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Supplemental Information

**A New Long Noncoding RNA ALB Regulates
Autophagy by Enhancing the Transformation of
LC3BI to LC3BII during Human Lens Development**

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Figure.S1

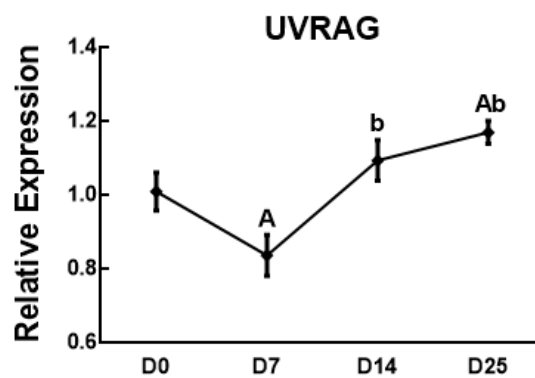
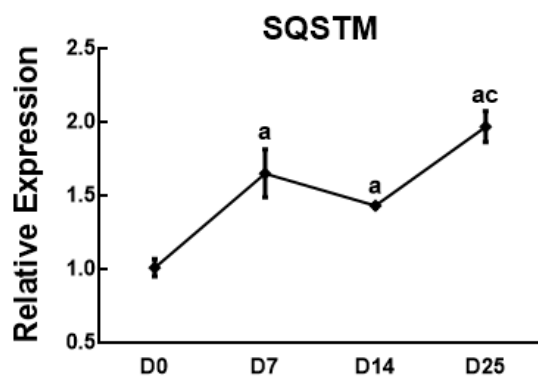
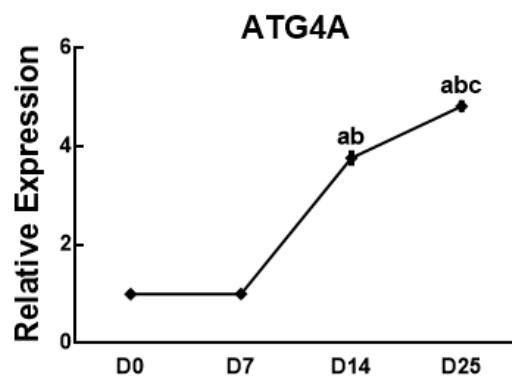
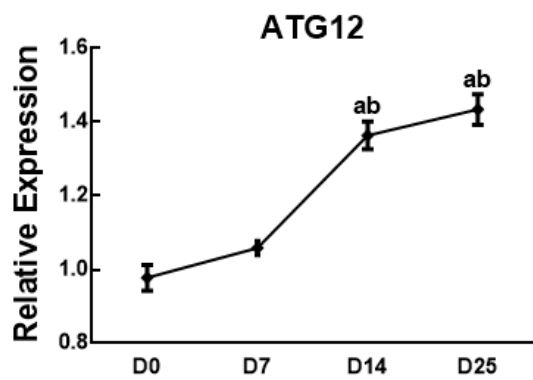
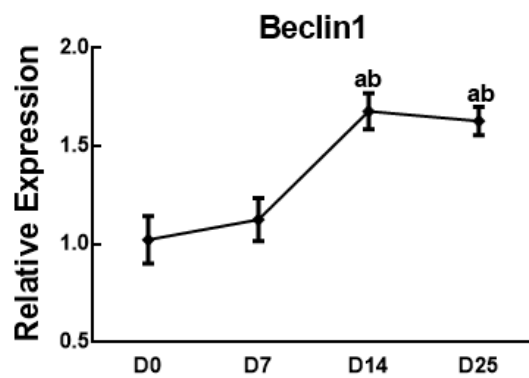
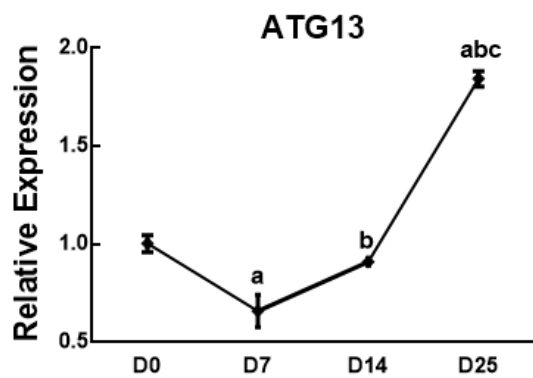
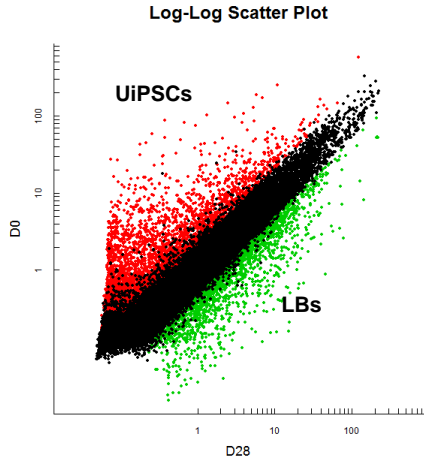
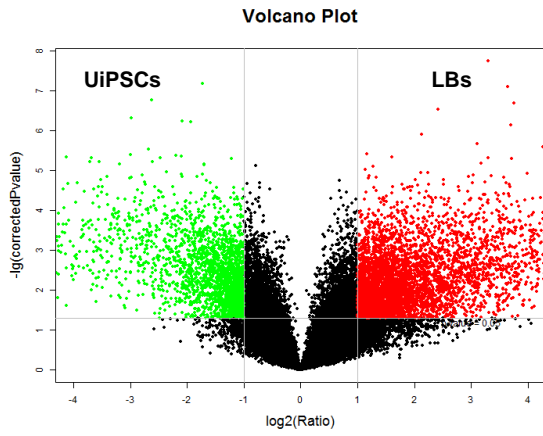


Figure.S2

A



B



C

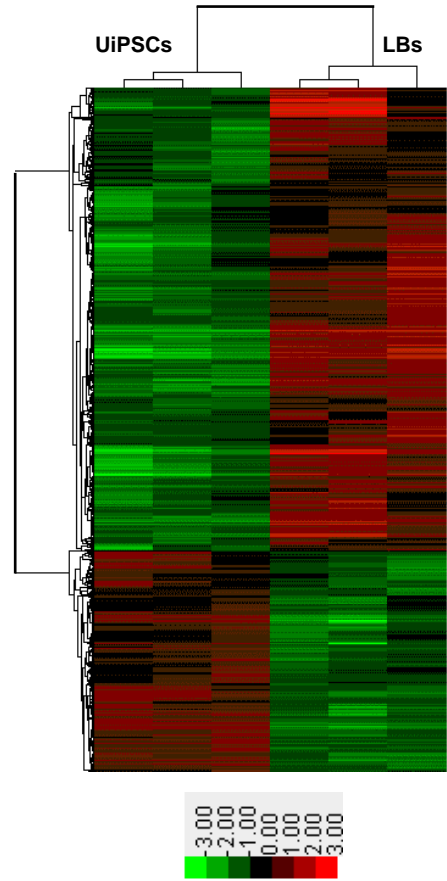


Figure.S3

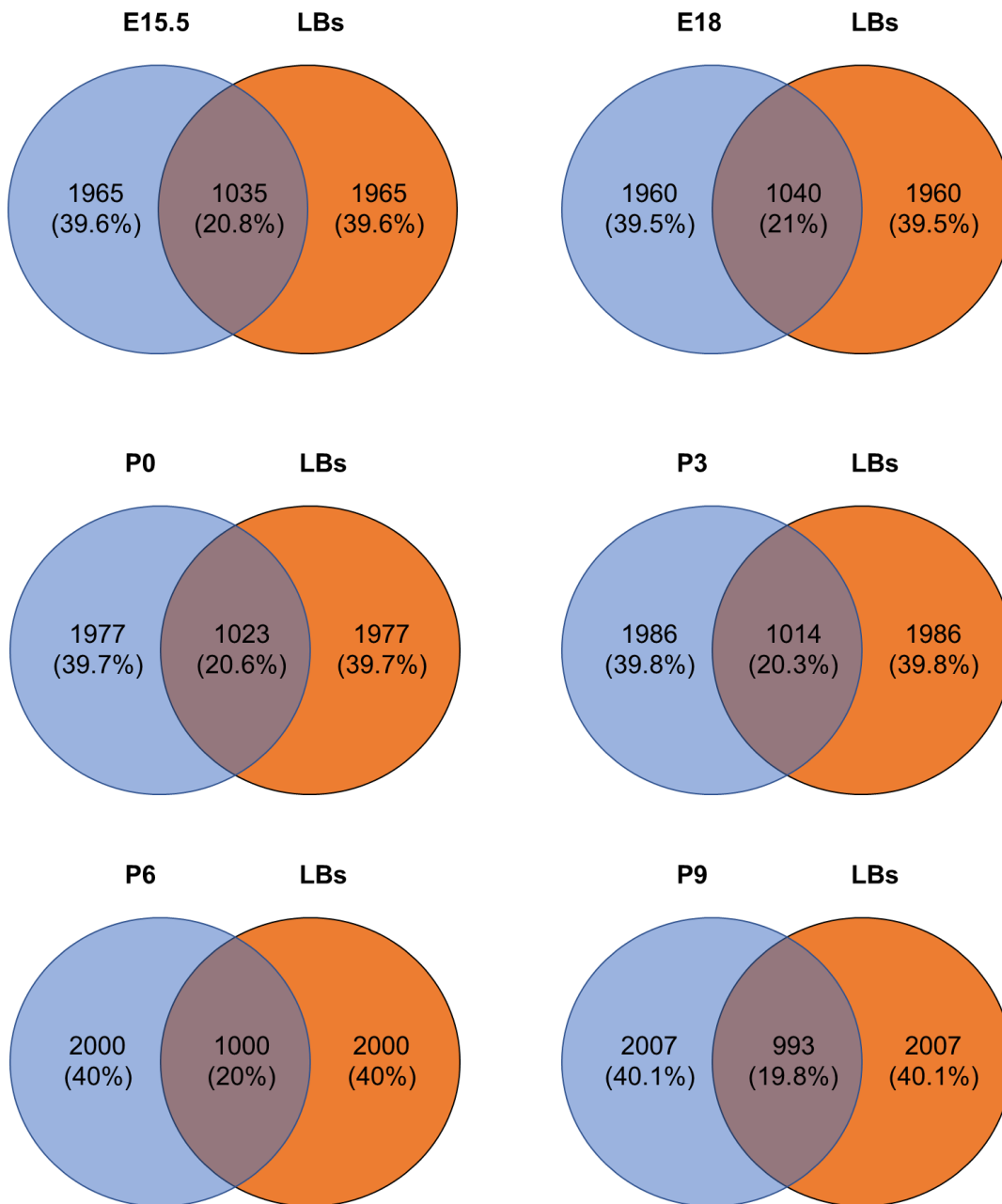


Figure.S4

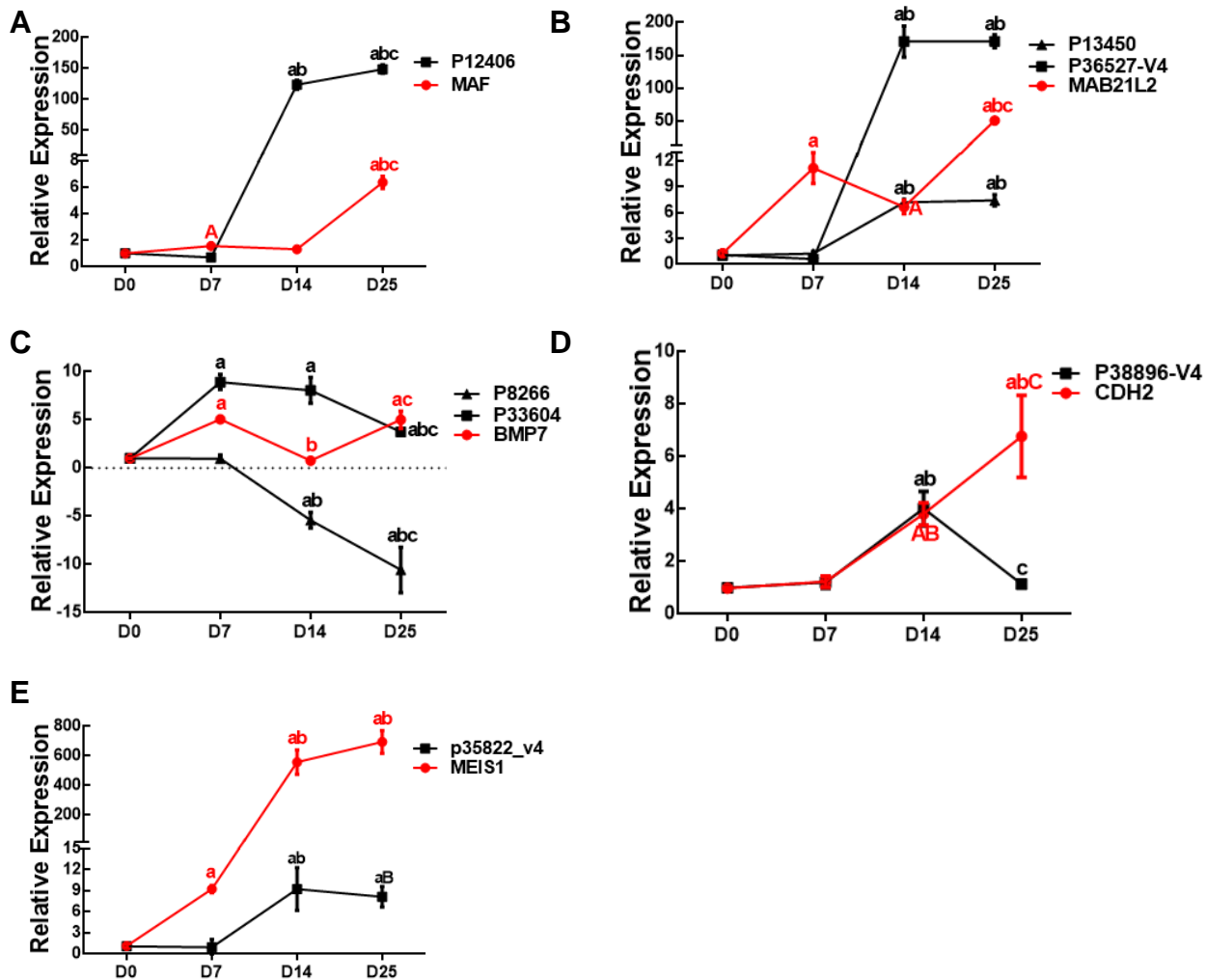
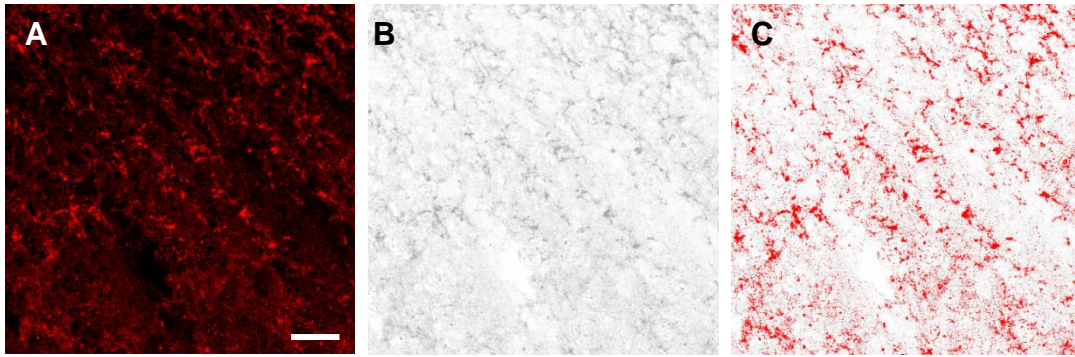


Figure.S5



SUPPLEMENTAL FIGURE LEGENDS

Figure. S1 Expression pattern of other autophagy associated genes during LB differentiation

qRT-PCR analysis showed the increased expression of other autophagy associated genes during LB differentiation process including ATG13, Beclin1, ATG12, ATG4A, SQSTM and UVRAG. The bar represents mean \pm SEM (n=3 independent experiments). a = $p < 0.01$ vs D0; A = $p < 0.05$ vs D0; b = $p < 0.01$ vs D7; c = $p < 0.01$ vs D14.

Figure. S2 Differential expression of mRNA between LBs and UiPSCs.

(A-B) Log-Log Scatter plot and Volcano plot show the differential expressed mRNAs between LBs and UiPSCs. (C) Heat map shows the different expression profiling of mRNAs between LBs and UiPSCs.

Figure. S3 Global bioinformatic comparison of the gene expression patterns between LBs and mouse embryonic and postnatal lens.

Global bioinformatic comparison of top 3000 expressed genes identified

in LBs with that of mouse embryonic and postnatal lens published by others using second generation sequencing.

Figure. S4 Expression pattern of lens development associated mRNAs and their corresponding lncRNAs during LB differentiation process.

(A) qRT-PCR analysis of MAF and its corresponding lncRNA p12406. (B) qRT-PCR analysis of MAB21L2 and its corresponding lncRNAs including lncRNA p13450 and lncRNA p36527_v4. (C) qRT-PCR analysis of BMP7 and its corresponding lncRNAs including lncRNA p8266 and lncRNA p33604. (D) qRT-PCR analysis of CDH2 and its corresponding lncRNA p38896_v4. (E) qRT-PCR analysis of MEIS1 and its corresponding lncRNA p35882_v4. The bar represents mean \pm SEM (n=3 independent experiments). a = $p < 0.01$ vs D0; A = $p < 0.05$ vs D0; b = $p < 0.01$ vs D7; B = $p < 0.05$ vs D7; c = $p < 0.01$ vs D14; C = $p < 0.05$ vs D14.

Figure. S5 Example for algorithm of LC3B fluorescence.

(A) The original image of LC3B staining. (B) The transformed image

after turning into 8-bit type and inverted by Image J software. (C) The calculated image after adjusting its threshold to manifest the LC3B dots.

Scar bars: 25 μm (630X).

Table S1. Differentially expressed autophagy related genes in LBs versus UiPSCs

mRNA	FC (abs) in microarray	FC (abs) in qRT-PCR	Regulation
SH3GLB1	3.96	2.78	up
WIP1	3.4	9.81	up
MAP1LC3B	2.33	1.71	up
VAMP7	2.33	1.84	up
VMP1	2.45	1.87	up
BNIP3L	4.18	5.71	up
PTEN	1.86	2.06	up
ATG5	1.4	1.81	up
PINK1	1.97	4.18	up

“up” means the expression of mRNA is higher in LBs both in microarray and qRT-PCR analysis.

Table S2. Differentially expressed lens development related lncRNA and their correlated genes in LBs versus UiPSCs

LncRNA ProbeName	LncRNA ID	Database	FC (abs) in microarray	FC (abs) in qRT-PCR	Regulation	Correlated mRNA
p12406	ENST00000513690.1	ENSEMBL	2.31	149.01	up	MAF
p36527_v4	ENST00000509463.1	ENSEMBL	5.05	171.24	up	MAB21L2
p13450	ENST00000517660.1	ENSEMBL	4.99	7.44	up	
p33604	ENST00000523759.1	ENSEMBL	4.4	3.76	up	BMP7
p8266	ENST00000567877.1	ENSEMBL	6.62	10.56	down	
p38896_v4	ENST00000571328.1	ENSEMBL	2.41	1.15	up	CDH2
p35822_v4	TCONS_00025230	HumanLincRNACatalog	5.64	8.15	up	MEIS1
p34737_v4	ENST00000444301.1	ENSEMBL	2.11	1.02	up/—	CTNNB1

“down” means the expression of lncRNA is lower in LBs both in microarray and qRT-PCR analysis. “up” means the expression of lncRNA is higher in LBs both in microarray and qRT-PCR analysis. “up/—” means the expression of lncRNA is higher in LBs in microarray analysis but shows no difference in qRT-PCR analysis.

Table S3. Differentially expressed lens development related genes in LBs versus UiPSCs

mRNA	FC (abs) in microarray	FC (abs) in qRT-PCR	Regulation
MAF	4.24	6.38	up
MAB21L2	4.97	50.46	up
BMP7	4.68	5.03	up
CDH2	4.89	6.78	up
MEIS1	12.18	694.94	up
CTNNB1	2.1	0.99	up/—

“up” means the expression of mRNA is higher in LBs both in microarray and qRT-PCR analysis. “up/—” means the expression of mRNA is higher in LBs in microarray analysis but shows no difference in qRT-PCR analysis.

Table S4. Primer sequences used in qRT-PCR

Gene	Direction	Primer sequence 5'→3'
SH3GLB1	Forward	ATTACCAGACTTCTGCTAGAGGG
	Reverse	GGATGGAAAACCTCCCAGTTGTT
WIP1	Forward	AGTCAGTCACACAAAACCACG
	Reverse	AGAGCACATAGACCTGTTGGG
MAP1LC3B	Forward	AAGGCGCTTACAGCTCAATG
	Reverse	CTGGGAGGCATAGACCATGT
VAMP7	Forward	GAGGTTCCAGACTACTTACGGT
	Reverse	GACACTTGAGAACTCGCTATTCA
VMP1	Forward	GACCAGAGACGTGTAGCAATG
	Reverse	ACAATGCTTTGACGATGCCATAA
BNIP3L	Forward	TTGGATGCACAACATGAATCAGG
	Reverse	TCTTCTGACTGAGAGCTATGGTC
PTEN	Forward	TTTGAAGACCATAACCCACCAC
	Reverse	ATTACACCAGTTCGTCCCTTTC
ATG5	Forward	AAAGATGTGCTTCGAGATGTGT
	Reverse	CACTTTGTCAGTTACCAACGTCA
PINK1	Forward	GCCTCATCGAGGAAAAACAGG
	Reverse	GTCTCGTGTCCAACGGGTC
MAF	Forward	AGTCCTGCCGCTTCAAGAG
	Reverse	CCGCTGCTCACCAACTTCT
MAB21L2	Forward	GTCTCTCTGGGTTCGAGTTCAT
	Reverse	CACATCCCGATAGCTGCACTT
BMP7	Forward	TCAACCTCGTGGAACATGACA
	Reverse	CTTGGAAGATCAAACCGGAACT
CDH2	Forward	AGCCAACCTTAACTGAGGAGT
	Reverse	GGCAACTTGATTGGAGGGATG
MEIS1	Forward	TACCCGCACACAGCTCATAC
	Reverse	CATTGAATGACTCTGACGAGCA
CTNNB1	Forward	CATCTACACAGTTTGATGCTGCT
	Reverse	GCAGTTTTGTCAGTTCAGGGA
Beclin1	Forward	GGTGTCTCTCGCAGATTCATC
	Reverse	TCAGTCTTCGGCTGAGGTTCT
UVRAG	Forward	ATGCCAGACCGTCTTGATACA
	Reverse	TGACCCAAGTATTTCAGCCCA
SQSTM	Forward	GCACCCCAATGTGATCTGC
	Reverse	CGCTACACAAGTCGTAGTCTGG
ATG12	Forward	TAGAGCGAACACGAACCATCC

ATG4A	Reverse	CACTGCCAAAACACTCATAGAGA
	Forward	TGCTGGTTGGGGATGTATGC
ATG13	Reverse	GCGTTGGTATTCTTTGGGTTGT
	Forward	AGACAGTTCGTGTTGGGACAG
LncRNA p4790	Reverse	CTCAAATTGCCTGGTAGACATGA
	Forward	AGAGCCACCTACGACCTCA
LncRNA p13116	Reverse	CTCCATCTCCTTGTCTTCTCCT
	Forward	GCCTGTTTGGTGGTCTCTTC
LncRNA p38664_v4	Reverse	CTGTTCTGTGTTAGTTTGCTGA
	Forward	TCAATAGTCAAGGAGGACAAAGAC
LncRNA p19101	Reverse	TTCGGTGATGCTGTAGATGG
	Forward	GCACTCAAGACCCTCTACGG
LncRNA p13515	Reverse	GCCATCCCTGTTCACTCCT
	Forward	CTGCTCTTTGCTCCGTGAAA
LncRNA p34310_v4	Reverse	GGCTGTGAGGTGTAGAAGTCT
	Forward	ATGAATCTCGCTGTGTTGTC
LncRNA ALB	Reverse	GGTATTAGGTGTCCAAGAAGAA
	Forward	TGGGAGAGGAGAAGAGATGC
LncRNA p35822_v4	Reverse	CTGTAGGTTGCTGGTGGTCA
	Forward	GCTGCGAGAGAATCTTGTTTC
LncRNA p13839	Reverse	AAACTTCACCGTGTTGATGA
	Forward	GACAGCAACATTCCTTCAG
LncRNA p36469_v4	Reverse	TACCTTCACAGCCTCCAA
	Forward	TCTTGCCTCTGCCTCCTGAGT
LncRNA p12406	Reverse	CCTGTGGTTGCCTCTGTGCTTA
	Forward	CCACCTCGGTTCCACTCAAC
LncRNA p36527-V4	Reverse	TCTCACAAGGCTGTCAACTTCA
	Forward	CGCTTCGGGATGAAATGACCAG
LncRNA p13450	Reverse	GCTGCTTCTGCCTCTGTCTTCT
	Forward	TCCTGCCTGTCCTTCTACTCA
LncRNA p33604	Reverse	GCTCTTATCTTGCTGCTGATGG
	Forward	TTCCTGGTTCTGGCTGGCATC
LncRNA p8266	Reverse	TGGATTCCCTGAGGTCGCACTG
	Forward	TCCTGCCACCTCAACCTCACA
LncRNA p38896-v4	Reverse	TCCACCATCATTGCTGCCTCTG
	Forward	ACCGCCAGACTATGATGAGAG
LncRNA p34737-v4	Reverse	GGGAAGGAGAGATGGAGTTAT
	Forward	CCAGCAGACCACGCTCATTACT
	Reverse	GGCAGCACAGCAGTCACCTT
