

Supplementary Materials: Transcriptome Profiling of the Lungs Reveals Molecular Clock Genes Expression Changes after Chronic Exposure to Ambient Air Particles

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Table S1. The primers for real-time PCR.

Gene Name	Forward (5'–3')	Reverse (5'–3')
<i>Per1</i>	CAGCAGTGGAGTCTGGAGGA	TAGGAGCTCTGAGAAGCGGG
<i>Per2</i>	AGCCCTGCAGCATGGAAGTA	ACGTCATGAGGAGCCAGGAA
<i>Per3</i>	TGTGTTCAAGGGTCCACTGC	GGTGCTGGCAACTTCTTTTCG
<i>Bmal1</i>	CCAAGAAAGTATGGACACAGACAAA	GCATTCTTGATCCTTCCTTGGT
<i>Clock</i>	TTGCTCCACGGGAATCCTT	GGAGGGAAAGTGCTCTGTTGTAG
<i>Cry1</i>	CTGGCGTGGAAGTCATCGT	CTGTCCGCCATTGAGTTCTATG
<i>Cry2</i>	TGTCCCTTCCTGTGTGGAAGA	GCTCCAGCTTGGCTTGA
<i>REV-ERBα</i>	GGGCACAAGCAACATTACCA	CACGTCCCCACACACCTTAC
<i>Dbp</i>	AAGGAGCGCAAGGCAACTCT	AGATGTCAAGCCTGCGCGGT
<i>Gapdh</i>	CCCTTAAGAGGGATGCTGCC	TACGGCCAAATCCGTTTACA

Table S2. Overlap genes of 4 groups data of RNA-Seq.

Adcy9	Cxcl14	Per1	A2m
Arntl	Cxcl2	Per2	Alas1
Ccl11	Cxcl6	Per3	Alox15
Ccl2	Gng10	Tnf	Ddit4
Ccl20	Ifnk	Tnfsf10	Efnb2
Ccl9	Il10	Hif3a	Epas1
Cry1	Il1b	Trim16	Fabp4
Ctf1	Il6	Prl8a2	Tef
Cxcl1	Lifr	Prl4a1	

Table S3. DAVID bioinformatics for functional annotation.

Term	Count	%	p-Value
Cytokine-cytokine receptor interaction	12	34.2857143	1.27E-10
Chemokine signaling pathway	10	28.5714286	8.32E-09
TNF signaling pathway	7	20	2.31E-06
Circadian rhythm	5	14.2857143	4.03E-06
Herpes simplex infection	8	22.8571429	1.05E-05
Rheumatoid arthritis	6	17.1428571	1.60E-05
Legionellosis	5	14.2857143	5.41E-05
Malaria	5	14.2857143	6.20E-05
Pertussis	5	14.2857143	1.43E-04
African trypanosomiasis	4	11.4285714	3.62E-04
Circadian entrainment	5	14.2857143	4.28E-04
Chagas disease (American trypanosomiasis)	5	14.2857143	6.21E-04
NOD-like receptor signaling pathway	4	11.4285714	0.001137577
Jak-STAT signaling pathway	5	14.2857143	0.001482411
Inflammatory bowel disease (IBD)	4	11.4285714	0.001752567

Influenza A	5	14.2857143	0.003511071
Salmonella infection	4	11.4285714	0.00352409
Asthma	3	8.57142857	0.005493904
Amoebiasis	4	11.4285714	0.008130768
Graft-versus-host disease	3	8.57142857	0.024937127
Leishmaniasis	3	8.57142857	0.029309668
Tuberculosis	4	11.4285714	0.029619359
Hematopoietic cell lineage	3	8.57142857	0.036396184
Toll-like receptor signaling pathway	3	8.57142857	0.050428394
Measles	3	8.57142857	0.087620423
FoxO signaling pathway	3	8.57142857	0.088747392

Table S4. The circadian gene expression level.

Log ₂ Ratio (Unfiltered/filtered)/Mother							Log ₂ Ratio (Unfiltered/Filtered)/ Offspring	
	Normal Fetus/1st	<i>p</i> -Value	Normal Fetus/2nd	<i>p</i> -Value	Abnormal Fetus	<i>p</i> -Value	8 Weeks	<i>p</i> -Value
<i>Per1</i>	−1.945	0.0000	−1.864	0.0000	−1.816	0.0000	−1.424	0.0000
<i>Per2</i>	−0.381	0.0177	−3.226	0.0000	−1.678	0.0000	−1.146	0.0000
<i>Per3</i>	−2.279	0.0000	−1.775	0.0000	−3.448	0.0000	−1.221	0.0000
<i>Cry1</i>	2.412	0.0000	1.071	0.0002	2.124	0.0000	0.610	0.0502
<i>Cry2</i>	−0.287	0.0642	−0.091	0.0000	−0.073	0.0000	0.049	0.7750
<i>Clock</i>	0.036	0.9369	−0.396	0.4581	0.287	0.5256	−0.887	0.1147
<i>Bmal1</i>	2.144	0.0000	1.966	0.0000	2.466	0.0000	0.695	0.0293
<i>Rev-erba</i>	−5.659	0.0000	−2.877	0.0000	−5.362	0.0000	−0.359	0.0001
<i>Dbp</i>	−3.551	0.0000	−3.870	0.0000	−3.492	0.0000	−3.318	0.0204

|log₂ Ratio| ≥ 0.5 and *p* value < 0.05 are significant.

Table S5. The top 50 up-regulated genes and top 50 down-regulated genes of the first set of experiments (Mothers with normal fetus).

Up-Regulated		Down-Regulated	
Gene Name	Log ₂ Ratio (Unfiltered/Filtered)	Gene Name	Log ₂ Ratio (Unfiltered/Filtered)
LOC688228	17.10880447	Hbe1	−14.54798886
Myh7	15.39361452	Atp6v0a4	−11.87580404
Mb	15.06807234	<i>Rev-erba</i>	−5.659
Sln	14.96594354	Sethp1	−4.548619992
RatNP-3b	13.60572642	Gli3	−4.487219447
Cxcl6	13.47712177	LOC100361038	−4.133582493
Smpx	13.13154909	Krt75	−4.133582493
LOC688228	13.02491448	RGD1566296	−3.821638486
Nppa	12.98516145	LOC691925	−3.578367335
Myoz2	12.89710001	Vsig4	−3.548619992
Pthlh	12.73528145	<i>Dbp</i>	−3.551
Tnfrsf13c	12.60433509	Nr1d2	−3.51281927
Mybpc3	12.30320783	Tbx18	−3.332891301
Jsrp1	11.90578723	LOC100359743	−3.285585586
Ckm	11.78715365	Rprml	−3.165291352
Lmod2	11.69406814	Pigz1	−3.133582493
Krt77	11.6684463	Slc16a12	−3.092940508
Lrrc10	11.63530344	Cyp2b2	−3.051120332
Adam28	11.57331715	RGD1563615	−2.771012413
Silv	11.28274372	Gm672	−2.718544993
Grem1	10.97864428	Vdr	−2.718544993

LOC681849	10.81805593	Slc38a7	-2.718544993
Tmem182	10.68144006	Abcb7	-2.718544993
Vsx1	10.62604547	Rasd2	-2.632036
Vwa5b1	10.46217143	RGD1565166	-2.621188618
Xirp2	9.463552884	Hyal1	-2.61900932
Sspo	8.421839333	Tlr8	-2.578367335
Plunc	8.227154877	RGD1566226	-2.478230664
Il6	8.14689435	Msr1	-2.42308911
Il10	7.825518061	RGD1359290	-2.402769125
Clca3	7.074163974	Wfs1	-2.401062803
Gp2	6.330963258	Dpep3	-2.389922246
Scgb3a1	5.931160272	Fras1	-2.363588098
Ccl20	5.428659932	Fam46b	-2.339524393
Itln1	4.514389806	Mtcp1	-2.317294446
Tnnt2	4.506228485	Tmem37	-2.285585586
Actn2	4.495774128	Upk3b	-2.285585586
C9	4.30312905	Kcnn3	-2.285585586
Cd177	3.828900429	Per3	-2.2786992
B3gnt5	3.780503604	LOC690492	-2.204665591
Ccl19	3.746000757	Tmem86b	-2.200696688
RGD1563047	3.730239381	Slc10a6	-2.186049912
Tnnc1	3.718166549	Arrb1	-2.176651214
Cxcl13	3.708767851	Lrrn4	-2.145860822
Cdh26	3.62130501	Ablim2	-2.133582493
Glycam1	3.532768335	RGD1565536	-2.089188373
Ccr6	3.445733445	Ficd	-2.079134709
Fcer2	3.428659932	Susd2	-2.005316643
Scin	3.428659932	Mfsd2	-1.996078969
Cox6a2	3.313182714	Abca17	-1.993404835

Table S6. The top 50 up-regulated genes and top 50 down-regulated genes of the second set of experiments (Mothers with normal fetus).

Up-Regulated		Down-Regulated	
Gene Name	Log ₂ Ratio (Unfiltered/Filtered)	Gene Name	Log ₂ Ratio (Unfiltered/Filtered)
Zbp2	11.94984935	Tpbpa	-14.72823222
Myh7	9.846311265	Hbe1	-14.54798886
Cxcl6	9.846311265	Cyp2b2	-13.36681948
Il10	8.940621387	Prl4a1	-13.24075465
Il6	8.261997677	Ceacam11	-12.80285399
Plunc	6.268309593	LOC100360737	-12.39417223
Ccl20	3.321370837	LOC100361038	-11.75559621
Scgb3a1	2.800311388	Cgm4	-11.43951871
Adh7	2.695766351	Gnao1	-11.21466135
Retnla	2.434504875	Prl8a5	-4.892948284
Slc26a4	2.373838256	RT1-T24-1	-4.372116121
LOC100359517	2.229448347	Dbp	-3.870
Ly6al	2.223854331	LOC100362483	-3.769119697
Trim16	2.215576173	RGD1566401	-3.492410355
F13a1	2.105642146	Per2	-3.225523623
Chodl	2.09004529	Sptb	-3.096481678
Cfi	2.029767279	Pilra	-3.077372855
LOC687234	1.974568073	Art4	-2.977837182
Arntl	1.965890182	Rev-erba	-2.877
Ngp	1.958800757	Vil1	-2.736079436
LOC100361788	1.942859213	C6	-2.736079436
Tnf	1.888458204	Slc4a1	-2.7346862

Ccl2	1.883305716	Tor3a	-2.655909087
Dmbt1	1.87936629	Cacna1h	-2.585519759
Abhd3	1.857714632	Wfikkn1	-2.585519759
Tekt3	1.851885553	Spred2	-2.548993883
Rnf11	1.848518702	Fndc3b	-2.457363408
Pcmt2	1.799734271	RT1-S2	-2.36640247
Ptma	1.799734271	RT1-CI	-2.346053824
Atg4c	1.799144091	RGD1565166	-2.343813863
Ap3s1	1.772934212	Tbxa2r	-2.307985783
LOC362795	1.764977488	Plekha6	-2.293339008
Ly6b	1.712856923	Dos	-2.233218015
LOC100365063	1.709441288	Atp6v0a4	-2.206106169
Kcne3	1.706034687	Ddit4	-2.129510479
Crp	1.694080158	Hyal1	-2.12539437
Il1b	1.686990734	Vsig4	-2.111588571
S100a8	1.68657718	Mfap3	-2.06005827
Rfc4	1.660459483	LOC500300	-2.041199243
RGD1563325	1.620931118	Myh7b	-2.036181168
RGD1308612	1.605163803	RGD1308124	-2.000557258
Aurkb	1.597245588	Gabrp	-2.000557258
Lcn2	1.556702314	RGD1562037	-1.943711398
Yipf4	1.549995212	LOC100363476	-1.942736604
Naip2	1.540488126	Cd52	-1.936017006
Gng10	1.535495642	Rasd2	-1.931970173
Zfp758	1.502918206	Wfs1	-1.870921978
Pon1	1.497220672	Per1	-1.864076437
Mrpl1	1.497220672	Hba-a2	-1.836132606
MGC105649	1.491674747	Cdc25b	-1.828376283

Table S7. The top 50 up-regulated genes and top 50 down-regulated genes of the set of experiments (Mothers with abnormal fetus).

Up-Regulated		Down-Regulated	
Gene Name	Log ₂ Ratio (Unfiltered/Filtered)	Gene Name	Log ₂ Ratio (Unfiltered/Filtered)
Ctsq	13.40182003	Hbe1	-14.54798886
Cxcl6	12.8239556	Cyp2b2	-13.36681948
LOC100360968	12.50664804	Atp6v0a4	-11.87580404
Myh7	11.01092757	LOC100361038	-11.75559621
Krt77	10.96523945	LOC367975	-11.60012236
Il10	10.12231121	Adcy9	-11.27521286
Il6	9.121759402	Slc39a5	-10.84557757
Plunc	7.856697612	LOC100359544	-10.73844375
Ccl20	5.534769515	<i>Rev-erba</i>	-5.362
Prl3d4	3.918098157	RGD620382	-4.632648628
Clca3	3.797803923	RT1-T24-1	-4.512354395
Ifnk	3.646796135	Prss35	-4.236719952
Scgb3a1	3.490460621	Mlc1	-3.689232157
H19	3.426245061	<i>Dbp</i>	-3.492
Prl3b1	3.368759566	Per3	-3.448224057
Ctsr	3.353599759	Zbtb16	-3.323776686
Prl8a7	3.26994183	Cd300lg	-3.07625528
Ly6al	3.259135075	Pilra	-3.047686128
Trim16	3.224201285	Nsg2	-3.047686128
Prl8a4	3.084456543	Nr1d2	-2.981560869
Prl2a1	2.974681685	Hyal1	-2.966072362
LOC100360737	2.877657231	RGD1561778	-2.796147361
A2m	2.859204468	Rnasel	-2.796147361

Cxcl2	2.818562483	RGD1305469	-2.403829938
Prl4a1	2.783797065	Hipk4	-2.373456289
RGD1562420	2.782791352	Hgd	-2.358026248
Prl8a2	2.766095063	Vsig4	-2.351362518
Ceacam11	2.766095063	RGD1566401	-2.310720534
Retnla	2.686137272	Lef1	-2.225831636
Tpbpa	2.684489865	Bmp3	-2.21118486
Prl8a9	2.620016804	Usp2	-2.198245804
Arntl	2.466109521	Ddit4	-2.185684488
Slc26a4	2.426245061	Atp2c2	-2.143120585
Car3	2.421491531	Slc4a1	-2.097316895
LOC100362680	2.333135656	LOC100364166	-2.083949672
Ctsql2	2.313770331	Dos	-2.083949672
Sh3rf2	2.267547315	RGD1305090	-2.024416348
RGD1564827	2.212841422	Pusl1	-2.01048751
Ly6b	2.212210874	LOC691259	-1.988792439
Cry1	2.123682291	Spred2	-1.988792439
Tnf	2.011207562	RGD1566226	-1.988792439
LOC687234	2.011207561	Ccdc129	-1.988792439
LOC684097	1.978040697	Dpep3	-1.955625575
Cxcl1	1.968979326	LOC641523	-1.944849091
Ccl2	1.886098931	Rnf24	-1.93220891
LOC683983	1.865356695	LOC100360801	-1.911624578
Igf2	1.811438049	Kcnj15	-1.830094693
Prl8a5	1.799703456	Coro6	-1.824372543
Ap3s1	1.770199462	Per1	-1.81601118
Cd177	1.727414595	Cables1	-1.796147361

Table S8. The top 50 up-regulated genes and top 50 down-regulated genes of offspring.

Up-Regulated		Down-Regulated	
Gene Name	Log ₂ Ratio (Unfiltered/Filtered)	Gene Name	Log ₂ Ratio (Unfiltered/Filtered)
LOC691925	14.42220984	Afp	-12.69024474
LOC690689	12.53245989	Marveld2	-12.64138316
Ctrb1	12.2808846	Kpna5	-11.34108037
Cav3	11.99075059	LOC100359743	-5.781532828
Il6	3.960866699	Kcnj15	-5.190172556
LOC363827	3.699493041	Zbtb41	-4.420785484
LOC500375	3.562208091	Shisa2	-4.420785484
Nuf2	2.992842445	Asb7	-4.28328196
LOC641523	2.846001057	Ctsq	-4.28328196
Gabrp	2.726702128	LOC171573	-4.246756084
Defb5	2.444638494	Slc36a1	-4.209281379
Slc5a5	2.404295607	Dusp4	-4.131278867
LOC681420	2.311664629	Psg29	-4.131278867
LOC100361706	2.240279996	Prl3d4	-4.076831083
RGD1564209	2.185487523	Prl3b1	-4.031743193
Ccl20	2.074270044	Prl8a9	-3.983721678
Slc7a11	2.038646135	Ctsr	-3.952308726
Tmc5	2.014398588	Ankrd44	-3.938633789
Osbp18	2.012650926	Slc7a2	-3.819334861
Il10	1.986861908	H19	-3.800557654
Rgs4	1.98054318	Prl8a4	-3.611607826
Pilra	1.974515797	Cyp2b2	-3.605210055
Tnf	1.932774392	LOC300314	-3.484915822
Cxcl14	1.932774392	Sema3d	-3.420785484
Exd1	1.926171405	LOC100362680	-3.420785484
LOC690276	1.892795268	Dcbld2	-3.420785484

LOC366772	1.838100416	Rbm20	-3.330587675
RGD1564859	1.83511274	Ctsql2	-3.296956897
Pon1	1.830841249	Baat	-3.28328196
Igh-1a	1.823174946	LOC100361884	-3.209281379
LOC499742	1.775611729	Pde7b	-3.131278867
Hp	1.764471171	Upk3b	-3.131278867
Pcp4l1	1.761112159	Gpr77	-3.076831083
RGD1565236	1.746465383	Abca8	-3.005747985
LOC100363106	1.740991407	Zbtb6	-2.996977775
Vom2r52	1.739085853	Gpr137b	-2.899953321
Mfap4	1.729343664	RGD1560666	-2.899953321
Pcdh17	1.704908737	Glt25d2	-2.899953321
Il1b	1.677284916	Ccdc6	-2.899953321
LOC303448	1.663136999	Tmtc2	-2.887353284
Hmox3	1.641310637	Fzd4	-2.835822983
Thnsl2	1.623608635	Dlk1	-2.819334861
LOC100363076	1.606929894	RGD1564827	-2.804628362
RGD1310371	1.581173369	Lifr	-2.768708788
Mki67	1.578379381	Zbtb33	-2.768708788
Pard3b	1.575911893	Cyp26b1	-2.727446822
LOC100361520	1.568611358	Fras1	-2.711375612
Tcf19	1.567025107	Prl8a5	-2.703857643
Tmem138	1.535071961	Serpina3n	-2.687178902
Ctsw	1.524072962	Pstpip2	-2.68381989



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