



Low correlation of lncRNA and target gene expression in microarray data

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Background: Recent studies have indicated that long non-coding RNAs (lncRNAs) play important roles in regulating the expression levels of genes and proteins. Challenges arise when trying to identify the target genes of lncRNAs. A popular approach is to select possible target genes of specific lncRNAs based on the similarity of their expression patterns. However, such associations have not been validated in the context of the whole human genome.

Methods: To address this issue, ten microarray datasets with at least 100 samples from five tissue types were analyzed in this study. All datasets were examined using the Affymetrix u133plus 2.0 platform. Probes targeting lncRNAs were identified by performing re-annotation of the probe sequences, and the link between lncRNAs and their target genes was retrieved from an online database. We manually annotated the link file with information about the regulation mechanism and tissue types.

Results: A total of 956 lncRNAs and their target genes were identified as having regulation at the transcriptional level. Pearson correlation coefficients were calculated in all datasets, and low correlations were observed. A resampling test demonstrated that the expression levels of lncRNAs and their target genes showed similar correlations in the pairs obtained by real data and random selection. Further investigations were performed by identifying lncRNAs with differential expression and tissue specificity; however, low correlations were still observed.

Conclusions: In conclusion, gene expression microarray data are not a valid way to identify possible target genes of lncRNAs.

Keywords: Long non-coding RNA (lncRNA); target gene; microarray; correlation

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Introduction

With the advancement in high-throughput genomic technologies such as microarrays and next-generation sequencing (NGS), many non-coding RNAs (ncRNAs) have been reported (1,2). The most important feature of these ncRNAs is that no functional protein products are generated from their RNA transcripts. Although the biological functions and signaling pathways of ncRNAs

remain unclear, several studies have indicated that ncRNAs may be an important player in a variety of biochemical processes and diseases (3,4).

The long non-coding RNAs (lncRNAs) are a subset of ncRNAs characterized by lengths longer than 200 nucleotides. Similar to ncRNAs in general, the biological functions of lncRNAs are not fully elucidated; however, several studies have suggested that lncRNAs may participate in regulating the

Table 1 Sample characteristics of analyzed microarray datasets

Accession number	Tissue	Sample size in the microarray	Reference
GSE36809	Blood	857	(19)
GSE37069	Blood	590	(20)
GSE48350	Brain	253	(21)
GSE50161	Brain	130	(22)
GSE10780	Breast	185	(23)
GSE54002	Breast	433	(24)
GSE19804	Lung	120	(25)
GSE30219	Lung	307	(26)
GSE13355	Skin	180	(27)
GSE30999	Skin	170	(28)

expression of genes and proteins at both the transcriptional and translational levels (5). One study demonstrated that lncRNAs are able to recruit some chromatin-modifying enzymes to activate or inhibit their target genes at the transcriptional level (6). For example, the lncRNA HOTAIR can interact with Polycomb repressive complex 2 (PRC2) to modify the chromatin status of its target genes in mammalian cells (7). In addition, lncRNAs are known to regulate mRNA splicing and degradation, as well as the translation and activity of proteins. However, further investigation is required to understand these regulatory mechanisms and the biological importance of lncRNAs in disease.

Several experimental technologies can be used to measure the expression level of lncRNAs, including real-time polymerase chain reaction (PCR), microarrays, and NGS. Real-time PCR is a standard approach to analyze the expression levels of mRNAs and lncRNAs. Based on the precise primer design in real-time PCR, the specificity is superior to the other two approaches. However, a critical limitation of real-time PCR is its low throughput, which makes it difficult to analyze a whole genome. In contrast, microarray and NGS technologies are high-throughput methods, which allow researchers to examine the expression levels of genome-wide RNA transcripts in only one experiment.

Recently, several studies have shown that the expression level of lncRNAs is detectable in both microarray and NGS platforms (8,9). Since microarray methods have been used for more than two decades, many microarray data from different biological conditions and disease types are available in the public domain. However, lncRNA is a relatively new concept and thus few microarray experiments have been

designed specifically for lncRNAs. To address this issue, a previous report has shown that the expression levels of some lncRNAs can be obtained using the Affymetrix gene expression microarray platforms, based on the re-annotation of their probe sequences (10). A NGS study indicated that the expression level of lncRNAs varies from tissue to tissue according to the RNA-seq data in multiple human tissues (11,12). Compared with microarrays, NGS technology is a better approach to investigate lncRNAs, because it does not require a priori knowledge of the nucleotide sequences of lncRNAs. Currently, the most important limitations for NGS technology in analyzing lncRNAs are the high cost and the small sample sizes of data in the public domain. Therefore, we focused on the gene expression microarray data to do the bioinformatics analyses of lncRNAs in this study.

Identification of the target genes of lncRNAs poses a major challenge. Our knowledge of lncRNAs and their target genes is still limited, even though some online databases are available for depositing information on lncRNAs (13,14). To date, the most popular approach to identify possible target genes of lncRNAs is based on the correlation coefficients between the expression levels of lncRNAs and genes (15,16). Only a few lncRNA-gene pairs have been validated by *in vitro* experiments (17). However, whether correlation coefficients are a good way to identify possible target genes of lncRNAs remains unclear. To address this issue, known lncRNAs and their target genes were downloaded from a publicly available database and manually curated based on the literature. Pearson correlation coefficients were calculated to examine the associations between the expression levels of the lncRNAs and their target genes in several biological scenarios. The findings indicate that using expression levels is not a good approach for identifying possible target genes of lncRNAs.

Methods

Microarray datasets

Ten published and publicly available gene expression microarrays from the Affymetrix u133plus 2.0 platform were retrieved from the Gene Expression Omnibus (GEO) (18). The sample characteristics are summarized in *Table 1*. Five different tissues, including breast, blood, brain, lung, and skin were analyzed. For each probe, the gene symbol was obtained from the official annotation file provided by Affymetrix. All analyses were conducted using the affy package with the default parameters in the R program (29).

Table 2 Subgroups of analyzed microarray datasets and numbers of identified pairs of lncRNAs and their target genes

Accession number	Subgroups ^a	Number of lncRNA-gene pairs with differentially expressed lncRNAs ^b
GSE36809	820+37 (trauma/normal)	417
GSE37069	553+37 (trauma/normal)	701
GSE48350	80+173 (ad/normal)	689
GSE50161	117+13 (cancer/normal)	257
GSE10780	42+143 (tumor/normal)	539
GSE54002	417+16 (tumor/normal)	574
GSE19804	60+60 (tumor/normal)	418
GSE13355	58+122 (psoriasis/normal)	547
GSE30999	85+85 (psoriasis/normal)	808

^a, the definition of the subgroups was provided in the annotation file from the microarray dataset respectively; ^b, differentially expressed lncRNAs was obtained from comparing the two subgroups in each dataset respectively. AD, Alzheimer's disease.

The robust multiarray average (RMA) algorithm was performed to reduce the systematic bias in one dataset. The correspondence between probe names and lncRNAs is provided in a previous study (10).

Identification of long non-coding RNA (lncRNA)-target gene pairs

Known pairings of lncRNAs with their target genes were retrieved from an online database, LncRNA2Target (13). Because the microarray data investigated the expression levels of messenger RNA (mRNA), we checked whether the association of a lncRNA with its target gene was reflected in the mRNA levels as described in the original references (Table S1). Lastly, after mapping to the Affymetrix u133plus 2.0 microarray platform, 956 pairs of lncRNAs and their target genes were identified (Table S2).

Associations of long non-coding RNAs (lncRNAs) and their target genes in different biological scenarios

For each microarray dataset, the Pearson correlation coefficients were calculated to quantitatively estimate the strength of the association between the expression of a lncRNA and the expression of its target gene(s). The

correlation coefficients were further classified into three groups as the follows: low correlation ($r < 0.3$), medium correlation ($0.3 < r < 0.7$), and high correlation ($r > 0.7$). A total of six scenarios were investigated. The first scenario was to investigate the 956 pairs of lncRNAs and their target genes. Subsequently, to establish a null baseline for comparison, a re-sampling test was performed (scenario 2). That is, we randomly selected a pair of probes targeting one lncRNA and one gene to calculate their correlation, and this re-sampling procedure was repeated 100,000 times. Furthermore, samples were classified into two phenotype groups based on their characteristics defined by their original references (Table 2). Based on the groupings, an unpaired *t*-test was performed to identify differentially expressed lncRNAs ($P < 0.05$). The significant lncRNAs were further classified into two groups based on which phenotype group had higher expression levels (scenarios 3 and 4).

Associations of long non-coding RNAs (lncRNAs) and their target genes in lung tissue

Since several studies have indicated that the expression levels of lncRNAs are tissue-specific (11,12), we further annotated the mapping file to include the tissue type, based on the original references. Although we intended to analyze all five tissues shown in Table 1, the published information about the tissue in which pairs of lncRNAs and their target genes are expressed is relatively limited. The highest number ($N=27$) of annotated lncRNA was reported in lung tissue, and thus we focused on the two lung datasets, GSE19804 and GSE30219, to do the comparisons. On the microarray platform, a total of 506 probe combinations of lncRNAs and their target genes were identified according to the 27 lncRNAs specific to lung tissue (Table S2), and only these 506 pairs showing significantly differential expression were selected for further analyses (scenarios 5 and 6).

Results

Identification of pairs of long non-coding RNAs (lncRNAs) and their target genes in the Affymetrix u133plus 2.0 microarray platform

Since all microarray data were examined in the Affymetrix u133plus 2.0 microarray, we obtained the gene symbol for each probe based on the official annotation file provided by Affymetrix. To identify the probes targeting lncRNAs, a previous study (10) was utilized, and 3,029

probes were found to correspond to lncRNA sequences. Subsequently, pairs of lncRNAs and their target genes were downloaded from the LncRNA2Target database (13). Since the microarray data contained the expression levels of mRNA, we focused on the lncRNA-gene pairs reported to participate in the regulation of transcription. A total of 74 pairs were identified and summarized in *Table S1*. Since microarray data contain multiple probes targeting the same gene, the 74 pairs could be mapped to 956 combinations of probes (*Table S2*). Therefore, further analyses were performed on these 956 pairs.

Low correlations between the expression levels of long non-coding RNAs (lncRNAs) and their target genes (scenarios 1–2)

To examine whether the expression level of a lncRNA is associated with that of its target gene, Pearson correlation coefficients were calculated among the 956 combinations of known lncRNAs and their target genes. The results are summarized in *Table 3*. We plotted the distribution of correlations in *Figure 1*. The correlation values are shown in the x-axis and the cumulated frequency of lncRNA-gene pairs is shown in the y-axis. Low correlation values were reported in the scenario 1 across all ten datasets, and the absolute value of the maximum deviation to zero is only around 0.05. Therefore, the expression level of probes targeting lncRNA is not correlated with the expression level of their target genes. To further confirm the low correlations, a resampling test was performed with 100,000 iterations. The details about the resampling test are described in the Methods. As shown in *Figure 1*, the distributions of correlation values obtained from the resampling test in all ten datasets are all similar to those calculated for the 956 curated pairs. The maximum difference of the correlation values between the curated pairs and the resampling test is less than 0.1 and most of them are less than 0.03. These results demonstrated that no strong correlations exist between the expression levels of lncRNAs and their target genes, suggesting that it is not advisable to identify target genes of lncRNAs based on the similarity of their expression patterns in microarray data.

Higher correlations were observed when the long non-coding RNAs (lncRNAs) were differentially expressed (scenarios 3–4)

It is possible that the low correlations between lncRNAs and their target genes were observed because most of

the examined lncRNAs were not expressed under the conditions of the microarray experiment. To exclude this possibility, the unpaired *t*-test was performed to identify lncRNAs with significantly different expression ($P < 0.05$) in two different phenotypes. The phenotypes groups in each dataset were shown in *Table 2* and the definitions were based on their original references. Subsequently, the differentially expressed lncRNAs were classified into two groups based on the tissue type in which they had higher expression levels. Similar to the previous approach, Pearson correlation coefficients were calculated to evaluate the associations between expression of lncRNAs and their target genes. Intriguingly, the absolute value of the correlations became higher (*Table 3*), suggesting stronger associations of the lncRNAs and their target genes were reported. However, the directions of the correlations were not consistent in different datasets. For examples, a peak of the positive correlations exists in the GSE36809 dataset, whereas a peak of the negative correlations was observed in the GSE48350 and GSE50161 datasets (*Figure 1*). This makes it difficult to determine the possible target genes, since both positive and negative correlations should be taken into consideration.

Low correlations between the expression of long non-coding RNAs (lncRNAs) and their target genes in lung tissue (scenarios 5–6)

Previous studies have shown that the expression levels of lncRNAs vary in different tissues. To further confirm whether the low correlations described above result from the lncRNAs being expressed in different tissues, we annotated the lncRNAs and their target genes based on their original references. Since lncRNA is a relatively new topic in the research field, information on their tissue types is limited. Among the 5 tissues examined in this study, lung tissue had the highest number of lncRNAs ($N=27$) with documentation. In the Affymetrix u133plus 2.0 microarray platform, these 27 lncRNAs and their target genes specific to lung tissue can be mapped as 506 pairs. Among the 506 pairs, we focused on the pairs with lncRNAs showing differential expression, since higher correlations were reported. The two microarray datasets targeting lung cancer patients, GSE19804 and GSE3021, were analyzed accordingly (*Figure 2*).

The Pearson correlation coefficients of lung-specific lncRNA-gene pairs in different scenarios are summarized in *Table 3* (scenarios 5 and 6). Although their absolute values were higher than those in scenarios 3 and 4 (the

Table 3 The mean and standard deviation (SD) values of Pearson correlation coefficients between the expression levels of lncRNAs and their target genes in different scenarios

Dataset	Tissue	Scenario	Mean	SD
GSE36809	Blood	1. Whole pairs (N=956)	0.0083	0.1916
		2. Resampling test (N=100,000)	0.0214	0.1509
		3. Highly expressed in trauma (N=233)	0.0385	0.2607
		4. Highly expressed in normal (N=184)	0.017	0.1927
GSE37069	Blood	1. Whole pairs (N=956)	0.0116	0.207
		2. Resampling test (N=100,000)	0.0243	0.2139
		3. Highly expressed in trauma (N=137)	0.0578	0.2325
		4. Highly expressed in normal (N=564)	0.009	0.2806
GSE48350	Brain	1. Whole pairs (N=956)	0.0592	0.2227
		2. Resampling test (N=100,000)	0.0256	0.2114
		3. Highly expressed in Alzheimer's disease (N=628)	0.059	0.1973
		4. Highly expressed in normal (N=61)	-0.1329	0.1523
GSE50161	Brain	1. Whole pairs (N=956)	0.0169	0.2329
		2. Resampling test (N=100,000)	0.007	0.2898
		3. Highly expressed in tumor (N=193)	0.2037	0.2053
		4. Highly expressed in normal (N=64)	-0.1805	0.3272
GSE10780	Breast	1. Whole pairs (N=956)	-0.0229	0.2071
		2. Resampling test (N=100,000)	0.0313	0.2013
		3. Highly expressed in tumor (N=144)	0.0362	0.1742
		4. Highly expressed in normal (N=395)	-0.0297	0.2024
GSE54002	Breast	1. Whole pairs (N=956)	-0.0411	0.1415
		2. Resampling test (N=100,000)	0.0238	0.1327

Table 3 (continued)**Table 3** (continued)

Dataset	Tissue	Scenario	Mean	SD
GSE19804	Lung	3. Highly expressed in tumor (N=211)	0.0496	0.0938
		4. Highly expressed in normal (N=363)	0.0407	0.3526
		1. Whole pairs (N=956)	-0.0571	0.2048
		2. Resampling test (N=100,000)	0.0189	0.2111
GSE30219	Lung	3. Highly expressed in tumor (N=414)	-0.0456	0.1929
		4. Highly expressed in normal (N=4)	-0.2699	0.2804
		5. Lung-specific pairs in tumor (N=148)	-0.0911	0.194
		6. Lung-specific pairs in normal (N=0)	-0.041	0.2259
GSE13355	Skin	1. Whole pairs (N=956)	-0.0337	0.1641
		2. Resampling test (N=100,000)	0.0199	0.1386
		3. Highly expressed in tumor (N=274)	-0.0284	0.1648
		4. Highly expressed in normal (N=349)	-0.1579	0.3364
		5. Lung-specific pairs in tumor (N=9)	0.1651	0.0197
		6. Lung-specific pairs in normal (N=284)	-0.1873	0.3339
GSE30999	Skin	1. Whole pairs (N=956)	-0.0273	0.2376
		2. Resampling test (N=100,000)	0.0303	0.2316
		3. Highly expressed in psoriasis (N=134)	0.0154	0.2375
		4. Highly expressed in normal (N=413)	-0.0408	0.2296
GSE30999	Skin	1. Whole pairs (N=956)	-0.0107	0.2479
		2. Resampling test (N=100,000)	0.0177	0.2309
		3. Highly expressed in psoriasis (N=240)	0.02	0.2369
		4. Highly expressed in normal (N=568)	-0.0338	0.2397

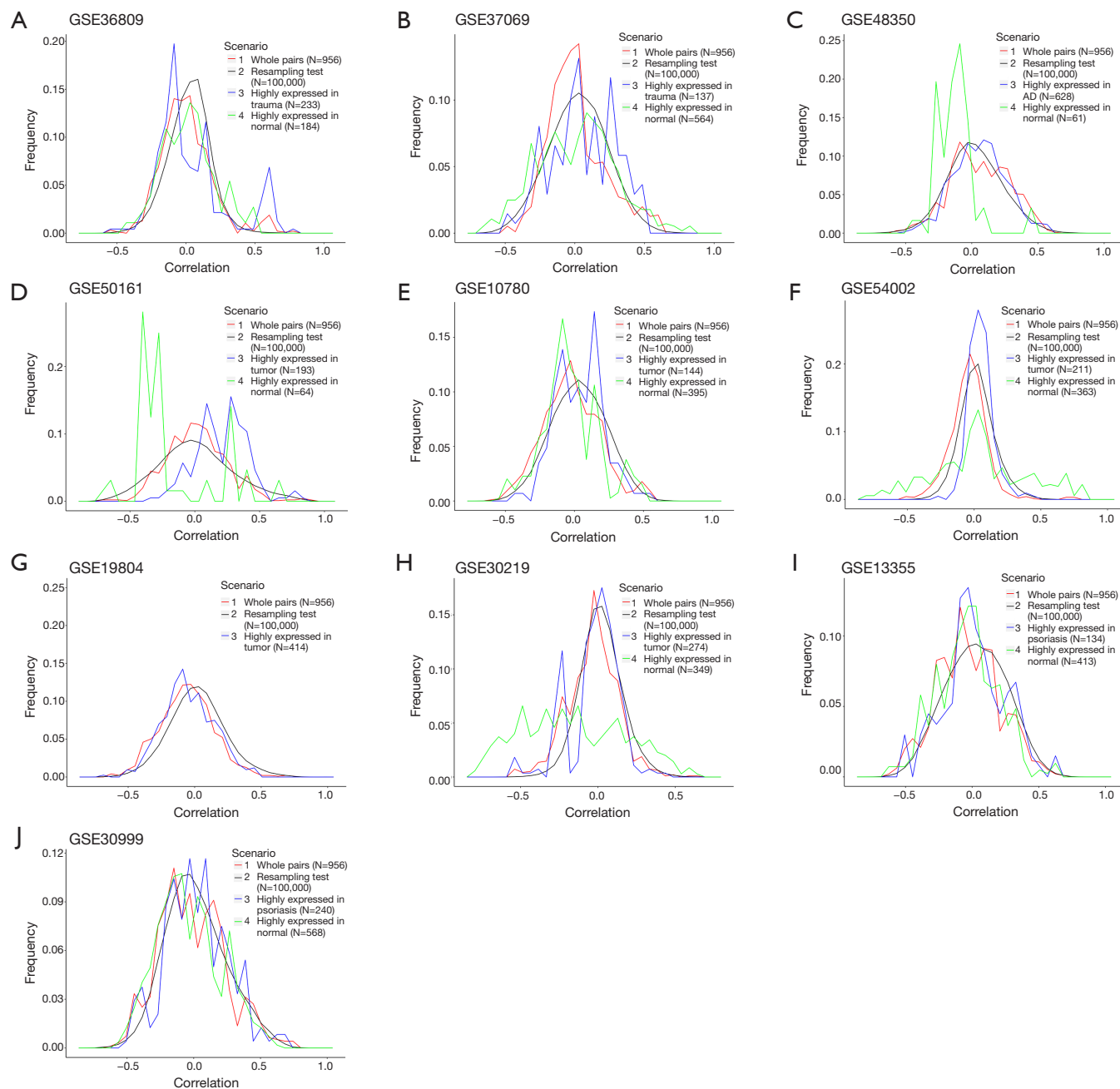


Figure 1 Pearson correlation coefficients in the 10 datasets with different scenarios. The x-axis represents the correlation values and the y-axis represents the relative frequency. Four different scenarios were compared: (I) the 956 curated pairs participating in regulation at the transcriptional level; (II) the 100,000 pairs obtained by random selection; 3–4) differentially expressed lncRNAs selected by the unpaired *t*-test with $P < 0.05$ in the two phenotype groups. Note that scenario 4 in dataset GSE19804 was not plotted due to the small sample size ($N < 10$).

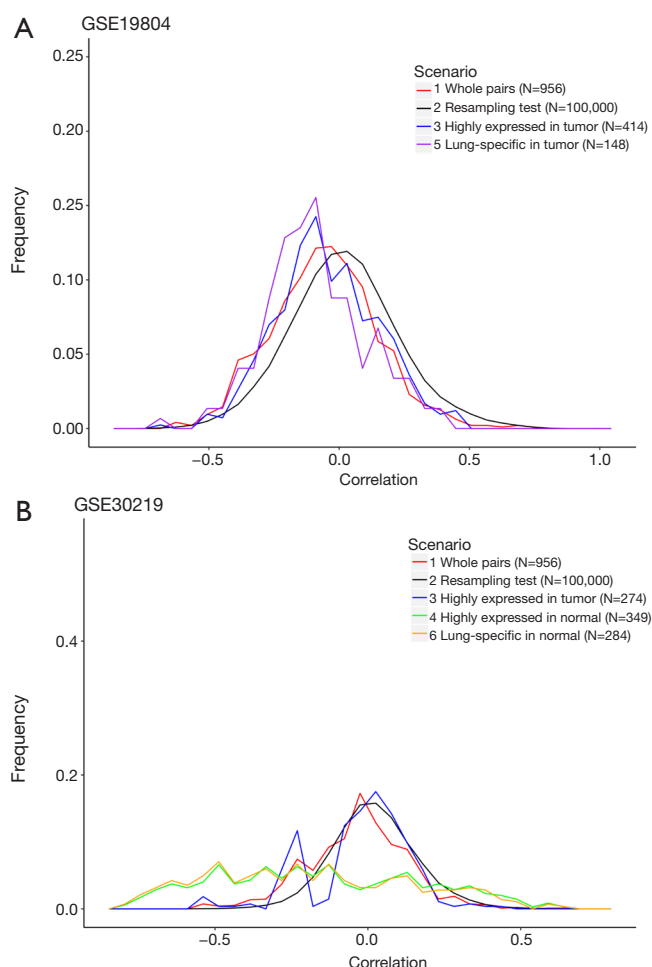


Figure 2 Pearson correlation coefficients of the two lung cancer datasets. The x-axis represents the correlation values and the y-axis represents the relative frequency. Six different scenarios were compared: (I) the 956 curated pairs participating in regulation at the transcriptional level; (II) the 100,000 pairs obtained by random selection; 3–4) differentially expressed lncRNAs selected by the unpaired *t*-test with $P < 0.05$ in the 2 phenotype groups; 5–6) differentially expressed lncRNAs specific to normal or cancerous lung tissue. Note that scenarios 4 and 6 in dataset GSE19804 and scenario 5 in dataset GSE30219 were not plotted due to the small sample sizes ($N < 10$).

classification by phenotype), the absolute values were still less than 0.2, which is regarded as low. However, more lncRNAs and their target genes specific to lung tissue should be analyzed in the future to confirm the conclusion, since the sample sizes were quite limited ($N=0$ for scenario 6 in GSE19804 and $N=9$ for scenario 5 in GSE30219). These results suggest that the correlation between the expression

levels of lncRNAs and their target genes was low even if the lncRNAs exhibited differential expression and were derived from a particular tissue.

Discussion

lncRNAs have been revealed as an important player in modulating the expression levels of their target genes and proteins (30,31). It has become essential to identify possible target genes of lncRNAs. The most popular approach for identifying the target gene of a lncRNA is to use the similarity in their expression levels. However, no systematic investigations have been performed to examine the validity of such associations. Our results demonstrated that this approach is ineffective, as indicated by the fact that the correlation coefficients between lncRNA and target gene expression levels in biological samples were not significantly different than those in the random resampling test (Table 3). Three pairs of scenarios were considered in this study, and all of them showed similar correlation values, suggesting that no differences exist. Therefore, other approaches for predicting possible target genes of lncRNAs should be developed.

We selected the Affymetrix u133plus 2.0 microarray to do the comparisons for two reasons. First, the Affymetrix u133plus 2.0 microarray has the largest numbers of datasets and samples in the public domain and thus more tissues types and biological statuses can be analyzed concurrently. Second, several previous studies have demonstrated that the probes in the Affymetrix u133plus 2.0 platform can be used to examine the expression levels of lncRNAs (8,10). Therefore, we can directly use data from the gene expression microarray to simultaneously investigate lncRNAs and genes without introducing systematic bias. In addition to the Affymetrix platform, many studies have been conducted using microarrays from Illumina. Unfortunately, the probe sequences in the Illumina microarrays are not available to the public and thus re-annotation is not possible for detecting lncRNAs.

The Pearson correlation coefficients of the expression levels of lncRNAs and their target genes were low in all scenarios (Table 3), suggesting the association of lncRNA with mRNA expression levels is low. One possible reason for this finding is the incompleteness of the probes targeting lncRNAs. Since the original purpose of the Affymetrix u133plus 2.0 microarray was targeting coding genes, not all lncRNAs are detected using the microarray data. In addition, our knowledge about lncRNAs is still very limited.

Only a few pairs of lncRNAs and their target genes have been reported, which may cause us to unknowingly discard or overlook some relevant information about the whole picture of associations. However, this issue can only be addressed after more data are accumulated.

Although low correlations of the lncRNAs and their target genes were reported in all scenarios, certain limitations exist in this study. We examined ten microarray datasets with at least 100 samples in five different tissues. However, the sample sizes and the tissue types are still limited. Larger sample sizes and more independent microarray datasets are required to confirm the results. In addition, many of the 10 datasets have unbalanced sample distributions for the two phenotype groups within them, which may introduce some bias into the identification of those significant lncRNAs. Additional analyses should be conducted with similar sample sizes in the two phenotype groups. We attempted to explore whether the associations were specific to different tissue types; however, only the lung tissue had enough annotated lncRNAs and target gene pairs to do this. Consequently, only lung tissue was examined in this study, and low correlations were observed. More tissue types should be analyzed using the same approach in the future to further demonstrate the associations.

In conclusion, pairs of lncRNAs and their corresponding target genes showed low correlation between lncRNA and gene expression in all scenarios. Neither differential expression of the lncRNAs nor limiting the analysis to a specific tissue type improved the correlations. Therefore, researchers should be more conservative when identifying possible target genes of lncRNAs using gene expression microarray data and should seek to validate the proposed targets by other methods.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/tcr.2016.04.07>). Eric Y. Chuang serves as the Editor-in-Chief of Translational Cancer Research. The other author has no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013).

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Supplementary

Table S1 LncRNA-target pairs proved at the transcriptional level in the LncRNA2Target database

LncRNA name	Target name	Tissue origin	PMID
GAS5	CDK6	Bladder	24069260
GAS5	CDK6	Pancreas	24026436
GAS5	MIR21	Mammary gland	23933812
HOTAIR	CD82	Liver	24663081
HOTAIR	PTEN	Laryngeal	23141928
HOTAIR	QKI	Liver	24663081
HOTAIR	RBM38	Liver	24663081
HOTAIR	WIF1	Esophageal	24118380
HOTAIRM1	HOXA1	Blood	19144990
HOTAIRM1	HOXA4	Blood	19144990
HOTTIP	HOXA10	Foreskin	21423168
HOTTIP	HOXA11	Foreskin	21423168
HOTTIP	HOXA13	Foreskin	21423168
HOTTIP	HOXA7	Foreskin	21423168
HOTTIP	HOXA9	Foreskin	21423168
MALAT1	ABCA1	Lung	23243023
MALAT1	ADAMTS12	Lung	23243023
MALAT1	BMPER	Lung	23243023
MALAT1	CA2	Lung	23243023
MALAT1	CCT4	Lung	20937273
MALAT1	CDCP1	Lung	23243023
MALAT1	COL6A1	Lung	23243023
MALAT1	CPM	Lung	23243023
MALAT1	CSF1	Lung	23243023
MALAT1	CTHRC1	Lung	20937273
MALAT1	CXCL5	Lung	23243023
MALAT1	DRD1	Lung	23243023
MALAT1	GPC6	Lung	23243023
MALAT1	HMMR	Lung	20937273
MALAT1	HNF4G	Lung	23243023
MALAT1	LAYN	Lung	23243023
MALAT1	LPAR1	Lung	23243023
MALAT1	LPHN2	Lung	23243023
MALAT1	LY6K	Lung	23243023
MALAT1	MCAM	Lung	23243023
MALAT1	MIA2	Lung	23243023

Table S1 (continued)

Table S1 (continued)

LncRNA name	Target name	Tissue origin	PMID
MALAT1	NNMT	Lung	23243023
MALAT1	PRKCE	Lung	23243023
MALAT1	RASSF6	Lung	23243023
MALAT1	ROBO1	Lung	23243023
MALAT1	SNAI2	Bladder	22722759
MALAT1	STC1	Lung	23243023
MALAT1	ZEB1	Bladder	22722759
MALAT1	ZEB2	Bladder	22722759
MEG3	CASP3	Brain	22234798
MEG3	CASP8	Brain	22234798
MEG3	TP53	Brain	22234798
MEG3	TP53	Ovarian	24859196
NEAT1	ADARB2	Cervical	24173718
PVT1	COL4A1	Mesangial cells	21526116
PVT1	FN1	Mesangial cells	21526116
PVT1	TGFB1	Mesangial cells	21526116
TUG1	HOXB7	Lung	24853421
UCA1	AKT3	Bladder	22576688
UCA1	ARNT2	Bladder	22576688
UCA1	ATM	Bladder	22576688
UCA1	BCR	Bladder	22576688
UCA1	CDKN2B	Bladder	22285928
UCA1	CRKL	Bladder	22576688
UCA1	EP300	Bladder	22285928
UCA1	EPAS1	Bladder	22576688
UCA1	FAS	Bladder	22576688
UCA1	FGF1	Bladder	22576688
UCA1	FN1	Bladder	22576688
UCA1	FZD5	Bladder	22576688
UCA1	LAMA3	Bladder	22576688
UCA1	MAPK1	Bladder	22576688
UCA1	PDGFB	Bladder	22576688
UCA1	PRKAR2A	Bladder	22576688
UCA1	PTGS2	Bladder	22576688
UCA1	SUFU	Bladder	22576688
UCA1	TGFB1	Bladder	22285928
UCA1	WNT5A	Bladder	22576688
UCA1	WNT6	Bladder	24495014

Table S2 Combination of probes by mapping names of lncRNA-target pairs from the LnRNA2Target database

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
GAS5	224741_x_at	CDK6	207143_at	
GAS5	224741_x_at	CDK6	224847_at	
GAS5	224741_x_at	CDK6	224848_at	
GAS5	224741_x_at	CDK6	224851_at	
GAS5	224741_x_at	CDK6	231198_at	
GAS5	224741_x_at	CDK6	235287_at	
GAS5	224741_x_at	CDK6	243000_at	
GAS5	224841_x_at	CDK6	207143_at	
GAS5	224841_x_at	CDK6	224847_at	
GAS5	224841_x_at	CDK6	224848_at	
GAS5	224841_x_at	CDK6	224851_at	
GAS5	224841_x_at	CDK6	231198_at	
GAS5	224841_x_at	CDK6	235287_at	
GAS5	224841_x_at	CDK6	243000_at	
GAS5	227517_s_at	CDK6	207143_at	
GAS5	227517_s_at	CDK6	224847_at	
GAS5	227517_s_at	CDK6	224848_at	
GAS5	227517_s_at	CDK6	224851_at	
GAS5	227517_s_at	CDK6	231198_at	
GAS5	227517_s_at	CDK6	235287_at	
GAS5	227517_s_at	CDK6	243000_at	
GAS5	228238_at	CDK6	207143_at	
GAS5	228238_at	CDK6	224847_at	
GAS5	228238_at	CDK6	224848_at	
GAS5	228238_at	CDK6	224851_at	
GAS5	228238_at	CDK6	231198_at	
GAS5	228238_at	CDK6	235287_at	
GAS5	228238_at	CDK6	243000_at	
GAS5	224741_x_at	CDK6	207143_at	
GAS5	224741_x_at	CDK6	224847_at	
GAS5	224741_x_at	CDK6	224848_at	
GAS5	224741_x_at	CDK6	224851_at	
GAS5	224741_x_at	CDK6	231198_at	
GAS5	224741_x_at	CDK6	235287_at	
GAS5	224741_x_at	CDK6	243000_at	
GAS5	224841_x_at	CDK6	207143_at	
GAS5	224841_x_at	CDK6	224847_at	
GAS5	224841_x_at	CDK6	224848_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
GAS5	224741_x_at	CDK6	231198_at	
GAS5	224741_x_at	CDK6	235287_at	
GAS5	224741_x_at	CDK6	243000_at	
GAS5	224841_x_at	CDK6	207143_at	
GAS5	224841_x_at	CDK6	224847_at	
GAS5	224841_x_at	CDK6	224848_at	
GAS5	224841_x_at	CDK6	224851_at	
GAS5	224841_x_at	CDK6	231198_at	
GAS5	224841_x_at	CDK6	235287_at	
GAS5	224841_x_at	CDK6	243000_at	
GAS5	227517_s_at	CDK6	207143_at	
GAS5	227517_s_at	CDK6	224847_at	
GAS5	227517_s_at	CDK6	224848_at	
GAS5	227517_s_at	CDK6	224851_at	
GAS5	227517_s_at	CDK6	231198_at	
GAS5	227517_s_at	CDK6	235287_at	
GAS5	227517_s_at	CDK6	243000_at	
GAS5	228238_at	CDK6	207143_at	
GAS5	228238_at	CDK6	224847_at	
GAS5	228238_at	CDK6	224848_at	
GAS5	228238_at	CDK6	224851_at	
GAS5	228238_at	CDK6	231198_at	
GAS5	228238_at	CDK6	235287_at	
GAS5	228238_at	CDK6	243000_at	
GAS5	224741_x_at	CDK6	207143_at	
GAS5	224741_x_at	CDK6	224847_at	
GAS5	224741_x_at	CDK6	224848_at	
GAS5	224741_x_at	CDK6	224851_at	
GAS5	224741_x_at	CDK6	231198_at	
GAS5	224741_x_at	CDK6	235287_at	
GAS5	224741_x_at	CDK6	243000_at	
GAS5	224841_x_at	CDK6	207143_at	
GAS5	224841_x_at	CDK6	224847_at	
GAS5	224841_x_at	CDK6	224848_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
GAS5	224841_x_at	CDK6	224851_at	
GAS5	224841_x_at	CDK6	231198_at	
GAS5	224841_x_at	CDK6	235287_at	
GAS5	224841_x_at	CDK6	243000_at	
GAS5	227517_s_at	CDK6	207143_at	
GAS5	227517_s_at	CDK6	224847_at	
GAS5	227517_s_at	CDK6	224848_at	
GAS5	227517_s_at	CDK6	224851_at	
GAS5	227517_s_at	CDK6	231198_at	
GAS5	227517_s_at	CDK6	235287_at	
GAS5	227517_s_at	CDK6	243000_at	
GAS5	228238_at	CDK6	207143_at	
GAS5	228238_at	CDK6	224847_at	
GAS5	228238_at	CDK6	224848_at	
GAS5	228238_at	CDK6	224851_at	
GAS5	228238_at	CDK6	231198_at	
GAS5	228238_at	CDK6	235287_at	
GAS5	228238_at	CDK6	243000_at	
GAS5	224741_x_at	CDK6	207143_at	
GAS5	224741_x_at	CDK6	224847_at	
GAS5	224741_x_at	CDK6	224848_at	
GAS5	224741_x_at	CDK6	224851_at	
GAS5	224741_x_at	CDK6	231198_at	
GAS5	224741_x_at	CDK6	235287_at	
GAS5	224741_x_at	CDK6	243000_at	
GAS5	224841_x_at	CDK6	207143_at	
GAS5	224841_x_at	CDK6	224847_at	
GAS5	224841_x_at	CDK6	224848_at	
GAS5	224841_x_at	CDK6	224851_at	
GAS5	224841_x_at	CDK6	231198_at	
GAS5	224841_x_at	CDK6	235287_at	
GAS5	224841_x_at	CDK6	243000_at	
GAS5	227517_s_at	CDK6	207143_at	
GAS5	227517_s_at	CDK6	224847_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
GAS5	227517_s_at	CDK6	224848_at	
GAS5	227517_s_at	CDK6	224851_at	
GAS5	227517_s_at	CDK6	231198_at	
GAS5	227517_s_at	CDK6	235287_at	
GAS5	227517_s_at	CDK6	243000_at	
GAS5	228238_at	CDK6	207143_at	
GAS5	228238_at	CDK6	224847_at	
GAS5	228238_at	CDK6	224848_at	
GAS5	228238_at	CDK6	224851_at	
GAS5	228238_at	CDK6	231198_at	
GAS5	228238_at	CDK6	235287_at	
GAS5	228238_at	CDK6	243000_at	
GAS5	224741_x_at	MIR21	220990_s_at	
GAS5	224741_x_at	MIR21	224917_at	
GAS5	224841_x_at	MIR21	220990_s_at	
GAS5	224841_x_at	MIR21	224917_at	
GAS5	227517_s_at	MIR21	220990_s_at	
GAS5	227517_s_at	MIR21	224917_at	
GAS5	228238_at	MIR21	220990_s_at	
GAS5	228238_at	MIR21	224917_at	
HOTAIR	239153_at	CD82	203904_x_at	
HOTAIR	239153_at	CD82	228910_at	
HOTAIR	239153_at	PTEN	204053_x_at	
HOTAIR	239153_at	PTEN	204054_at	
HOTAIR	239153_at	PTEN	211711_s_at	
HOTAIR	239153_at	PTEN	217492_s_at	
HOTAIR	239153_at	PTEN	225363_at	
HOTAIR	239153_at	PTEN	227469_at	
HOTAIR	239153_at	PTEN	228006_at	
HOTAIR	239153_at	PTEN	233254_x_at	
HOTAIR	239153_at	PTEN	242622_x_at	
HOTAIR	239153_at	QKI	1555154_a_at	
HOTAIR	239153_at	QKI	212262_at	
HOTAIR	239153_at	QKI	212263_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
HOTAIR	239153_at	QKI	212265_at	
HOTAIR	239153_at	QKI	212636_at	
HOTAIR	239153_at	QKI	214541_s_at	
HOTAIR	239153_at	QKI	214543_x_at	
HOTAIR	239153_at	QKI	228540_at	
HOTAIR	239153_at	QKI	236154_at	
HOTAIR	239153_at	QKI	241938_at	
HOTAIR	239153_at	RBM38	212430_at	
HOTAIR	239153_at	WIF1	204712_at	
HOTAIRM1	1557050_at	HOXA1	214639_s_at	
HOTAIRM1	1557051_s_at	HOXA1	214639_s_at	
HOTAIRM1	228642_at	HOXA1	214639_s_at	
HOTAIRM1	1557050_at	HOXA4	206289_at	
HOTAIRM1	1557051_s_at	HOXA4	206289_at	
HOTAIRM1	228642_at	HOXA4	206289_at	
HOTTIP	1564069_at	HOXA10	213147_at	
HOTTIP	1564069_at	HOXA10	213150_at	
HOTTIP	1564070_s_at	HOXA10	213147_at	
HOTTIP	1564070_s_at	HOXA10	213150_at	
HOTTIP	244553_at	HOXA10	213147_at	
HOTTIP	244553_at	HOXA10	213150_at	
HOTTIP	1564069_at	HOXA11	208493_at	
HOTTIP	1564069_at	HOXA11	213823_at	
HOTTIP	1564070_s_at	HOXA11	208493_at	
HOTTIP	1564070_s_at	HOXA11	213823_at	
HOTTIP	244553_at	HOXA11	208493_at	
HOTTIP	244553_at	HOXA11	213823_at	
HOTTIP	1564069_at	HOXA13	231786_at	
HOTTIP	1564069_at	HOXA13	238571_at	
HOTTIP	1564069_at	HOXA13	238808_at	
HOTTIP	1564070_s_at	HOXA13	231786_at	
HOTTIP	1564070_s_at	HOXA13	238571_at	
HOTTIP	1564070_s_at	HOXA13	238808_at	
HOTTIP	244553_at	HOXA13	231786_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
HOTTIP	244553_at	HOXA13	238571_at	
HOTTIP	244553_at	HOXA13	238808_at	
HOTTIP	1564069_at	HOXA7	206847_s_at	
HOTTIP	1564069_at	HOXA7	235753_at	
HOTTIP	1564070_s_at	HOXA7	206847_s_at	
HOTTIP	1564070_s_at	HOXA7	235753_at	
HOTTIP	244553_at	HOXA7	206847_s_at	
HOTTIP	244553_at	HOXA7	235753_at	
HOTTIP	1564069_at	HOXA9	209905_at	
HOTTIP	1564069_at	HOXA9	214651_s_at	
HOTTIP	1564070_s_at	HOXA9	209905_at	
HOTTIP	1564070_s_at	HOXA9	214651_s_at	
HOTTIP	244553_at	HOXA9	209905_at	
HOTTIP	244553_at	HOXA9	214651_s_at	
MALAT1	1558678_s_at	ABCA1	1570279_at	V
MALAT1	1558678_s_at	ABCA1	203504_s_at	V
MALAT1	1558678_s_at	ABCA1	203505_at	V
MALAT1	1558678_s_at	ABCA1	216066_at	V
MALAT1	223940_x_at	ABCA1	1570279_at	V
MALAT1	223940_x_at	ABCA1	203504_s_at	V
MALAT1	223940_x_at	ABCA1	203505_at	V
MALAT1	223940_x_at	ABCA1	216066_at	V
MALAT1	224558_s_at	ABCA1	1570279_at	V
MALAT1	224558_s_at	ABCA1	203504_s_at	V
MALAT1	224558_s_at	ABCA1	203505_at	V
MALAT1	224558_s_at	ABCA1	216066_at	V
MALAT1	224559_at	ABCA1	1570279_at	V
MALAT1	224559_at	ABCA1	203504_s_at	V
MALAT1	224559_at	ABCA1	203505_at	V
MALAT1	224559_at	ABCA1	216066_at	V
MALAT1	224567_x_at	ABCA1	1570279_at	V
MALAT1	224567_x_at	ABCA1	203504_s_at	V
MALAT1	224567_x_at	ABCA1	203505_at	V
MALAT1	224567_x_at	ABCA1	216066_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224568_x_at	ABCA1	1570279_at	V
MALAT1	224568_x_at	ABCA1	203504_s_at	V
MALAT1	224568_x_at	ABCA1	203505_at	V
MALAT1	224568_x_at	ABCA1	216066_at	V
MALAT1	226675_s_at	ABCA1	1570279_at	V
MALAT1	226675_s_at	ABCA1	203504_s_at	V
MALAT1	226675_s_at	ABCA1	203505_at	V
MALAT1	226675_s_at	ABCA1	216066_at	V
MALAT1	1558678_s_at	ADAMTS12	221421_s_at	V
MALAT1	1558678_s_at	ADAMTS12	226997_at	V
MALAT1	223940_x_at	ADAMTS12	221421_s_at	V
MALAT1	223940_x_at	ADAMTS12	226997_at	V
MALAT1	224558_s_at	ADAMTS12	221421_s_at	V
MALAT1	224558_s_at	ADAMTS12	226997_at	V
MALAT1	224559_at	ADAMTS12	221421_s_at	V
MALAT1	224559_at	ADAMTS12	226997_at	V
MALAT1	224567_x_at	ADAMTS12	221421_s_at	V
MALAT1	224567_x_at	ADAMTS12	226997_at	V
MALAT1	224568_x_at	ADAMTS12	221421_s_at	V
MALAT1	224568_x_at	ADAMTS12	226997_at	V
MALAT1	226675_s_at	ADAMTS12	221421_s_at	V
MALAT1	226675_s_at	ADAMTS12	226997_at	V
MALAT1	1558678_s_at	BMPER	241986_at	V
MALAT1	223940_x_at	BMPER	241986_at	V
MALAT1	224558_s_at	BMPER	241986_at	V
MALAT1	224559_at	BMPER	241986_at	V
MALAT1	224567_x_at	BMPER	241986_at	V
MALAT1	224568_x_at	BMPER	241986_at	V
MALAT1	226675_s_at	BMPER	241986_at	V
MALAT1	1558678_s_at	CA2	209301_at	V
MALAT1	223940_x_at	CA2	209301_at	V
MALAT1	224558_s_at	CA2	209301_at	V
MALAT1	224559_at	CA2	209301_at	V
MALAT1	224567_x_at	CA2	209301_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224568_x_at	CA2	209301_at	V
MALAT1	226675_s_at	CA2	209301_at	V
MALAT1	1558678_s_at	CCT4	200877_at	V
MALAT1	1558678_s_at	CCT4	227171_at	V
MALAT1	223940_x_at	CCT4	200877_at	V
MALAT1	223940_x_at	CCT4	227171_at	V
MALAT1	224558_s_at	CCT4	200877_at	V
MALAT1	224558_s_at	CCT4	227171_at	V
MALAT1	224559_at	CCT4	200877_at	V
MALAT1	224559_at	CCT4	227171_at	V
MALAT1	224567_x_at	CCT4	200877_at	V
MALAT1	224567_x_at	CCT4	227171_at	V
MALAT1	224568_x_at	CCT4	200877_at	V
MALAT1	224568_x_at	CCT4	227171_at	V
MALAT1	226675_s_at	CCT4	200877_at	V
MALAT1	226675_s_at	CCT4	227171_at	V
MALAT1	1558678_s_at	CDCP1	1554110_at	V
MALAT1	1558678_s_at	CDCP1	218451_at	V
MALAT1	1558678_s_at	CDCP1	234932_s_at	V
MALAT1	223940_x_at	CDCP1	1554110_at	V
MALAT1	223940_x_at	CDCP1	218451_at	V
MALAT1	223940_x_at	CDCP1	234932_s_at	V
MALAT1	224558_s_at	CDCP1	1554110_at	V
MALAT1	224558_s_at	CDCP1	218451_at	V
MALAT1	224558_s_at	CDCP1	234932_s_at	V
MALAT1	224559_at	CDCP1	1554110_at	V
MALAT1	224559_at	CDCP1	218451_at	V
MALAT1	224559_at	CDCP1	234932_s_at	V
MALAT1	224567_x_at	CDCP1	1554110_at	V
MALAT1	224567_x_at	CDCP1	218451_at	V
MALAT1	224567_x_at	CDCP1	234932_s_at	V
MALAT1	224568_x_at	CDCP1	1554110_at	V
MALAT1	224568_x_at	CDCP1	218451_at	V
MALAT1	224568_x_at	CDCP1	234932_s_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	226675_s_at	CDCP1	1554110_at	V
MALAT1	226675_s_at	CDCP1	218451_at	V
MALAT1	226675_s_at	CDCP1	234932_s_at	V
MALAT1	1558678_s_at	COL6A1	212091_s_at	V
MALAT1	1558678_s_at	COL6A1	212937_s_at	V
MALAT1	1558678_s_at	COL6A1	212938_at	V
MALAT1	1558678_s_at	COL6A1	212939_at	V
MALAT1	1558678_s_at	COL6A1	212940_at	V
MALAT1	1558678_s_at	COL6A1	213428_s_at	V
MALAT1	1558678_s_at	COL6A1	214200_s_at	V
MALAT1	223940_x_at	COL6A1	212091_s_at	V
MALAT1	223940_x_at	COL6A1	212937_s_at	V
MALAT1	223940_x_at	COL6A1	212938_at	V
MALAT1	223940_x_at	COL6A1	212939_at	V
MALAT1	223940_x_at	COL6A1	212940_at	V
MALAT1	223940_x_at	COL6A1	213428_s_at	V
MALAT1	223940_x_at	COL6A1	214200_s_at	V
MALAT1	224558_s_at	COL6A1	212091_s_at	V
MALAT1	224558_s_at	COL6A1	212937_s_at	V
MALAT1	224558_s_at	COL6A1	212938_at	V
MALAT1	224558_s_at	COL6A1	212939_at	V
MALAT1	224558_s_at	COL6A1	212940_at	V
MALAT1	224558_s_at	COL6A1	213428_s_at	V
MALAT1	224558_s_at	COL6A1	214200_s_at	V
MALAT1	224559_at	COL6A1	212091_s_at	V
MALAT1	224559_at	COL6A1	212937_s_at	V
MALAT1	224559_at	COL6A1	212938_at	V
MALAT1	224559_at	COL6A1	212939_at	V
MALAT1	224559_at	COL6A1	212940_at	V
MALAT1	224559_at	COL6A1	213428_s_at	V
MALAT1	224559_at	COL6A1	214200_s_at	V
MALAT1	224567_x_at	COL6A1	212091_s_at	V
MALAT1	224567_x_at	COL6A1	212937_s_at	V
MALAT1	224567_x_at	COL6A1	212938_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224567_x_at	COL6A1	212939_at	V
MALAT1	224567_x_at	COL6A1	212940_at	V
MALAT1	224567_x_at	COL6A1	213428_s_at	V
MALAT1	224567_x_at	COL6A1	214200_s_at	V
MALAT1	224568_x_at	COL6A1	212091_s_at	V
MALAT1	224568_x_at	COL6A1	212937_s_at	V
MALAT1	224568_x_at	COL6A1	212938_at	V
MALAT1	224568_x_at	COL6A1	212939_at	V
MALAT1	224568_x_at	COL6A1	212940_at	V
MALAT1	224568_x_at	COL6A1	213428_s_at	V
MALAT1	224568_x_at	COL6A1	214200_s_at	V
MALAT1	226675_s_at	COL6A1	212091_s_at	V
MALAT1	226675_s_at	COL6A1	212937_s_at	V
MALAT1	226675_s_at	COL6A1	212938_at	V
MALAT1	226675_s_at	COL6A1	212939_at	V
MALAT1	226675_s_at	COL6A1	212940_at	V
MALAT1	226675_s_at	COL6A1	213428_s_at	V
MALAT1	226675_s_at	COL6A1	214200_s_at	V
MALAT1	1558678_s_at	CPM	206100_at	V
MALAT1	1558678_s_at	CPM	217557_s_at	V
MALAT1	1558678_s_at	CPM	235019_at	V
MALAT1	1558678_s_at	CPM	235706_at	V
MALAT1	1558678_s_at	CPM	241765_at	V
MALAT1	1558678_s_at	CPM	243403_x_at	V
MALAT1	223940_x_at	CPM	206100_at	V
MALAT1	223940_x_at	CPM	217557_s_at	V
MALAT1	223940_x_at	CPM	235019_at	V
MALAT1	223940_x_at	CPM	235706_at	V
MALAT1	223940_x_at	CPM	241765_at	V
MALAT1	223940_x_at	CPM	243403_x_at	V
MALAT1	224558_s_at	CPM	206100_at	V
MALAT1	224558_s_at	CPM	217557_s_at	V
MALAT1	224558_s_at	CPM	235019_at	V
MALAT1	224558_s_at	CPM	235706_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224558_s_at	CPM	241765_at	V
MALAT1	224558_s_at	CPM	243403_x_at	V
MALAT1	224559_at	CPM	206100_at	V
MALAT1	224559_at	CPM	217557_s_at	V
MALAT1	224559_at	CPM	235019_at	V
MALAT1	224559_at	CPM	235706_at	V
MALAT1	224559_at	CPM	241765_at	V
MALAT1	224559_at	CPM	243403_x_at	V
MALAT1	224567_x_at	CPM	206100_at	V
MALAT1	224567_x_at	CPM	217557_s_at	V
MALAT1	224567_x_at	CPM	235019_at	V
MALAT1	224567_x_at	CPM	235706_at	V
MALAT1	224567_x_at	CPM	241765_at	V
MALAT1	224567_x_at	CPM	243403_x_at	V
MALAT1	224568_x_at	CPM	206100_at	V
MALAT1	224568_x_at	CPM	217557_s_at	V
MALAT1	224568_x_at	CPM	235019_at	V
MALAT1	224568_x_at	CPM	235706_at	V
MALAT1	224568_x_at	CPM	241765_at	V
MALAT1	224568_x_at	CPM	243403_x_at	V
MALAT1	226675_s_at	CPM	206100_at	V
MALAT1	226675_s_at	CPM	217557_s_at	V
MALAT1	226675_s_at	CPM	235019_at	V
MALAT1	226675_s_at	CPM	235706_at	V
MALAT1	226675_s_at	CPM	241765_at	V
MALAT1	226675_s_at	CPM	243403_x_at	V
MALAT1	1558678_s_at	CSF1	207082_at	V
MALAT1	1558678_s_at	CSF1	209716_at	V
MALAT1	1558678_s_at	CSF1	210557_x_at	V
MALAT1	1558678_s_at	CSF1	211839_s_at	V
MALAT1	223940_x_at	CSF1	207082_at	V
MALAT1	223940_x_at	CSF1	209716_at	V
MALAT1	223940_x_at	CSF1	210557_x_at	V
MALAT1	223940_x_at	CSF1	211839_s_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224558_s_at	CSF1	207082_at	V
MALAT1	224558_s_at	CSF1	209716_at	V
MALAT1	224558_s_at	CSF1	210557_x_at	V
MALAT1	224558_s_at	CSF1	211839_s_at	V
MALAT1	224559_at	CSF1	207082_at	V
MALAT1	224559_at	CSF1	209716_at	V
MALAT1	224559_at	CSF1	210557_x_at	V
MALAT1	224559_at	CSF1	211839_s_at	V
MALAT1	224567_x_at	CSF1	207082_at	V
MALAT1	224567_x_at	CSF1	209716_at	V
MALAT1	224567_x_at	CSF1	210557_x_at	V
MALAT1	224567_x_at	CSF1	211839_s_at	V
MALAT1	224568_x_at	CSF1	207082_at	V
MALAT1	224568_x_at	CSF1	209716_at	V
MALAT1	224568_x_at	CSF1	210557_x_at	V
MALAT1	224568_x_at	CSF1	211839_s_at	V
MALAT1	226675_s_at	CSF1	207082_at	V
MALAT1	226675_s_at	CSF1	209716_at	V
MALAT1	226675_s_at	CSF1	210557_x_at	V
MALAT1	226675_s_at	CSF1	211839_s_at	V
MALAT1	1558678_s_at	CTHRC1	225681_at	V
MALAT1	223940_x_at	CTHRC1	225681_at	V
MALAT1	224558_s_at	CTHRC1	225681_at	V
MALAT1	224559_at	CTHRC1	225681_at	V
MALAT1	224567_x_at	CTHRC1	225681_at	V
MALAT1	224568_x_at	CTHRC1	225681_at	V
MALAT1	226675_s_at	CTHRC1	225681_at	V
MALAT1	1558678_s_at	CXCL5	207852_at	V
MALAT1	1558678_s_at	CXCL5	214974_x_at	V
MALAT1	1558678_s_at	CXCL5	215101_s_at	V
MALAT1	223940_x_at	CXCL5	207852_at	V
MALAT1	223940_x_at	CXCL5	214974_x_at	V
MALAT1	223940_x_at	CXCL5	215101_s_at	V
MALAT1	224558_s_at	CXCL5	207852_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224558_s_at	CXCL5	214974_x_at	V
MALAT1	224558_s_at	CXCL5	215101_s_at	V
MALAT1	224559_at	CXCL5	207852_at	V
MALAT1	224559_at	CXCL5	214974_x_at	V
MALAT1	224559_at	CXCL5	215101_s_at	V
MALAT1	224567_x_at	CXCL5	207852_at	V
MALAT1	224567_x_at	CXCL5	214974_x_at	V
MALAT1	224567_x_at	CXCL5	215101_s_at	V
MALAT1	224568_x_at	CXCL5	207852_at	V
MALAT1	224568_x_at	CXCL5	214974_x_at	V
MALAT1	224568_x_at	CXCL5	215101_s_at	V
MALAT1	226675_s_at	CXCL5	207852_at	V
MALAT1	226675_s_at	CXCL5	214974_x_at	V
MALAT1	226675_s_at	CXCL5	215101_s_at	V
MALAT1	1558678_s_at	DRD1	214652_at	V
MALAT1	223940_x_at	DRD1	214652_at	V
MALAT1	224558_s_at	DRD1	214652_at	V
MALAT1	224559_at	DRD1	214652_at	V
MALAT1	224567_x_at	DRD1	214652_at	V
MALAT1	224568_x_at	DRD1	214652_at	V
MALAT1	226675_s_at	DRD1	214652_at	V
MALAT1	1558678_s_at	GPC6	223730_at	V
MALAT1	1558678_s_at	GPC6	227059_at	V
MALAT1	223940_x_at	GPC6	223730_at	V
MALAT1	223940_x_at	GPC6	227059_at	V
MALAT1	224558_s_at	GPC6	223730_at	V
MALAT1	224558_s_at	GPC6	227059_at	V
MALAT1	224559_at	GPC6	223730_at	V
MALAT1	224559_at	GPC6	227059_at	V
MALAT1	224567_x_at	GPC6	223730_at	V
MALAT1	224567_x_at	GPC6	227059_at	V
MALAT1	224568_x_at	GPC6	223730_at	V
MALAT1	224568_x_at	GPC6	227059_at	V
MALAT1	226675_s_at	GPC6	223730_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	226675_s_at	GPC6	227059_at	V
MALAT1	1558678_s_at	HMMR	207165_at	V
MALAT1	1558678_s_at	HMMR	209709_s_at	V
MALAT1	223940_x_at	HMMR	207165_at	V
MALAT1	223940_x_at	HMMR	209709_s_at	V
MALAT1	224558_s_at	HMMR	207165_at	V
MALAT1	224558_s_at	HMMR	209709_s_at	V
MALAT1	224559_at	HMMR	207165_at	V
MALAT1	224559_at	HMMR	209709_s_at	V
MALAT1	224567_x_at	HMMR	207165_at	V
MALAT1	224567_x_at	HMMR	209709_s_at	V
MALAT1	224568_x_at	HMMR	207165_at	V
MALAT1	224568_x_at	HMMR	209709_s_at	V
MALAT1	226675_s_at	HMMR	207165_at	V
MALAT1	226675_s_at	HMMR	209709_s_at	V
MALAT1	1558678_s_at	HNF4G	207456_at	V
MALAT1	1558678_s_at	HNF4G	232271_at	V
MALAT1	223940_x_at	HNF4G	207456_at	V
MALAT1	223940_x_at	HNF4G	232271_at	V
MALAT1	224558_s_at	HNF4G	207456_at	V
MALAT1	224558_s_at	HNF4G	232271_at	V
MALAT1	224559_at	HNF4G	207456_at	V
MALAT1	224559_at	HNF4G	232271_at	V
MALAT1	224567_x_at	HNF4G	207456_at	V
MALAT1	224567_x_at	HNF4G	232271_at	V
MALAT1	224568_x_at	HNF4G	207456_at	V
MALAT1	224568_x_at	HNF4G	232271_at	V
MALAT1	226675_s_at	HNF4G	207456_at	V
MALAT1	226675_s_at	HNF4G	232271_at	V
MALAT1	1558678_s_at	LAYN	1556885_at	V
MALAT1	1558678_s_at	LAYN	1556886_a_at	V
MALAT1	1558678_s_at	LAYN	228080_at	V
MALAT1	223940_x_at	LAYN	1556885_at	V
MALAT1	223940_x_at	LAYN	1556886_a_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	223940_x_at	LAYN	228080_at	V
MALAT1	224558_s_at	LAYN	1556885_at	V
MALAT1	224558_s_at	LAYN	1556886_a_at	V
MALAT1	224558_s_at	LAYN	228080_at	V
MALAT1	224559_at	LAYN	1556885_at	V
MALAT1	224559_at	LAYN	1556886_a_at	V
MALAT1	224559_at	LAYN	228080_at	V
MALAT1	224567_x_at	LAYN	1556885_at	V
MALAT1	224567_x_at	LAYN	1556886_a_at	V
MALAT1	224567_x_at	LAYN	228080_at	V
MALAT1	224568_x_at	LAYN	1556885_at	V
MALAT1	224568_x_at	LAYN	1556886_a_at	V
MALAT1	224568_x_at	LAYN	228080_at	V
MALAT1	226675_s_at	LAYN	1556885_at	V
MALAT1	226675_s_at	LAYN	1556886_a_at	V
MALAT1	226675_s_at	LAYN	228080_at	V
MALAT1	1558678_s_at	LPAR1	204036_at	V
MALAT1	1558678_s_at	LPAR1	204037_at	V
MALAT1	1558678_s_at	LPAR1	204038_s_at	V
MALAT1	223940_x_at	LPAR1	204036_at	V
MALAT1	223940_x_at	LPAR1	204037_at	V
MALAT1	223940_x_at	LPAR1	204038_s_at	V
MALAT1	224558_s_at	LPAR1	204036_at	V
MALAT1	224558_s_at	LPAR1	204037_at	V
MALAT1	224558_s_at	LPAR1	204038_s_at	V
MALAT1	224559_at	LPAR1	204036_at	V
MALAT1	224559_at	LPAR1	204037_at	V
MALAT1	224559_at	LPAR1	204038_s_at	V
MALAT1	224567_x_at	LPAR1	204036_at	V
MALAT1	224567_x_at	LPAR1	204037_at	V
MALAT1	224567_x_at	LPAR1	204038_s_at	V
MALAT1	224568_x_at	LPAR1	204036_at	V
MALAT1	224568_x_at	LPAR1	204037_at	V
MALAT1	224568_x_at	LPAR1	204038_s_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	226675_s_at	LPAR1	204036_at	V
MALAT1	226675_s_at	LPAR1	204037_at	V
MALAT1	226675_s_at	LPAR1	204038_s_at	V
MALAT1	1558678_s_at	LPHN2	1569850_at	V
MALAT1	1558678_s_at	LPHN2	206953_s_at	V
MALAT1	223940_x_at	LPHN2	1569850_at	V
MALAT1	223940_x_at	LPHN2	206953_s_at	V
MALAT1	224558_s_at	LPHN2	1569850_at	V
MALAT1	224558_s_at	LPHN2	206953_s_at	V
MALAT1	224559_at	LPHN2	1569850_at	V
MALAT1	224559_at	LPHN2	206953_s_at	V
MALAT1	224567_x_at	LPHN2	1569850_at	V
MALAT1	224567_x_at	LPHN2	206953_s_at	V
MALAT1	224568_x_at	LPHN2	1569850_at	V
MALAT1	224568_x_at	LPHN2	206953_s_at	V
MALAT1	226675_s_at	LPHN2	1569850_at	V
MALAT1	226675_s_at	LPHN2	206953_s_at	V
MALAT1	1558678_s_at	LY6K	223687_s_at	V
MALAT1	1558678_s_at	LY6K	223688_s_at	V
MALAT1	223940_x_at	LY6K	223687_s_at	V
MALAT1	223940_x_at	LY6K	223688_s_at	V
MALAT1	224558_s_at	LY6K	223687_s_at	V
MALAT1	224558_s_at	LY6K	223688_s_at	V
MALAT1	224559_at	LY6K	223687_s_at	V
MALAT1	224559_at	LY6K	223688_s_at	V
MALAT1	224567_x_at	LY6K	223687_s_at	V
MALAT1	224567_x_at	LY6K	223688_s_at	V
MALAT1	224568_x_at	LY6K	223687_s_at	V
MALAT1	224568_x_at	LY6K	223688_s_at	V
MALAT1	226675_s_at	LY6K	223687_s_at	V
MALAT1	226675_s_at	LY6K	223688_s_at	V
MALAT1	1558678_s_at	MCAM	209086_x_at	V
MALAT1	1558678_s_at	MCAM	209087_x_at	V
MALAT1	1558678_s_at	MCAM	210869_s_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	1558678_s_at	MCAM	211042_x_at	V
MALAT1	1558678_s_at	MCAM	211340_s_at	V
MALAT1	223940_x_at	MCAM	209086_x_at	V
MALAT1	223940_x_at	MCAM	209087_x_at	V
MALAT1	223940_x_at	MCAM	210869_s_at	V
MALAT1	223940_x_at	MCAM	211042_x_at	V
MALAT1	223940_x_at	MCAM	211340_s_at	V
MALAT1	224558_s_at	MCAM	209086_x_at	V
MALAT1	224558_s_at	MCAM	209087_x_at	V
MALAT1	224558_s_at	MCAM	210869_s_at	V
MALAT1	224558_s_at	MCAM	211042_x_at	V
MALAT1	224558_s_at	MCAM	211340_s_at	V
MALAT1	224559_at	MCAM	209086_x_at	V
MALAT1	224559_at	MCAM	209087_x_at	V
MALAT1	224559_at	MCAM	210869_s_at	V
MALAT1	224559_at	MCAM	211042_x_at	V
MALAT1	224559_at	MCAM	211340_s_at	V
MALAT1	224567_x_at	MCAM	209086_x_at	V
MALAT1	224567_x_at	MCAM	209087_x_at	V
MALAT1	224567_x_at	MCAM	210869_s_at	V
MALAT1	224567_x_at	MCAM	211042_x_at	V
MALAT1	224567_x_at	MCAM	211340_s_at	V
MALAT1	224568_x_at	MCAM	209086_x_at	V
MALAT1	224568_x_at	MCAM	209087_x_at	V
MALAT1	224568_x_at	MCAM	210869_s_at	V
MALAT1	224568_x_at	MCAM	211042_x_at	V
MALAT1	224568_x_at	MCAM	211340_s_at	V
MALAT1	226675_s_at	MCAM	209086_x_at	V
MALAT1	226675_s_at	MCAM	209087_x_at	V
MALAT1	226675_s_at	MCAM	210869_s_at	V
MALAT1	226675_s_at	MCAM	211042_x_at	V
MALAT1	226675_s_at	MCAM	211340_s_at	V
MALAT1	1558678_s_at	MIA2	1553944_at	V
MALAT1	1558678_s_at	MIA2	221177_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	223940_x_at	MIA2	1553944_at	V
MALAT1	223940_x_at	MIA2	221177_at	V
MALAT1	224558_s_at	MIA2	1553944_at	V
MALAT1	224558_s_at	MIA2	221177_at	V
MALAT1	224559_at	MIA2	1553944_at	V
MALAT1	224559_at	MIA2	221177_at	V
MALAT1	224567_x_at	MIA2	1553944_at	V
MALAT1	224567_x_at	MIA2	221177_at	V
MALAT1	224568_x_at	MIA2	1553944_at	V
MALAT1	224568_x_at	MIA2	221177_at	V
MALAT1	226675_s_at	MIA2	1553944_at	V
MALAT1	226675_s_at	MIA2	221177_at	V
MALAT1	1558678_s_at	NNMT	202237_at	V
MALAT1	1558678_s_at	NNMT	202238_s_at	V
MALAT1	223940_x_at	NNMT	202237_at	V
MALAT1	223940_x_at	NNMT	202238_s_at	V
MALAT1	224558_s_at	NNMT	202237_at	V
MALAT1	224558_s_at	NNMT	202238_s_at	V
MALAT1	224559_at	NNMT	202237_at	V
MALAT1	224559_at	NNMT	202238_s_at	V
MALAT1	224567_x_at	NNMT	202237_at	V
MALAT1	224567_x_at	NNMT	202238_s_at	V
MALAT1	224568_x_at	NNMT	202237_at	V
MALAT1	224568_x_at	NNMT	202238_s_at	V
MALAT1	226675_s_at	NNMT	202237_at	V
MALAT1	226675_s_at	NNMT	202238_s_at	V
MALAT1	1558678_s_at	PRKCE	206248_at	V
MALAT1	1558678_s_at	PRKCE	226101_at	V
MALAT1	1558678_s_at	PRKCE	236459_at	V
MALAT1	1558678_s_at	PRKCE	239011_at	V
MALAT1	223940_x_at	PRKCE	206248_at	V
MALAT1	223940_x_at	PRKCE	226101_at	V
MALAT1	223940_x_at	PRKCE	236459_at	V
MALAT1	223940_x_at	PRKCE	239011_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224558_s_at	PRKCE	206248_at	V
MALAT1	224558_s_at	PRKCE	226101_at	V
MALAT1	224558_s_at	PRKCE	236459_at	V
MALAT1	224558_s_at	PRKCE	239011_at	V
MALAT1	224559_at	PRKCE	206248_at	V
MALAT1	224559_at	PRKCE	226101_at	V
MALAT1	224559_at	PRKCE	236459_at	V
MALAT1	224559_at	PRKCE	239011_at	V
MALAT1	224567_x_at	PRKCE	206248_at	V
MALAT1	224567_x_at	PRKCE	226101_at	V
MALAT1	224567_x_at	PRKCE	236459_at	V
MALAT1	224567_x_at	PRKCE	239011_at	V
MALAT1	224568_x_at	PRKCE	206248_at	V
MALAT1	224568_x_at	PRKCE	226101_at	V
MALAT1	224568_x_at	PRKCE	236459_at	V
MALAT1	224568_x_at	PRKCE	239011_at	V
MALAT1	226675_s_at	PRKCE	206248_at	V
MALAT1	226675_s_at	PRKCE	226101_at	V
MALAT1	226675_s_at	PRKCE	236459_at	V
MALAT1	226675_s_at	PRKCE	239011_at	V
MALAT1	1558678_s_at	RASSF6	229147_at	V
MALAT1	1558678_s_at	RASSF6	233463_at	V
MALAT1	1558678_s_at	RASSF6	235638_at	V
MALAT1	223940_x_at	RASSF6	229147_at	V
MALAT1	223940_x_at	RASSF6	233463_at	V
MALAT1	223940_x_at	RASSF6	235638_at	V
MALAT1	224558_s_at	RASSF6	229147_at	V
MALAT1	224558_s_at	RASSF6	233463_at	V
MALAT1	224558_s_at	RASSF6	235638_at	V
MALAT1	224559_at	RASSF6	229147_at	V
MALAT1	224559_at	RASSF6	233463_at	V
MALAT1	224559_at	RASSF6	235638_at	V
MALAT1	224567_x_at	RASSF6	229147_at	V
MALAT1	224567_x_at	RASSF6	233463_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224567_x_at	RASSF6	235638_at	V
MALAT1	224568_x_at	RASSF6	229147_at	V
MALAT1	224568_x_at	RASSF6	233463_at	V
MALAT1	224568_x_at	RASSF6	235638_at	V
MALAT1	226675_s_at	RASSF6	229147_at	V
MALAT1	226675_s_at	RASSF6	233463_at	V
MALAT1	226675_s_at	RASSF6	235638_at	V
MALAT1	1558678_s_at	ROBO1	213194_at	V
MALAT1	223940_x_at	ROBO1	213194_at	V
MALAT1	224558_s_at	ROBO1	213194_at	V
MALAT1	224559_at	ROBO1	213194_at	V
MALAT1	224567_x_at	ROBO1	213194_at	V
MALAT1	224568_x_at	ROBO1	213194_at	V
MALAT1	226675_s_at	ROBO1	213194_at	V
MALAT1	1558678_s_at	SNAI2	213139_at	
MALAT1	223940_x_at	SNAI2	213139_at	
MALAT1	224558_s_at	SNAI2	213139_at	
MALAT1	224559_at	SNAI2	213139_at	
MALAT1	224567_x_at	SNAI2	213139_at	
MALAT1	224568_x_at	SNAI2	213139_at	
MALAT1	226675_s_at	SNAI2	213139_at	
MALAT1	1558678_s_at	STC1	204595_s_at	V
MALAT1	1558678_s_at	STC1	204596_s_at	V
MALAT1	1558678_s_at	STC1	204597_x_at	V
MALAT1	223940_x_at	STC1	204595_s_at	V
MALAT1	223940_x_at	STC1	204596_s_at	V
MALAT1	223940_x_at	STC1	204597_x_at	V
MALAT1	224558_s_at	STC1	204595_s_at	V
MALAT1	224558_s_at	STC1	204596_s_at	V
MALAT1	224558_s_at	STC1	204597_x_at	V
MALAT1	224559_at	STC1	204595_s_at	V
MALAT1	224559_at	STC1	204596_s_at	V
MALAT1	224559_at	STC1	204597_x_at	V
MALAT1	224567_x_at	STC1	204595_s_at	V

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	224567_x_at	STC1	204596_s_at	V
MALAT1	224567_x_at	STC1	204597_x_at	V
MALAT1	224568_x_at	STC1	204595_s_at	V
MALAT1	224568_x_at	STC1	204596_s_at	V
MALAT1	224568_x_at	STC1	204597_x_at	V
MALAT1	226675_s_at	STC1	204595_s_at	V
MALAT1	226675_s_at	STC1	204596_s_at	V
MALAT1	226675_s_at	STC1	204597_x_at	V
MALAT1	1558678_s_at	ZEB1	210875_s_at	
MALAT1	1558678_s_at	ZEB1	212758_s_at	
MALAT1	1558678_s_at	ZEB1	212764_at	
MALAT1	1558678_s_at	ZEB1	239952_at	
MALAT1	223940_x_at	ZEB1	210875_s_at	
MALAT1	223940_x_at	ZEB1	212758_s_at	
MALAT1	223940_x_at	ZEB1	212764_at	
MALAT1	223940_x_at	ZEB1	239952_at	
MALAT1	224558_s_at	ZEB1	210875_s_at	
MALAT1	224558_s_at	ZEB1	212758_s_at	
MALAT1	224558_s_at	ZEB1	212764_at	
MALAT1	224558_s_at	ZEB1	239952_at	
MALAT1	224559_at	ZEB1	210875_s_at	
MALAT1	224559_at	ZEB1	212758_s_at	
MALAT1	224559_at	ZEB1	212764_at	
MALAT1	224559_at	ZEB1	239952_at	
MALAT1	224567_x_at	ZEB1	210875_s_at	
MALAT1	224567_x_at	ZEB1	212758_s_at	
MALAT1	224567_x_at	ZEB1	212764_at	
MALAT1	224567_x_at	ZEB1	239952_at	
MALAT1	224568_x_at	ZEB1	210875_s_at	
MALAT1	224568_x_at	ZEB1	212758_s_at	
MALAT1	224568_x_at	ZEB1	212764_at	
MALAT1	224568_x_at	ZEB1	239952_at	
MALAT1	226675_s_at	ZEB1	210875_s_at	
MALAT1	226675_s_at	ZEB1	212758_s_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	226675_s_at	ZEB1	212764_at	
MALAT1	226675_s_at	ZEB1	239952_at	
MALAT1	1558678_s_at	ZEB2	203603_s_at	
MALAT1	1558678_s_at	ZEB2	228333_at	
MALAT1	1558678_s_at	ZEB2	233031_at	
MALAT1	1558678_s_at	ZEB2	233033_at	
MALAT1	1558678_s_at	ZEB2	235593_at	
MALAT1	223940_x_at	ZEB2	203603_s_at	
MALAT1	223940_x_at	ZEB2	228333_at	
MALAT1	223940_x_at	ZEB2	233031_at	
MALAT1	223940_x_at	ZEB2	233033_at	
MALAT1	223940_x_at	ZEB2	235593_at	
MALAT1	224558_s_at	ZEB2	203603_s_at	
MALAT1	224558_s_at	ZEB2	228333_at	
MALAT1	224558_s_at	ZEB2	233031_at	
MALAT1	224558_s_at	ZEB2	233033_at	
MALAT1	224558_s_at	ZEB2	235593_at	
MALAT1	224559_at	ZEB2	203603_s_at	
MALAT1	224559_at	ZEB2	228333_at	
MALAT1	224559_at	ZEB2	233031_at	
MALAT1	224559_at	ZEB2	233033_at	
MALAT1	224559_at	ZEB2	235593_at	
MALAT1	224567_x_at	ZEB2	203603_s_at	
MALAT1	224567_x_at	ZEB2	228333_at	
MALAT1	224567_x_at	ZEB2	233031_at	
MALAT1	224567_x_at	ZEB2	233033_at	
MALAT1	224567_x_at	ZEB2	235593_at	
MALAT1	224568_x_at	ZEB2	203603_s_at	
MALAT1	224568_x_at	ZEB2	228333_at	
MALAT1	224568_x_at	ZEB2	233031_at	
MALAT1	224568_x_at	ZEB2	233033_at	
MALAT1	224568_x_at	ZEB2	235593_at	
MALAT1	226675_s_at	ZEB2	203603_s_at	
MALAT1	226675_s_at	ZEB2	228333_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MALAT1	226675_s_at	ZEB2	233031_at	
MALAT1	226675_s_at	ZEB2	233033_at	
MALAT1	226675_s_at	ZEB2	235593_at	
MEG3	210794_s_at	CASP3	202763_at	
MEG3	226210_s_at	CASP3	202763_at	
MEG3	226211_at	CASP3	202763_at	
MEG3	227390_at	CASP3	202763_at	
MEG3	210794_s_at	CASP8	1553306_at	
MEG3	210794_s_at	CASP8	207686_s_at	
MEG3	210794_s_at	CASP8	213373_s_at	
MEG3	226210_s_at	CASP8	1553306_at	
MEG3	226210_s_at	CASP8	207686_s_at	
MEG3	226210_s_at	CASP8	213373_s_at	
MEG3	226211_at	CASP8	1553306_at	
MEG3	226211_at	CASP8	207686_s_at	
MEG3	226211_at	CASP8	213373_s_at	
MEG3	227390_at	CASP8	1553306_at	
MEG3	227390_at	CASP8	207686_s_at	
MEG3	227390_at	CASP8	213373_s_at	
MEG3	210794_s_at	TP53	201746_at	
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	226211_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
MEG3	210794_s_at	TP53	201746_at	
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	227390_at	TP53	201746_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MEG3	227390_at	TP53	211300_s_at	
MEG3	210794_s_at	TP53	201746_at	
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	226211_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
MEG3	210794_s_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	226211_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
MEG3	210794_s_at	TP53	201746_at	
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	226211_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
MEG3	210794_s_at	TP53	201746_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	226211_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
MEG3	210794_s_at	TP53	201746_at	
MEG3	210794_s_at	TP53	211300_s_at	
MEG3	226210_s_at	TP53	201746_at	
MEG3	226210_s_at	TP53	211300_s_at	
MEG3	226211_at	TP53	201746_at	
MEG3	226211_at	TP53	211300_s_at	
MEG3	227390_at	TP53	201746_at	
MEG3	227390_at	TP53	211300_s_at	
NEAT1	214657_s_at	ADARB2	220648_at	
NEAT1	214657_s_at	ADARB2	237437_s_at	
NEAT1	220983_s_at	ADARB2	220648_at	
NEAT1	220983_s_at	ADARB2	237437_s_at	
NEAT1	224565_at	ADARB2	220648_at	
NEAT1	224565_at	ADARB2	237437_s_at	
NEAT1	224566_at	ADARB2	220648_at	
NEAT1	224566_at	ADARB2	237437_s_at	
NEAT1	225239_at	ADARB2	220648_at	
NEAT1	225239_at	ADARB2	237437_s_at	
NEAT1	227062_at	ADARB2	220648_at	
NEAT1	227062_at	ADARB2	237437_s_at	
NEAT1	234989_at	ADARB2	220648_at	
NEAT1	234989_at	ADARB2	237437_s_at	
NEAT1	238320_at	ADARB2	220648_at	
NEAT1	238320_at	ADARB2	237437_s_at	
NEAT1	239269_at	ADARB2	220648_at	
NEAT1	239269_at	ADARB2	237437_s_at	
PVT1	1558290_a_at	COL4A1	211980_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
PVT1	1558290_a_at	COL4A1	211981_at	
PVT1	1562153_a_at	COL4A1	211980_at	
PVT1	1562153_a_at	COL4A1	211981_at	
PVT1	1558290_a_at	FN1	1558199_at	
PVT1	1558290_a_at	FN1	210495_x_at	
PVT1	1558290_a_at	FN1	211719_x_at	
PVT1	1558290_a_at	FN1	212464_s_at	
PVT1	1558290_a_at	FN1	214701_s_at	
PVT1	1558290_a_at	FN1	214702_at	
PVT1	1558290_a_at	FN1	216442_x_at	
PVT1	1562153_a_at	FN1	1558199_at	
PVT1	1562153_a_at	FN1	210495_x_at	
PVT1	1562153_a_at	FN1	211719_x_at	
PVT1	1562153_a_at	FN1	212464_s_at	
PVT1	1562153_a_at	FN1	214701_s_at	
PVT1	1562153_a_at	FN1	214702_at	
PVT1	1562153_a_at	FN1	216442_x_at	
PVT1	1558290_a_at	TGFB1	203084_at	
PVT1	1558290_a_at	TGFB1	203085_s_at	
PVT1	1562153_a_at	TGFB1	203084_at	
PVT1	1562153_a_at	TGFB1	203085_s_at	
TUG1	212337_at	HOXB7	204778_x_at	V
TUG1	212337_at	HOXB7	204779_s_at	V
TUG1	212337_at	HOXB7	216973_s_at	V
TUG1	212725_s_at	HOXB7	204778_x_at	V
TUG1	212725_s_at	HOXB7	204779_s_at	V
TUG1	212725_s_at	HOXB7	216973_s_at	V
TUG1	222244_s_at	HOXB7	204778_x_at	V
TUG1	222244_s_at	HOXB7	204779_s_at	V
TUG1	222244_s_at	HOXB7	216973_s_at	V
UCA1	227919_at	AKT3	212607_at	
UCA1	227919_at	AKT3	212609_s_at	
UCA1	227919_at	AKT3	219393_s_at	
UCA1	227919_at	AKT3	222880_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
UCA1	227919_at	AKT3	224229_s_at	
UCA1	227919_at	AKT3	242876_at	
UCA1	227919_at	AKT3	242879_x_at	
UCA1	227919_at	ARNT2	202986_at	
UCA1	227919_at	ATM	1553387_at	
UCA1	227919_at	ATM	1554631_at	
UCA1	227919_at	ATM	1570352_at	
UCA1	227919_at	ATM	208442_s_at	
UCA1	227919_at	ATM	210858_x_at	
UCA1	227919_at	ATM	212672_at	
UCA1	227919_at	BCR	202315_s_at	
UCA1	227919_at	BCR	217223_s_at	
UCA1	227919_at	BCR	226602_s_at	
UCA1	227919_at	CDKN2B	207530_s_at	
UCA1	227919_at	CDKN2B	236313_at	
UCA1	227919_at	CRKL	206184_at	
UCA1	227919_at	CRKL	212180_at	
UCA1	227919_at	EP300	202221_s_at	
UCA1	227919_at	EP300	213579_s_at	
UCA1	227919_at	EPAS1	200878_at	
UCA1	227919_at	EPAS1	200879_s_at	
UCA1	227919_at	FAS	204780_s_at	
UCA1	227919_at	FAS	204781_s_at	
UCA1	227919_at	FAS	215719_x_at	
UCA1	227919_at	FAS	216252_x_at	
UCA1	227919_at	FGF1	1552721_a_at	
UCA1	227919_at	FGF1	205117_at	
UCA1	227919_at	FGF1	208240_s_at	
UCA1	227919_at	FN1	1558199_at	
UCA1	227919_at	FN1	210495_x_at	
UCA1	227919_at	FN1	211719_x_at	
UCA1	227919_at	FN1	212464_s_at	
UCA1	227919_at	FN1	214701_s_at	
UCA1	227919_at	FN1	214702_at	

Table S2 (continued)

Table S2 (continued)

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
UCA1	227919_at	FN1	216442_x_at	
UCA1	227919_at	FZD5	206136_at	
UCA1	227919_at	FZD5	221245_s_at	
UCA1	227919_at	LAMA3	1560078_at	
UCA1	227919_at	LAMA3	1563772_a_at	
UCA1	227919_at	LAMA3	1568879_a_at	
UCA1	227919_at	LAMA3	203726_s_at	
UCA1	227919_at	LAMA3	234608_at	
UCA1	227919_at	LAMA3	234719_at	
UCA1	227919_at	MAPK1	1552263_at	
UCA1	227919_at	MAPK1	1552264_a_at	
UCA1	227919_at	MAPK1	208351_s_at	
UCA1	227919_at	MAPK1	212271_at	
UCA1	227919_at	MAPK1	224620_at	
UCA1	227919_at	MAPK1	224621_at	
UCA1	227919_at	MAPK1	229847_at	
UCA1	227919_at	PDGFB	204200_s_at	
UCA1	227919_at	PDGFB	216055_at	
UCA1	227919_at	PDGFB	216061_x_at	
UCA1	227919_at	PDGFB	217112_at	
UCA1	227919_at	PRKAR2A	204842_x_at	
UCA1	227919_at	PRKAR2A	204843_s_at	
UCA1	227919_at	PRKAR2A	213052_at	
UCA1	227919_at	PRKAR2A	225000_at	
UCA1	227919_at	PRKAR2A	225011_at	
UCA1	227919_at	PTGS2	1554997_a_at	
UCA1	227919_at	PTGS2	204748_at	
UCA1	227919_at	SUFU	222749_at	
UCA1	227919_at	SUFU	224201_s_at	
UCA1	227919_at	SUFU	224202_at	
UCA1	227919_at	SUFU	224203_at	
UCA1	227919_at	TGFB1	203084_at	
UCA1	227919_at	TGFB1	203085_s_at	
UCA1	227919_at	WNT5A	205990_s_at	

Table S2 (continued)

Table S2 *(continued)*

LncRNA name	LncRNA probe	Target name	Target probe	Lung-specific
UCA1	227919_at	WNT5A	213425_at	
UCA1	227919_at	WNT5A	231227_at	
UCA1	227919_at	WNT6	221608_at	
UCA1	227919_at	WNT6	221609_s_at	
UCA1	227919_at	WNT6	222086_s_at	
UCA1	227919_at	WNT6	71933_at	