Supplementary tables for ADONIX: Lung function and source specific PM

Table S1 Correlation (Pearson's) matrix of exposure

		PM_{10}					$PM_{2.5}$					PM_{BC}				
		Total	Traffic	Res. heating	Marine traffic	Industry	Total	Traffic	Res. heating	Marine traffic	Industry	Total	Traffic	Res. heating	Marine traffic	Industry
PM_{10}	Total	1														
	Traffic	0.75*	1													
	Residential heating	-0.43	-0.70*	1												
	Marine traffic	0.06	0.44	-0.83*	1											
	Industry	-0.32	0.30	-0.60*	0.63*	1										
$PM_{2.5}$	Total	0.89*	0.37	-0.12	-0.22	-0.66*	1									
	Traffic	0.77*	1*	-0.70*	0.43	0.27	0.40	1								
	Residential heating	-0.43	-0.70*	1*	-0.83*	-0.60*	-0.12	-0.70*	1							
	Marine traffic	0.06	0.44	-0.83*	1*	0.63*	-0.22	0.43	-0.83*	1						
	Industry	-0.23	0.29	-0.70*	0.72*	0.94*	-0.54*	0.27	-0.70*	0.72*	1					
PM_{BC}	Total	0.83*	0.98*	-0.59*	0.32*	0.13	0.49	0.99*	-0.59*	0.32	0.13	1				
	Traffic	0.83*	0.99*	-0.69*	0.40*	0.19	0.48	1*	-0.69*	0.40	0.21	0.99*	1			
	Residential heating	-0.41	-0.69*	1*	-0.83*	-0.62*	-0.09	-0.69*	1*	-0.83*	-0.73*	-0.58*	-0.68*	1		
	Marine traffic	0.08	0.45	-0.83*	1*	0.62*	-0.20	0.44	-0.83*	1*	0.71*	0.33	0.41	-0.83*	1	
	Industry	-0.24	0.29	-0.70*	0.72*	0.94*	-0.54*	0.27	-0.70*	0.72*	1*	0.13	0.21	-0.72*	0.70*	1

* $p<0.05$

Supplementary tables for ADONIX: Lung function and source specific PM

Table S2 Trends in change in FEV_1 and FVC (% predicted) across exposure strata from low (0-50th percentile) to high (above 90th percentile) concentrations of source-specific PM (Figure 1)

	FEV_1				FVC			
	β	95% CI		*p*	*β*	95% CI		*p*
		Lower	Upper			Lower	Upper	
PM_{10}								
Total	-0.37	-0,97	0,22	0.22	**-0.73**	-1,27	-0,19	**0.01**
Traffic	**-0.85**	-1,51	-0,19	**0.01**	**-0.81**	-1,40	-0,21	**0.01**
Residential heating	-0.21	-0,79	0,37	0.47	0.15	-0,38	0,67	0.59
Marine traffic	0.08	-0,54	0,71	0.32	-0.24	-0,81	0,32	0.29
Industry	-0.29	-0,91	0,33	0.36	-0.22	-0,79	0,35	0.45
$PM_{2.5}$								
Total	-0.03	-0,60	0,54	0.92	-0.47	-0,98	0,05	0.08
Traffic	**-0.79**	-1,45	-0,13	**0.02**	**-0.81**	-1,41	-0,21	0.01
Residential heating	-0.18	-0,77	0,40	0.53	0.15	-0,37	0,68	0.57
Marine traffic	0.08	-0,54	0,71	0.32	-0.24	-0,81	0,32	0.29
Industry	-0.12	-0,76	0,53	0.72	0.03	-0,55	0,62	0.91
PM_{BC}								
Total	**-0.66**	-1,30	-0,01	**0.05**	-0.75	-1,34	-0,17	0.01
Traffic	-0.57	-1,22	0,09	0.09	-0.75	-1,34	-0,16	0.01
Residential heating	-0.02	-0,61	0,58	0.95	0.39	-0,15	0,93	0.16
Marine traffic	0.03	-0,61	0,67	0.33	-0.34	-0,91	0,24	0.30
Industry	-0.22	-0,86	0,42	0.49	-0.03	-0,61	0,55	0.92

ORs from regression models adjusted for age, weight, education, area of residence, smoking status and exposure to environmental tobacco smoke in the last 12 months.

Supplementary tables for ADONIX: Lung function and source specific PM

Table S3 Change in FEV_1 and FVC (mL) per IQR change in PM exposure

		FEV1			FVC		
			95% CI			95% CI	
	IQR (µg/m³)	*β*	*Lower*	*Upper*	*β*	*Lower*	*Upper*
PM_{10}							
Total	3.05	-23	-46	0	-11	-30	8
Traffic	1.64	**-23**	**-43**	**-4**	**-20**	**-36**	**-4**
Residential heating	0.62	4	-20	28	-7	-27	12
Marine traffic	0.03	4	-8	16	4	-6	13
Industry	0.10	**-26**	**-47**	**-5**	**-18**	**-35**	**-1**
$PM_{2.5}$							
Total	2.47	**-28**	**-54**	**-3**	-5	-26	15
Traffic	0.52	**-24**	**-43**	**-5**	**-20**	**-36**	**-4**
Residential heating	0.62	4	-20	28	-7	-27	12
Marine traffic	0.03	4	-38	46	4	-30	38
Industry	0.06	**-24**	**-49**	**0**	**-18**	**-38**	**2**
PM_{BC}							
Total	0.33	**-29**	**-50**	**-8**	**-25**	**-42**	**-7**
Traffic	0.25	**-24**	**-42**	**-6**	**-18**	**-33**	**-4**
Residential heating	0.07	4	-21	28	-11	-31	8
Marine traffic	0.01	3	-8	15	3	-6	13
Industry	0.01	**-27**	**-51**	**-2**	**-20**	**-40**	**0**

Change estimated from linear regression models adjusted for age, weight, education, area of residence, smoking status and exposure to environmental tobacco smoke in the last 12 months

Supplementary tables for ADONIX: Lung function and source specific PM

Table S4 Odds ratio of having FEV_1 and FVC below LLN in medium and high exposure strata by PM source and size fraction*

		LLN FEV_1				LLN FVC			
			95% CI				95% CI		
Model	**Percentile**	OR	**lower**	upper	p	OR	**lower**	upper	p
PM_{10}									
Total	0-50th	-	-	-	-				
	50th-90th	1.05	0.87	1.26	0.61	**1.23**	**1.00**	**1.51**	**0.05**
	90th-100th	1.18	0.86	1.62	0.31	**1.40**	**0.98**	**1.99**	**0.06**
Traffic	0-50th	ref	-	-		ref	-	-	
	50th-90th	1.12	0.92	1.36	0.28	1.16	0.93	1.45	0.18
	90th-100th	**1.46**	**1.06**	**2.02**	**0.02**	**1.45**	**1.00**	**2.08**	**0.05**
Residential heating	0-50th	ref	-	-			ref	-	-
	50th-90th	1.04	0.87	1.25	0.65	1.02	0.83	1.25	0.87
	90th-100th	0.90	0.66	1.25	0.54	0.69	0.47	1.01	0.06
Marine traffic	0-50th	ref	-	-		ref	-	-	
	50th-90th	0.98	0.81	1.18	0.82	1.01	0.82	1.26	0.89
	90th-100th	0.83	0.59	1.17	0.29	0.91	0.62	1.33	0.64
Industry	0-50th	ref	-	-		ref	-	-	
	50th-90th	0.99	0.81	1.22	0.95	1.03	0.82	1.30	0.79
	90th-100th	0.97	0.71	1.32	0.85	1.13	0.79	1.61	0.49
$PM_{2.5}$									
Total	0-50th								
	50th-90th	0.97	0.81	1.16	0.76	1.03	0.84	1.26	0.77
	90th-100th	1.07	0.79	1.46	0.66	1.31	0.94	1.82	0.11
Traffic	0-50th	ref	-	-	-				
	50th-90th	1.13	0.93	1.38	0.22	1.21	0.97	1.51	0.09
	90th-100th	**1.47**	**1.06**	**2.03**	**0.02**	**1.54**	**1.07**	**2.21**	**0.02**
Residential heating	0-50th	ref	-	-	-	ref	-	-	
	50th-90th	1.03	0.85	1.23	0.79	1.02	0.83	1.25	0.87
	90th-100th	0.90	0.65	1.23	0.50	0.69	0.47	1.01	0.06
Marine traffic	0-50th	ref	-	-		ref	-	-	
	50th-90th	0.98	0.81	1.18	0.82	1.01	0.82	1.26	0.89
	90th-100th	0.83	0.59	1.17	0.29	0.91	0.62	1.33	0.64
Industry	0-50th					ref	-	-	
	50th-90th	0.91	0.74	1.12	0.38	1.03	0.82	1.30	0.79

Supplementary tables for ADONIX: Lung function and source specific PM

	90th-100th	0.97	0.71	1.33	0.83	1.13	0.79	1.61	0.49
PM_{BC}									
Total	0-50th					ref	-	-	
	50th-90th	1.08	0.89	1.31	0.44	1.07	0.86	1.32	0.56
	90th-100th	1.34	0.97	1.86	0.08	**1.46**	**1.02**	**2.09**	**0.04**
Traffic	0-50th	ref	-	-	-				
	50th-90th	1.17	0.96	1.42	0.12	1.19	0.95	1.48	0.13
	90th-100th	1.37	0.98	1.90	0.06	**1.55**	**1.08**	**2.23**	**0.02**
Residential heating	0-50th	ref	-	-	-	ref	-	-	
	50th-90th	1.09	0.90	1.30	0.38	0.94	0.76	1.15	0.54
	90th-100th	0.80	0.57	1.11	0.18	**0.64**	**0.44**	**0.94**	**0.02**
Marine traffic	0-50th	ref	-	-		ref	-	-	
	50th-90th	1.00	0.82	1.21	0.96	1.00	0.81	1.25	0.98
	90th-100th	0.89	0.64	1.26	0.52	0.94	0.64	1.37	0.75
Industry	0-50th					ref	-	-	
	50th-90th	0.96	0.78	1.17	0.67	1.05	0.84	1.32	0.68
	90th-100th	0.99	0.72	1.35	0.95	1.09	0.77	1.56	0.62

ORs from regression models adjusted for age, weight, education, area of residence, smoking status and exposure to environmental tobacco smoke in the last 12 months.FEV_1, forced expiratory volume in 1 second, FVC, forced vital capacity, LLN, lower limit of normal, the fifth percentile of a healthy population, according to formula from Brisman et al., 2017.

Supplementary tables for ADONIX: Lung function and source specific PM

Table S5 Genetic main effects: Changes in FEV_1 and FVC in minor allele carriers relative to major allele carriers of GSTP, GSTT and SP-A SNPs

		FEV_1				FVC			
	N (%)	*β*	95% CI Lower	Upper	p	β	95% CI Lower	Upper	*p*
GSTP									
rs1138272									
(TT+CT)	707 (14.3)								
***vs* CC**	4250 (85.7)	0.513	-0.539	1.565	0.339	0.790	-0.161	1.741	0.103
rs596603									
(TT+GT)	3363 (68.0)								
***vs* GG**	1581 (32.0)	-0.336	-1.126	0.455	0.405	-0.216	-0.931	0.499	0.554
rs762803									
(AA+AC)	3309 (67.0)								
***vs* CC**	1633 (33.0)	**-0.802**	**-1.583**	**-0.02**	**0.044**	**-0.736**	**-1.443**	**-0.028**	**0.042**
rs1695									
(AG+GG)	2683 (54.4)								
***vs* AA**	2244 (45.5)	**-0.902**	**-1.643**	**-0.16**	**0.017**	-0.575	-1.246	0.095	0.093
GSTT									
rs2266637									
GG	1005 (23.8)								
***vs* CC**	3219 (76.2)	-0.378	-1.331	0.575	0.437	**-1.431**	**-2.293**	**-0.57**	**0.001**
SP-A 1									
rs1136450									
(CC+GC)	2926 (63.8)								
***vs* GG**	1660 (36.2)	-0.106	-0.899	0.704	0.807	-0.106	-0.832	0.62	0.774
rs1136451									
(GG+GA)	1352 (29.7)								
***vs* AA**	3195 (70.3)	0.498	-0.348	1.345	0.248	0.257	-0.51	1.023	0.511
rs1059057									
(GG + GA)	579 (12.6)								
***vs* AA**	4018 (87.4)	0.155	-1.003	1.313	0.793	0.073	-0.977	1.124	0.891
rs4253527									

Supplementary tables for ADONIX: Lung function and source specific PM

(TT+TC)	848 (18.5)								
***vs* CC**	3735 (81.5)	0.479	-0.513	1.471	0.344	0.508	-0.392	1.408	0.269
SP-A 2									
rs1059046									
(GG+GT)	2814 (61.8)								
***vs* TT**	1741 (38.2)	0.070	-0.724	0.865	0.862	0.038	-0.682	0.759	0.917
rs1965707									
(AA+AG)	2103 (46.2)								
***vs* GG**	2449 (53.8)	0.085	-0.686	0.856	0.829	0.255	-0.446	0.956	0.476
rs1965708)									
(TT+TG)	1551 (33.8)								
***vs* GG**	3041 (66.2)	-0.583	-1.397	0.231	0.160	-0.342	-1.08	0.396	0.364

With adjustment for age, weight, education, area of residence, smoking status, and exposure to environmental tobacco smoke in the last 12 months.

Supplementary tables for ADONIX: Lung function and source specific PM

Table S6 Interaction between genotype (minor allele carriers) and total and source specific PM on lung function in a linear model

Gene	SNP	INTERACTION (p)* Total	Traffic	Residential heating	Marine traffic	Industry
FEV_1						
GSTP1	rs1138272	P>0.1	P>0.1	P>0.1	P>0.1	0.05
GSTP1	rs596603	P>0.1	P>0.1	P>0.1	P>0.1	0.06
GSTP1	rs762803	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
GSTP1	rs1695	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
GSTT1	rs2266637	0. 01	P>0.1	P>0.1	P>0.1	P>0.1
SP-A1	**rs1136450**	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
SP-A1	rs1136451	P>0.1	P>0.1	P>0.1	**0.04**	**0.01**
SP-A1	rs1059057	0. 05	P>0.1	P>0.1	P>0.1	P>0.1
SP-A1	rs4253527	P>0.1	P>0.1	P>0.1	**0.02**	P>0.1
SP-A2	**rs1059046**	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
SP-A2	rs1965707	P>0.1	P>0.1	P>0.1	0.06	P>0.1
SP-A2	rs1965708	P>0.1	P>0.1	P>0.1	0.08	P>0.1
FVC						
GSTP1	rs1138272	P>0.1	P>0.1	P>0.1	P>0.1	0.06
GSTP1	rs596603	P>0.1	P>0.1	P>0.1	P>0.1	0.07
GSTP1	rs762803	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
GSTP1	rs1695	P>0.1	P>0.1	P>0.1	P>0.1	**0.03**
GSTT1	rs2266637	0.048	P>0.1	P>0.1	P>0.1	P>0.1
SP-A1	**rs1136450**	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
SP-A1	rs1136451	P>0.1	P>0.1	P>0.1	P>0.1	0.03
SP-A1	rs1059057	P>0.1	0.07	0.08	P>0.1	**0.01**
SP-A1	rs4253527	P>0.1	P>0.1	P>0.1	**0.03**	P>0.1
SP-A2	**rs1059046**	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
SP-A2	rs1965707	P>0.1	P>0.1	P>0.1	P>0.1	P>0.1
SP-A2	rs1965708	P>0.1	P>0.1	P>0.1	**0.03**	P>0.1

Interaction models were adjusted for age, weight, education, area of residence, smoking status and exposure to environmental tobacco smoke in the last 12 months.

Supplementary tables for ADONIX: Lung function and source specific PM

Table S7 Sensitivity analysis - ESTIMATED CHANGE IN FEV_1 AND FVC PER IQR CHANGE IN $PM_{2.5}$ FROM traffic in various subgroups of the cohort

Linear regression	FEV_1				FVC			
		95% CI				95% CI		
	β	Lower	Upper	*p*	β	Lower	Upper	*p*
Smoking status								
Never smoker	-0.26	-0.84	0.33	0.10	-0.47	-1.01	0.07	0.09
Former smoker	-0.10	-0.83	0.61	0.50	-0.33	-0.98	0.31	0.31
Current smoker	-1.61	-2.50	-0.72	0.06	-0.71	-1.52	0.10	0.09
Atopic sensibilisation*								
No atopy	-0.84	0.13	0.08	<0.00	-0.36	-0.80	0.08	0.03
Atopy	-1.46	0.12	0.05	<0.00	-0.67	-1.37	0.04	0.37
Asthma*								
No asthma	-0.38	-0.79	0.04	0.07	-0.44	-0.82	-0.06	0.02
Asthma	-0.70	-2.33	0.92	0.40	-0.58	-1.89	0.74	0.39
Body mass index (BMI. kg/m2)								
Underweight (BMI <= 20)	0.41	-2.06	2.88	0.74	0.22	-2.11	2.55	0.85
Normal weight (BMI 0-25)	-0.08	-0.70	0.53	0.79	-0.29	-0.83	0.26	0.30
Overweight (BMI >25)	-0.85	-1.42	-0.29	<0.00	-0.64	-1.15	-0.13	0.01
Logistic regression		95% CI				95% CI		
Smoking status	OR	Lower	Upper	*p*	OR	Lower	Upper	*p*
Never smoker	1.43	1.08	1.90	0.01	1.38	1.04	1.85	0.03
Former smoker	1.24	0.94	1.64	0.12	1.06	0.87	1.30	0.72
Current smoker	0.98	0.69	1.39	0.90	1.26	0.97	1.63	0.27
Atopic sensibilisation*								
No atopy	1.13	0.92	1.39	0.23	1.23	0.98	1.55	0.07
Atopy	1.38	0.98	1.95	0.06	1.26	0.98	1.62	0.26
Asthma**								
No asthma	1.21	0.99	1.47	0.05	1.27	1.03	1.57	0.03
Asthma	1.18	0.76	1.82	0.47	1.24	0.91	1.69	0.41
Body mass index (BMI. kg/m2)								

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Underweight (BMI <= 20)	1.15	0.39	3.32	0.81	1.02	0.44	2.34	0.96
Normal weight (BMI 0-25)	1.03	0.75	1.41	0.85	1.06	0.84	1.35	0.75
Overweight (BMI >25)	1.35	1.09	1.66	<0.00	1.36	1.19	1.56	0.01

FEV_1, forced expiratory volume in 1 second. FVC, forced vital capacity. IQR, interquartile range. β from linear regression models adjusted for age, weight, education, area of residence, and smoking status, excluding the stratification variable in the models stratified for smoking status and BMI. ORs from generalized linear regression models adjusted for age, weight, education, area of residence, and smoking status excluding the stratification variable in the models stratified for smoking status and BMI.

*Allergy was determined by a positive phadiatop test (IgE >0.35 IU/mL)

**Answering “yes” to “Have you had an asthma attack in the last 12 months?”