>	F-box protein 44	NM_173401	<i>Mus musculus</i> F-box protein 44 (Fbxo44), transcript variant 1, mRNA
10607841	2.01	<i>Tceanc</i>	Transcription elongation factor A (SII) N-terminal and central domain containing	NM_001007577	<i>Mus musculus</i> transcription elongation factor A (SII) N-terminal and central domain containing (Tceanc), mRNA
10356269	2.01	<i>Sp140</i>	SP140 nuclear body protein	NM_001013817	<i>Mus musculus</i> Sp140 nuclear body protein (Sp140), mRNA
10518957	2.01	<i>Dffb</i>	DNA fragmentation factor, beta subunit	NM_007859	<i>Mus musculus</i> DNA fragmentation factor, beta subunit (Dffb), mRNA
10398907	2.01	<i>Pld4</i>	Phospholipase D family, member 4	NM_178911	<i>Mus musculus</i> phospholipase D family, member 4 (Pld4), mRNA
10490632	2.00	<i>BC006779</i>	Cdna sequence BC006779	NM_183162	<i>Mus musculus</i> cDNA sequence BC006779(BC006779). mRNA
10385391	2.00	<i>Cyfp2</i>	Cytoplasmic FMR1 interacting protein 2	NM_133769	<i>Mus musculus</i> cytoplasmic FMR1 interacting protein 2 (Cyfp2), transcript variant 1, mRNA

Table II. Down-regulation of gene expression in α -phellandrene-treated WEHI-3 cells.

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10461158	-4.19	<i>Snhg1</i>	Small nucleolar RNA host gene 1 (non-protein coding)	AK051045	<i>Mus musculus</i> 9 days embryo whole body cDNA, RIKEN full-length enriched library, mRNA
10516906	-4.23	<i>Snora73b</i>	Small nucleolar RNA, H/ACA box 73b	NR_028513	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 73b (Snora73b), small nucleolar RNA
10391985	-4.41	<i>Tafld</i>	TATA box binding protein (Tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717)
10405739	-4.41	<i>Tafld</i>	TATA box binding protein (Tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717)
10409988	-4.41	<i>Tafld</i>	TATA box binding protein (Tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717)
10583318	-4.41	<i>Tafld</i>	TATA box binding protein (Tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717)
10418480	-4.41	<i>Gnl3</i>	Guanine nucleotide binding protein-like 3 (nucleolar)	NM_153547	<i>Mus musculus</i> guanine nucleotide binding protein-like 3 (nucleolar) (Gnl3), mRNA
10583310	-4.44	<i>Tafld</i>	TATA box binding protein (Tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717)
10545417	-4.45	<i>Mat2a</i>	Methionine adenosyltransferase II, alpha	NM_145569	<i>Mus musculus</i> methionine adenosyltransferase II, alpha (Mat2a), mRNA
10583312	-4.46	<i>Tafld</i>	TATA box binding protein (Tbp)-associated factor	AK161656	<i>Mus musculus</i> 8 day embryo whole body cDNA, RIKEN full-length enriched library, mRNA
10351035	-4.68	<i>Gas5</i>	Growth arrest specific 5	NR_002840	<i>Mus musculus</i> growth arrest specific 5 (Gas5), non-coding RNA
10461152	-4.68	<i>Snhgl</i>	Small nucleolar RNA host gene 1 (non-protein coding)	AK051045	<i>Mus musculus</i> 9 days embryo whole body cDNA, RIKEN full-length enriched library, mRNA
10510391	-4.81	<i>Srm</i>	Spermidine synthase	NM_009272	<i>Mus musculus</i> spermidine synthase (Srm), mRNA
10600485	-5.08	<i>Dkc1</i>	Dyskeratosis congenita 1, dyskerin homolog (human)	NM_001030307	<i>Mus musculus</i> dyskeratosis congenita 1, dyskerin homolog (human) (Dkc1), mRNA
10351043	-5.22	<i>Snord52</i>	Small nucleolar RNA, C/D box 52	NR_028527	<i>Mus musculus</i> small nucleolar RNA, C/D box 52 (Snord52), small nucleolar RNA
10351043	-6.55	<i>Snord47</i>	Small nucleolar RNA, C/D box 47	NR_028543	<i>Mus musculus</i> small nucleolar RNA, C/D box 47 (Snord47), small nucleolar RNA
10461156	-6.79	<i>Snhgl</i>	Small nucleolar RNA host gene 1 (non-protein coding)	AK051045	<i>Mus musculus</i> 9 days embryo whole body cDNA, RIKEN full-length enriched library, mRNA
10466224	-7.90	<i>Ms4a3</i>	Membrane-spanning 4-domains, subfamily A, member 3 (hematopoietic cell-specific)	NM_133246	<i>Mus musculus</i> membrane-spanning 4-domains, subfamily A, member 3 (hematopoietic cell-specific) (Ms4a3), mRNA
10527920	-2.84	<i>Cyp51</i>	Cytochrome P450, family 51	NM_020010	<i>Mus musculus</i> cytochrome P450, family 51 (Cyp51), mRNA
10542164	-2.86	<i>Clec12a</i>	C-type lectin domain family 12, member a	NM_177686	<i>Mus musculus</i> C-type lectin domain family 12, member a (Clec12a), mRNA
10500140	-2.88	<i>Anxa9</i>	Annexin A9	NM_001085383	<i>Mus musculus</i> annexin A9 (Anxa9), transcript variant 1, mRNA
10351026	-2.91	<i>Gas5</i>	Growth arrest specific 5	NR_002840	<i>Mus musculus</i> growth arrest specific 5 (Gas5), non-coding RNA
10431792	-2.94	<i>Pus71</i>	Pseudouridylylase synthase 7 homolog (<i>S. Cerevisiae</i>)-like	NM_172437	<i>Mus musculus</i> pseudouridylylase synthase 7 homolog (<i>S. cerevisiae</i>)-like (Pus71), mRNA
10485483	-2.94	<i>Nat10</i>	N-acetyltransferase 10	NM_153126	<i>Mus musculus</i> N-acetyltransferase 10 (Nat10), mRNA
10576216	-3.04	<i>Snord68</i>	Small nucleolar RNA, C/D box 68	NR_028128	<i>Mus musculus</i> small nucleolar RNA, C/D box 68 (Snord68), small nucleolar RNA
10577685	-3.05	<i>Adam3</i>	A disintegrin and metalloproteinase domain 3 (cyritestin)	NM_009619	<i>Mus musculus</i> a disintegrin and metalloproteinase domain 3 (cyritestin) (Adam3), mRNA
10371676	-3.13	<i>Utp20</i>	UTP20, small subunit (SSU) processome component, homolog (yeast)	NM_175158	<i>Mus musculus</i> UTP20, small subunit (SSU) processome component, homolog (yeast) (Utp20), mRNA
10446907	-3.14	<i>Ttc27</i>	Tetratricopeptide repeat domain 27	NM_152817	<i>Mus musculus</i> tetratricopeptide repeat domain 27 (Ttc27), mRNA

Table II. Continued

Table II. Continued

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10368277	-3.15	<i>Rps12</i>	Ribosomal protein S12	AF357393	<i>Mus musculus</i> clone MBI-42 H/ACA box snoRNA, partial sequence
10463517	-3.16	<i>Pprc1</i>	Peroxisome proliferator-activated receptor gamma, coactivator-related 1	NM_001081214	<i>Mus musculus</i> peroxisome proliferator-activated receptor gamma, coactivator-related 1 (Pprc1), mRNA
10378508	-3.17	<i>Tsr1</i>	TSR1, 20S rna accumulation, homolog (yeast)	NM_177325	<i>Mus musculus</i> TSR1, 20S rRNA accumulation, homolog (yeast) (Tsr1), mRNA
10469278	-3.18	<i>Il2ra</i>	Interleukin 2 receptor, alpha chain	NM_008367	<i>Mus musculus</i> interleukin 2 receptor, alpha chain (Il2ra) ,mRNA
10461154	-3.29	<i>Snhg1</i>	Small nucleolar RNA host gene (non-protein coding) 1	AK051045	<i>Mus musculus</i> 9 days embryo whole body cDNA, RIKEN full-length enriched library, mRNA
10503723	-3.33	<i>Mdn1</i>	Midasin homolog (yeast)	NM_001081392	<i>Mus musculus</i> midasin homolog (yeast) (Mdn1), mRNA
10476093	-3.42	<i>Nop56</i>	NOP56 ribonucleoprotein homolog (yeast)	NM_024193	<i>Mus musculus</i> NOP56 ribonucleoprotein homolog (yeast) (Nop56), mRNA
10403511	-3.45	<i>Heatr1</i>	HEAT repeat containing 1	NM_144835	<i>Mus musculus</i> HEAT repeat containing 1 (Heatr1), mRNA
10475965	-3.48	<i>Polr1b</i>	Polymerase (RNA) I polypeptide B	NM_009086	<i>Mus musculus</i> polymerase (RNA) I polypeptide B (Polr1b), mRNA
10443749	-3.50	<i>Ubash3a</i>	Ubiquitin associated and SH3 domain containing, A	NM_177823	<i>Mus musculus</i> ubiquitin associated and SH3 domain containing, A (Ubash3a), mRNA
10375501	-3.54	<i>Snord95</i>	Small nucleolar RNA, C/D box 95	NR_028564	<i>Mus musculus</i> small nucleolar RNA, C/D box 95 (Snord95), small nucleolar RNA
10416945	-3.54	<i>Mirhg1</i>	Microrna host gene 1 (non-protein coding)	NR_029382	<i>Mus musculus</i> microRNA host gene 1 (non-protein coding) (Mirhg1), mRNA
10583297	-3.59	<i>Taf1d</i>	TATA box binding protein (Tbp)-associatrd factor	NM_027261	<i>Mus musculus</i> TATA box binding protein (Tbp)-associatrd factor, RNA polymerase 1, mRNA
10365966	-3.61	<i>Gm5426</i>	ATP synthase, H+ transporting, mitochondrial ENSMU SG00000062918	ENSMUST0000074615	Hypothetical protein gene: ENSMUSG00000062918
10423629	-3.64	<i>Pop1</i>	Processing of precursor 1, ribonuclease P/MRP family, (<i>S. Cerevisiae</i>)	NM_152894	<i>Mus musculus</i> processing of precursor 1, ribonuclease P/MRP family, (<i>S. cerevisiae</i>) (Pop1), mRNA
10420268	-3.73	<i>Gzme</i>	Granzyme E	NM_010373	<i>Mus musculus</i> granzyme E (Gzme), mRNA
10537638	-3.74	<i>Try10</i>	Trypsin 10	NM_001038996	<i>Mus musculus</i> trypsin 10 (Try10), mRNA
10420261	-3.75	<i>Ctsg</i>	Cathepsin G	NM_007800	<i>Mus musculus</i> cathepsin G (Ctsg), mRNA
10583314	-3.77	<i>Taf1d</i>	TATA box binding protein (Tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717)
10400124	-3.78	<i>Gm7239</i>	Predicted gene 7239	XR_034827	<i>Mus musculus</i> similar to protein phosphatase 2A inhibitor-2 I-2PP2A
10351037	-3.89	<i>Gas5</i>	Growth arrest specific 5	NR_002840	<i>Mus musculus</i> growth arrest specific 5 (Gas5), non-coding RNA
10448124	-3.90	<i>Fpr1</i>	Formyl peptide receptor 1	NM_013521	<i>Mus musculus</i> formyl peptide receptor 1 (Fpr1), mRNA
10522465	-3.93	<i>Snora26</i>	Small nucleolar RNA, H/ACA box 26	NR_031758	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 26 (Snord26), small nucleolar RNA
10353034	-4.10	<i>Snord87</i>	Small nucleolar RNA, C/D box 87	NR_004410	<i>Mus musculus</i> small nucleolar RNA, C/D box 87 (Snord87), small nucleolar RNA
10433101	-4.14	<i>Gpr84</i>	G protein-coupled receptor 84	NM_030720	<i>Mus musculus</i> G protein-coupled receptor 84 (Gpr84), mRNA
10504757	-2.46	<i>BC005685</i>	Cdna sequence BC005685	BC005685	<i>Mus musculus</i> cDNA sequence BC005685, mRNA (cDNA clone IMAGE:3154990), partial cds
10467653	-2.47	<i>Rrp12</i>	Ribosomal RNA processing 12 homolog (<i>S. Cerevisiae</i>)	NM_199447	<i>Mus musculus</i> ribosomal RNA processing 12 homolog (<i>S. cerevisiae</i>) (Rrp12), mRNA
10477949	-2.47	<i>Rpp38</i>	Ribonuclease P/MRP 38 subunit (human)	NM_001013376	<i>Mus musculus</i> ribonuclease P/MRP 38 subunit (human) (Rpp38), mRNA.
10382888	-2.48	<i>28100 O8D09Rik</i>	RIKEN cdna 2810008D09 gene	AK171830	<i>Mus musculus</i> activated spleen cDNA, RIKEN full-length enriched library, clone:F830013G13 product: hypothetical protein, full insert sequence
10346074	-2.48	<i>Wdr75</i>	WD repeat domain 75	NM_028599	<i>Mus musculus</i> WD repeat domain 75 (Wdr75), mRNA

Table II. Continued

Table II. *Continued*

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10538901	-2.50	<i>BC005685</i>	Cdna sequence BC005685	BC005685	<i>Mus musculus</i> cDNA sequence BC005685, mRNA (cDNA clone IMAGE:3154990), partial cds
10535852	-2.51	<i>Slc7a1</i>	Solute carrier family 7 (cationic amino acid transporter, y+ system), member 1	NM_007513	<i>Mus musculus</i> solute carrier family 7 (cationic amino acid transporter, y+ system), member 1 (<i>Slc7a1</i>), mRNA
10405047	-2.53	<i>Nol8</i>	Nucleolar protein 8	NM_001081350	<i>Mus musculus</i> nucleolar protein 8 (<i>Nol8</i>), mRNA
10375499	-2.54	<i>Snord96a</i>	Small nucleolar RNA, C/D box 96A	NR_028563	<i>Mus musculus</i> small nucleolar RNA, C/D box 96A (<i>Snord96a</i>), small nucleolar RNA
10514732	-2.57	<i>Slc35d1</i>	Solute carrier family 35 (UDP-glucuronic acid/UDP-N-acetylgalactosamine dual transporter), member D1	NM_177732	<i>Mus musculus</i> solute carrier family 35 (UDP-glucuronic acid/UDP-N-acetylgalactosamine dual transporter), member D1 (<i>Slc35d1</i>), mRNA
10528507	-2.57	<i>Pus7</i>	Pseudouridylylase synthase 7 homolog (<i>S. Cerevisiae</i>)	NM_178403	<i>Mus musculus</i> pseudouridylylase synthase 7 homolog (<i>S. cerevisiae</i>) (<i>Pus7</i>), transcript variant 3, mRNA
10607421	-2.59	<i>49305</i> <i>24N10Rik</i>	RIKEN cdna 4930524N10 gene	ENSMUST 00000082357	Putative uncharacterized protein gene:ENSMUSG00000059663
10596664	-2.60	<i>Cyb561d2</i>	Cytochrome b-561 domain containing 2	NM_019720	<i>Mus musculus</i> cytochrome b-561 domain containing 2 (<i>Cyb561d2</i>), mRNA
10490815	-2.61	<i>Gm5841</i>	Predicted gene 5841	XR_031642	<i>Mus musculus</i> similar to ubiquitin specific protease 1 (LOC545500), misc RNA
10498024	-2.61	<i>Slc7a11</i>	Solute carrier family 7 (cationic amino acid transporter, y+ system), member 11	NM_011990	<i>Mus musculus</i> solute carrier family 7 (cationic amino acid transporter, y+ system), member 11 (<i>Slc7a11</i>), mRNA
10541605	-2.62	<i>Clec4n</i>	C-type lectin domain family 4, member n	NM_020001	<i>Mus musculus</i> C-type lectin domain family 4, member n (<i>Clec4n</i>), transcript variant 1, mRNA
10378088	-2.63	<i>Mybbp1a</i>	MYB binding protein (P160) 1a	NM_016776	<i>Mus musculus</i> MYB binding protein (P160) 1a (<i>Mybbp1a</i>), mRNA
10463535	-2.63	<i>Nolc1</i>	Nucleolar and coiled-body phosphoprotein 1	NM_053086	<i>Mus musculus</i> nucleolar and coiled-body phosphoprotein 1 (<i>Nolc1</i>), transcript variant 1, mRNA
10435288	-2.65	<i>Muc13</i>	Mucin 13, epithelial transmembrane	NM_010739	<i>Mus musculus</i> mucin 13, epithelial transmembrane (<i>Muc13</i>), mRNA
10583496	-2.66	<i>Ppan</i>	Peter pan homolog (<i>Drosophila</i>)	NM_145610	<i>Mus musculus</i> peter pan homolog (<i>Drosophila</i>) (<i>Ppan</i>), mRNA
10406614	-2.68	<i>Mtx3</i>	Metaxin 3	NM_001162945	<i>Mus musculus</i> metaxin 3 (<i>Mtx3</i>), mRNA
10380524	-2.68	<i>Slc35b1</i>	Solute carrier family 35, member B1	NM_016752	<i>Mus musculus</i> solute carrier family 35, member B1 (<i>Slc35b1</i>), mRNA
10526654	-2.71	<i>Gm7285</i>	Predicted gene 7285	XR_034706	<i>Mus musculus</i> predicted gene, EG640050 (EG640050), misc RNA
10563110	-2.72	<i>Snord34</i>	Small nucleolar RNA, C/D box 34	NR_002455	<i>Mus musculus</i> small nucleolar RNA, C/D box 34 (<i>Snord34</i>), small nucleolar RNA
10356329	-2.75	<i>Snora75</i>	Small nucleolar RNA, H/ACA box 75	NR_028478	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 75 (<i>Snora75</i>), small nucleolar RNA
10466901	-2.75	<i>Gm5623</i>	Predicted gene 5623	ENSMUST 00000087473	Similar to Rps15a peptin gene:ENSMUSG00000067351
10470905	-2.75	<i>Set</i>	SET nuclear oncogene	AK031561	<i>Mus musculus</i> 13 days embryo male testis cDNA, RIKEN full-length enriched library, clone:6030453D13 product:SET translocation, full insert sequence
10470628	-2.75	<i>Ddx31</i>	DEAD/H (Asp-Glu-Ala-Asp/His) box polypeptide 31	NM_001033294	<i>Mus musculus</i> DEAD/H (Asp-Glu-Ala-Asp/His) box polypeptide 31 (<i>Ddx31</i>), mRNA
10512308	-2.79	<i>Sigmar1</i>	Sigma non-opioid intracellular receptor 1	NM_011014	<i>Mus musculus</i> sigma non-opioid intracellular receptor 1 (<i>Sigmar1</i>), mRNA
10424853	-2.80	<i>Brp16</i>	Brain protein 16	NM_021555	<i>Mus musculus</i> brain protein 16 (<i>Brp16</i>), mRNA
10516908	-2.80	<i>Snora73a</i>	Small nucleolar RNA, H/ACA box 73a	NR_028512	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 73a (<i>Snora73a</i>), small nucleolar RNA
10392098	-2.80	<i>Ftsj3</i>	Ftsj homolog 3 (<i>E. Coli</i>)	NM_025310	<i>Mus musculus</i> FtsJ homolog 3 (<i>E. coli</i>) (<i>Ftsj3</i>), mRNA

Table II. *Continued*

Table II. Continued

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10471503	-2.82	<i>Taf1d</i>	TATA box binding protein (Tbp)-associated factor, RNA polymerase I, D	BC110660	<i>Mus musculus</i> TATA box binding protein (Tbp)-associated factor, RNA polymerase I, D, mRNA (cDNA clone MGC:117821 IMAGE:3158156), complete cds
10464359	-2.83	<i>Gm9276</i>	Eukaryotic translation elongation factor 1 gamma	XR_031213	<i>Mus musculus</i> similar to eukaryotic translation elongation factor 1 gamma (LOC674623), misc RNA
10531383	-2.83	<i>Sdad1</i>	SDA1 domain containing 1	NM_172713	<i>Mus musculus</i> SDA1 domain containing 1 (Sdad1), mRNA
10440566	-2.29	<i>Rnf160</i>	Ring finger protein 160	NM_001081068	<i>Mus musculus</i> ring finger protein 160 (Rnf160), mRNA
10503359	-2.29	<i>C43004</i>	RIKEN cdna	NM_198957	<i>Mus musculus</i> RIKEN cDNA
		<i>8L16Rik</i>	C430048L16 gene		C430048L16 gene (C430048L16Rik), mRNA
10461162	-2.29	<i>Snord22</i>	Small nucleolar RNA, C/D box 22	NR_004445	<i>Mus musculus</i> small nucleolar RNA, C/D box 22 (Snord22), small nucleolar RNA
10378453	-2.30	<i>130000</i>	RIKEN cdna 1300001101 gene	BC072573	<i>Mus musculus</i> RIKEN cDNA 1300001101 gene, mRNA
		<i>1101Rik</i>			
10473363	-2.30	<i>Timm10</i>	Translocase of inner mitochondrial membrane 10	NM_013899	<i>Mus musculus</i> translocase of inner mitochondrial membrane 10 (Timm10), mRNA
10433904	-2.30	<i>Yars2</i>	Tyrosyl-trna synthetase 2 (mitochondrial)	NM_198246	<i>Mus musculus</i> tyrosyl-tRNA synthetase 2 (mitochondrial) (Yars2), transcript variant 1, mRNA
10356333	-2.30	<i>Snord82</i>	Small nucleolar RNA, C/D box 82	NR_002851	<i>Mus musculus</i> small nucleolar RNA, C/D box 82 (Snord82), small nucleolar RNA
10537410	-2.31	<i>Tbxas1</i>	Thromboxane A synthase 1, platelet	NM_011539	<i>Mus musculus</i> thromboxane A synthase 1, platelet (Tbxas1), mRNA
10437384	-2.31	<i>Tfap4</i>	Transcription factor AP4	NM_031182	<i>Mus musculus</i> transcription factor AP4 (Tfap4), mRNA
10385375	-2.33	<i>Thg11</i>	Trna-histidine guanylyltransferase 1-like	NM_001080969	<i>Mus musculus</i> tRNA-histidine guanylyltransferase 1-like (<i>S. cerevisiae</i>) (Thg11), mRNA
10476945	-2.33	<i>Cst7</i>	Cystatin F (leukocystatin)	NM_009977	<i>Mus musculus</i> cystatin F (leukocystatin) (Cst7), mRNA
10547073	-2.34	<i>Snora7a</i>	Small nucleolar RNA, H/ACA box 7A	NR_028546	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 7A (Snora7a), small nucleolar RNA
10524082	-2.35	<i>2310001</i>	RIKEN cdna	ENSMUST00	61 kDa protein gene:ENSMUSG00000066613
		<i>H12Rik</i>	2310001H12 gene	000112540	
10571752	-2.36	<i>Dctd</i>	Dcmp deaminase	NR_027759	<i>Mus musculus</i> dCMP deaminase (Dctd), transcript variant 4, non-coding RNA
10564520	-2.36	<i>Snora21</i>	Small nucleolar RNA, H/ACA box 21	NR_028078	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 21 (Snora21), small nucleolar RNA
10450930	-2.36	<i>Crisp1</i>	Cysteine-rich secretory protein 1	NM_009638	<i>Mus musculus</i> cysteine-rich secretory protein 1 (Crisp1), mRNA
10591563	-2.36	<i>Kank2</i>	KN motif and ankyrin repeat domains 2	NM_145611	<i>Mus musculus</i> KN motif and ankyrin repeat domains 2 (Kank2), mRNA
10550098	-2.37	<i>Wdr12</i>	WD repeat domain 12	NM_021312	<i>Mus musculus</i> WD repeat domain 12 (Wdr12), transcript variant 2, mRNA
10434668	-2.37	<i>Tmem97</i>	Transmembrane protein 97	NM_133706	<i>Mus musculus</i> transmembrane protein 97 (Tmem97), mRNA
10519886	-2.37	<i>Sema3c</i>	Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3C	NM_013657	<i>Mus musculus</i> sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3C (Sema3c), mRNA
10456836	-2.38	<i>St8sia5</i>	ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 5	NM_013666	<i>Mus musculus</i> ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 5 (St8sia5), transcript variant 1, mRNA
10390505	-2.38	<i>Snora21</i>	Small nucleolar RNA, H/ACA box 21	NR_028078	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 21 (Snora21), small nucleolar RNA
10441813	-2.38	<i>Snora20</i>	Small nucleolar RNA, H/ACA box 20	NR_028479	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 20 (Snora20), small nucleolar RNA
10453555	-2.39	<i>26100</i>	RIKEN cdna	NM_153780	<i>Mus musculus</i> RIKEN cDNA 2610044O15 gene (2610044O15Rik8), mRNA
		<i>44O15Rik8</i>	2610044O15 gene		
10507539	-2.40	<i>Elov11</i>	Elongation of very long chain fatty acids (FEN1/Elo2, SUR4/Elo3, yeast)-like 1	NM_019422	<i>Mus musculus</i> elongation of very long chain fatty acids (FEN1/Elo2, SUR4/Elo3, yeast)-like 1 (Elov11), transcript variant 2, mRNA

Table II. Continued

Table II. *Continued*

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10538755	-2.40	<i>Smarcd1</i>	SWI/SNF-related, matrix-associated actin-dependent regulator of chromatin, subfamily a, containing DEAD/H box 1	NM_007958	<i>Mus musculus</i> SWI/SNF-related, matrix-associated actin-dependent regulator of chromatin, subfamily a, containing DEAD/H box 1 (<i>Smarcd1</i>), transcript variant 1, mRNA
10453334	-2.41	<i>Lrpprc</i>	Leucine-rich PPR-motif containing	NM_028233	<i>Mus musculus</i> leucine-rich PPR-motif containing (<i>Lrpprc</i>), mRNA
10346876	-2.41	<i>Snora41</i>	Small nucleolar RNA, H/ACA box 41	NR_028558	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 41 (<i>Snora41</i>), small nucleolar RNA
10469712	-2.42	<i>Pdss1</i>	Prenyl (solanesyl) diphosphate synthase, subunit 1	NM_019501	<i>Mus musculus</i> prenyl (solanesyl) diphosphate synthase, subunit 1 (<i>Pdss1</i>), mRNA
10433462	-2.42	<i>Pmm2</i>	Phosphomannomutase 2	NM_016881	<i>Mus musculus</i> phosphomannomutase 2 (<i>Pmm2</i>), mRNA
10346634	-2.43	<i>Nop58</i>	NOP58 ribonucleoprotein	NM_018868	<i>Mus musculus</i> NOP58 ribonucleoprotein (<i>Nop58</i>), mRNA
10446693	-2.43	<i>Wdr43</i>	WD repeat domain 43	NM_175639	<i>Mus musculus</i> WD repeat domain 43 (<i>Wdr43</i>), mRNA
10424400	-2.43	<i>Myc</i>	Myelocytomatosis oncogene	NM_010849	<i>Mus musculus</i> myelocytomatosis oncogene (<i>Myc</i>), transcript variant 1, mRNA
10362442	-2.45	<i>Trdn</i>	Triadin	NM_029726	<i>Mus musculus</i> triadin (<i>Trdn</i>), mRNA
10349239	-2.45	<i>Mki67ip</i>	MKI67 (FHA domain) interacting nucleolar phosphoprotein	NM_026472	<i>Mus musculus</i> MKI67 (FHA domain) interacting nucleolar phosphoprotein (<i>Mki67ip</i>), mRNA
10565813	-2.19	<i>Snord15a</i>	Small nucleolar RNA, C/D box 15A	NR_002172	<i>Mus musculus</i> small nucleolar RNA, C/D box 15A (<i>Snord15a</i>)
10597420	-2.19	<i>Ccr4</i>	Chemokine (C-C motif) receptor 4	NM_009916	<i>Mus musculus</i> chemokine (C-C motif) receptor 4 (<i>Ccr4</i>), mRNA
10493688	-2.19	<i>Nup210l</i>	Nucleoporin 210-like	NM_029937	<i>Mus musculus</i> nucleoporin 210-like (<i>Nup210l</i>), mRNA
10510629	-2.19	<i>Nol9</i>	Nucleolar protein 9	NM_028727	<i>Mus musculus</i> nucleolar protein 9, (<i>Nol9</i>), mRNA
10415640	-2.19	<i>Snora65</i>	Small nucleolar RNA, H/ACA box 65	NR_002898	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 65 (<i>Snora65</i>), small nucleolar RNA
10523717	-2.20	<i>Spp1</i>	Secreted phosphoprotein 1	NM_009263	<i>Mus musculus</i> secreted phosphoprotein 1 (<i>Spp1</i>), mRNA
10439532	-2.20	<i>Qtrtd1</i>	Queuine trna-ribosyltransferase domain containing 1	NM_029128	<i>Mus musculus</i> queuine tRNA-ribosyltransferase domain containing 1 (<i>Qtrtd1</i>), mRNA
10498350	-2.22	<i>P2ry14</i>	Purinergic receptor P2Y, G-protein coupled, 14	NM_133200	<i>Mus musculus</i> purinergic receptor P2Y, G-protein coupled, 14 (<i>Pry14</i>), transcript variant 1, mRNA
10399882	-2.22	<i>Dus4l</i>	Dihydrouridine synthase 4-like (<i>S. cerevisiae</i>)	NM_028002	<i>Mus musculus</i> dihydrouridine synthase 4-like (<i>S. cerevisiae</i>) (<i>Dus4l</i>), mRNA
10471550	-2.22	<i>Rpl12</i>	Ribosomal protein L12	BC075731	<i>Mus musculus</i> ribosomal protein L12 (<i>Rpl12</i>), mRNA (cDNA clone IMAGE:6511935), partial
10366796	-2.22	<i>Metl1</i>	Methyltransferase like 1	NM_010792	<i>Mus musculus</i> methyltransferase like 1 (<i>Metl1</i>), mRNA
10575102	-2.22	<i>Cirhla</i>	Cirrhosis, autosomal recessive 1A (human)	NM_011574	<i>Mus musculus</i> cirrhosis, autosomal recessive 1A (human), (<i>Cirh1a</i>), mRNA
10522827	-2.22	<i>Csn1s1</i>	Casein alpha s1	NM_007784	<i>Mus musculus</i> casein alpha s1, (<i>Csn1s1</i>), mRNA
10348879	-2.23	<i>Ing5</i>	Inhibitor of growth family, member 5	NM_025454	<i>Mus musculus</i> inhibitor of growth family, member 5 (<i>Ing5</i>), mRNA
10579012	-2.23	<i>Csgalnact1</i>	Chondroitin sulfate	NM_172753	<i>Mus musculus</i> chondroitin sulfate
10370330	-2.23	<i>Krtap10-4</i>	N-acetylgalactosaminyltransferase 1 Keratin associated protein 10-4	NM_001135991	<i>Mus musculus</i> N-acetylgalactosaminyltransferase 1 <i>Mus musculus</i> keratin associated protein 10-4 (<i>Krtap10-4</i>), mRNA
10499128	-2.23	<i>Rnu73a</i>	U73A small nucleolar RNA	NR_004417	<i>Mus musculus</i> U73A small nucleolar RNA (<i>Run73a</i>), small nucleolar RNA
10583316	-2.23	<i>Tatfld</i>	TATA box binding protein (tbp)-associated factor	BC056964	<i>Mus musculus</i> Josephin domain containing 3, mRNA (cDNA clone IMAGE:6827717), partial
10391373	-2.23	<i>Ccr10</i>	Chemokine (C-C motif) receptor 10	NM_007721	<i>Mus musculus</i> chemokine (C-C motif) receptor 10 (<i>Ccr10</i>), mRNA
10546805	-2.23	<i>Ddx18</i>	DEAD (Asp-Glu-Ala-Asp) box polypeptide 18	NM_025860	<i>Mus musculus</i> DEAD (Asp-Glu-Ala-Asp) box polypeptide 18 (<i>Ddx18</i>), mRNA
10361200	-2.23	<i>AA408296</i>	Expressed sequence AA408296	NM_145415	<i>Mus musculus</i> expressed sequence AA408296 (<i>AA408296</i>), mRNA
10563108	-2.24	<i>Snord35a</i>	Small nucleolar RNA, C/D box 35A	NR_000003	<i>Mus musculus</i> small nucleolar RNA, C/D box 35A (<i>Snord35a</i>), small nucleolar RNA

Table II. *Continued*

Table II. Continued

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10401935	-2.25	<i>BC005685</i>	Cdna sequence BC005685	BC005685	<i>Mus musculus</i> cDNA sequence BC005685, mRNA (cDNA clone IMAGE:3154990), partial
10603805	-2.25	<i>Mir221</i>	Microrna 221	NR_029806	<i>Mus musculus</i> microRNA 221 (Mir221), microRNA
10515326	-2.26	<i>Tmem69</i>	Transmembrane protein 69	NM_177670	<i>Mus musculus</i> transmembrane protein 69 (Tmem69), mRNA
10545346	-2.26	<i>Clec11a</i>	C-type lectin domain family 11, member a	NM_009131	<i>Mus musculus</i> C-type lectin domain family 11, member a (Clec11a), mRNA
10487564	-2.26	<i>Zc3h8</i>	Zinc finger CCCH type containing 8	NM_020594	<i>Mus musculus</i> zinc finger CCCH type containing 8 (ZC3h8), mRNA
10545346	-2.27	<i>Ptcd3</i>	Pentatricopeptide repeat domain 3	NM_027275	<i>Mus musculus</i> pentatricopeptide repeat domain 3 (Ptcd3), nuclear gene encoding mitochondrial protein
10369630	-2.27	<i>Ddx21</i>	DEAD (Asp-Glu-Ala-Asp) box polypeptide 21	NM_019553	<i>Mus musculus</i> DEAD (Asp-Glu-Ala-Asp) box polypeptide 21 (Ddx21), mRNA
10514383	-2.28	<i>Larp7</i>	La ribonucleoprotein domain family, member 7	NM_138593	<i>Mus musculus</i> La ribonucleoprotein domain family, member 7 (Larp7), mRNA
10540085	-2.28	<i>Fbln2</i>	Fibulin 2	NM_007992	<i>Mus musculus</i> fibulin 2 (Fbln2), transcript variant 1, mRNA
10578962	-2.29	<i>Gm10061</i>	Predicted gene 10061	ENSMUST0000098707	Putative uncharacterized protein gene:ENSMUSG00000074294
10544273	-2.29	<i>Clec5a</i>	C-type lectin domain family 5, member a	NM_001038604	<i>Mus musculus</i> C-type lectin domain family 5, member a (Clec5a), transcript variant 1, mRNA
10539042	-2.29	<i>Polr1a</i>	Polymerase (RNA) I polypeptide A	NM_009088	<i>Mus musculus</i> polymerase (RNA) I polypeptide A (Polr1a), mRNA
10574432	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821 (LOC100043821), mRNA
10581009	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821 (LOC100043821), mRNA
10603549	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821 (LOC100043821), mRNA
10603803	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821 (LOC100043821), mRNA
10454077	-2.11	<i>Taf4b</i>	TAF4B RNA polymerase II, TATA box binding protein (TBP)-associated factor	NM_001100449	<i>Mus musculus</i> TAF4B RNA polymerase II, TATA box binding protein (TBP)-associated factor (Taf4b), mRNA
10556206	-2.11	<i>Snora3</i>	Small nucleolar RNA, H/ACA box 3	NR_028079	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 3 (Snora3) small nucleolar RNA
10501922	-2.11	<i>Snhg8</i>	Small nucleolar RNA host gene 8	NR_028574	<i>Mus musculus</i> small nucleolar RNA host gene 8 (Snhg8), non-coding RNA
10461454	-2.11	<i>1810006 K21Rik</i>	RIKEN cdna 1810003K21 gene	NM_026919	<i>Mus musculus</i> RIKEN cDNA 1810003K21 gene (1810006K21Rik), transcript variant 1, mRNA
10495035	-2.11	<i>Slc16a1</i>	Solute carrier family 16 (monocarboxylate transporter), member 1	NM_009196	<i>Mus musculus</i> solute carrier family 16 (monocarboxylate transporter), member 1 (Slc16a1), mRNA
10600355	-2.12	<i>Snora70</i>	Small nucleolar RNA, H/ACA box 70	NR_002899	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 70 (Snora70), small nucleolar RNA
10435075	-2.12	<i>Tfrc</i>	Transferrin receptor	NM_011638	<i>Mus musculus</i> transferrin receptor (Tfrc), mRNA
10587486	-2.12	<i>Set</i>	SET nuclear oncogene	NM_023871	<i>Mus musculus</i> SET nuclear oncogene (Set), mRNA
10584572	-2.13	<i>Hspa8</i>	Heat shock protein 8	NM_031165	<i>Mus musculus</i> heat shock protein 8 (Hspa8), mRNA
10346747	-2.13	<i>Cyp20a1</i>	Cytochrome P450, family 20, subfamily a, polypeptide 1	NM_030013	<i>Mus musculus</i> cytochrome P450, family 20, subfamily a, polypeptide 1 (Cyp20a1), mRNA
10552622	-2.13	<i>2410002 F23Rik</i>	RIKEN cdna 2410002F23 gene	NM_025880	<i>Mus musculus</i> RIKEN cDNA 2410002F23 gene (2410002F23Rik), mRNA
105063888	-2.13	<i>Tctex1d1</i>	Tctex1 domain containing 1	NM_026100	<i>Mus musculus</i> Tctex1 domain containing 1 (Tctex1d1), transcript variant 1, mRNA
10539143	-2.13	<i>Retsat</i>	Retinol saturase (all trans retinol 13,14 reductase)	NM_026519	<i>Mus musculus</i> retinol saturase (all trans retinol 13,14 reductase) (Retsat), mRNA
10564313	-2.13	<i>Mphosph10</i>	M-phase phosphoprotein 10 (U3 small nucleolar ribonucleoprotein	NM_026483	<i>Mus musculus</i> M-phase phosphoprotein 10 (U3 small nucleolar ribonucleoprotein (Mphosph10), mRNA

Table II. Continued

Table II. *Continued*

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10361282	-2.14	<i>Cr11</i>	Complement component (3b/4b) receptor 1-like	NM_013499	<i>Mus musculus</i> s complement component (3b/4b) receptor 1-like (Cr11), mRNA
10534504	-2.14	<i>Tmem120a</i>	Transmembrane protein 120A	NM_172541	<i>Mus musculus</i> transmembrane protein 120A (Tmem120a), mRNA
10541845	-2.14	<i>Nop2</i>	NOP2 nucleolar protein homolog (yeast)	NM_138747	<i>Mus musculus</i> NOP2 nucleolar protein homolog (yeast) (Nop2), mRNA
10441899	-2.15	<i>Gm7168</i>	Predicted gene 7168	NM_001122977	<i>Mus musculus</i> predicted gene 7168 (Gm7168), mRNA
10562592	-2.15	<i>Gm5114</i>	Predicted gene 5114	NM_177890	<i>Mus musculus</i> predicted gene 5114 (Gm5114), mRNA
10360370	-2.15	<i>BC094916</i>	Cdna sequence BC094916	NM_001024721	<i>Mus musculus</i> cDNA sequence BC094916 (BC094916), mRNA
10466771	-2.15	<i>Fxn</i>	Frataxin	NM_008044	<i>Mus musculus</i> frataxin (Fxn), nuclear gene encoding mitochondrial protein, mRNA
10375880	-2.15	<i>Nhp2</i>	NHP2 ribonucleoprotein homolog (yeast)	NM_026631	<i>Mus musculus</i> NHP2 ribonucleoprotein homolog (yeast) (Nhp2), mRNA
10508723	-2.15	<i>Snora61</i>	Small nucleolar RNA, H/ACA box 61		<i>Mus musculus</i> clone MBI-164 H/ACA box snoRNA, partial sequence
10570432	-2.16	<i>Snora3</i>	Small nucleolar RNA, H/ACA box 3	NR_028079	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 3 (Snora3), small nucleolar RNA
10500582	-2.16	<i>Wdr3</i>	WD repeat domain 3	NM_175552	<i>Mus musculus</i> WD repeat domain 3 (Wdr3), mRNA
10412616	-2.17	<i>Rpp14</i>	Ribonuclease P 14 subunit (human)	NM_025938	<i>Mus musculus</i> ribonuclease P 14 subunit (human) (Rpp14), mRNA
10366344	-2.17	<i>Gm5176</i>	Predicted gene 5176	NR_033603	<i>Mus musculus</i> predicted gene 5176 (Gm5176), non-coding RNA
10394749	-2.18	<i>Nol10</i>	Nucleolar protein 10	NM_001008421	<i>Mus musculus</i> nucleolar protein 10 (Nol10), mRNA
10555116	-2.18	<i>Gm9990</i>	Predicted gene 9990	ENSMUST0000070021	Putative uncharacterized protein 10 (Nol10), mRNA
10376959	-2.18	<i>Elac2</i>	Elac homolog 2 (<i>E. Coli</i>)	NM_023479	<i>Mus musculus</i> elacC homolog 2 (<i>E. coli</i>) (Elac2), mRNA
10505109	-2.18	<i>BC026590</i>	Cdna sequence BC026590	BC026590	<i>Mus musculus</i> cDNA sequence BC026590, mRNA (cDNA clone MGC:37261 IMAGE:4973099)
10576403	-2.09	<i>Urb2</i>	URB2 ribosome biogenesis 2 homolog (<i>S. Cerevisiae</i>)	NM_001029876	<i>Mus musculus</i> URB2 ribosome biogenesis 2 homolog (<i>S. cerevisiae</i>) (Urb2), mRNA.
10403413	-2.09	<i>Idi1</i>	Isopentenyl-diphosphate delta isomerase	NM_145360	<i>Mus musculus</i> isopentenyl-diphosphate delta isomerase (Idi1), mRNA.
10491704	-2.09	<i>Spata5</i>	Spermatogenesis associated 5	NM_001163511	<i>Mus musculus</i> spermatogenesis associated 5 (Spata5), transcript variant 1, mRNA.
10528021	-2.09	<i>Hspa8</i>	Heat shock protein 8	NM_031165	<i>Mus musculus</i> heat shock protein 8 (Hspa8), mRNA.
10517706	-2.09	<i>Mrto4</i>	MRT4, mrna turnover 4, homolog (<i>S. Cerevisiae</i>)	NM_023536	<i>Mus musculus</i> MRT4, mRNA turnover 4, homolog (<i>S. cerevisiae</i>) (Mrto4), mRNA.
10396074	-2.09	<i>Mgat2</i>	Mannoside acetylglucosaminyltransferase 2	NM_146035	<i>Mus musculus</i> mannoside acetylglucosaminyltransferase 2 (Mgat2), mRNA.
10498595	-2.09	<i>Snrpd2</i>	Small nuclear ribonucleoprotein D2	NM_026343	<i>Mus musculus</i> small nuclear ribonucleoprotein D2 (Snrpd2), mRNA.
10410721	-2.09	<i>Arsk</i>	Arylsulfatase K	NM_029847	<i>Mus musculus</i> arylsulfatase K (Arsk), mRNA.
10511149	-2.10	<i>Mrpl20</i>	Mitochondrial ribosomal protein L20	NM_025570	<i>Mus musculus</i> mitochondrial ribosomal protein L20 (Mrpl20), nuclear gene encoding mitochondrial protein.
10508721	-2.10	<i>Snora44</i>	Small nucleolar RNA, H/ACA box 44	AF357394	<i>Mus musculus</i> MBI-64 H/ACA box snoRNA, partial sequence.
10368025	-2.11	<i>Hspa8</i>	Heat shock protein 8	NM_031165	<i>Mus musculus</i> heat shock protein 8 (Hspa8), mRNA.
10393509	-2.11	<i>Usp36</i>	Ubiquitin specific peptidase 36	NM_001033528	<i>Mus musculus</i> ubiquitin specific peptidase 36 (Usp36), mRNA.
10410927	-2.11	<i>LOC280487</i>	Pol polyprotein	X16670	Mouse RNA for type IIB intracisternal A-particle (IAP) element encoding integrase, clone 111.
10522742	-2.11	<i>LOC280487</i>	Pol polyprotein	X16670	Mouse RNA for type IIB intracisternal A-particle (IAP) element encoding integrase, clone 111.
10528165	-2.11	<i>LOC280487</i>	Pol polyprotein	X16670	Mouse RNA for type IIB intracisternal A-particle (IAP) element encoding integrase, clone 111.
10357298	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.

Table II. *Continued*

Table II. Continued

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10363561	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10374183	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10416696	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10416698	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10424377	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10457667	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10476399	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10483161	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10484355	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10485355	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10489721	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10497327	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10574434	-2.11	<i>Gm4638</i>	Predicted gene 4638	XM_001480931	<i>Mus musculus</i> hypothetical protein LOC100043775(LOC100043775), mRNA.
10359642	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821(LOC100043821), mRNA.
10422247	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821(LOC100043821), mRNA.
10448230	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821(LOC100043821), mRNA.
10469127	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821(LOC100043821), mRNA.
10496336	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821(LOC100043821), mRNA.
10512463	-2.11	<i>Gm4671</i>	Predicted gene 4671	XM_001481017	<i>Mus musculus</i> hypothetical protein LOC100043821(LOC100043821), mRNA.
10402606	-2.01	<i>Rtl1</i>	Retrotransposon-like 1	NM_184109	<i>Mus musculus</i> retrotransposon-like 1 (Rtl1), mRNA.
10478847	-2.02	15000 <i>12F01Rik</i>	RIKEN cdna 1500012F01 gene	NM_001081005	<i>Mus musculus</i> RIKEN cDNA 1500012F01 gene (1500012F01Rik), mRNA.
10530806	-2.02	<i>Ppat</i>	Phosphoribosyl pyrophosphate amidotransferase	NM_172146	<i>Mus musculus</i> phosphoribosyl pyrophosphate amidotransferase (Ppat), mRNA.
10595614	-2.02	2810 <i>026P18Rik</i>	RIKEN cdna 2810026P18 gene	BC032970	<i>Mus musculus</i> RIKEN cDNA 2810026P18 gene, mRNA (cDNA clone IMAGE: 1224948).
10556244	2.02	<i>Snora23</i>	Small nucleolar RNA, H/ACA box 23	NR_033336	<i>Mus musculus</i> small nucleolar RNA, H/ACA box 23 (Snora23), small nucleolar RNA.
10567213	-2.03	<i>LOC 100047986</i>	Similar to eukaryotic translation elongation factor 1 gamma	XR_033846	<i>Mus musculus</i> similar to eukaryotic translation elongation factor 1 gamma.
10577666	-2.03	<i>Adam18</i>	A disintegrin and metallopeptidase domain 18	NM_010084	<i>Mus musculus</i> a disintegrin and metallopeptidase domain 18 (Adam18), mRNA.
10459229	-2.03	<i>Pcyox11</i>	Prenylcysteine oxidase 1 like	NM_172832	<i>Mus musculus</i> prenylcysteine oxidase 1 like (Pcyox11), mRNA.
10398678	-2.03	<i>Eif5</i>	Eukaryotic translation initiation factor 5	NM_173363	<i>Mus musculus</i> eukaryotic translation initiation factor 5 (Eif5), transcript variant 1, mRNA.
10399820	-2.03	<i>Acp1</i>	Acid phosphatase 1, soluble	NM_001110239	<i>Mus musculus</i> acid phosphatase 1, soluble (Acp1), transcript variant 1, mRNA.
10557439	-2.03	<i>Ccdc101</i>	Coiled-coil domain containing 101	NM_029339	<i>Mus musculus</i> coiled-coil domain containing 101 (Ccdc101), mRNA.
10388018	-2.03	<i>Dhx33</i>	DEAH (Asp-Glu-Ala-His) box polypeptide 33	NM_178367	<i>Mus musculus</i> DEAH (Asp-Glu-Ala-His) box polypeptide 33 (Dhx33), mRNA.

Table II. Continued

Table II. *Continued*

Probe Set ID	Fold change	Gene symbol	Gene description	mRNA accession	mRNA description
10393714	-2.04	<i>241000</i> <i>2101Rik</i>	RIKEN cdna 2410002101 gene	NM_183137	<i>Mus musculus</i> RIKEN cDNA 2410002101 gene (2410002101Rik), mRNA.
10590968	-2.04	<i>Ankrd49</i>	Ankyrin repeat domain 49	NM_019683	<i>Mus musculus</i> ankyrin repeat domain 49 (Ankrd49), mRNA.
10469786	-2.04	<i>Il1f9</i>	Interleukin 1 family, member 9	NM_153511	<i>Mus musculus</i> interleukin 1 family, member 9 (Il1f9), mRNA.
10389269	-2.04	<i>Aatf</i>	Apoptosis antagonizing transcription factor	NM_019816	<i>Mus musculus</i> apoptosis antagonizing transcription factor (Aatf), mRNA.
10405372	-2.04	<i>Zfp346</i>	Zinc finger protein 346	NM_012017	<i>Mus musculus</i> zinc finger protein 346 (Zfp346), mRNA.
10461164	-2.05	<i>Wdr74</i>	WD repeat domain 74	NM_134139	<i>Mus musculus</i> WD repeat domain 74 (Wdr74), mRNA.
10468419	-2.05	<i>D19Ert</i> <i>d652e</i>	DNA segment, Chr 19, ERATO Doi 652, expressed	XM_129357	<i>Mus musculus</i> DNA segment, Chr 19, ERATO Doi 652, expressed (D19Ert652e).
10561456	-2.05	<i>Med29</i>	Mediator complex subunit 29	NM_026042	<i>Mus musculus</i> mediator complex subunit 29 (Med29), mRNA.
10474229	-2.05	<i>Cd59a</i>	CD59a antigen	NM_001111060	<i>Mus musculus</i> CD59a antigen (Cd59a), transcript variant 1, mRNA.
10479221	-2.05	<i>Gm14403</i>	Predicted gene 14403	BC025828	<i>Mus musculus</i> predicted gene, OTTMUSG00000016571, mRNA (cDNA clone MGC:106630 IMAGE:30362243).
10429568	-2.05	<i>Ly6c1</i>	Lymphocyte antigen 6 complex, locus C1	NM_010741	<i>Mus musculus</i> lymphocyte antigen 6 complex, locus C1 (Ly6c1), mRNA.
10550332	-2.05	<i>Slc1a5</i>	Solute carrier family 1 (neutral amino acid transporter), member 5	NM_009201	<i>Mus musculus</i> solute carrier family 1 (neutral amino acid transporter), member 5 (Slc1a5).
10600301	-2.05	<i>Ssr4</i>	Signal sequence receptor, delta	NM_001166480	<i>Mus musculus</i> signal sequence receptor, delta (Ssr4), transcript variant 1, mRNA.
10574985	-2.06	<i>Slc7a6</i>	Solute carrier family 7 (cationic amino acid transporter, y+ system), member 6	NM_178798	<i>Mus musculus</i> solute carrier family 7 (cationic amino acid transporter, y+ system), member 6.
10360934	-2.06	<i>Rrp15</i>	Ribosomal RNA processing 15 homolog (<i>S. Cerevisiae</i>)	NM_026041	<i>Mus musculus</i> ribosomal RNA processing 15 homolog (<i>S. cerevisiae</i>) (Rrp15), mRNA.
10369586	-2.06	<i>Supv311</i>	Suppressor of var1, 3-like 1 (<i>S. Cerevisiae</i>)	NM_181423	<i>Mus musculus</i> suppressor of var1, 3-like 1 (<i>S. cerevisiae</i>) (Supv311), mRNA.
10352703	-2.06	<i>Mfsd7b</i>	Major facilitator superfamily domain containing 7B	NM_001081259	<i>Mus musculus</i> major facilitator superfamily domain containing 7B (Mfsd7b), mRNA.
10482762	-2.06	<i>Idi1</i>	Isopentenyl-diphosphate delta isomerase	NM_145360	<i>Mus musculus</i> isopentenyl- diphosphate delta isomerase (Idi1), mRNA.
10453102	-2.06	<i>Srsf7</i>	Serine/arginine-rich splicing factor 7	NM_146083	<i>Mus musculus</i> serine/arginine-rich splicing factor 7 (Srsf7), mRNA.
10484920	-2.07	<i>Ptpmt1</i>	Protein tyrosine phosphatase, mitochondrial 1	NM_025576	<i>Mus musculus</i> protein tyrosine phosphatase, mitochondrial 1 (Ptpmt1), nuclear gene encoding mitochondrial protein, mRNA.
10429573	-2.08	<i>Ly6c2</i>	Lymphocyte antigen 6 complex, locus C2	NM_001099217	<i>Mus musculus</i> lymphocyte antigen 6 complex, locus C2 (Ly6c2), mRNA.
10540676	-2.08	<i>Jagn1</i>	Jagunal homolog 1 (<i>Drosophila</i>)	NM_026365	<i>Mus musculus</i> jagunal homolog 1 (<i>Drosophila</i>) (Jagn1), mRNA.
10572727	-2.09	<i>Zfp882</i>	Zinc finger protein 882	NM_001166645	<i>Mus musculus</i> zinc finger protein 882 (Zfp882), mRNA.
10448226	-2.00	<i>Vmn2r111</i>	Vomer nasal 2, receptor 111	NM_001104573	<i>Mus musculus</i> vomer nasal 2, receptor 111 (Vmn2r111), mRNA.
10350102	-2.00	<i>Ptpn7</i>	Protein tyrosine phosphatase, non-receptor type 7	NM_177081	<i>Mus musculus</i> protein tyrosine phosphatase, non-receptor type 7 (Ptpn7), mRNA.
10471586	-2.01	<i>Hspa5</i>	Heat shock protein 5	NM_022310	<i>Mus musculus</i> heat shock protein 5 (Hspa5), transcript variant 2, mRNA.
10462346	-2.01	<i>Rcl1</i>	RNA terminal phosphate cyclase-like 1	NM_021525	<i>Mus musculus</i> RNA terminal phosphate cyclase-like 1 (Rcl1), mRNA.
10607950	-2.01	<i>G5300</i> <i>11006Rik</i>	RIKEN cdna G530011006 gene	NM_029457	<i>Mus musculus</i> RIKEN cDNA G530011006 gene (G530011006Rik), non-coding RNA gene.
10399636	-2.01	<i>Mrto4</i>	MRT4, mrna turnover 4, homolog (<i>S. Cerevisiae</i>)	NM_023536	<i>Mus musculus</i> MRT4, mRNA turnover 4, homolog (<i>S. cerevisiae</i>) (Mrto4), mRNA.
10382625	-2.01	<i>Llg12</i>	Lethal giant larvae homolog 2 (<i>Drosophila</i>)	NM_145438	<i>Mus musculus</i> lethal giant larvae homolog 2 (<i>Drosophila</i>) (Llg12), mRNA.
10463061	-2.01	<i>Gm5827</i>	Predicted gene 5827	XR_033677	<i>Mus musculus</i> similar to Rev-Erb-beta (LOC545289), misc RNA.
10541614	-2.01	<i>Clec4d</i>	C-type lectin domain family 4, member d	NM_010819	<i>Mus musculus</i> C-type lectin domain family 4, member d (Clec4d), transcript variant 1, mRNA.

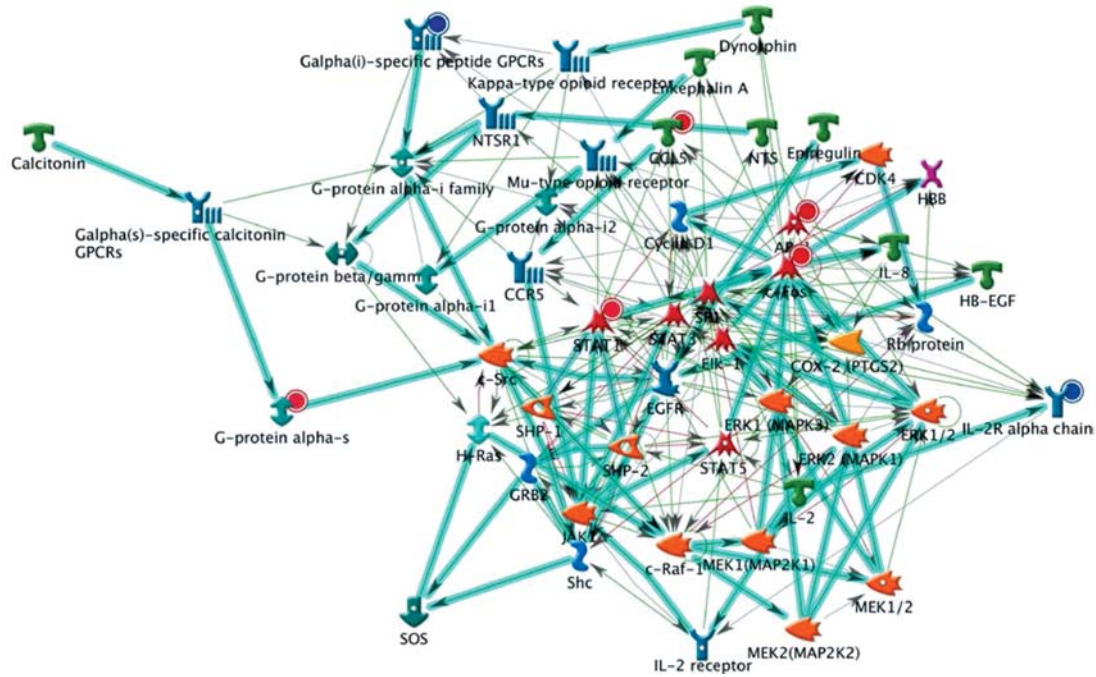


Figure 1. The first (top) scored (by the number of pathways) AN network from Gene Go 02. WEHI-3 cells were treated with 10 μ M α -PA, and then were harvested and total RNA was extracted for cDNA microarray assay. Thick cyan lines indicate the fragments of canonical pathways. Up regulated genes are marked with red circles; down regulated ones with blue circles. Mixed expression for genes between files or between multiple tags for the same gene are marked in 'checkerboard' color.

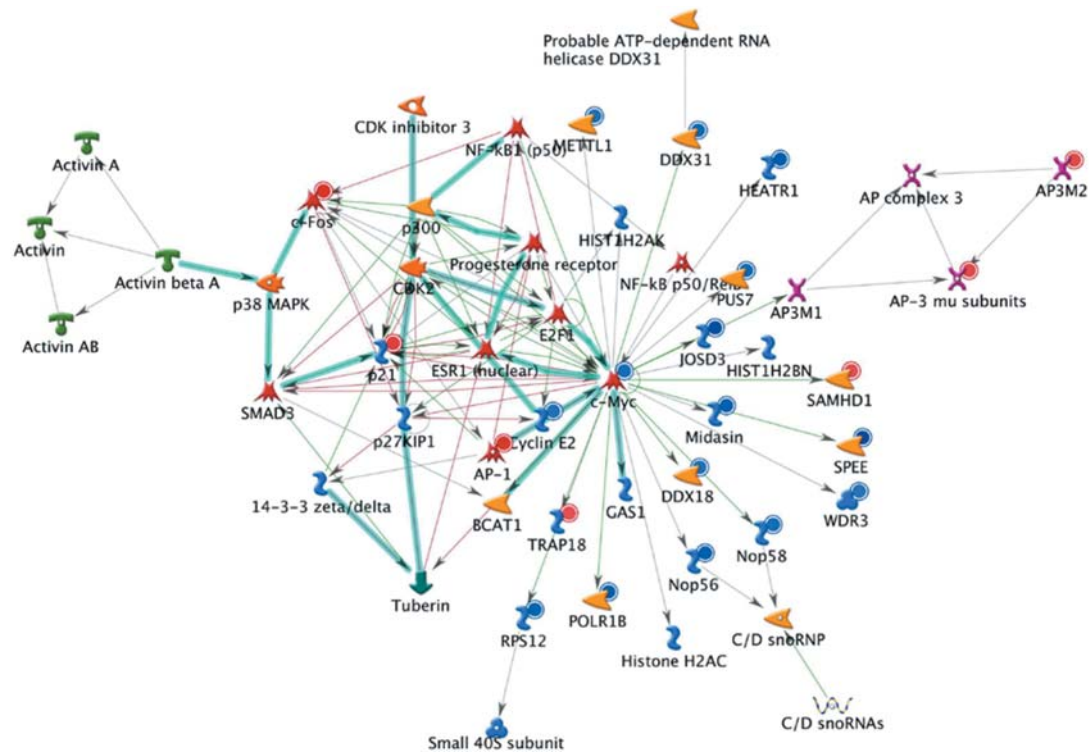


Figure 2. The second scored (by the number of pathways) AN network from Gene Go 02. WEHI-3 cells were treated with 10 μ M α -PA and then were harvested and total RNA was extracted for cDNA microarray assay. Thick cyan lines indicate the fragments of canonical pathways. Up regulated genes are marked with red circles; down regulated ones with blue circles. Mixed expression for genes between files or between multiple tags for the same gene are marked in 'checkerboard' color.

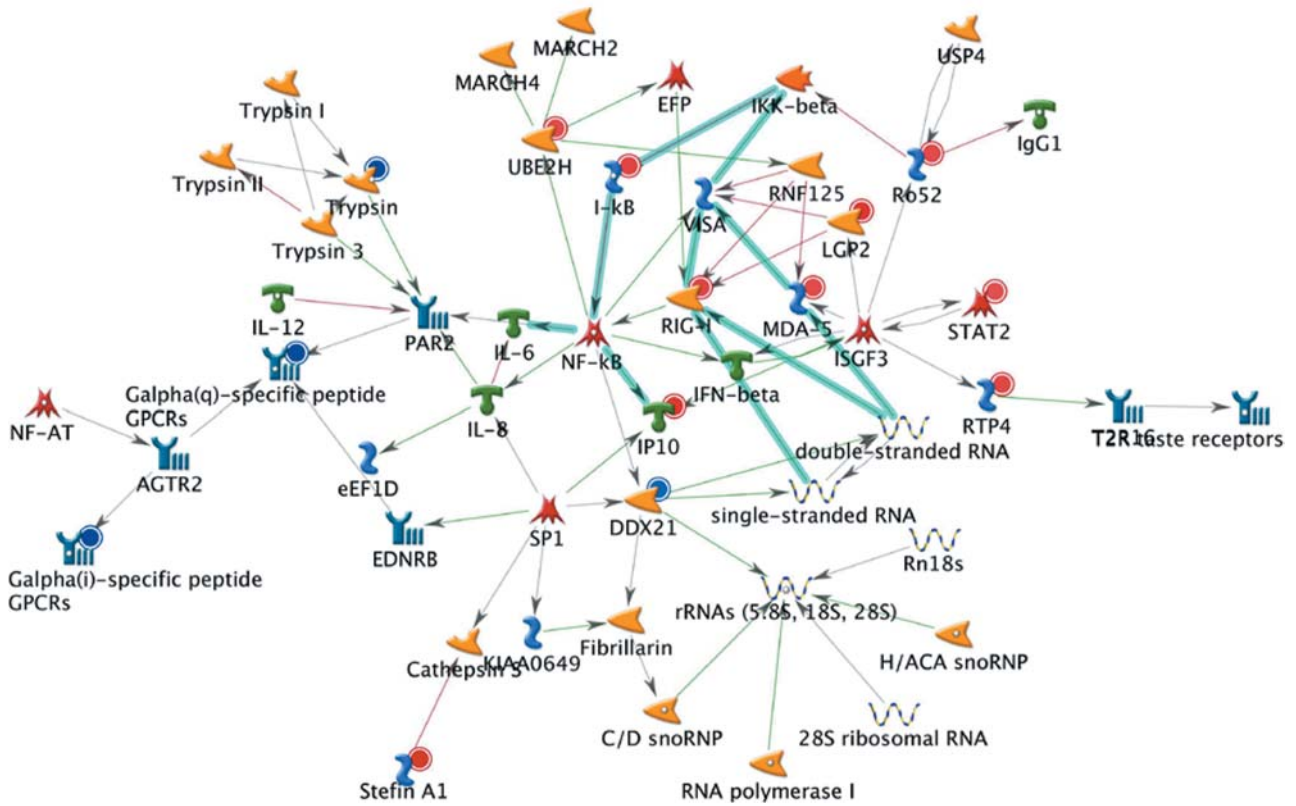


Figure 3. The third scored (by the number of pathways) AN network from Gene Go 02. WEHI-3 cells were treated with 10 μ M α -PA, and then were harvested and total RNA was extracted for cDNA microarray assay. Thick cyan lines indicate the fragments of canonical pathways. Up regulated genes are marked with red circles; down-regulated ones with blue circles. Mixed expression for genes between files or between multiple tags for the same gene are marked in 'checkerboard' color.

cytotoxic effects of α -PA on WEHI-3 cells (data not shown), thus, we further investigated whether α -PA affects expression of genes associated with DNA damage, cell-cycle arrest and apoptosis in WEHI-3 cells. Tables I and II show that α -PA up-regulated or down-regulated some genes associated with DNA damage, cell cycle and apoptosis in WEHI-3 cells.

In order to understand the associated changes in gene expression, Figures 1, 2 and 3 were obtained from GeneGo Process Networks and include about 110 cellular and molecular processes whose content is defined and annotated by GeneGo. Each process represents a preset network of protein interactions characteristic for the process. Experimental data are mapped on the processes and shown as up-regulation (in red) and down regulation (in blue) circles of different intensity. The relative intensity corresponds to the expression value. Based on those observations, our findings provided important possible molecular mechanisms of how α -PA affects gene expression and possibly signaling pathways in WEHI-3 cells and they may also provide characteristics for further investigations.

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