

**Table S1 The association gene expression levels of AHRR and EXOC3 and gas exchange**

Outcome	mRNA expression*	$\beta$	Model1		Model2	
			95% CI	$\beta$	95% CI	
DLCO	<i>AHRR</i>	1.96	-1.13;5.05	3.36	0.49;6.24	
	<b><i>EXOC3</i></b>	4.77	-0.53;10.07	<b>7.06</b>	<b>2.26;11.85</b>	
DLCO/VA	<i>AHRR</i>	0.22	-0.26;0.70	0.4	-0.70;0.87	
	<b><i>EXOC3</i></b>	0.76	-0.06;1.58	<b>1.05</b>	<b>0.28;1.82</b>	

\*mRNA expression levels are used in the log scale.

Model 1: adjusted for age, sex, smoking status, white blood cell counts and batch effects.

Model2: adjusted for age, sex, smoking status, weight, height, white blood cell counts and batch effects.

Bold indicates statistically significant association.

**Table S2 Sensitivity analyses of smoking probes**

Lead association	Probe Chr	Gene	Conditioned for	Discovery cohort (model2)			
				B	SE	P-value	FDR
cg05575921	5	AHRR	-	0.065	0.013	3.60e-07	0.047
	6	-	cg06126421	0.046	0.011	1.72e-05	
	2	ALPG <sup>a</sup>	cg05951221	0.028	0.010	8.11e-03	
			cg06126421 + cg05951221	0.025	0.0097	1.06e-02	
cg05951221	2	ALPG <sup>a</sup>	-	0.049	0.0096	4.37e-07	0.047
	6	-	cg06126421	0.038	0.0086	8.97e-06	
	5	AHRR	cg05575921	0.022	0.0079	5.40e-03	
			cg06126421 + cg05575921	0.022	0.0078	5.28e-03	

<sup>a</sup>Closest gene

**Table S3 Sensitivity analysis in non-smokers**

Lead association	Study sample	Discovery cohort (model2)			
		B	SE	P-value	FDR
cg05575921	Total population (N=659)	0.065	0.013	3.60e-07	0.047
	In non-smokers (N=207)	0.023	0.011	3.65e-02	
cg05951221	Total population (N=659)	0.049	0.0096	4.37e-07	0.047
	In non-smokers (N=207)	0.037	0.015	1.6e-02	

**Table S4 Sensitivity analysis with additional adjustment for FEV<sub>1</sub>/FVC**

Lead association	Probe Chr	Gene	Conditioned for	Discovery cohort (model2)			
				B	SE	P-value	FDR
cg05575921	5	AHRR	-	0.065	0.013	3.60e-07	0.047
			FEV <sub>1</sub> /FVC	0.047	0.013	2.61e-04	
cg05951221	2	ALPG <sup>a</sup>	-	0.049	0.0096	4.37e-07	0.047
			FEV <sub>1</sub> /FVC	0.039	0.0098	7.82e-05	

<sup>a</sup>Closest gene